



UNIVERSIDADE  
FEDERAL DO CEARÁ

Diretrizes de serviço de arquitetura e engenharia visando à construção da Nova Sede  
do Instituto de Ciências do Mar - LABOMAR/Centro Tecnológico De Ciências Naturais -  
*Campus Iracema - UFC*

# **ESTUDO CONCEITUAL MEMORIAL DESCRITIVO E JUSTIFICATIVO**

AGOSTO/2024



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## A. INTRODUÇÃO

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A UFC vem por meio deste memorial apresentar a descrição do programa de necessidades elaborado e as devidas justificativas para as propostas de soluções arquitetônicas e dos sistemas de engenharia para funcionamento das edificações do novo Campus de Iracema. O documento foi dividido por cada disciplina, constando o sistema com as descrições específicas de cada um.

Neste documento constam:

- Contextualização da proposta;
- Localização do empreendimento;
- Programa de necessidades adotado;
- Fundamentos e Justificativa do Partido do Projeto Arquitetônico;
- Fundamentos e Justificativa dos Projetos de Engenharia e afins.

Considerações gerais acerca dos materiais e soluções construtivas adotadas.

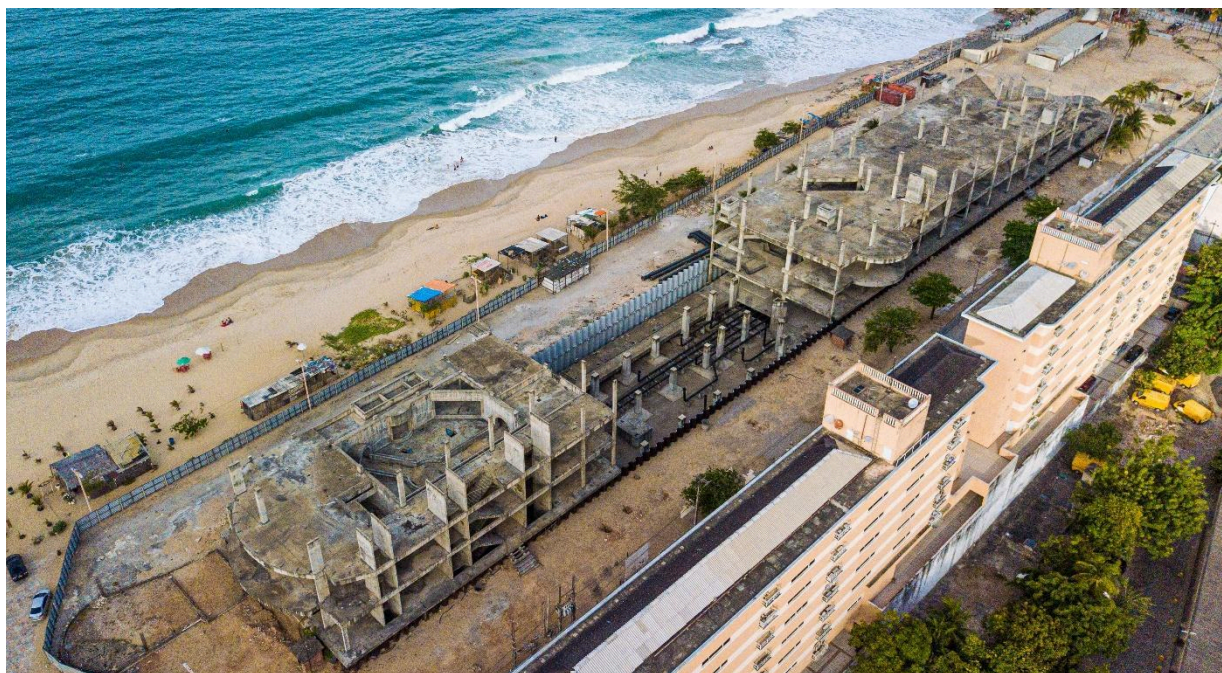
## 1 APRESENTAÇÃO E CONTEXTUALIZAÇÃO

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### 1.1 Introdução

A proposta da edificação do antigo Acquario do Ceará, após muitos anos, resultou em uma obra inacabada do Governo do Estado do Ceará. A conclusão dessa obra representaria um grande potencial para a região da Praia de Iracema e para a cidade de Fortaleza como um todo. O atual cenário consiste em uma grande estrutura de concreto com amplos espaços que encontram-se inutilizados e, portanto, sem serviços contínuos de manutenção.

A intervenção proposta para esse espaço conta com um projeto de reconversão de uso do antigo Acquario na nova Sede do LABOMAR/CTCN tomando partido do reaproveitamento estrutural, sem interferência na geometria viária e beneficiando-se da requalificação de um grande espaço com estrutura inutilizada. Tal proposta enriquece também o entorno imediato, bem como uma ampla área de influência indireta, a partir da implantação de um equipamento institucional-educacional, com amplas áreas de praça e de usufruto do público geral.



**Figura 1:** Imagem aérea da atual situação do terreno, da estrutura existente e sua integração com parte de seu entorno. Fonte: Acervo UFC

## 1.2 A proposta de reconversão de uso do antigo Acquario do Ceará

Com uma série de empecilhos que foram impostos ao encaminhamento da obra do Acquario, que tinha como objetivo inicial ser o maior da América Latina, e anos após a data prevista para conclusão do projeto (inicialmente prevista para ser finalizada no ano de 2010), o terreno e sua estrutura foram doados à Universidade Federal do Ceará – UFC, no ano de 2024.

Com a necessidade latente de incentivo ao crescimento e investimento em equipamentos públicos de ensino e pesquisa que promovam a inclusão da população em geral, foi proposto no local um *campus* destinado a cursos e programas de pesquisa que estivessem alinhados à localização, ao histórico da proposta de equipamento inicial e que melhor se integrassem ao entorno do local, respeitando as prerrogativas ambientais e desfrutando do maior atributo da área, tanto para contemplação mas principalmente para usufruto científico.

Logo, a decisão levou à escolha de ampliação do Instituto de Ciências do Mar (LABOMAR) e criação do *Campus Iracema*, que abrigará os cursos voltados a ciências marítimas da Universidade Federal do Ceará, como graduação em Oceanografia, Ciências Ambientais e Engenharia de Pesca, e pós-graduação em Ciências Marinhas Tropicais, dentre outros cursos que venham a integrar grade da UFC, como Turismo Ecológico e Meteorologia.

Surgiu, ainda, a oportunidade de aproveitar parte do espaço do antigo Acquario para a construção de um novo equipamento científico-cultural, o Centro Tecnológico de Ciências Naturais (CTCN). Por meio do Centro, a UFC pretende oferecer um espaço inovador que integra educação, tecnologia e arte para



promover o conhecimento das Ciências Naturais, aproximando, desta forma, a ciência da comunidade e fortalecendo a cultura e a divulgação científica.

### **1.3 A proposta para a nova Sede do LABOMAR/CTCN**

Assim, considerando-se uma estrutura já executada, foi necessária uma melhor compreensão do que havia sido feito, o entendimento de sua constituição e da possível necessidade de algum tipo de reforço ou modificação, considerando o uso principal ao qual se destinará, o educacional.

Assim, para o projeto em questão, estarão contemplados os projetos de Arquitetura, Urbanismo, Paisagismo, Comunicação Visual, Estrutura de Concreto e Metálica, Instalações Hidrossanitárias e Águas Pluviais, Drenagem Externa, Instalações Mecânicas, Central de Gases, Instalações Elétricas, CFTV, Rede Estruturada, Sistema de Detecção e Alarme, Sistema de Combate a Incêndio, Sistema de Proteção Contra Descargas Atmosféricas.

As intervenções propostas consistem na completa requalificação do terreno e reconversão do uso inicial, com aproveitamento da estrutura existente, que culminará no aumento de usuários na região, na valorização do entorno, na integração da comunidade Poço da Draga a um equipamento de extrema importância e na criação de um novo centro de estudos e pesquisa das Ciências do Mar.

Quando a nova sede do LABOMAR estiver em pleno funcionamento, haverá duas vezes mais alunos nos cursos de graduação em comparação ao atual cenário, que conta com 317 alunos de graduação ativos. Com o CTCN, por sua vez, a cidade ganhará um importante equipamento público que irá fomentar a disseminação do conhecimento das Ciências Naturais e irá aproximar a ciência da comunidade.

O Programa de Necessidades foi proposto com base na análise das necessidades, atividades, equipamentos utilizados, integrações necessárias entre setores e divisão de fluxos e setores dos diversos usuários do campus: alunos, professores, pesquisadores e visitantes.

As intervenções projetadas consideram as seguintes premissas:

- Máximo aproveitamento da infraestrutura existente, no sentido de minimizar as intervenções necessárias e reduzir os custos de obra;
- Adequação dos ambientes laboratoriais e salas de aula para atender, no mínimo, os pré-requisitos necessários às atividades estudantis e de pesquisa a serem realizadas no local;
- Intervenções das áreas propostas de forma a priorizar a melhor divisão e direcionamento dos fluxos de usuários.



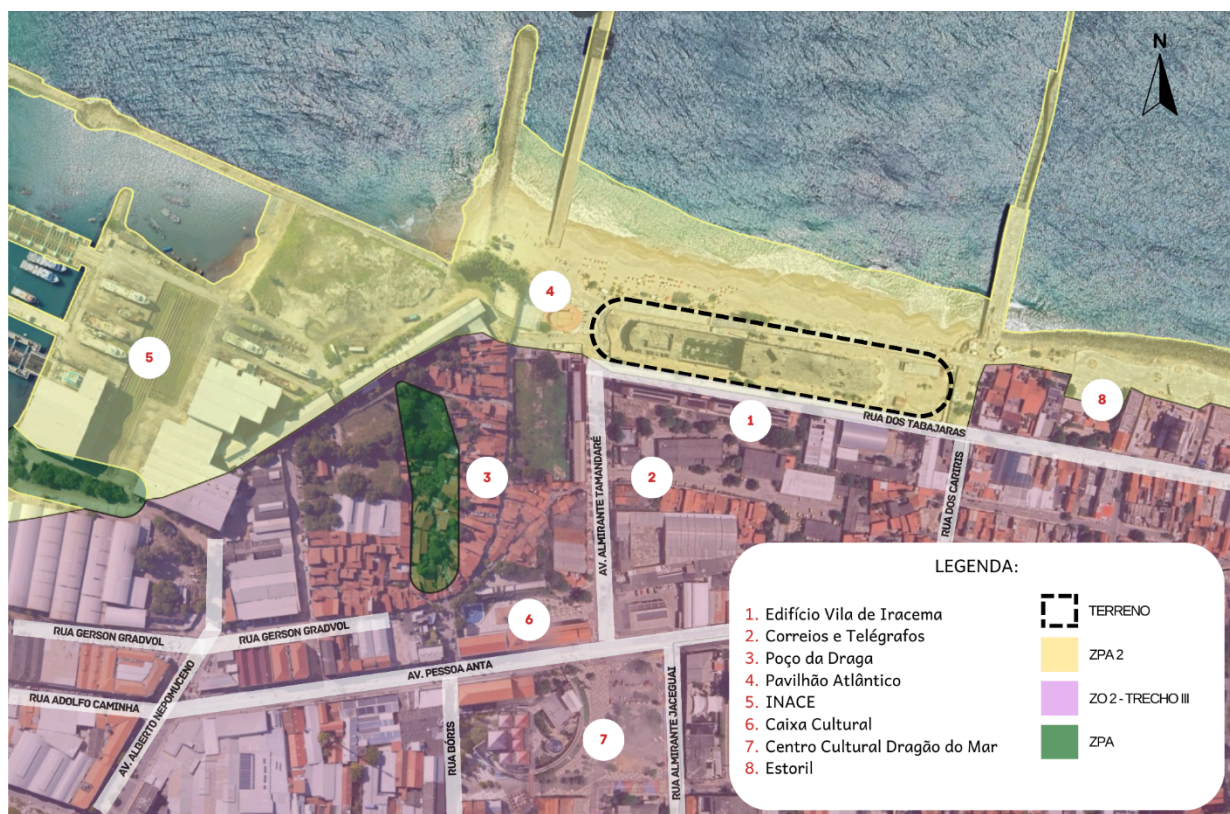
## 2 LOCALIZAÇÃO

Localizado no bairro Praia de Iracema, na cidade de Fortaleza - Ceará, o terreno destinado ao empreendimento **Campus Iracema - LABOMAR/CTCN** encontra-se na Rua dos Tabajaras, entre a Ponte dos Ingleses e a Ponte Metálica. A Secretaria Executiva Regional II é a responsável administrativa pela região do projeto.

Próximo à comunidade do Poço da Draga e a importantes equipamentos culturais da cidade de Fortaleza, a área está localizada a cerca de 4km de distância da atual edificação do Labomar, e seu terreno possui uma área de intervenção com aproximadamente 14.690,51 m<sup>2</sup>. Suas principais vias de acesso são a Rua dos Tabajaras, a Rua dos Cariris e a Avenida Alberto Nepomuceno.

A área é atendida pelo sistema de transporte público municipal, havendo disponibilidade de ônibus e micro-ônibus nas proximidades do equipamento.

Inserido na Macrozona de Proteção Ambiental 2 (ZPA 2) – Faixa de Praia, a ocupação do terreno deverá respeitar as disposições estabelecidas pelo Plano de Gestão Integrada da Orla Marítima – Projeto Orla, de 2018. Dessa forma, os parâmetros urbanísticos considerados para o projeto são os da Zona de Orla II – Trecho III.



**Figura 2:** Mapa de localização do terreno, principais equipamentos próximos e identificação das Macrozonas. Fonte: Google Earth Adaptado

## B. PROJETO CONCEITUAL

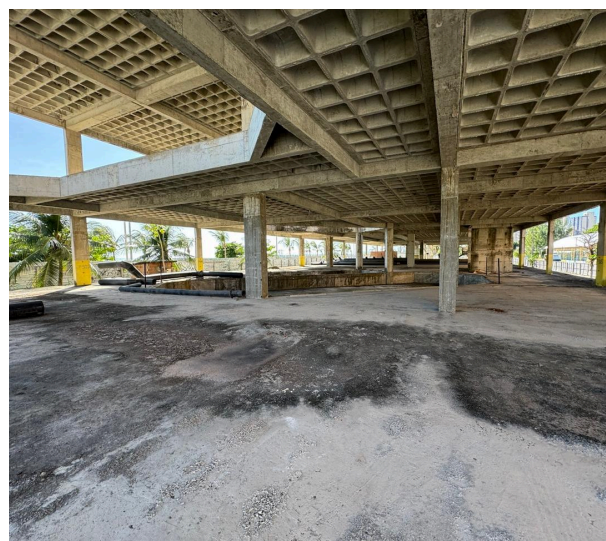
A definição das diretrizes e dos parâmetros para a setorização e escolha de sistemas (construtivos e de instalações) da edificação da nova sede do Labomar/CTCN baseou-se nas restrições físicas do arcabouço existente no local e nas demandas específicas listadas nas Fichas Técnicas, documentos preenchidos pelos usuários da instituição e que elencam diretrizes relativas a número de pessoas em cada ala, mobiliários, equipamentos utilizados, bem como condicionantes ambientais e arquitetônicas.

O primeiro critério observado foi o espaço físico disponível para a implantação do programa de necessidades. A área de intervenção no terreno tem aproximadamente 14.690,51 m<sup>2</sup> e parte dessa área será destinada a praças externas, áreas de acesso e jardins, respeitando as taxas de permeabilidade exigidas por lei.

Vale salientar que o terreno já possui interferências e alterações em sua topografia natural devido à construção prévia que seria destinada ao antigo Acquario. Sendo assim, serão aproveitadas a terraplenagem, as fundações e estruturas de concreto já executadas. A estrutura de concreto existente conta com uma área construída que totaliza 19.440,01 m<sup>2</sup>, distribuídos entre subsolo, pavimento térreo, primeiro e segundo pavimentos.



**Figura 3:** Remanescente estrutural em concreto a ser mantido e utilizado. Fonte: Acervo UFC



**Figura 4:** Remanescente de pilares em concreto a serem mantidos e utilizados. Fonte: Acervo UFC

Outro fator considerado são os índices demandados pelo Plano Diretor de Fortaleza, que definem os parâmetros a serem seguidos para a quantidade de vagas de estacionamento necessárias para o empreendimento. Considerando a área útil da edificação proposta, e a tipologia de uso principal – o uso educacional – foi indicado um estacionamento semienterrado composto por 112 vagas de carro (vagas de idoso e PCD inclusas), 16 vagas de moto e um bicicletário. Tais definições ainda podem ser revistas a partir de um Relatório de Impacto Sobre o Sistema de Tráfego – RIST, que será posteriormente desenvolvido. Entretanto, além das questões de aproveitamento estrutural supracitadas, que limitam as áreas entre pilares e vãos existentes, ponderou-se o incentivo à utilização de meios de transporte alternativos, como transporte público e veículos não motorizados.



Além dos parâmetros de definição de vagas de estacionamento, também há definições específicas de dimensões de recuos a serem respeitadas, entretanto, visto que o esqueleto da edificação já está consolidado, pressupõe-se que os recuos estabelecidos por lei foram considerados. Assim, a edificação proposta manterá os recuos previamente estabelecidos.

O estudo conceitual analisou a implantação da edificação já considerando o ajuste das dimensões dos ambientes definidos pelo Programa de Necessidades e seus sistemas à malha estrutural existente.

Portanto, a ocupação do terreno e da estrutura dá-se por meio da seguinte divisão:

- ❖ **SETORES DE PESQUISA E ENSINO:** Salas de aula, salas técnicas e laboratórios do Centro Tecnológico de Ciências Naturais (CTCN) e do LABOMAR; salas de pós-graduação; biblioteca e salas de estudos; *coworking* e salas de expansão; centros acadêmicos e salas de programas de educação.
- ❖ **SETORES DE GESTÃO:** Secretaria, administração, coordenações, diretorias e gabinetes.
- ❖ **SETORES CULTURAIS:** Auditório, sala imersiva e salas expositivas, terraço.
- ❖ **SETORES DE INFRAESTRUTURA:** Central de resíduos sólidos, almoxarifados, salas de manutenção e garagem náutica.
- ❖ **SETORES DE SERVIÇOS:** Banheiros, vestiários, copas, restaurante universitário.

## 1 ARQUITETURA E URBANISMO

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O projeto da nova sede do LABOMAR/CTCN surgiu com a intenção de criar espaços de qualidade para discentes e docentes da Universidade Federal do Ceará e para a população em geral, utilizando-se da estrutura existente que seria destinada ao antigo Acquario do Ceará, espaço atualmente inutilizado. A partir da realização desta obra, será estabelecido o novo *Campus Iracema*, da UFC.

Por se tratar da complementação de uma estrutura remanescente, foram aproveitados, ao máximo, os pilares e a delimitação de ambientes pré-estabelecida, como caixas de escada, caixas de elevador, *shafts*, etc., não alterando a conformação base do edifício ou seus índices urbanísticos. Mesmo com a previsão de novas edículas, não se fez necessária a elaboração de projetos de Terraplenagem ou Pavimentação nesses pontos, visto que essas construções serão feitas em áreas com ocupações já consolidadas, compreendendo-se que a pavimentação poderá ser resolvida em proposta urbanística, sem necessidade de projeto específico de infraestrutura. No entanto, para a implementação do estacionamento semienterrado que será localizado em um trecho da praça externa, serão necessários os projetos de infraestrutura, englobando terraplenagem, drenagem e pavimentação.

O principal objetivo do projeto foi propor soluções para atender às exigências apontadas nas reuniões e nas fichas técnicas, tendo estas sido preenchidas pela equipe de alunos, pesquisadores e professores diretamente beneficiados com o *Campus Iracema*. Para tanto, foram propostas diversas diretrizes e especificações, incluindo: especificação de materiais, equipamentos e sistemas considerados adequados ao uso proposto e à localização da edificação (tendo em vista possíveis dificuldades advindas da





maresia); adaptação da configuração física (layout) de ambientes para atender a questões de fluxo de amostras, materiais, pessoas, equipamentos e resíduos; e incorporação de novos equipamentos e sistemas para proporcionar maior segurança.

## 1.1 ACESSIBILIDADE UNIVERSAL

A acessibilidade universal deve ser um dos principais axiomas de todo projeto. Esta premissa é a garantia fundamental para o acesso de pessoas com deficiência e/ou mobilidade reduzida aos espaços públicos e privados. Todas as intervenções devem estar de acordo com os parâmetros estabelecidos pela NBR9050 de 2020 e pelo Estatuto do Idoso, estabelecido pela Lei 10.741 de 2003.

O Decreto Federal nº 5.296, de 2 de dezembro de 2004, veio regulamentar definitivamente as Leis nº. 10.048, de 8 de novembro de 2000 e nº. 10.098, de 19 de dezembro de 2000. Com este decreto, ficam estabelecidas tanto a prioridade ao atendimento das pessoas com deficiência ou mobilidade reduzida - incluindo gestantes e idosos - quanto a obrigatoriedade de implementação de acessibilidade física nos espaços públicos e coletivos urbanos e nas edificações, como se observa em seu capítulo IV, referente à “implementação da acessibilidade arquitetônica e urbanística”, onde o art. 10 determina que:

*“A concepção e a implantação dos projetos arquitetônicos e urbanísticos devem atender aos princípios do desenho universal, tendo como referências básicas as normas técnicas de acessibilidade da ABNT, a legislação específica e as regras contidas neste Decreto.” (Decreto 5.296/2004 – Capítulo IV, art. 10)*

Além disso, o mesmo decreto, em seu Art. 16, também dispõe que:

*“As características do desenho e a instalação do mobiliário urbano devem garantir a aproximação segura e o uso por pessoa portadora de deficiência visual, mental ou auditiva, a aproximação e o alcance visual e manual para as pessoas portadoras de deficiência física, em especial aquelas em cadeira de rodas, e a circulação livre de barreiras, atendendo às condições estabelecidas nas normas técnicas de acessibilidade da ABNT.” (Decreto 5.296/2004 – Capítulo IV, art. 16)*

Desta forma, fica claro que as edificações devem garantir pelo menos:

- Acessos ao seu interior, com comunicação com todas as suas dependências e serviços, livres de barreiras e obstáculos que impeçam ou dificultem a sua acessibilidade;
- Desníveis, das áreas de circulação internas ou externas, transpostos por meio de rampa ou equipamento eletromecânico de deslocamento vertical, garantindo um percurso livre de obstáculos;
- Dispor de sanitários acessíveis destinados ao uso por qualquer pessoa, inclusive as com deficiência ou com mobilidade reduzida;
- Estacionamentos reservados para veículos que transportem pessoas com deficiência física ou visual, de preferência em locais próximos a sua entrada principal e de fácil acesso a circulação de pedestres;
- Alturas de superfícies de trabalho de uma cozinha ou escritório com alturas adequadas, bem como altura de prateleiras;
- Espaços livres para cadeiras de rodas ao redor de mesas de jantar, de estudos ou de reuniões;





- Larguras de corredores em edifícios comerciais, residenciais ou públicos, com, no mínimo, 1,20 m de largura para locais públicos e com 0,90 m ou mais, para pequenas residências;
- Projetar sinalização que inclua símbolos significativos e intuitivos, posicionados ao lado de palavras, levando em consideração sua fácil leitura, para facilitar a comunicação com os deficientes visuais;
- Posicionar tomadas, interruptores, alavancas e outros comandos para o acionamento de dispositivos dentro da faixa de alcance manual de uma pessoa sentada em uma cadeira de rodas.

Os projetos de acessibilidade em edificações devem resultar de uma abordagem global do mesmo, prevendo intervenções que garantam às pessoas com deficiência ou com mobilidade reduzida, a possibilidade de acesso ao interior do imóvel, sempre que possível e preferencialmente pela entrada principal, ou outra integrada à primeira; pelo menos uma rota acessível interligando todos os espaços e atividades abertos ao público; além de serviços e equipamentos como sanitários, telefones públicos e bebedouros acessíveis, vagas de estacionamento reservadas e lugares específicos em auditórios; tudo isso devidamente sinalizado com o Símbolo Internacional de Acesso, sinalização tátil e sonora.

## 1.2 PROGRAMA DE NECESSIDADES

A nova sede do LABOMAR/CTCN - *Campus Iracema* foi pensada a partir das demandas e necessidades elencadas pelo público-alvo por meio das Fichas Técnicas e em reuniões, construindo-se, assim, o Programa de Necessidades a seguir:

CAMPUS IRACEMA - LABOMAR		
SUBSOLO		
SALA	NÚCLEO	ÁREA (m <sup>2</sup> )
Expansão	Didático	52.24
Direção	Administrativo	52.24
Estúdio Áudio	Administrativo	52.24
Sala de Treinamento	Administrativo	52.24
Circulação Sala Imersiva	Circ. Horizontal	91.75
Área Técnica (pressurização)	Circ. Vertical	18.46
Elevador Carga 01	Circ. Vertical	11.03
Elevador Carga 02	Circ. Vertical	10.42
Elevador Social 02	Circ. Vertical	8.80
Elevador Social 03	Circ. Vertical	8.85
Escada 01	Circ. Vertical	18.83
Escada 02	Circ. Vertical	40.75
Escada 03	Circ. Vertical	29.46
Escada 05	Circ. Vertical	47.78
Circulação Técnica	Circulação	357.74
Circulação 01	Circulações	235.75
Circulação 02	Circulações	411.65



Circulação técnica	Circulações	74.79
Coleções Secas	CTCN	60.95
Coleções Úmidas	CTCN	50.10
Controle de Exibição	CTCN	46.98
Corredores Exposições	CTCN	170.11
Exposição UFC	CTCN	96.86
Reserva Técnica	CTCN	57.52
Sala de Exibição 01	CTCN	56.42
Sala de Exibição 02	CTCN	52.83
Sala de Exibição 03	CTCN	57.52
Sala de Exibição 04	CTCN	57.80
Sala de Exibição 05	CTCN	57.80
Sala Imersiva Principal	CTCN	302.37
Lab. Materiais Compósitos	Didático	88.58
Laboratório 02	Didático	52.24
Sala de Pesquisadores 01	Didático	82.99
Sala de Pesquisadores 02	Didático	58.91
Auditório (356 Lugares)	Outros	416.25
Camarim 01	Outros	7.93
Camarim 02	Outros	15.33
Exposição Coleções	Outros	22.58
Lojinha	Outros	22.50
Palco (Auditório)	Outros	79.10
Sala de Controle	Outros	11.64
Tradução (Auditório)	Outros	5.35
Almoxarifado Central	Serviço	37.80
Almoxarifado Equipamentos	Serviço	52.64
Área Técnica (Exaustão)	Serviço	25.57
Área Técnica (Exaustão)	Serviço	30.32
Área Técnica (Exaustão)	Serviço	15.99
Área Técnica (Pressurização)	Serviço	7.62
Área Técnica (Pressurização)	Serviço	7.60
Área Técnica (Pressurização)	Serviço	14.75
Armazenagem Equipamentos / Curadoria	Serviço	75.15
Banco de amostras	Serviço	48.60
Banheiro	Serviço	3.56
Banheiro Feminino	Serviço	4.03
Banheiro Masculino	Serviço	4.03
Cantina / Terceirizados	Serviço	51.60



Copa Apoio	Serviço	17.25
Depósito	Serviço	3.13
Depósito	Serviço	199.89
Depósito	Serviço	16.23
DML	Serviço	3.30
DML	Serviço	2.04
DML	Serviço	5.66
Estacionamento (112 Vagas)	Serviço	2332.61
Estacionamento (16 Motos)	Serviço	29.15
Estacionamento (Bicicletário)	Serviço	33.42
Estocagem de Inservíveis	Serviço	54.11
Guarda Volumes	Serviço	54.12
HVAC	Serviço	18.82
Quadros Elétricos	Serviço	6.47
Quadros Elétricos	Serviço	3.56
Rack	Serviço	7.02
Rack	Serviço	7.50
Reservatório de água potável	Serviço	14.40
Reservatório de água reuso	Serviço	203.96
Sala Motoristas	Serviço	16.23
Sanitário PCD Feminino	Serviço	5.46
Sanitário PCD Masculino	Serviço	5.35
Sanitário PCD Feminino	Serviço	3.67
Sanitário PCD Masculino	Serviço	3.67
Sanitário Feminino	Serviço	21.46
Sanitário Feminino	Serviço	12.25
Sanitário Masculino	Serviço	19.29
Sanitário Masculino	Serviço	12.24
Vestiário Feminino	Serviço	18.96
Vestiário Masculino	Serviço	22.99
Vestiário PCD Feminino	Serviço	10.60
Vestiário PCD Masculino	Serviço	9.78
Sanitário Feminino	Serviço	13.41
Sanitário Masculino	Serviço	13.41
Sanitário PCD	Serviço	3.57
<b>TÉRREO</b>		
<b>SALA</b>	<b>NÚCLEO</b>	<b>ÁREA (m<sup>2</sup>)</b>
Circulação	Circulação Horizontal	38.60
Circulação	Circulação Horizontal	35.59



Circulação	Circulação Horizontal	92.15
Circulação	Circulação Horizontal	70.41
Circulação	Circulação Horizontal	27.91
Circulação	Circulação Horizontal	101.64
Circulação	Circulação Horizontal	52.51
Circulação	Circulação Horizontal	82.69
Circulação	Circulação Horizontal	101.55
Circulação	Circulação Horizontal	31.89
Circulação	Circulação Horizontal	121.04
Circulação	Circulação Horizontal	70.50
Hall recepção de amostras	Apoio	17.53
Arquivo	Administrativo	4.06
Recepção	Administrativo	25.11
Secretaria	Administrativo	19.71
Amamentação	Apoio	15.04
Centro Acadêmico	Apoio	21.76
Controle e recebimento	Apoio	4.50
Guarda amostras	Apoio	9.66
Nobreaks	Apoio	6.44
Recepção e lavagem de amostras	Apoio	47.91
Sala de águas	Apoio	9.80
Diretoria	Biblioteca	19.67
Estudo em grupo 01	Biblioteca	12.29
Estudo em grupo 02	Biblioteca	11.29
Informática	Biblioteca	32.67
Sala estudo (público externo)	Biblioteca	26.87
Elevador Carga 01	Circ. Vertical	11.02
Elevador Carga 02	Circ. Vertical	10.41
Elevador Social 01	Circ. Vertical	8.30
Elevador Social 02	Circ. Vertical	8.80
Elevador Social 03	Circ. Vertical	8.60
Escada 01	Circ. Vertical	23.62
Escada 02	Circ. Vertical	40.74
Escada 03	Circ. Vertical	29.45
Escada 04	Circ. Vertical	19.83
Escada 05	Circ. Vertical	47.78
PID - Programa Iniciação a Docência	Didático	23.04
Cromatografia ambiental e do Petróleo - CECAMP	Didático	25.03
Empresa Júnior	Didático	23.04



Lab. biogeoquímica costeira	Didático	143.30
Lab. contaminantes orgânicos - LACOR	Didático	84.73
Lab. de mergulho	Didático	21.24
Lab. efluentes e qualidade da água	Didático	98.53
Lab. Ictiologia Din. Pop. e Rec. Pesqueiros	Didático	57.20
PET 1	Didático	28.35
PET 2	Didático	28.35
PET 3	Didático	28.35
Recepção	Didático	54.15
Sala de aula 01	Didático	59.79
Sala de aula 02	Didático	59.27
Sala de aula 03	Didático	59.27
Sala de aula 04	Didático	59.27
Sala de aula 05	Didático	59.79
Sala escalonada 03	Didático	71.14
Área de mesas - Café	Refeitório	34.25
Armazenamento	Refeitório	21.58
Banheiro Refeitório	Refeitório	2.94
Café	Refeitório	19.69
Controle de cartão	Refeitório	4.65
Despensa	Refeitório	9.69
Depósito	Refeitório	3.60
Depósito Café	Refeitório	3.20
Devolução de bandejas	Refeitório	20.79
Distribuição	Refeitório	67.15
DML	Refeitório	3.18
DTRS	Refeitório	9.90
Hall Entrada	Refeitório	10.16
Recebimento	Refeitório	16.50
Sala nutricionista	Refeitório	10.18
Salão de mesas (216 lugares)	Refeitório	228.23
Vestiário	Refeitório	4.00
Vestiário	Refeitório	3.12
Vestiário Feminino	Refeitório	20.26
Vestiário Masculino	Refeitório	20.26
Almoxarifado	Serviço	42.36
Copa	Serviço	9.36
Copa	Serviço	20.44
Depósito	Serviço	4.18



Depósito	Serviço	21.11
DML	Serviço	4.18
DML	Serviço	3.90
DML	Serviço	5.40
DML	Serviço	5.56
DML	Serviço	6.48
DTRS	Serviço	10.20
Guarderia / pranchas	Serviço	11.75
Quadros Elétricos	Serviço	3.90
Quadros Elétricos	Serviço	6.09
Rack	Serviço	13.11
Rack	Serviço	6.18
Sanitário PCD Feminino	Serviço	3.68
Sanitário PCD Masculino	Serviço	3.68
Sanitário PCD Feminino	Serviço	3.50
Sanitário PCD Feminino	Serviço	3.62
Sanitário PCD Feminino	Serviço	3.60
Sanitário PCD Feminino	Serviço	4.17
Sanitário PCD Masculino	Serviço	4.18
Sanitário PCD Masculino	Serviço	3.50
Sanitário PCD Masculino	Serviço	3.60
Sanitário PCD Masculino	Serviço	3.62
Sanitário Feminino	Serviço	13.09
Sanitário Feminino	Serviço	14.30
Sanitário Feminino	Serviço	12.23
Sanitário Masculino	Serviço	12.90
Sanitário Masculino	Serviço	14.30
Sanitário Masculino	Serviço	12.31
Sanitário	Serviço	4.07
Sanitário Feminino	Serviço	9.49
Sanitário Feminino	Serviço	15.19
Sanitário Masculino	Serviço	9.62
Sanitário Masculino	Serviço	15.19
Vestiário Acessível	Serviço	9.46
<b>PAVIMENTO 1</b>		
<b>SALA</b>	<b>NÚCLEO</b>	<b>ÁREA (m<sup>2</sup>)</b>
Hall recepção de amostras	Apoio	17.54
Coordenação 01	Administrativo	17.96
Coordenação 02	Administrativo	17.96



Coordenação 03	Administrativo	17.96
Coordenação 04	Administrativo	17.96
Coordenação 05	Administrativo	17.96
Coordenação 06	Administrativo	17.96
Diretor	Administrativo	33.28
Open Office	Administrativo	94.80
S. Convênios Internacionais	Administrativo	32.70
Sala CPA	Administrativo	30.16
Sala de reuniões	Administrativo	31.86
Sala do Conselho	Administrativo	34.85
Secretaria	Administrativo	26.55
Vice-Diretor	Administrativo	27.73
Área de Convivência	Apoio	15.94
Elevador de Carga 01	Circ. Vertical	11.02
Elevador de Carga 02	Circ. Vertical	10.47
Elevador Social 01	Circ. Vertical	8.30
Elevador Social 02	Circ. Vertical	8.80
Elevador Social 03	Circ. Vertical	8.60
Escada 01	Circ. Vertical	28.30
Escada 02	Circ. Vertical	40.74
Escada 03	Circ. Vertical	29.47
Escada 04	Circ. Vertical	19.83
Escada 05	Circ. Vertical	47.78
Circulação	Circulação Horizontal	120.62
Circulação	Circulação Horizontal	306.31
Circulação	Circulação Horizontal	363.41
Circulação	Circulação Horizontal	61.27
Circulação	Circulação Horizontal	345.10
Centro de Diagnóstico de Enfermidades CEDECAM	Didático	111.18
Co-working	Didático	61.64
Hub Economia Azul	Didático	56.74
Lab. Bioensaios (infect./não infect.)	Didático	44.00
Lab. Biogeografia e Veget. (BIOVEG)	Didático	110.88
Lab. Dinâmica Pop. e Ecologia DIPEMAR	Didático	110.88
Lab. Geofísica	Didático	60.77
Lab. Meteorologia	Didático	69.98
Lab. Microbiologia Ambiental e do Pescado (LAMAP)	Didático	101.37
Lab. Modelagem Numérica	Didático	80.12
Lab. Oceanografia Física LOF	Didático	80.07



Lab. Plancton	Didático	77.86
LEDS Economia Ecológica	Didático	64.28
Sala de Águas	Didático	9.78
Sala de Aula 01	Didático	57.79
Sala de Aula 02	Didático	53.18
Sala de Aula 03	Didático	58.84
Sala de Aula 04	Didático	58.84
Sala de Aula 05	Didático	60.94
Sala de Aula 06	Didático	60.94
Sala de Aula 07	Didático	60.94
Sala de Estufas e Autoclaves	Didático	56.86
Sala de Expansão 01	Didático	60.77
Sala Vídeo Conferência	Didático	92.86
Sala Expansão 01	Expansão	39.20
Sala Expansão 02	Expansão	39.72
Sala Expansão 03	Expansão	39.90
Lab. Expansão 01	Expansão Didático	39.81
Lab. Expansão 02	Expansão Didático	39.81
Lab. Expansão 03	Expansão Didático	39.20
Copa Diretoria	Serviço	23.41
Copa Funcionários	Serviço	25.82
Depósito	Serviço	17.42
Depósito	Serviço	14.19
Depósito	Serviço	11.30
Depósito	Serviço	21.08
Depósito	Serviço	4.18
DML	Serviço	5.69
DML	Serviço	4.18
DML	Serviço	6.31
DML	Serviço	3.90
DTRS	Serviço	16.76
DTRS	Serviço	11.10
DTRS	Serviço	6.31
Quadros Elétricos	Serviço	3.90
Quadros Elétricos	Serviço	6.09
Rack	Serviço	6.59
Rack	Serviço	18.39
Sanitário PCD Feminino	Serviço	4.66
Sanitário PCD Feminino	Serviço	3.68





Sanitário PCD Masculino	Serviço	4.66
Sanitário PCD Masculino	Serviço	3.67
Sanitário PCD Feminino	Serviço	4.18
Sanitário PCD Masculino	Serviço	4.18
Sanitário Feminino	Serviço	14.30
Sanitário Feminino	Serviço	12.20
<b>PAVIMENTO 2</b>		
<b>SALA</b>	<b>NÚCLEO</b>	<b>ÁREA (m<sup>2</sup>)</b>
Expansão	Didático	24.03
Gabinete 01	Administrativo	16.38
Gabinete 02	Administrativo	16.38
Gabinete 03	Administrativo	16.38
Gabinete 04	Administrativo	16.38
Gabinete 05	Administrativo	16.38
Gabinete 06	Administrativo	16.38
Gabinete 07	Administrativo	16.38
Gabinete 08	Administrativo	16.38
Gabinete 09	Administrativo	16.38
Gabinete 10	Administrativo	16.38
Gabinete 11	Administrativo	16.38
Gabinete 12	Administrativo	16.38
Gabinete 13	Administrativo	16.38
Gabinete 14	Administrativo	16.38
Gabinete 15	Administrativo	16.38
Gabinete 16	Administrativo	16.38
Gabinete 17	Administrativo	16.38
Gabinete 18	Administrativo	16.38
Gabinete 19	Administrativo	16.38
Gabinete 20	Administrativo	16.38
Gabinete 21	Administrativo	16.38
Gabinete 22	Administrativo	16.38
Gabinete 23	Administrativo	16.38
Gabinete 24	Administrativo	16.38
Gabinete 25	Administrativo	16.38
Gabinete 26	Administrativo	16.38
Gabinete 27	Administrativo	16.38
Gabinete 28	Administrativo	16.38



Gabinete 29	Administrativo	16.38
Gabinete 30	Administrativo	16.38
Gabinete 31	Administrativo	16.38
Gabinete 32	Administrativo	16.38
Gabinete 33	Administrativo	16.38
Hall recepção de amostras	Apoio	17.53
Inter laboratórios	Didático	14.49
Arquivo Acadêmico	Administrativo	30.22
Contratos Terceirizados	Administrativo	19.61
Gestão Arquivo	Administrativo	21.70
Gestão TI	Administrativo	22.78
Infra Campus	Administrativo	19.61
RH	Administrativo	19.61
Servidores	Administrativo	6.59
Alunos pós-Graduação 02	Apoio	40.70
Alunos pós-Graduação 02	Apoio	42.64
Professores Visitantes Pós	Apoio	48.07
Sala Convivência Professores	Apoio	77.62
Sala de Freezers	Apoio	22.56
Sala Doutores e PHD	Apoio	21.45
Sala Pesquisadores	Apoio	21.45
Sala Reunião	Apoio	34.85
Elevador Carga 01	Circ. Vertical	11.02
Elevador Carga 02	Circ. Vertical	10.45
Elevador Social 01	Circ. Vertical	8.30
Elevador Social 02	Circ. Vertical	8.80
Elevador Social 03	Circ. Vertical	8.60
Escada 01	Circ. Vertical	28.15
Escada 02	Circ. Vertical	40.75
Escada 03	Circ. Vertical	29.47
Escada 03	Circ. Vertical	47.78
Escada 04	Circ. Vertical	19.83
Circulação	Circulação Horizontal	262.15
Circulação	Circulação Horizontal	118.35
Circulação	Circulação Horizontal	346.47
Circulação	Circulação Horizontal	264.05
Circulação	Circulação Horizontal	196.88
Laboratório de Informática (estudantes)	Didático	56.40
Laboratório Estudos Costeiros e Marítimos	Didático	97.74



Laboratório Microscopia	Didático	65.15
Laboratório observação da terra (EOLLAB)	Didático	65.66
Laboratório de Oceanografia Geológica	Didático	111.05
Laboratório de Química	Didático	119.76
Laboratório Didático Informática 01	Didático	86.01
Laboratório didático informática 02	Didático	85.15
Laboratório Ecologia Pesqueira	Didático	67.83
Laboratório Geologia	Didático	38.94
Laboratório Oceanografia Biológica	Didático	63.50
Laboratório Zoobentos	Didático	110.88
Sala de Águas	Didático	7.69
Sala de Aula 01	Didático	56.40
Sala de Aula 02	Didático	56.40
Sala de Aula 03	Didático	56.40
Sala de Aula 04	Didático	56.40
Sala escalonada 01	Didático	70.42
Sala escalonada 02	Didático	70.40
Copa Funcionários	Serviço	16.80
Copa Professores	Serviço	25.27
Depósito	Serviço	16.39
DML	Serviço	6.31
DML	Serviço	3.90
DML	Serviço	5.15
DTRS	Serviço	6.31
DTRS	Serviço	5.68
Quadros Eletr.	Serviço	3.90
Quadros Eletr.	Serviço	3.57
Rack	Serviço	3.30
Rack	Serviço	6.54
Sanitário PCD Feminino	Serviço	4.66
Sanitário PCD Feminino	Serviço	3.67
Sanitário PCD Masculino	Serviço	4.66
Sanitário PCD Masculino	Serviço	3.68
Sanitário Feminino	Serviço	14.30
Sanitário Feminino	Serviço	19.07
Sanitário Feminino	Serviço	12.23
Sanitário masculino	Serviço	14.30
Sanitário masculino	Serviço	19.07
Sanitário Masculino	Serviço	12.30



Sanitário PCD	Serviço	4.05
Sanitário Feminino	Serviço	13.15
Sanitário masculino	Serviço	13.14
Sanitário PCD Feminino	Serviço	3.69
Sanitário PCD Masculino	Serviço	3.69
<b>COBERTURA   TERRAÇO</b>		
<b>SALA</b>	<b>NÚCLEO</b>	<b>ÁREA (m<sup>2</sup>)</b>
Água Bruta 01	Serviço	4.32
Água Bruta 02	Serviço	4.32
Água Potável 01	Serviço	12.52
Água Potável 02	Serviço	12.52
Barrilete	Serviço	37.80
Casa de bombas	Serviço	3.49
Climatização	Área Técnica 01	421.29
Climatização	Área Técnica 02	527.84
Elevador Carga 01	Circ. Vertical	11.71
Elevador Carga 02	Circ. Vertical	10.47
Elevador Social 01	Circ. Vertical	8.30
Elevador Social 02	Circ. Vertical	8.91
Elevador Social 03	Circ. Vertical	8.60
Escada 02	Circ. Vertical	40.74
Escada 03	Circ. Vertical	29.46
Escada 03	Circ. Vertical	47.78
Escada 04	Circ. Vertical	19.83
Área Técnica	Serviço	31.01
Quadros Elétricos	Serviço	5.81
Circulação	Terraço	70.90
Circulação Serviço	Terraço	259.90
Laje Impermeabilizada	Terraço	10.97
Laje Impermeabilizada	Terraço	81.82
Laje Impermeabilizada	Terraço	39.19
Laje Impermeabilizada	Terraço	3.49
Laje Impermeabilizada	Terraço	37.73
Laje Impermeabilizada	Terraço	347.75
Laje Impermeabilizada	Terraço	901.95
Laje Impermeabilizada	Terraço	10.89
Praça 01	Terraço	875.44
Praça 02	Terraço	739.85

### 1.3 ÁREA EXTERNA

Em relação ao nível da Rua Tabajaras, a estrutura pré-existente possui um desnível considerável, de cerca de 2,10m. Considerando as premissas de acessibilidade universal pré-estabelecidas, já apresentadas no item 1.1., foram propostas rampas de acesso em todas as fachadas da edificação, sendo a fachada sul contemplada com quatro blocos de rampas com distâncias variáveis entre si. A proposta visa a facilitar o acesso e a reduzir a distância de deslocamento dos usuários com deficiência ou mobilidade reduzida.

Além das rampas, também estão propostas escadarias, que auxiliam na dispersão do fluxo de pessoas, evitando possíveis aglomerações em casos de sinistro.

Foram criados, ainda, blocos anexos à edificação principal, destinados ao funcionamento das centrais de resíduos, setor de embarcações e casa de gás, que abrigará 07 tipos de gases diferentes, que serão utilizados nos variados laboratórios que funcionarão no *Campus*.

## 1.4 PAVIMENTOS

### 1.4.1 SUBSOLO

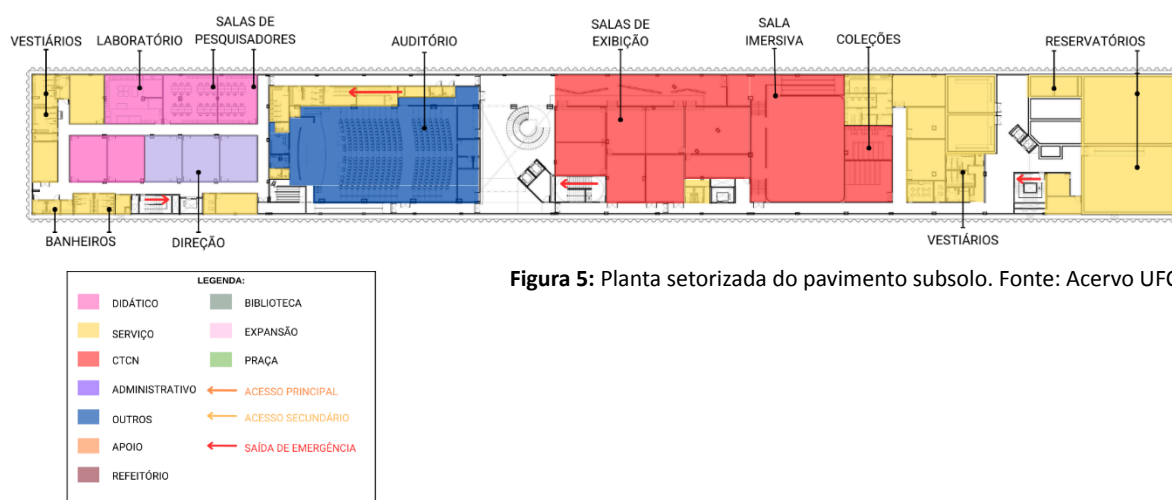


Figura 5: Planta setORIZADA do pavimento subsolo. Fonte: Acervo UFC

No subsolo da edificação, haverá ambientes relacionados aos diversos tipos de usos, desde os culturais e de visitaç o do p blico, os de pesquisa e ensino, bem como de servi os (Figura 05). A defini o quanto   localiza o dos ambientes se deu de forma a respeitar a l gica dos fluxos e do acesso a determinadas alas. A ala cultural, a exemplo disso,   aberta ao p blico e o setor de pesquisa e ensino   limitado a estudantes, pesquisadores e docentes.

As salas administrativas do CTGN foram dispostas na ala oeste da edifica o - pr ximas ao audit rio – e seu acesso   restrito a determinados usu rios. Na ala central, as salas de exposi o e sala imersiva foram acomodadas junto  s salas t cnicas destinadas ao CTGN, que armazenam cole oes secas e  midas. Ambas as alas possuem vesti rios pr prios para estudantes, pesquisadores e docentes.

Al m do uso educacional, o atrativo cultural e tur stico resultante da grandeza do equipamento tamb m foram de grande valia para idealizar sua concep o. Foi proposto, ent o, um audit rio com cerca de 416.25 m<sup>2</sup>, 356 lugares de plateia, um amplo palco, camarins, sala de controle e de tradu o simult nea.



Além de apresentações acadêmico-científicas, também poderá abrigar palestras, congressos e conferências nacionais e internacionais.

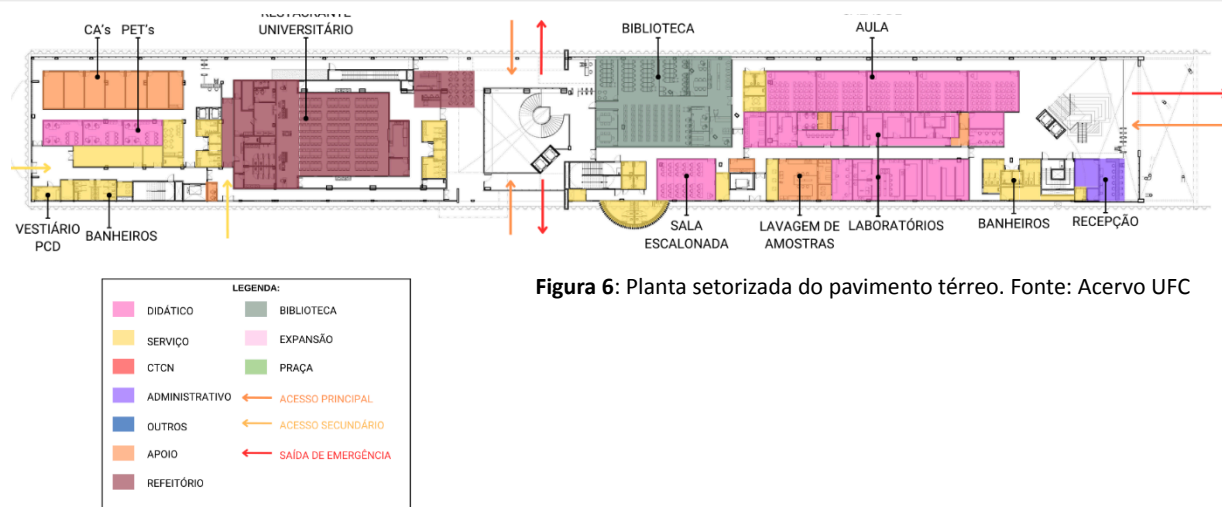
Ainda dentro do setor cultural, a sala imersiva do CTCN possui 302.37 m<sup>2</sup> e seu desenho com cantos abaulados visa a melhorar a experiência sensorial alcançada com o recurso de equipamentos de projeção de luzes e imagens. Próximos a essa sala, estão localizados outros ambientes de exibição e espaços expositivos, de modo a criar um percurso cultural a ser seguido.

Além da setorização, foram consideradas também as atividades a serem realizadas em cada ambiente e as possíveis interferências em relação aos demais. Os laboratórios que necessitam de quietude, por exemplo, foram propostos distantes de laboratórios de áudio ou que possuam equipamentos que causem algum tipo de ruído. Já as salas de exibição, a sala imersiva e o auditório foram propostos de forma mais central, visando a agregar os locais de uso público geral próximos uns dos outros e dos acessos principais.

Os acessos central e o principal (oeste) são feitos a partir de escadarias – sendo a escada central helicoidal - e de blocos de dois elevadores em cada acesso. Ambos interligam o subsolo a todos os outros pavimentos e ao terraço. Além dessas conexões, foram propostas, ainda, mais 3 blocos de escadas técnicas (uma central, uma na ala oeste e uma na ala leste da edificação) e mais 7 de elevadores, sendo dois do tipo monta-cargas, permitindo o transporte de materiais de pesquisa e de exposição às alas específicas. A proposta das escadas técnicas se dá como forma de suprir a segurança necessária a uma edificação deste porte em caso de sinistro, considerando a distância máxima de deslocamento e o número de usuários no local. Dos três blocos de escada supracitados, que se iniciam no subsolo, todos chegam até o terraço da cobertura juntamente com a escadaria central e a escada leste.

O subsolo da edificação possui, ainda, um pavimento técnico, com cerca de 2,10m de altura, que será destinado ao encaminhamento de instalações.

## 1.4.2 TÉRREO



Ao centro do pavimento térreo, há um átrio central iluminado por luz natural, criando um ambiente acolhedor e inspirador desde o primeiro momento. A escadaria helicoidal, elegantemente localizada no centro do átrio, não apenas serve como uma peça arquitetônica marcante, mas também como um ponto focal que conecta os diferentes setores dos pavimentos.

O pavimento térreo foi dividido em setores de pesquisa e ensino, de gestão, de infraestrutura e de serviços, abrangendo, entre outros, salas destinadas a centros acadêmicos e programas de pesquisa, vestiários (femininos, masculinos e PCD), copa, almoxarifado e sala de guarda de pranchas, e ainda um amplo Restaurante Universitário (RU) destinado à comunidade acadêmica da UFC como um todo. Assim como o subsolo, as alas destinadas à utilização de público externo foram locadas ao centro da edificação, facilitando assim o acesso dos usuários.

A entrada principal da edificação se dá a partir da Rua dos Cariris, onde está proposta uma grande praça contemplativa, que tem também função de laje do estacionamento semienterrado, cujo acesso ocorre a partir da Rua dos Tabajaras. O acesso é dotado de setor de atendimento rápido com secretaria e arquivo, para assistência e informações, e o ingresso na edificação é feito a partir de controle de catracas.

À centro-leste da edificação, foram previstos os ambientes de estudo coletivo e individual, favorecendo fluxo de alunos e professores, bem como a manutenção de um ambiente tranquilo. A biblioteca, que poderá ser utilizada tanto por alunos e professores como pelo público em geral, possui área de cerca de 354m<sup>2</sup> e possui recepção com guarda-volumes, acervo, diretoria, sala de processamento técnico, sala de informática, salas de estudo em grupo, sala de estudos do público externo e cabines de estudos individuais. A sala de estudos pública possui acesso exclusivo, de forma a facilitar a administração de entrada e saída de pessoas do local.

As salas de aula foram desenhadas com tamanhos similares, com áreas aproximadas de 59 m<sup>2</sup> e capacidade máxima para cerca de 40 alunos. Seus acessos foram previstos para se localizarem em corredores voltados para a fachada norte, trazendo conexão com a paisagem natural e favorecendo o desfrute da vista mar.



Os laboratórios, por sua vez, foram dimensionados levando em consideração a natureza específica de cada disciplina, com capacidade e equipamentos adequados para suportar experimentos avançados e pesquisa científica intensiva. Cada laboratório é um ambiente controlado, projetado para oferecer segurança e precisão nos procedimentos realizados, contribuindo diretamente para o avanço do conhecimento nas áreas de ciências naturais. O acesso aos ambientes acontece por um corredor central, para fácil conexão entre os laboratórios em casos de ocorrência de estudos compartilhados por áreas distintas e também de forma a conectá-los à recepção e lavagem de amostras, cujo acesso acontece a partir da garagem náutica.

O restaurante universitário, cuja capacidade máxima é de cerca de 216 usuários, terá seu acesso controlado por *ticket* de compra, organizando, assim, o fluxo de entrada e saída do local. O espaço contará com vestiários de funcionários/terceirizados, depósitos, sala de recebimento e sala de armazenamento, despensa e sala destinada à nutricionista, além de sala de bandejas.

Os Centros Acadêmicos e salas PETs estão previstos na ponta oeste da edificação, logo atrás do RU, com acesso restrito a usuários autorizados. Sua localização se deu de forma a priorizar um ambiente de maior quietude e concentração. A ala conta ainda com sala de Empresa Júnior, sala de programa de iniciação à pesquisa, sala de amamentação, amplo almoxarifado, sala de guarda de pranchas e vestiários.



### 1.4.3 1º E 2º PAVIMENTOS

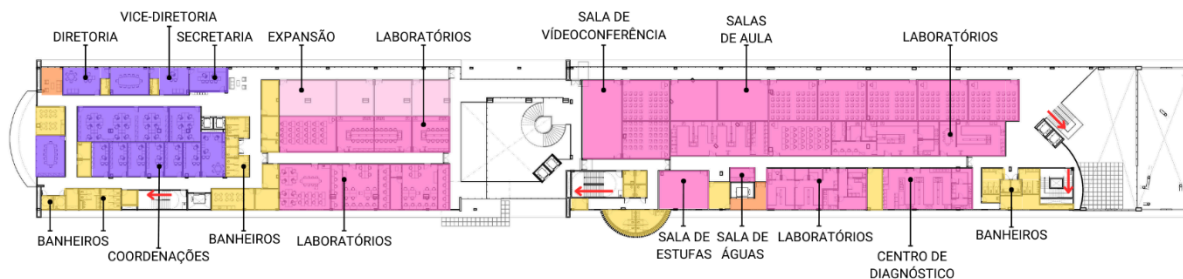


Figura 7: Planta setORIZADA do primeiro pavimento. Fonte: Acervo UFC.

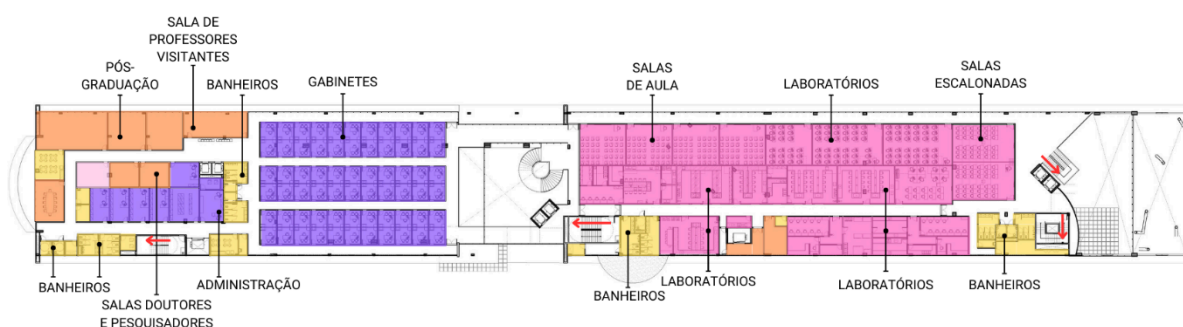


Figura 8: Planta setORIZADA do segundo pavimento. Fonte: Acervo UFC.

LEGENDA:	
<span style="color: pink;">■</span> DIDÁTICO	<span style="color: lightgreen;">■</span> BIBLIOTECA
<span style="color: yellow;">■</span> SERVIÇO	<span style="color: lightpink;">■</span> EXPANSÃO
<span style="color: orange;">■</span> CTN	<span style="color: green;">■</span> PRAÇA
<span style="color: blue;">■</span> ADMINISTRATIVO	<span style="color: orange;">→</span> ACESSO PRINCIPAL
<span style="color: lightblue;">■</span> OUTROS	<span style="color: yellow;">→</span> ACESSO SECUNDÁRIO
<span style="color: brown;">■</span> APOIO	<span style="color: red;">→</span> SAÍDA DE EMERGÊNCIA
<span style="color: maroon;">■</span> REFEITÓRIO	

O primeiro e o segundo pavimento são bastante similares no que se refere à disposição geral dos setores, que consistem no setor administrativo e salas do setor de ensino e pesquisa. Cada espaço foi projetado para promover ambientes propícios ao aprendizado, pesquisa e administração eficientes.

No primeiro setor, a oeste do átrio, encontram-se as salas de coordenações de cursos, sala administrativa, diretoria e vice-diretoria, secretaria, sala de comissão permanente de avaliação, sala de reuniões, sala do conselho, banheiros, vestiários e duas copas, uma de uso exclusivo da diretoria e uma de uso dos demais funcionários. Cada um dos espaços foi planejado para otimizar a eficiência operacional, oferecendo um ambiente tranquilo e organizado para as atividades administrativas, gestão de recursos humanos, coordenação acadêmica e outras funções essenciais à instituição.

A sala administrativa é composta por um amplo espaço de cerca de 95m<sup>2</sup> subdividido por ilhas, permitindo melhor comunicação interna e organização. Já as 06 salas de coordenação possuem a mesma área, de 17,96 m<sup>2</sup> cada, dispostas lado a lado. A diretoria e a vice-diretoria possuem banheiros privativos, como forma de promover maior comodidade aos responsáveis.



Os ambientes de laboratório possuem acesso restrito, juntamente com parte das salas de expansão. Das 07 salas desse tipo, 03 se relacionam diretamente com os laboratórios, de forma que seu acesso acontece a partir de um corredor central reservado. As demais salas de expansão possuem acessos voltados para o corredor Norte. Assim como os laboratórios do pavimento térreo, estes também foram dimensionados considerando os equipamentos a serem utilizados e a quantidade de usuários que usufruirão do local, de forma que suas áreas são variáveis.

A leste, além dos blocos de banheiros, das salas de aula e demais laboratórios, foram propostas sala de videoconferência, sala de *hub* de economia azul, *coworking*, sala de estufas e autoclaves, e, ainda, um centro de diagnóstico de enfermidades. A sala de estufas foi localizada na fachada sul, pois, por se tratar de um local destinado a abrigar equipamentos que utilizam elevada potência e produzem muito calor, necessita de ventilação e de fontes de exaustão.

No segundo pavimento, a continuidade da arquitetura funcional e estética se faz presente. Novamente, o átrio central com sua escadaria helicoidal proporciona uma transição suave entre os diferentes setores do pavimento.

Na ala oeste deste pavimento, foram localizadas salas destinadas à pós-graduação, sala de convivência de professores e de professores convidados, copa dos professores, sala de reuniões, gestão de pessoas, de arquivos e de infraestrutura; além de banheiros, depósitos e copa de funcionários.

As salas de pós-graduação oferecem um ambiente dedicado à pesquisa avançada e ao estudo intensivo, sendo equipadas com os recursos necessários para apoiar o desenvolvimento de teses e projetos acadêmicos. Estas salas foram dispostas usufruindo da fachada norte, gerando ambientes agradáveis com vista privilegiada, e foram projetadas para oferecer privacidade e concentração aos estudantes e pesquisadores, incentivando a inovação e a descoberta científica. As salas administrativas foram indicadas de forma central na ala oeste, facilitando a integração dos setores.

Na ala central do pavimento, foi sugerida a colocação de 33 gabinetes, todos subdivididos em duas salas individuais, separadas por divisórias de vidro. Os gabinetes serão destinados aos professores da universidade e dos centros de pesquisa, permitindo privacidade aos seus trabalhos, bem como nos horários de orientação de alunos ou pesquisadores.

A leste encontram-se as demais salas de aula e laboratórios, além de duas salas escalonadas, separadas por uma divisória retrátil com enchimento acústico. A divisão proposta permitirá o funcionamento das salas de forma individual sem interferências, bem como o funcionamento das duas em conjunto, quando necessário, a partir da retração da divisória.

Os laboratórios atendem às recomendações do: Manual de Segurança Biológica em Laboratório – Organização Mundial de Saúde – Genebra – 2004 e da NBR ISO 14644-4 - Salas limpas e Ambientes Controlados Associados. Parte 4: Projeto, Construção e Partida – ABNT – Rio de Janeiro – 2004.

Em ambos os pavimentos, o acesso é facilitado por escadarias e elevadores modernos, garantindo acessibilidade a todos os espaços da edificação. A distribuição estratégica dos diferentes ambientes, com áreas administrativas concentradas a oeste e salas de aula/laboratórios a leste, não só promove uma

organização eficiente, mas também maximiza o aproveitamento da luz natural e vistas externas, criando ambientes de trabalho e aprendizado mais agradáveis e produtivos.

Assim, cada detalhe da concepção deste edifício reflete o compromisso com a excelência acadêmica e científica, proporcionando uma ambiência de *Campus* Universitário estimulante e funcional para estudantes, pesquisadores e funcionários administrativos.

#### 1.4.4 TERRAÇO/COBERTURA

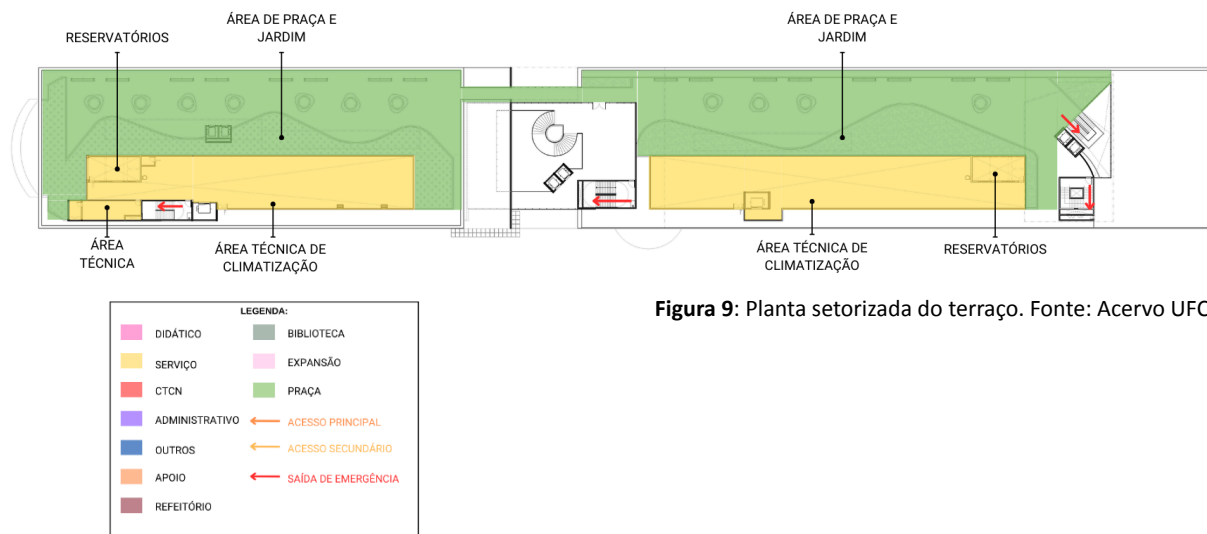


Figura 9: Planta setorializada do terraço. Fonte: Acervo UFC.

No topo da edificação, foi proposto um terraço projetado para unir funcionalidade, contemplação e beleza natural. Neste espaço, os visitantes serão recepcionados pela ampla visão do horizonte marítimo da cidade de Fortaleza, bem como por áreas de jardins elevados onde plantas nativas de pequeno e médio porte poderão ser cultivadas tornando o espaço acolhedor e proporcionando um clima mais ameno.

A área de contemplação é um convite ao relaxamento e à convivência. Bancos foram estrategicamente posicionados, oferecendo vistas panorâmicas da praia, de leste a oeste. É um local pensado para o descanso, estudos ou encontros informais entre estudantes e pesquisadores, incentivando a troca de ideias e a socialização.

Pontuando o espaço, áreas técnicas abrigarão o maquinário essencial para a manutenção dos equipamentos dispostos em toda a edificação. Além disso, estão previstas áreas disponíveis para equipamentos de pesquisa avançada presentes na instituição, como antenas para captação de dados atmosféricos. Tratam-se de espaços projetados para garantir o funcionamento eficiente das instalações sem interferir na tranquilidade do ambiente como um todo.

Na área central da edificação, uma cobertura curva destaca-se em meio ao terraço, não apenas como solução de proteção do átrio, escada e elevadores, mas também como recriação da forma das ondas do mar. Este design não só se integra com a proposta do LABOMAR, mas também serve como um lembrete visual da missão principal da edificação: o estudo, exploração e compreensão dos oceanos.



O acesso ao terraço é facilitado por escadas e elevadores, garantindo que o espaço seja acessível a todos, desde os pesquisadores e alunos do LABOMAR que buscam um momento de pausa e descanso até o público visitante do CTCN, interessado em uma contemplação tranquila.

## 2. ENGENHARIAS

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A seguir serão descritas as soluções e sistemas de engenharias e instalações complementares propostos para a execução da Nova Sede do LABOMAR/CTCN - *Campus* Iracema.

### 2.1. ESTRUTURA

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Considerando a estrutura existente a ser aproveitada para a execução da Nova Sede do LABOMAR/CTCN - *Campus* Iracema, se fez necessário o desenvolvimento de um parecer técnico constando análises dos resultados de relatórios prévios e também um projeto contemplando as intervenções estruturais necessárias considerando ampliações e demolições que atenderão à nova arquitetura.

Os dados relativos à análise, metodologia e desenvolvimento estrutural encontram-se no documento **ANEXO II - PARECER TÉCNICO ESTRUTURAL**.

### 2.2. VENTILAÇÃO, EXAUSTÃO E AR CONDICIONADO

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#### 2.2.1. AR CONDICIONADO

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##### Estimativa de Carga Térmica do Empreendimento e Concepção do Sistema:

Devido ao perfil do empreendimento, a solução proposta para o sistema de climatização poderia ser pensada tanto com um sistema de expansão direta VRF (*Variable Refrigerant Flow*) como também para um sistema de expansão indireta com a utilização de *chillers* dimensionados de forma modular que permita expansões na edificação no futuro. Esta última apresenta uma um melhor aproveitamento de área técnica e um sistema robusto com possibilidade de maior nível de controle e eficiência energética. A escolha entre VRF e *Chiller* a ar em um ambiente com alta maresia dependerá de fatores específicos do projeto, como o tamanho do edifício, o orçamento de instalação e manutenção, a disponibilidade de espaço técnico e as preferências do cliente quanto à redundância e flexibilidade do sistema. Em ambos os casos, será crucial implementar medidas adicionais de proteção contra a corrosão e estabelecer um rigoroso programa de manutenção preventiva. Para o presente projeto adotamos uma solução com VRF para melhor parametrização orçamentária.

Para a estimativa de carga térmica da edificação, será considerada toda a área dos usuários como climatizada, restando as circulações, banheiros e parte das áreas técnicas não climatizadas. Em anexo segue o cálculo de carga térmica apresentando um total em capacidade de refrigeração de aproximadamente 550 Toneladas de Refrigeração (TR). Esta estimativa é baseada no **ANEXO I - CARGA TÉRMICA VRF**:

##### Sistema de Distribuição de Ar:

A edificação possui duas topologias para o sistema de distribuição de ar. Uma para o auditório e grandes espaços e outra para os ambientes administrativos e de ensino. Para os ambientes de auditório serão



instaladas nas áreas técnicas próximas os Splitões dimensionados para atender um único espaço, possibilitando a recirculação do ar e um menor custo energético. No entanto para os demais ambientes o conceito será a utilização de splits convencionais (VRF) do tipo mais adequado para aquele ambiente. Para esta topologia também se propõe a utilização de equipamentos dedicados para ar externo, porém dimensionados para atender a vazão de todas as áreas deste tipo previstas na edificação.

### 2.2.2. VENTILAÇÃO E EXAUSTÃO

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O sistema de exaustão tem como principal função garantir o equilíbrio do sistema de climatização e o diferencial de pressão relativa entre os ambientes, especialmente com relação ao sistema de controle de fumaça e para a pressurização das escadas de emergência.

## 2.3. INSTALAÇÕES ELÉTRICAS

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### 2.3.1. INFRAESTRUTURA DE ALIMENTAÇÃO ELÉTRICA

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A solução proposta para a rede de distribuição elétrica do Edifício terá sua alimentação proveniente de duas subestações, localizadas na área externa ao prédio e no nível do térreo, e a partir desta serão encaminhados os condutores para alimentação dos quadros gerais de baixa tensão (QGBTs), localizado no ambiente da subestação. Será especificado também um quadro geral responsável pela alimentação das cargas “emergenciais” (fonte auxiliar de alimentação). Dos referidos quadros partirão as alimentações dos quadros de distribuição conforme a setorização adotada, estes serão alocados nos seus respectivos centros de carga para reduzir a queda de tensão dos circuitos terminais. O posicionamento seguirá as salas técnicas previstas na arquitetura, sendo duas salas por pavimento.

O controle de fator de potência desta edificação será realizado nas subestações. Será previsto sistema automático de banco capacitor com monitoramento da energia reativa.

Os geradores funcionarão, através de chaveamento, atendendo as cargas críticas da edificação, ou seja, operarão em regime *stand by* e serão montados em sala específica com controle acústico localizada próxima a subestação e serão conectados aos painéis de transferências do tipo manual e automático.

A edificação contará com ainda sistemas backup de energia descentralizado, serão previstos Nobreaks para equipamentos e cargas específicas. Estes equipamentos serão responsáveis para manter a operação durante o período da interrupção do fornecimento de energia elétrica até o seu reestabelecimento via gerador.

Para estimativa da carga elétrica do empreendimento foram considerados os seguintes fatores: 10W/m<sup>2</sup> para ambientes técnicos, 50W/m<sup>2</sup> para áreas gerais (referente a carga geral de iluminação, tomadas gerais e equipamentos eventuais), 100W/m<sup>2</sup> para os ambientes administrativos (referente as cargas de iluminação, tomadas e ar condicionado), e 300W/m<sup>2</sup> para os ambientes laboratoriais (referente as cargas de iluminação, tomadas e ar condicionado). Conforme apresentado na tabela 1, multiplicando os fatores mencionados pelas áreas estimadas, por tipo de ambiente, chegou-se a uma potência total instalada aproximada de 2.108,79 kW. Sendo considerado duas subestações com capacidade de 1000 kVA cada.



PROJ.	SETOR	ÁREA (m <sup>2</sup> )	Áreas por tipo de ambiente					Laboratórios (300 W/m <sup>2</sup> ) (W)	Á. Adm. (100 W/m <sup>2</sup> ) (W)	Á. Ensino (100 W/m <sup>2</sup> ) (W)	Á. Gerais (50 W/m <sup>2</sup> ) (W)	Á. Técnica (10 W/m <sup>2</sup> ) (W)
			Laboratórios (m <sup>2</sup> )	Á. Adm. (m <sup>2</sup> )	Á. Ensino (m <sup>2</sup> )	Á. Gerais (m <sup>2</sup> )	Á. Técnica (m <sup>2</sup> )					
							300	100	100	50	10	
LABOMAR	SUBSOLO	5.122,27	1.067,26	895,35	282,00	2.513,93	363,73	320.178,00	89.535,00	28.200,00	125.696,50	3.637,30
	TÉRREO	5.647,29	476,11	943,87	983,84	3.167,47	76,00	142.833,00	94.387,00	98.384,00	158.373,50	760,00
	1ª PAV.	4.357,36	800,21	504,70	1.398,94	1.618,54	34,97	240.063,00	50.470,00	139.894,00	80.927,00	349,70
	2ª PAV.	4.313,09	968,07	1.047,05	474,61	1.788,39	34,97	290.421,00	104.705,00	47.461,00	89.419,50	349,70
	TERRAÇO	75,00				50,00	25,00	0,00	0,00	0,00	2.500,00	250,00
<b>2108,7942 kW</b>												

Tabela 1: Estimativa de cargas por tipo de área.

Com relação a geração de energia elétrica a partir da energia solar, será analisado a possibilidade de utilização do sistema tipo *on-grid*, assim, possibilitando uma redução no consumo por energia elétrica do empreendimento pela concessionária de energia.

O conceito básico das infraestruturas de alimentação será do tipo aparente nas áreas técnicas e nos demais ambientes serão embutidos na alvenaria ou instalados no entre forro e quando em contato com o ambiente externo estas deverão ser vedadas de modo a não permitir a contaminação do ambiente interno.

### 2.3.2. INFRAESTRUTURA DE DISTRIBUIÇÃO ELÉTRICA

Os circuitos terminais da edificação terão o mesmo conceito básico do sistema de alimentação sendo do tipo aparente nas áreas técnicas e para os demais ambientes os elementos serão embutidos na alvenaria ou instalados no entre forro.

### 2.3.3. SISTEMA DE ILUMINAÇÃO

Os conceitos básicos para os sistemas de iluminação em todas as edificações do Campus serão a alta eficiência das luminárias e o conforto dos usuários. A tabela a seguir apresenta os valores de referência para cada parâmetro das luminárias.

Parâmetro	Valores de Referência
Eficácia (lm/W)	Maior que 80 lm/W
Índice de Reprodução de Cor (Ra)	Maior que 80%
Vida útil mínima (Curva L70*)	25.000 Horas
Temperatura de cor**	3.000K ou 4.000K

\* Curva de eficiência da luminária até 70% de lumêns original.

\*\* Esses são os valores padrões variando conforme o tipo de ambiente.

Será previsto sistema de iluminação com supervisão e controle, de modo a possibilitar o acionamento e desligamento automático das fontes luminosas internas (definidas conforme estudo) e externas.

Para os ambientes com permanência de usuários deverá ser aplicado elementos para controle de ofuscamento e, em salas específicas, de intensidade de luz. Para os locais de escritório serão aplicadas luminárias com aletas parabólicas, enquanto para os ambientes que demandem limpeza constante serão utilizados difusores translúcidos. As áreas técnicas, depósitos, entre outros não será aplicado elementos



para controle do ofuscamento para aumentar a eficiência do sistema. Para os ambientes que gerem sujeira serão aplicadas luminárias herméticas.

O projeto deverá ainda considerar os valores de uniformidade dos ambientes para melhor conforto aos usuários. Será utilizado como valor de referência 0,60 (Emin/Emed).

Os valores de iluminância média (Emed) para os prováveis ambientes da edificação estão descritos na tabela abaixo. Será considerado a NBR ISO/CIE 8995-1 como referência.

Tipo de Ambiente	Iluminância Média	Observações
Laboratórios	500 lux	
Corredores: durante o dia	200 lux	Iluminância ao nível do piso.
Vestiário	200 lux	
Depósitos	100 lux	200 lux se for continuamente ocupado
Subestação	200 lux	
Áreas Técnicas	200 lux	

## 2.4. TELECOMUNICAÇÕES

### 2.4.1. REDE ESTRUTURADA

Com relação ao cabeamento de entrada, serão previstas infraestruturas independentes, através de caminhos distintos, para receber duas entradas de link.

A topologia do sistema de distribuição externa deverá estar definida para o desenvolvimento do projeto do empreendimento (Radial). Para uma infraestrutura Radial o número de linhas será apenas uma.

O sistema de telefonia poderá ser através de voz por IP, baseado em tecnologias existentes e homologadas para uso no *campus* da UFC.

A edificação contará com rede Wireless Lan. Os *access points*, visando a fornecer a cobertura necessária à edificação, serão distribuídos em pontos estratégicos.

O conceito básico das infraestruturas do sistema de rede estruturada será do tipo aparente nas áreas técnicas e para os demais serão embutidos na alvenaria ou instalados no entre forro. Todos os sistemas de telecomunicações poderão ser compartilhados no mesmo conduto a determinar pelo tipo de função (*backbone* ou distribuição).

### 2.4.2. CFTV

O sistema de CFTV terá como conceito monitorar e identificar os usuários nas áreas internas e o fluxo realizado por estes bem como as áreas externas. Este sistema ainda deverá cumprir o papel de avaliação de situações de emergência para determinar a melhor forma de atuar.

Para comunicação entre os dispositivos periféricos e o CPD o sistema de CFTV utilizará a mesma infraestrutura do sistema de rede estruturada (ver Figura 1), podendo realizar a separação dos acessos





através de redes virtuais tipo “Corporativa” e “Segurança”. Desta forma, todas as câmeras terão comunicação via IP (Internet Protocol). Para alimentação elétrica das câmeras serão propostos aplicação de equipamentos com tecnologia PoE para reduzir o impacto de infraestrutura na edificação, somente para os equipamentos interligados a rede por fibra óptica serão propostas fontes de alimentação elétrica independentes

## **2.5. SONORIZAÇÃO E VIDEO**

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O sistema fará a previsão de difusão de som e projeção de vídeo para ambientes específicos que demandem tal solução. Serão especificados racks para abrigar os equipamentos necessários ao sistema de sonorização e estes serão alocados, quando possível, próximos aos ambientes a que atenderão.

O conceito básico das infraestruturas do sistema de sonorização e vídeo seguirá o mesmo conceito das demais instalações, será do tipo aparente nas áreas técnicas e para os demais serão embutidos na alvenaria ou instalados no entre forro. Todos os sistemas de telecomunicações poderão ser compartilhados no mesmo conduto.

## **2.6. INSTALAÇÕES DE GLP**

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Conforme as fichas dos Laboratórios preenchidos pelo usuário haverá necessidade de gás combustível para o seu funcionamento, assim como para o aquecimento de água para alguns dos equipamentos do refeitório. Desta forma, serão previstas duas casas de GLP uma próxima ao refeitório e uma segunda próxima aos laboratórios.

Para atender a esta demanda será projetada duas centrais com suas localizações orientadas por dois critérios: acesso facilitado de terceiros para substituição dos recipientes portáteis; e proximidade aos seus centros de consumo para reduzir perda de carga do sistema.

Quanto a infraestrutura, a partir da central será projetada uma tubulação até os pontos de uso onde serão projetadas estações reguladoras de pressão para posterior distribuição nos ambientes. Todas as instalações internas da edificação serão projetadas com tubos metálicos revestidos com fitas anticorrosivas e embutidas no contrapiso dos pavimentos ou em alvenaria. Em caso de necessidade de instalações aparentes deverá ser verificado a ventilação do ambiente, bem como as proximidades com os demais sistemas da edificação.

## **2.7. INSTALAÇÕES ESPECIAIS OXIGÊNIO (O<sub>2</sub>), HÉLIO (HE), NITROGÊNIO (N<sub>2</sub>), HIDROGÊNIO (H<sub>2</sub>), ÓXIDO DE NITROGÊNIO (N<sub>2</sub>O) E ARGÔNIO (AR) E OUTROS**

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Conforme as fichas de ambientes do Programa de Necessidades os únicos gases esperados para os Laboratórios serão: O<sub>2</sub>, He, N<sub>2</sub>, H<sub>2</sub>, N<sub>2</sub>O e Ar.

Para todos os fluidos haverá uma central de gases localizada próxima a área dos Laboratórios no pavimento térreo, porém externa a edificação principal, onde permita o acesso a equipe responsável pela substituição dos cilindros, sem que tenham acesso às áreas controladas da edificação. Desta edificação será encaminhada a tubulação até a edificação principal. Nos pavimentos serão projetadas estações reguladoras de pressão para posterior distribuição nos ambientes. Os ramais principais de distribuição serão encaminhados através do entre forro, com exceção aos gases inflamáveis, estes





deverão seguir de forma embutida garantindo o não confinamento dos gases em caso de vazamento. A rede será criada em formato radial para garantir maior economia a facilidade na execução.

## 2.8. INSTALAÇÕES DE PREVENÇÃO E COMBATE A INCÊNDIO

Para o projeto de prevenção e combate a incêndio serão consideradas as orientações e recomendações da Normas Técnicas do Corpo de Bombeiros Militar do Estado do Ceará (CBM/CE), além das normas locais será adotado as premissas da Associação Brasileira de Normas técnicas e NFPA que forem pertinentes. O trabalho inicial será a classificação do tipo de edificação quanto ao uso e ocupação da Sede do LABOMAR.

### 2.8.1. CLASSIFICAÇÃO DA EDIFICAÇÃO

Classificação da edificação: O LABOMAR é considerado um empreendimento de uso misto por apresentar várias classificações conforme uso por pavimento. Iremos apresentar todos os pavimentos fazendo uma correlação com as possíveis classificações e escolhermos os enquadramentos mais restritivos em relação a sistemas de combate a incêndio.

NOME	CENTRO DE TREINAMENTO PROFISSIONAL (TÉRREO A COBERTA)	MUSEU	AUDITÓRIO	ESTACIONAMENTO/GARAGEM
DIVISÃO	E4	F1	F5	G2
ALTURA CONSIDERADA (m)	16,34	SUBSOLO - 5,32m	SUBSOLO - 8,02m	SUBSOLO - 3,28m
ACESSO DE VIATURA NA EDIFICAÇÃO	X	X	X	X
SEGURANÇA ESTRUTURAL DE CONTRA INCÊNDIO	X	X	X	X
COMPARTIMENTAÇÃO VERTICAL	X <sup>1</sup>	X <sup>2</sup>	X	-
CONTROLE DE MATERIAS DE ACABAMENTO	X	X	X	X
SAÍDA DE EMERGÊNCIA	X	X	X	X
GERENCIAMENTO DE RISCO DE DE INCÊNDIO	X	X <sup>3</sup>	X <sup>3</sup>	-
BRIGADA DE INCÊNDIO	X <sup>4</sup>	X <sup>4</sup>	X <sup>4</sup>	X <sup>4</sup>
ILUMINAÇÃO DE EMERGÊNCIA	X	X	X	X
DETECÇÃO DE INCÊNDIO	X	X	X	-
ALARME DE INCÊNDIO	X	X	X	X
SINALIZAÇÃO DE EMERGÊNCIA	X	X	X	X
EXTINTORES	X	X	X	X
HIDRANTES E MANGOTINHOS	X	X	X	X
CENTRAL DE GÁS	X	X	X	X
S.P.D.A	X <sup>0</sup>	X <sup>0</sup>	X <sup>0</sup>	X <sup>0</sup>
HIDRANTE URBANO	X <sup>0</sup>	X <sup>0</sup>	X <sup>0</sup>	X <sup>0</sup>

Notas Específicas:

0. Ver Norma Técnica específica;

1. A compartimentação vertical será considerada para as fachadas e selagens dos shafts e dutos de instalações;
2. Os subsolos das edificações devem ser compartimentados em relação aos demais pisos contíguos;
3. Somente para locais com público acima de 1.000 pessoas;
4. Inclui Bombeiro Civil, quando exigido pela Norma Técnica específica;



Analisando as diversas divisões possíveis, enquadrámos a **Edificação como E-4** (Centro Educacional profissionalizante) **como a classificação mais restritiva**.

### 2.8.2. LABOMAR

#### Quanto ao Uso e Ocupação:

Conforme a Tabela “1” do Anexo A da NT 001/2024 do Corpo de Bombeiros do Estado do Ceará:

Para a edificação a classificação será tipo E-4. Descrição: Centro Educacional Profissionalizante. A classificação quanto a carga de incêndio é de risco baixo para os pavimentos do térreo a coberta e de risco médio para o pavimento subsolo por conter um Auditório.

Grupo	Ocupação/Us	Divisão	Descrição	Tipificação
E	Educacional e cultura física	E-3	Espaço para cultura física	Locais de ensino e/ou práticas de artes marciais, ginástica, artística, dança, musculação, tênis e outros, esportes coletivos como futebol e os que não estejam incluídos em F-3, sauna, casas de fisioterapia e assemelhados
		E-4	Centro de treinamento profissional	Escolas profissionais em geral.
		E-5	Educação infantil	Creches, escolas maternas e de educação infantil e assemelhados
		E-6	Escola para pessoas com deficiência	Escolas para pessoa com deficiência e assemelhados

Figura 10: Classificação por uso e ocupação conforme Tabela “1” da NT 001/2024 do Estado do Ceará.

#### Quanto à Altura:

A edificação é composta por térreo, 2 pavimentos, coberta, 1 subsolo e 1 pavimento técnico. Desta forma, o empreendimento será do **Tipo IV – Edificação de Média Altura**.

Tipo	Denominação	Altura (H)
I	Edificação Térrea	Um pavimento
II	Edificação Baixa	$H \leq 6,00 \text{ m}$
III	Edificação de Baixa-Média Altura	$6,00 \text{ m} < H \leq 12,00 \text{ m}$
IV	Edificação de Média Altura	$12,00 \text{ m} < H \leq 23,00 \text{ m}$
V	Edificação Medianamente Alta	$23,00 \text{ m} < H \leq 30,00 \text{ m}$
VI	Edificação Alta	Acima de 30,00 m

Figura 11: Classificação da edificação quanto à altura conforme Tabela “2” da NT 001/2024 do Estado do Ceará.



Quanto ao Risco:

Quanto a definição do risco será utilizada a NT-006: Carga de incêndio nas edificações e áreas de risco.

- Para classificação E-4 – (Térreo a coberta):

OCUPAÇÃO/USO	DESCRIÇÃO	DIVISÃO	CARGA DE INCÊNDIO (q <sub>n</sub> ) EM MJ/m <sup>2</sup>
Educativa e Cultura Física	Academias de ginástica e similares	E-3	300
	Pré-escolas e similares	E-5	300
	Creches e similares	E-5	300
	Escolas em geral	E-1/E2/E4/E6	300

Figura 12: Carga de Incêndio para os ambientes tipo E-4 do Térreo a Coberta conforme Anexo "A" da NT-006.

Carga de Incêndio 300 MJ/m<sup>2</sup>, **Risco Baixo.**

- Para classificação F-5 – (Subsolo/Auditório):

OCUPAÇÃO/USO	DESCRIÇÃO	DIVISÃO	CARGA DE INCÊNDIO (q <sub>n</sub> ) EM MJ/m <sup>2</sup>
Educativa e Cultura Física	Academias de ginástica e similares	E-3	300
	Pré-escolas e similares	E-5	300
	Creches e similares	E-5	300
	Escolas em geral	E-1/E2/E4/E6	300
Locais de Reunião de Público	Bibliotecas	F-1	2000
	Cinemas, teatros e similares	F-5	600
	Circos e assemelhados	F-7	500
	Centros esportivos e de exibição	F-3	150
	Clubes sociais, boates e similares	F-6	600
	Estações e terminais de passageiros	F-4	200
	Exposições	F-10	Adotar Anexo B
	Igrejas e templos	F-2	200
	Museus	F-1	300
Restaurantes	F-8	300	

Figura 13: Carga de Incêndio para o auditório (subsolo) conforme Anexo "A" da NT-006.

Carga de Incêndio 600 MJ/m<sup>2</sup>, **Risco Médio.**

### 2.8.3. MEDIDAS DE SEGURANÇA CONTRA INCÊNDIO E PÂNICO



Grupo de ocupação e uso	GRUPO E – EDUCACIONAL E CULTURAL					
	E-1, E-2, E-3, E-4, E-5 e E-6					
	Classificação quanto à altura (em metros)					
Divisão	Térrea	H ≤ 6	6 < H ≤ 12	12 < H ≤ 23	23 < H ≤ 30	Acima de 30
Acesso de Viatura na Edificação	X	X	X	X	X	X
Segurança Estrutural contra Incêndio	X	X	X	X	X	X
Compartimentação Horizontal ou de Áreas <sup>7</sup>	-	-	-	-	X <sup>6</sup>	X
Compartimentação Vertical	-	-	-	X <sup>1</sup>	X <sup>1</sup>	X <sup>2</sup>
Controle de Materiais de Acabamento	X	X	X	X	X	X
Saídas de Emergência	X	X	X	X	X	X <sup>3</sup>
Gerenciamento de Risco de Incêndio	-	X	X	X	X	X
Brigada de incêndio	X <sup>5</sup>	X <sup>5</sup>	X <sup>5</sup>	X <sup>5</sup>	X <sup>5</sup>	X <sup>5</sup>
Iluminação de Emergência	X	X	X	X	X	X
Deteção de Incêndio	-	-	-	X	X	X
Alarme de Incêndio	X	X	X	X	X	X
Sinalização de Emergência	X	X	X	X	X	X

Extintores	X	X	X	X	X	X
Hidrantes e Mangotinhos	X	X	X	X	X	X
Chuveiros Automáticos	-	-	-	-	-	X
Controle de Fumaça	X <sup>4</sup>	X <sup>4</sup>	X <sup>4</sup>	X <sup>4</sup>	X <sup>4</sup>	X <sup>4</sup>
Central de Gás	X	X	X	X	X	X
SPDA	X <sup>8</sup>	X <sup>8</sup>	X <sup>8</sup>	X <sup>8</sup>	X <sup>8</sup>	X <sup>8</sup>
Hidrante Urbano	X <sup>8</sup>	X <sup>8</sup>	X <sup>8</sup>	X <sup>8</sup>	X <sup>8</sup>	X <sup>8</sup>

**NOTAS ESPECÍFICAS:**

1. A compartimentação vertical será considerada para as fachadas e selagens dos shafts e dutos de instalações;
2. Pode ser substituída por sistema de controle de fumaça, deteção de incêndio e chuveiros automáticos, até 90 metros de altura, exceto para as compartimentações das fachadas e selagens dos shafts e dutos de instalações, sendo que para altura superior deve-se, adicionalmente, adotar as soluções contidas na Norma de Compartimentação;
3. Deve haver Elevador de Emergência para altura maior que 60 m;
4. Acima de 60 metros de altura ou acima de 02(dois) Subsolos (para as áreas dos subsolos) conforme critérios da Norma Técnica específica;
5. Inclui Bombeiro Civil, quando exigido pela Norma Técnica específica;
6. Pode ser substituída por sistema de deteção de incêndio e chuveiros automáticos;
7. A área máxima de compartimentação deve abranger as áreas dos pavimentos e mezaninos interligados sem compartimentação;
8. Ver Norma Técnica específica.

**NOTAS GERAIS:**

- a. As instalações elétricas, o SPDA e o controle das fontes de ignição devem estar em conformidade com as normas técnicas oficiais;
- b. Os subsolos das edificações devem ser compartimentados em relação aos demais pisos contíguos. Para subsolos ocupados ver Tabela 7;
- c. Os locais destinados a laboratórios devem ter proteção em função dos produtos utilizados;
- d. Observar ainda as exigências para os riscos específicos das respectivas Normas Técnicas.
- e. Os pavimentos ocupados devem possuir aberturas para o exterior (por exemplo: janelas, painéis de vidro, etc) ou controle de fumaça, dimensionados conforme o disposto na Norma Técnica específica.

Figura 14: Medidas de segurança contra Incêndio e Pânico para a classificação E-4 conforme Tabela “6E” da NT 001/2024 do Estado do Ceará.

- Essa edificação tem subsolo ocupado por um museu e auditório. Dessa forma para esse pavimento teremos exigências adicionais.

Entende-se por medidas adicionais àquelas complementares às exigências prescritas ao edifício (E-4).



Área ocupada (m <sup>2</sup> ) no(s) subsolo(s)	Ocupação do subsolo	Medidas de segurança adicionais no subsolo
Área > 500m <sup>2</sup>	Depósito <sup>5</sup>	<ul style="list-style-type: none"><li>➤ Depósitos individuais<sup>1</sup>, em edificações residenciais, com área máxima até 5m<sup>2</sup> cada, ou</li><li>➤ Chuveiros automáticos<sup>3</sup> de resposta rápida e Detecção automática de incêndio em todo o subsolo, duas saídas de emergência em lados opostos e Controle de Fumaça nos ambientes ocupados.</li></ul>
	Outras ocupações	<ul style="list-style-type: none"><li>➤ Chuveiros automáticos<sup>3</sup> de resposta rápida e Detecção automática de incêndio em todo o subsolo, duas saídas de emergência em lados opostos e Controle de Fumaça nos ambientes ocupados.</li></ul>

Figura 15: Medidas adicionais para ocupações em subsolos diferentes de estacionamento conforme Tabela “7” da NT 001/2024 do Estado do Ceará.

**Nota<sup>3</sup>:** Pode ser interligado à rede de hidrantes pressurizada, utilizando-se da reserva de incêndio dimensionada para o sistema de hidrantes, entretanto a bomba de incêndio deve ser dimensionada considerando o funcionamento simultâneo de seis bicos e um hidrante. Havendo chuveiros automáticos instalados no edifício, não há necessidade de trocar os bicos de projeto por bicos de resposta rápida.

#### 2.8.4. ACESSO DE VIATURA E FAIXAS DE ESTACIONAMENTO NA EDIFICAÇÃO

O acesso das viaturas do Corpo de Bombeiros Militar do Estado do Ceará, para o LABOMAR, se dará por estacionamento em via pública junto ao passeio, que visa disciplinar a operação na busca de salvamento de vítimas e no combate a incêndios.

Conforme a NT 010, a largura mínima da via deve ser de 6,00m e suportar o peso do veículo de 25 toneladas distribuídos em dois eixos.

É aconselhável no mínimo uma vaga reservada exclusiva para a viaturas do Corpo de Bombeiros Militar do Estado do Ceará, através de uma faixa de estacionamento dedicada, localizada a menos de 8,00m da projeção da edificação.

A vaga exclusiva de estacionamento deve ser obrigatoriamente sinalizada através de placa vertical reflexiva (de alta intensidade) com indicação de proibido parar e estacionar instalada em coluna circular metálica (padrão usada pela Autarquia Municipal de Transito – AMC), bem como através de sinalização horizontal de solo, caso o piso seja asfáltico ou concreto, com a demarcação de um retângulo por faixas amarelas reflexivas, identificada com os dizeres “RESERVADO PARA O CORPO DE BOMBEIROS”. Essas placas devem estar livres de postes, painéis, árvores ou quaisquer outros elementos que possam obstruir a operação das viaturas aéreas de intervenção ou resgate. Em situações específicas as placas podem ser instaladas em poste de concreto junto a via pública.

#### 2.8.5. ACESSO DE VIATURA E FAIXAS DE ESTACIONAMENTO NA EDIFICAÇÃO



O acesso das viaturas do Corpo de Bombeiros Militar do Estado do Ceará, para o LABOMAR, se dará por estacionamento em via pública junto ao passeio, que visa disciplinar a operação na busca de salvamento de vítimas e no combate a incêndios.

Conforme a NT 010, a largura mínima da via deve ser de 6,00m e suportar o peso do veículo de 25 toneladas distribuídos em dois eixos.

É aconselhável no mínimo uma vaga reservada exclusiva para a viaturas do Corpo de Bombeiros Militar do Estado do Ceará, através de uma faixa de estacionamento dedicada, localizada a menos de 8,00m da projeção da edificação.

A vaga exclusiva de estacionamento deve ser obrigatoriamente sinalizada através de placa vertical reflexiva (de alta intensidade) com indicação de proibido parar e estacionar instalada em coluna circular metálica (padrão usada pela Autarquia Municipal de Transito – AMC), bem como através de sinalização horizontal de solo, caso o piso seja asfáltico ou concreto, com a demarcação de um retângulo por faixas amarelas reflexivas, identificada com os dizeres “RESERVADO PARA O CORPO DE BOMBEIROS”. Essas placas devem estar livres de postes, painéis, árvores ou quaisquer outros elementos que possam obstruir a operação das viaturas aéreas de intervenção ou resgate. Em situações específicas as placas podem ser instaladas em poste de concreto junto a via pública.

#### 2.8.6. SEGURANÇA ESTRUTURAL CONTRA INCÊNDIO

Para determinar os tempos requeridos de resistência a fogo (TRRF) a IT-08 de CBMSP determina pelo tipo de classificação por ocupação e altura da edificação.

A Figura 16 apresenta a tabela “A” da norma com a marcação da classificação definida (E-4) demandam que a estrutura seja dimensionada para atender 30 minutos.

Grupo	Ocupação/Use	Divisão	Profundidade do subsolo h		Altura da edificação h							
			Classe S <sub>2</sub> hs > 10m	Classe S <sub>1</sub> hs ≤ 10m	Classe P <sub>1</sub> h ≤ 6m	Classe P <sub>2</sub> 6m < h ≤ 12m	Classe P <sub>3</sub> 12m < h ≤ 23m	Classe P <sub>4</sub> 23m < h ≤ 30m	Classe P <sub>5</sub> 30m < h ≤ 80m	Classe P <sub>6</sub> 80m < h ≤ 120m	Classe P <sub>7</sub> 120m < h ≤ 150m	Classe P <sub>8</sub> 150m < h ≤ 250m
E	Educacional e cultura física	E-1 a E-6	90	60	30	30	60	90	120	120	150	180

Figura 16: Tempos Requeridos de Resistência ao Fogo (TRRF), em minutos, para cada classificação por ocupação da edificação.

#### 2.8.7. COMPARTIMENTAÇÃO VERTICAL

Conforme a NT-013, deverá ser previsto selagem dos shafts e dutos de instalações: Quaisquer aberturas existentes nas paredes de compartimentação destinadas à passagem de instalações elétricas, Hidrossanitárias, telefônicas e outros que permitam a comunicação direta entre áreas compartimentadas devem ser seladas de forma a promover a vedação total corta-fogo;

Os tubos plásticos de diâmetro interno superior a 40 mm, devem receber proteção especial representada por selagem capaz de fechar o buraco deixado pelo tubo ao ser consumido pelo fogo em ambos os lados da parede.

#### 2.8.8. CONTROLE DE MATERIAIS E EQUIPAMENTOS

Conforme a IT-10 de CBMSP, a classificação da utilização dos materiais para a edificação é dada no Anexo B.



		Finalidade do Material			
		Piso (Acabamento <sup>1</sup> / Revestimento)	Parede e Divisória (Acabamento <sup>2</sup> / Revestimento)	Teto e forro (Acabamento/ Revestimento)	Fachada (Acabamento/ Revestimento)
Grupo/ Divisão	A-3 <sup>5</sup> e Condomínios Residenciais <sup>5</sup>	Classe I, II-A, III-A, IV-A ou V-A <sup>7</sup>	Classe I, II-A, III-A, ou IV-A <sup>8</sup>	Classe I, II-A, ou III-A <sup>6</sup>	Classe I a II-B
	B, D, E, G, H, I-1, J-1 <sup>4</sup> , J-2, C-1, F-1, F-2, F-3, F-4, F-6, F-8, F-9, F-10	Classe I, II-A, III-A, ou IV-A	Classe I, II-A, ou III-A <sup>9</sup>	Classe I, II-A	
	C-2, C-3, F-5, F-7, F-11, I-2, I-3, J-3, J-4, L-1, M-2 <sup>3</sup> e M-3	Classe I, II-A, III-A, ou IV-A	Classe I, II-A	Classe I, II-A	

**Notas específicas:**

- 1) Incluem-se aqui cordões, rodapés e arremates;
- 2) Excluem-se aqui portas, janelas, cordões e outros acabamentos decorativos com área inferior a 20% da parede onde estão aplicados;
- 3) Somente para líquidos e gases combustíveis e inflamáveis acondicionados, devendo todos os materiais de acabamento e revestimento serem de Classe I;
- 4) Exceto edificação térrea;
- 5) Somente para edificações com altura superior a 12 metros;
- 6) Exceto para cozinhas que serão Classe I ou II-A;
- 7) Exceto para revestimentos que serão Classe I, II-A, III-A ou IV-A;
- 8) Exceto para revestimentos que serão Classe I, II-A ou III-A;
- 9) Exceto para revestimentos que serão Classe I ou II-A.

Figura 17: Anexo B da IT10 com Classe dos materiais a serem utilizados para o grupo E.

### 2.8.9. SAÍDAS DE EMERGÊNCIA (NT-005)

As saídas de emergência são definidas a partir da classificação da ocupação, o tipo de pavimento (descarga ou demais andares), as medidas de segurança previstas e pela a população estimada.

- Dimensões Mínimas:

A instrução técnica define os seguintes valores.

Largura das Saídas de Emergência = 1,20 metros;

Altura dos Acessos = 2,50 metros (sem considerar vigas ou vergas de porta);

Largura do vão livre das portas = 80 centímetros.

#### 2.8.9.1. LABOMAR (TÉRREO AO 2º PAVIMENTO)

- População Estimada: 2355 pessoas.

População do Pav. Térreo: 833 pessoas (conforme layout).

População do 1º Pavimento: 709 pessoas (conforme layout).

População do 2º Pavimento: 813 pessoas (conforme layout).





Ocupação		População <sup>(A)</sup>	Capacidade da U de passagem		
Grupo	Divisão		Acessos/ Descargas	Escadas/ rampas	Portas
A	A-1,A-2	Duas pessoas por dormitório <sup>(C)</sup>	60	45	100
	A-3	Duas pessoas por dormitório e uma pessoa por 4 m <sup>2</sup> de área de alojamento <sup>(D)</sup>			
B		Uma pessoa por 15 m <sup>2</sup> de área <sup>(E) (G)</sup>	100	60	100
C		Uma pessoa por 4 m <sup>2</sup> de área <sup>(E) (H)</sup>			
D		Uma pessoa por 7 m <sup>2</sup> de área	100	60	100
E	E-1 a E-4	Uma pessoa por 1,50 m <sup>2</sup> de área de sala de aula <sup>(F)</sup>			
	E-5, E-6	Uma pessoa por 1,50 m <sup>2</sup> de área de sala de aula <sup>(F)</sup>	30	22	30

Pavimento Térreo:

$$P = 833 \text{ pessoas}$$

- Número de unidades para Acessos / Descargas:

$$N = \frac{833}{100} = 8,33 = 9$$

$$L = 0,55 \times 9 = 4,95 \text{ metros}$$

- Número de unidades Rampas:

$$N = \frac{833}{60} = 13,88 = 14$$

$$L = 0,55 \times 14 = 7,7 \text{ metros}$$

- Número de unidades Portas:

$$N = \frac{833}{100} = 8,33 = 9$$

$$L = 0,55 \times 9 = 4,95 \text{ metros}$$

2º Pavimento (mais populoso):

$$P = 813 \text{ pessoas}$$

- Número de unidades para Acessos / Descargas:

$$N = \frac{813}{100} = 8,13 = 9$$

$$L = 0,55 \times 9 = 4,95 \text{ metros}$$

- Número de unidades Rampas/Escadas:





$$N = \frac{813}{60} = 13,55 = 14$$

$$L = 0,55 \times 14 = 7,7 \text{ metros}$$

- Número de unidades Portas:

$$N = \frac{813}{100} = 8,13 = 9$$

$$L = 0,55 \times 9 = 4,95 \text{ metros}$$

- Tipo de Escada:

A definição do tipo de escada também utiliza a classificação de uso e ocupação da edificação e a sua altura. A Tabela “6” da NT 005 define o tipo de escada.

Conforme apresentado na **Figura 18**, o tipo de escada adotado é Escada a Prova de Fumaça (PF) para a classificação (E-4).

Dimensão		N (área de pavimentos ≤ a 750 m²)								O (área de pavimento > 750 m²)							
Altura (em m)		Terreos/ Saídas		H ≤ 6	6 < H ≤ 12	12 < H ≤ 30	Acima de 30		Terreos	H ≤ 6	6 < H ≤ 12	12 < H ≤ 30	Acima de 30				
Ocupação				Nºs	Tipo Esc	Nºs	Tipo Esc	Nºs	Tipo Esc	Nºs	Tipo Esc	Nºs	Tipo Esc	Nºs	Tipo Esc		
Gr.	Div.	Nºs	Nºs	Tipo Esc	Nºs	Tipo Esc	Nºs	Tipo Esc	Nºs	Tipo Esc	Nºs	Tipo Esc	Nºs	Tipo Esc	Nºs	Tipo Esc	
A	A-1	1	1	NE	1	NE	-	-	-	PF	1	1	NE	1	NE	-	-
	A-2	1	1	NE	1	NE	1	EP	1	PF	1	1	NE	2	NE	2	EP
	A-3	1	1	NE	1	NE	1	EP	2	PF	1	1	NE	2	NE	2	EP
B	B-1	1	1	NE	1	EP	1	PF	2	PF	2	2	NE	2	EP	2	PF
	B-2	1	1	NE	1	EP	1	PF	2	PF	2	2	NE	2	EP	2	PF
C	C-1	1	1	NE	1	NE	1	EP	2	EP	2	2	NE	2	EP	2	PF
	C-2	1	1	NE	1	NE	1	EP	2	PF	2	2	NE	2	EP	3	PF
	C-3	1	1	NE	2	EP	2	PF	3	PF	2	2	NE	2	EP	3	PF
D	-	1	1	NE	1	EP	2	EP	2	PF	2	2	NE	2	EP	2	PF
E	E-1	1	1	NE	1	NE	1	EP	2	PF	2	2	NE	2	EP	2	PF
	E-2	1	1	NE	1	NE	1	EP	2	PF	2	2	NE	2	EP	2	PF
	E-3	1	1	NE	1	NE	1	EP	2	PF	2	2	NE	2	EP	2	PF
	E-4	1	1	NE	1	NE	1	EP	2	PF	2	2	NE	2	EP	2	PF
	E-5	1	1	NE	1	EP	1	EP	2	PF	2	2	NE	2	EP	2	PF
	E-6	2	2	NE	2	EP	2	EP	2	PF	2	2	NE	2	EP	2	PF

Figura 18: Parte da Tabela “6” da NT 005 com a informação dos tipos de escadas de emergência por classificação.

- Distâncias Máximas a serem percorridas:

Para determinar as distâncias máximas é necessário identificar as medidas de segurança previstas para a edificação, a classificação de uso e ocupação, a quantidade de saídas e o tipo de pavimento. Com estas premissas definidas encontrou-se o valor de distância máxima devido a classificação (E-4). O valor será de **55 metros**.



Tipo de edificação	Grupo e divisão de ocupação	Sem chuveiros ou sem detectores automáticos		Com chuveiros ou com detectores Automáticos	
		Saída única	Mais de uma saída	Saída única	Mais de uma saída
X	Qualquer	10 m	20 m	25 m	35 m
Y	Qualquer	20 m	30 m	35 m	45 m
Z	C,D,E,F,G-3,G-4, H, I, L e M	30 m	40 m	45 m	55 m
	AB,G-I,G-2 e J	40 m	50 m	55 m	65 m

Figura 19: Parte da Tabela “5” da NT 005 com a informação das distâncias máximas a serem percorridas por classificação e as medidas de segurança presentes.

### 2.8.9.2. LABOMAR (SUBSOLO)

- População Estimada (SUBSOLO): 737 pessoas.

Auditório: 360 pessoas conforme layout.

Museu: 259 pessoas (F-1, uma pessoa por 3m<sup>2</sup> de área)

Depósitos: 13 pessoas (J-2, uma pessoa por 3m<sup>2</sup> de área)

Laboratórios: 105 pessoas (D-4, uma pessoa por 7m<sup>2</sup> de área)

#### Pavimento Subsolo:

$$P = 737 \text{ pessoas}$$

- Número de unidades para Acessos / Descargas:

$$N = \frac{737}{100} = 7,37 = 8$$

$$L = 0,55 \times 8 = 4,40 \text{ metros}$$

- Número de unidades Escadas/Rampas:

$$N = \frac{737}{60} = 12,28 = 13$$

$$L = 0,55 \times 13 = 7,15 \text{ metros}$$

- Número de unidades Portas:

$$N = \frac{737}{100} = 7,37 = 8$$

$$L = 0,55 \times 8 = 4,40 \text{ metros}$$

### 2.8.10. BRIGADA DE INCÊNDIO

Grupo organizado de pessoas, preferencialmente voluntárias ou indicadas, treinadas e capacitadas para atuar no abandono da edificação, combate a um princípio de incêndio e prestar os primeiros socorros,



dentro de uma área preestabelecida. Sendo composta por pessoas de todos os setores de empresa ou por brigadistas efetivos, que deverão ter a sua quantidade dimensionada em função do turno de funcionamento e da natureza do trabalho desenvolvido pela empresa.

Para cada edificação deverá ter no mínimo um chefe de brigada e um líder de brigada por pavimento da edificação.

As atribuições dos brigadistas para as ações de prevenção são as seguintes:

- Avaliação dos riscos existentes;
- Inspeção geral dos equipamentos de combate a incêndio;
- Inspeção geral das rotas de fuga;
- Elaboração de relatório de irregularidades encontradas e posterior encaminhamento do mesmo aos setores competentes;
- Orientação à população fixa e flutuante;
- Exercícios simulados.

As atribuições dos brigadistas para as ações de emergência são as seguintes:

- Identificação da situação;
- Alarme/abandono da área;
- Acionamento do Corpo de Bombeiros Militar e/ou ajuda externa;
- Corte de energia;
- Primeiros socorros;
- Combate ao princípio de incêndio;
- Recepção e orientação ao Corpo de Bombeiros Militar.

#### **2.8.11. ILUMINAÇÃO DE EMERGÊNCIA**

O projeto de iluminação de emergência da edificação será estruturado a partir de Blocos autônomos com baterias com autonomia mínima de 1 hora. Estes serão utilizados tanto para iluminação de aclaramento quanto para balizamento. Os níveis de iluminância mínimos para as rotas de fuga serão 5 lux em locais com desnível (escadas e rampas) e 3 lux para os locais planos (corredores) ou o proporcional de 20 para 1 considerando o nível de iluminância normal do ambiente. A temperatura de cor utilizada para as luminárias será superior a 3.000 K.

Segue especificações a serem adotadas:

Tipo 01 – Luminária de Emergência LED

Tipo de lâmpada: LED

Potência (watt) consumo: 9 W

Tensão de alimentação: 110/220V

Autonomia mínima: 4 horas

Nível de iluminação: 500 Lumens

Bateria: 6 Volts, 4Ah (selada livre de manutenção)

- Tipo 02 – Luminária de Emergência com dois faróis em LED

Tipo de lâmpada: LED

Potência (watt) consumo: 15 W

Tensão de alimentação: 110/220V

Autonomia mínima: 4 horas

Nível de iluminação: 2400 Lumens

Bateria: 12,0Volts, 7Ah (selada livre de manutenção)

Deve assegurar o mínimo de proteção de acordo com a NBR 6146, de forma a ter resistência contra impacto de água, sem causar danos mecânicos nem o desprendimento da luminária.


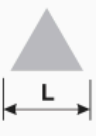
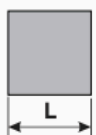
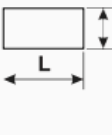
#### **2.8.12. DETECÇÃO E ALARME DE INCÊNDIO**

O sistema de detecção e alarme de incêndio será composto por uma central localizada na área de supervisão do empreendimento de modo a garantir o monitoramento 24 horas. A localização dos elementos periféricos de acionamento manual e sinalizadores audiovisuais serão determinados pela distância a serem percorridas pelos usuários (a cada 30 metros) e preferencialmente instalados próximos aos hidrantes. Os detectores serão distribuídos na edificação conforme as características de cada ambiente.

O conceito básico das infraestruturas do sistema de alarme será do tipo aparente no pavimento técnico e para circulação e os ambientes de escritório os elementos serão embutidos na alvenaria ou instalados no entre forro. Para os ambientes aparentes serão aplicados infraestrutura metálica, enquanto os embutidos serão de PVC.

#### **2.8.13. SINALIZAÇÃO DE EMERGÊNCIA**

Projeto será desenvolvido conforme as instruções técnicas do Corpo de Bombeiros do Ceará e NBR 16820. Serão projetadas placas fotoluminescentes com dimensões padronizadas atendendo a distância de observação constante com exceção de ambientes com necessidades específicas. Para ambientes de reunião de público serão previstas sinalização iluminada.

Sinal	Forma geométrica	Cota	Relação entre dimensão e distância de visualização						
			100	150	200	300	400	500	700
Proibição		Medida em milímetros (D)	100	150	200	300	400	500	700
		Distância de visualização em metros	4 m	5,9 m	7,9 m	11,9 m	15,8 m	19,8 m	27,7 m
Alerta		Largura em milímetros	100	150	200	300	400	500	700
		Distância de visualização em metros	--	4,4 m	5,9 m	8,8 m	11,8 m	14,7 m	20,6 m
Orientação, salvamento e equipamentos		Medida em milímetros (L <sup>2</sup> )	100 × 100	150 × 150	200 × 200	250 × 250	300 × 300	400 × 400	600 × 600
		Distância de visualização em metros	4,5 m	6,7 m	8,9 m	11,2 m	13,4 m	17,8 m	26,8 m
		Medida em milímetros (L × H)	200 × 100	240 × 120	300 × 150	400 × 200	600 × 300	700 × 350	1 000 × 500
		Distância de visualização em metros	6,3 m	7,6 m	9,5 m	12,6 m	19 m	22,1 m	31,6 m

NOTA 1 A Tabela 1 apresenta valores de referência para algumas medidas predefinidas.

NOTA 2 As dimensões utilizadas são exemplos de algumas medidas encontradas no mercado brasileiro. Outras dimensões podem ser utilizadas, sempre levando em consideração o cálculo de distância máxima de visualização.

Figura 20: Tabela "1" da NBR 16820:2022 das dimensões dos símbolos de sinalização.

### 2.8.14. EXTINTORES

As premissas para o desenvolvimento deste projeto será a minimização do uso de extintores de pó ABC sempre tentando realizar uma composição entre agentes extintores diferentes ou específicos para o tipo de proteção.

A definição de posicionamento basicamente é para atender aos ambientes com riscos especiais (subestação, sala de grupo gerador, casa de bombas, etc.) que demandam proteção próxima e para satisfazer a distância máxima a ser percorrida pelos usuários até encontrar um aparelho extintor. Estas distâncias são definidas conforme o risco da edificação e o tipo de aparelho extintor.

Do pavimento térreo a coberta o empreendimento está classificado com o Risco Baixo e o valor máximo para o usuário percorrer até o aparelho portátil mais próximo será de 20 metros.

O subsolo por ter um auditório está classificado com o Risco Médio e o valor máximo para o usuário percorrer até o aparelho portátil mais próximo será de 15 metros.



### 2.8.15. HIDRANTES E MANGOTINHOS

A solução técnica que será desenvolvida para esta medida de segurança está diretamente ligada a solução do sistema de água de potável. Com a determinação da posição dos reservatórios que atenderá ao LABOMAR poderá ser definido onde será prevista o volume de Reserva Técnica de Incêndio (RTI).

O conceito básico das infraestruturas das instalações de Hidrantes será do tipo aparente nas áreas técnicas e para circulação e similares, as tubulações serão embutidas na alvenaria ou instalados no entre forro.

Reserva Técnica de Incêndio (RTI) e Tipo de Sistema de Proteção por Hidrantes:

Para determinar o volume necessário para Reserva Técnica de Incêndio é necessária a área da edificação protegida, a classificação de uso de ocupação e a carga de incêndio prevista. O dimensionamento levou em consideração a ocupação com maior risco, no caso o Subsolo/Auditório.

ÁREA DAS EDIFICAÇÕES E ÁREAS DE RISCO	CLASSIFICAÇÃO DAS EDIFICAÇÕES E ÁREAS DE RISCO			
	A-2, A-3, C-1, D-1(até 300 MJ/m <sup>2</sup> ), D-2, D-3 (até 300 MJ/m <sup>2</sup> ), D-4 (até 300 MJ/m <sup>2</sup> ), E-1, E-2, E-3, E-4, E-5, E-6, F-1 (até 300 MJ/m <sup>2</sup> ), F-2, F-3, F-4, F-8, G-1, G-2, G-3, G-4, H1, H-2, H-3, H-5, H-6, I-1, J-1, J-2 e M-3	D-1 (acima de 300 MJ/m <sup>2</sup> ), D-3 (acima de 300 MJ/m <sup>2</sup> ), D-4 (acima de 300 MJ/m <sup>2</sup> ); B-1; B-2; C-2 (acima de 300 até 800 MJ/m <sup>2</sup> ), C-3, F-5, F-6, F-7, F-9, H-4, I-2 (acima de 300 até 800 MJ/m <sup>2</sup> ), J-2 e J-3 (acima de 300 até 800 MJ/m <sup>2</sup> )	C-2 (acima de 800 MJ/m <sup>2</sup> ), F-1 (acima de 300 MJ/m <sup>2</sup> ); F-10, G-5, I-2 (acima de 800 MJ/m <sup>2</sup> ), J-3 (acima de 800 MJ/m <sup>2</sup> ), L-1 e M-1	I-3, J-4, L-2 e L-3
A < 2.500m <sup>2</sup>	RTI <sup>2</sup> 4,5m <sup>3</sup>	RTI <sup>3</sup> 7,5m <sup>3</sup>	RTI <sup>3</sup> 15m <sup>3</sup>	RTI <sup>3</sup> 22,5m <sup>3</sup>
2.500m <sup>2</sup> > A > 5.000m <sup>2</sup>	RTI <sup>2</sup> 4,5m <sup>3</sup>	RTI <sup>3</sup> 7,5m <sup>3</sup>	RTI <sup>4</sup> 30m <sup>3</sup>	RTI <sup>4</sup> 45m <sup>3</sup>
5.000m <sup>2</sup> > A > 10.000m <sup>2</sup>	RTI <sup>2</sup> 4,5m <sup>3</sup>	RTI <sup>3</sup> 7,5m <sup>3</sup>	RTI <sup>4</sup> 30m <sup>3</sup>	RTI <sup>5</sup> 45m <sup>3</sup>
10.000m <sup>2</sup> > A > 20.000m <sup>2</sup>	RTI <sup>2</sup> 9m <sup>3</sup>	RTI <sup>3</sup> 15m <sup>3</sup>	RTI <sup>5</sup> 48m <sup>3</sup>	RTI <sup>5</sup> 72m <sup>3</sup>
20.000m <sup>2</sup> > A > 50.000m <sup>2</sup>	RTI <sup>2</sup> 9m <sup>3</sup>	RTI <sup>3</sup> 15m <sup>3</sup>	RTI <sup>5</sup> 48m <sup>3</sup>	RTI <sup>5</sup> 72m <sup>3</sup>
A > 50.000m <sup>2</sup>	RTI <sup>2</sup> 9m <sup>3</sup>	RTI <sup>3</sup> 15m <sup>3</sup>	RTI <sup>5</sup> 48m <sup>3</sup>	RTI <sup>5</sup> 72m <sup>3</sup>

**Notas:**

- 1) Os volumes acima devem ser acrescidos de 600 x n° de pontos de hidrantes para compor a RTI
- 2) Sistema de hidrantes para combate a incêndio tipo I
- 3) Sistema de hidrantes para combate a incêndio tipo II
- 4) Sistema de hidrantes para combate a incêndio tipo III
- 5) Sistema de hidrantes para combate a incêndio tipo IV

Figura 21: Volume mínimo da reserva técnica de incêndio conforme Tabela "3" da NT-006.

A reserva técnica de incêndio é dimensionada pela fórmula  $V_{RTI} = 15 \text{ m}^3 + "H" \times 0,6 \text{ m}^3$ , onde H é o número de hidrantes distribuídos em todas as áreas da edificação. Desta forma temos:

$$V_{RTI} = 15 \text{ m}^3 + (52 \times 0,6 \text{ m}^3) = 46,20 \text{ m}^3.$$

Com isto, o volume do reservatório para o LABOMAR com carga de incêndio de 600 MJ/m<sup>2</sup> terá o volume de RTI de **46.200 litros**.

Nestas mesmas características a Figura 21 define o tipo de sistema de segurança que será o **Tipo 2**.

Características do Sistema de Proteção:



A Figura 22 e a Figura 23 apresentam as características e os componentes do sistema de proteção Tipo 2.

TIPO	ESGUICHO	MANGUEIRAS DE INCÊNDIO		NÚMERO DE EXPEDIÇÕES	VAZÃO (l/min) E PRESSÃO (kgf/cm <sup>2</sup> ) MÍNIMAS NO HIDRANTE MAIS DESFAVORÁVEL
		DIÂMETRO (mm)	COMPRIMENTO MÁXIMO (m)		
I	jato compacto de 13 mm ou regulável	40	2x15(30)	simples	150/0,4
II	jato compacto de 16 mm ou regulável	40	2x15(30)	simples	250/1,0
III	jato compacto de 19 mm ou regulável	40 ou 65	2x15(30)	simples	400/1,5
IV	jato compacto de 25 mm ou regulável	65	2x15(30)	duplo	600/2,0

Nota:  
1) Nos sistemas de hidrantes dimensionados por cálculo hidráulico total, as pressões acima são substituídas pelas pressões resultantes do cálculo.  
2) As alturas estáticas de 4m, 10m, 15m e 20m respectivamente para os tipos I, II, III e IV torna facultativo o uso de pressurização mecânica.

Figura 22: Tipos de Sistema por Hidrante conforme Tabela “2” da NT-006.

MATERIAIS	TIPOS DE SISTEMA			
	I	II	III	IV
Abrigo	Sim	Sim	Sim	Sim
Mangueira de incêndio	Sim	Sim	Sim	Sim
Chaves para hidrantes (engate rápido)	Sim	Sim	Sim	Sim
Esguicho	Sim	Sim	Sim	Sim

Figura 23: Tabela “4” da NT-006 com os componentes para cada hidrante simples.

### 2.8.16. METODOLOGIA A SER ADOTADA PARA O SISTEMA DE PRESSURIZAÇÃO (HIDRANTES + CHUVEIROS AUTOMÁTICOS NO SUBSOLO)

Conforme mencionado na nota<sup>3</sup> do item **Erro! Fonte de referência não encontrada.**, teremos o adicional da medida de preventiva por chuveiros automáticos no subsolo. Esse sistema será interligado à rede de hidrantes pressurizada, utilizando-se da reserva de incêndio dimensionada para o sistema de hidrantes, entretanto a bomba de incêndio será dimensionada considerando o funcionamento simultâneo de seis bicos e um hidrante.

Premissa a ser adotada ao Hidrante:

- Velocidade máxima nas tubulações 5,0 m/s;
- Coeficiente de Hazen-Willians para tubos de ferro dúctil com revestimento interno C=120;
- Vazões e pressões mínimas para o hidrante de acordo com a Figura 22: Tipos de Sistema por Hidrante conforme Tabela “2” da NT-006.

Premissa a ser adotada aos bicos de chuveiros automáticos:

- chuveiro automático de resposta e supressão rápidas (ESFR);
- Vazões mínimas para os chuveiros automáticos, densidade de 6,1 l/min/m<sup>2</sup>, de acordo com o item 8.5.2 da NBR 10897/2020 e pressão mínima de 48 kPa de acordo com o item 9.4.4.10 da



NBR 10897/2020 e a pressão máxima para os chuveiros automáticos é de 1.210kPa de acordo com o item 9.4.4.11 da NBR 10897/2020.

### 2.8.17. CONTROLE DE FUMAÇA

Deverá ser implantado sistema de controle de fumaça para o pavimento subsolo ocupado e Átrio, conforme Instrução Técnica nº 15/2019 (Controle de Fumaça) do Corpo de Bombeiros Militar do Estado de São Paulo.

#### 2.8.17.1. CONTROLE DE FUMAÇA SUBSOLO

Os sistemas de controle de fumaça para subsolo, será com introdução de ar mecânica e extração de fumaça mecânica.

Extração de fumaça	Introdução de ar limpo
Natural	Natural
Mecânica	Natural
Mecânica	Mecânica

Figura 24: Tabela “1” da NT-015 parte 1 - Sistemas de extração de fumaça e introdução de ar.

A proposta é que a captação do ar, seja feita através de grelhas de extração, instaladas nos dutos e conduzida à uma área externa ao empreendimento, no pavimento térreo através de dutos.

Os cálculos de determinação da vazão do ar de extração, serão baseados na IT-015 parte 06 (Controle de Fumaça).

A forma de acionamento destes sistemas será pelo uso de um sistema de acionamento automático de detecção pelo sistema de combate a incêndio.

Os ventiladores de extração de fumaça de serão alimentados eletricamente, seja por energia comercial, como também por energia de emergência (através de gerador autônomo), na ausência da primeira.

### 2.8.18. CENTRAL DE GÁS

Serão previstas 02 centrais de gás do Tipo GLP para atender as necessidades dos aquecedores de passagem a gás para aquecimento de água a serem utilizados em ambientes de apoio ao refeitório e apoio aos ambientes laboratoriais.

A tubulação proposta para abastecimento dos pontos é o Cobre sem costura – classe A.

As centrais de gás deverão atender ao TRF dos elementos estruturais:

- A parede resistente ao fogo deve ser totalmente fechada (sem aberturas) e construída em alvenaria, concreto ou construção similar, com materiais e formas aprovadas, com tempo de resistência ao fogo mínima de 2 horas, NBR 10636.





- E parede resistente ao fogo deve possuir no mínimo 1,80 metros de altura ou estar na mesma altura do recipiente, o que for maior, e estar localizada entre 1 m e 3m, medidos do ponto mais do recipiente.
- É recomendável a construção de somente uma parede resistente ao fogo. O número total de paredes deve ser limitado a duas.

Afastamentos mínimos das centrais de gás a outras instalações:

Tabela 1 — Afastamentos de segurança

Tabela de afastamentos de segurança									
m									
Capacidade individual do recipiente m <sup>3</sup>	Divisa de propriedades edificáveis / edificações d, t, g, h		Entre recipientes	Aberturas abaixo da descarga da válvula de segurança		Fontes de ignição e outras aberturas (portas e janelas) j		Produtos tóxicos, perigosos, inflamáveis e chama aberta i	Materiais combustíveis
	Superfície a, c, e	Enterrados /Aterrados b		Abastecidos no local	Destrocáveis	Abastecidos no local	Destrocáveis		
Até 0,5	0	3	0	1	1	3	1,5	6	3
> 0,5 a 2	1,5	3	0	1,5	-	3	-	6	3
> 2 a 5,5	3	3	1	1,5	-	3	-	6	3
> 5,5 a 8	7,5	3	1	1,5	-	3	-	6	3
> 8 a 120	15	15	1,5	1,5	-	3	-	6	3
> 120	22,5	15	¼ da soma dos diâmetros adjacentes	1,5	-	3	-	6	3

- Nos recipientes de superfície, as distâncias apresentadas são medidas a partir da superfície externa mais próxima. A válvula de segurança dos recipientes estacionários deve estar fora das projeções da edificação, tais como telhados, balcões e marquises.
- As distâncias de afastamento das edificações não devem considerar projeções de complementos ou partes destas, tais como telhados, balcões e marquises.
- Em uma instalação, se a capacidade total com recipientes até 0,5 m<sup>3</sup> for menor ou igual a 2 m<sup>3</sup>, a distância mínima continuará sendo de 0 metros; se for maior que 2 m<sup>3</sup>, considerar.
- Para recipientes transportáveis contidos em abrigos com as mínimas paredes laterais e cobertura, a distância pode ser reduzida à metade.

Tabela 2 — Afastamentos para estocagem de oxigênio

Capacidade volumétrica total dos recipientes de GLP m <sup>3</sup>	Capacidade máxima de oxigênio possível de ser contida nos recipientes, em fase líquida e gasosa, incluindo reservas de oxigênio na fase gasosa Nm <sup>3</sup>		
	Até 11	11 a 566	Acima de 566
Até 5,5	0	6	7,5
> 5,5	0	6	15



Tabela 4 — Afastamentos para redes elétricas

Nível de tensão kV	Distância mínima m
≤ 0,6	1,8
Entre 0,6 e 23	3,0
≥ 23	7,5

### 2.8.18.1. AFASTAMENTOS DAS TOMADAS DE ABASTECIMENTOS

As tomadas de abastecimento estarão localizadas dentro da propriedade, no interior da edificação e será realizada nos próprios recipientes. Para tal, serão respeitados os seguintes afastamentos mínimos:

- 3 m de aberturas (janelas, portas, tomadas e ar e etc.) das edificações;
- 6 m de reservatórios que contenham outros fluidos inflamáveis;
- 1,5 m de ralos, rebaixos ou canaletas e dos veículos abastecedores;
- 3,0 m de materiais de fácil combustão e de ponto de ignição.

### 2.8.19. SPDA

Durante o desenvolvimento do projeto será realizada a análise de risco prevista na NBR 5419 para determinar a necessidade de instalar este sistema. Porém, pelo perfil construtivo da edificação, a implantação de um SPDA externo provavelmente será exigida. A análise determinará a classe deste sistema e os demais elementos de proteção.

## 2.9. INSTALAÇÕES HIDRÁULICAS – ÁGUA FRIA / QUENTE POTÁVEL - ÁGUA BRUTA - ÁGUA TRATADA

### 2.9.1. DESCRIÇÃO GERAL DO SISTEMA

O projeto da rede de água fria potável terá a premissa de que a água para abastecimento dos reservatórios será proveniente da rede pública. A partir dos reservatórios superiores, a água será encaminhada por gravidade até os pontos de consumo nas respectivas áreas molhadas. No caso de equipamentos que exijam maiores pressões de serviço, será prevista rede exclusiva pressurizada para tal atendimento. Nos locais de lavagem de utensílios de cozinha e para lavadora de louças serão previstos pontos de água quente, de forma que a geração será feita por aquecedores de passagem a gás. Serão previstos pontos hidráulicos para atendimento aos equipamentos de geração de água tratada (ex.: filtros abrandadores / osmose reversa). As tubulações utilizadas serão de PVC Soldável Marrom para condução da água potável e água tratada, água bruta e CPVC para a condução de água quente potável.

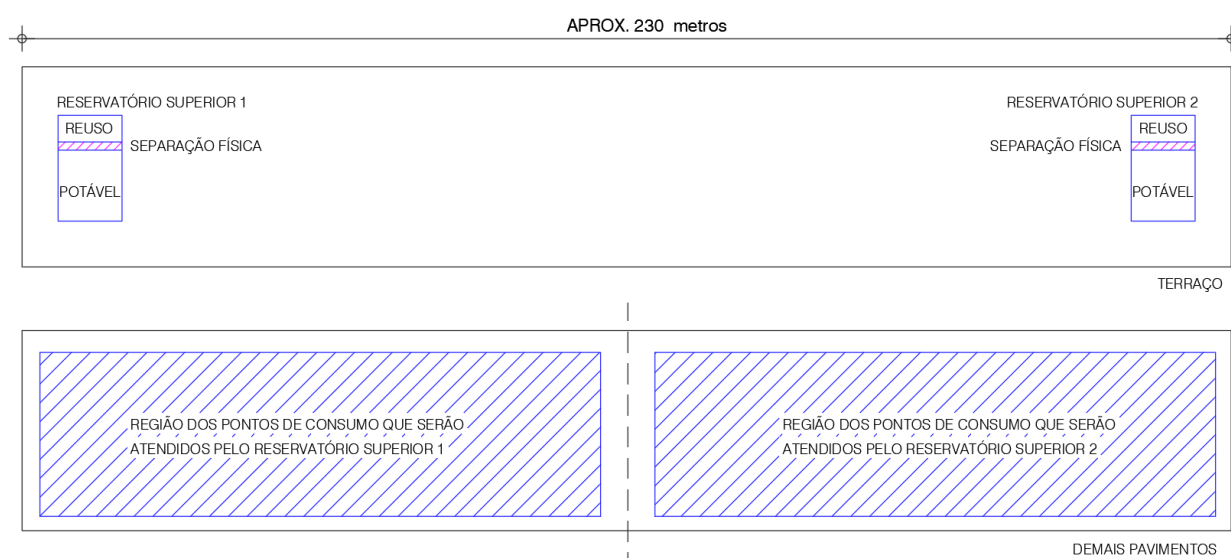
Haverá reaproveitamento das águas de chuva e da rede de drenos dos equipamentos de climatização, de forma que o seu reuso atenderá aos pontos de consumo das descargas nos vasos sanitários, descargas nos mictórios e a irrigação manual das áreas de paisagismo. Para a rede de reuso de água bruta, serão previstos reservatórios inferiores e superiores para devido armazenamento independente.

### 2.9.2. SISTEMA DE ABASTECIMENTO DE ÁGUA POTÁVEL

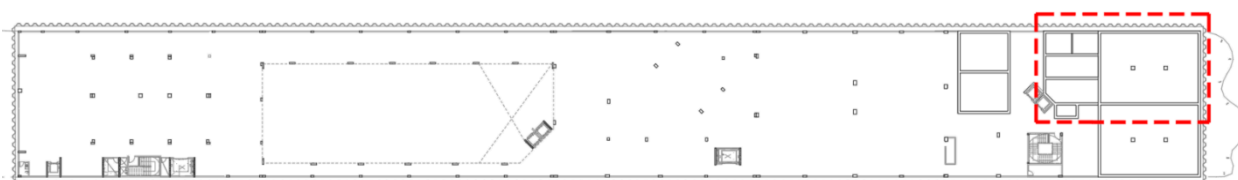
A edificação possui mais de dois pavimentos e nessa condição a solução do abastecimento de água potável adotada será do tipo indireto com bombeamento, pois a rede de água da Concessionária não disponibiliza pressão suficiente para vencer a altura da edificação e alimentar diretamente aos reservatórios superiores. Portanto, serão previstos reservatórios inferiores na cota abaixo do nível do passeio (no subsolo) sendo abastecidos diretamente da rede pública através dos alimentadores prediais. O tempo de enchimento estimado para as cisternas será de 6 horas. Necessária confirmação com a Concessionária através da DVT (Declaração de Viabilidade Técnica) das informações de vazão e pressão na rede que passa na via principal de acesso à edificação.

### 2.9.3. RESERVAÇÃO DE ÁGUA POTÁVEL E DE ÁGUA BRUTA

Como a edificação é de grande porte, área construída em torno de 20.000 m<sup>2</sup>, serão previstos dois reservatórios superiores localizados nas “extremidades” leste e oeste do prédio. Desta forma, teremos duas redes independentes para atendimento aos pontos de consumo, minimizando os efeitos da perda de carga devido a redução do comprimento desenvolvido pela tubulação e facilitando as manutenções na rede hidráulica.



**Figura 25:** Esquema – Área que será atendida no prédio por cada reservatório superior



**Figura 26:** Esquema – Locais no subsolo onde serão previstos os reservatórios inferiores (cisternas) de água potável e água bruta

A Figura 25 e a Figura 26 mostram respectivamente a localização dos reservatórios superiores com as suas “áreas” de atendimento e a localização no subsolo (demarcada em vermelho) da área onde serão executadas as cisternas de água potável e água bruta.



#### 2.9.4. PREMISSAS DE DIMENSIONAMENTO DOS PONTOS DE CONSUMO E TUBULAÇÕES

Serão seguidas as seguintes premissas atendendo as recomendações da NBR 5626 – Sistemas prediais de água fria e quente – Projeto, execução, operação e manutenção:

- Velocidade do fluido inferior a 3 m/s em todos os trechos de tubulação;
- Pressão dinâmica maior que 5 kPa em todos os trechos de tubulação;
- Pressão estática nos pontos de consumo inferior a 400 kPa;
- Cálculo da perda de carga unitária “J” será conforme Azevedo Netto:

$$J = 10,643xC^{-1,85}xQ^{1,85}xD^{-4,75}, \text{ onde:}$$

- J = perda de carga unitária em m/m;
- Q = vazão do trecho em m<sup>3</sup>/s;
- D = diâmetro interno da tubulação em m;
- C = 140 (tubos novos de PVC).

- Velocidade do fluido “V” será dada por:

$$V = \frac{Q}{A}, \text{ onde:}$$

- Q = vazão do trecho em m<sup>3</sup>/s;
- A = seção interna da tubulação em m<sup>2</sup>.

Peças de utilização	Diâmetro	
	DN (mm)	Ref. (pol.)
Aquecedor de alta pressão	20	1/2
Aquecedor de baixa pressão	25	3/4
Banheira	20	1/2
Bebedouro	20	1/2
Bidê	20	1/1
Caixa de descarga	20	1/2
Chuveiro	20	1/2
Filtro de pressão	20	1/2
Lavatório	20	1/2
Máquina de lavar pratos ou roupas	25	3/4
Mictório autoaspirante	32	1
Mictória não aspirante	20	1/2
Pia de cozinha	20	1/2
Tanque de despejo ou de lavar roupas	25	3/4
Válvula de descarga	40	1 1/4

Figura 27: Tabela – Diâmetros mínimos dos pontos de consumo – Retirado das literaturas de referência

Aparelho sanitário	Peça de utilização	Vazão de projeto (litros/s)	Peso relativo	
Bacia sanitária	Caixa de descarga	0,15	0,3	
	Válvula de descarga	1,70	32	
Banheira	Misturador (água fria)	0,30	1,0	
Bebedouro	Registro de pressão	0,10	0,1	
Bidê	Misturador (água fria)	0,10	0,1	
Chuveiro ou ducha	Misturador (água fria)	0,20	0,4	
Chuveiro elétrico	Registro de pressão	0,10	0,1	
Lavadora de louças ou de roupas	Registro de pressão	0,30	1,0	
Lavatório	Torneira ou misturador (água fria)	0,15	0,3	
Mictório cerâmico	Com sifão integrado	Válvula de descarga	0,50	2,8
	Sem sifão integrado	Caixa de descarga, registro de pressão ou válvula de descarga para mictório	0,15	0,3
Mictório tipo calha	Caixa de descarga ou registro de pressão	0,15 por metro de calha	0,3	

Figura 28: Tabela – Vazão e pesos relativos dos aparelhos – Retirado das literaturas de referência

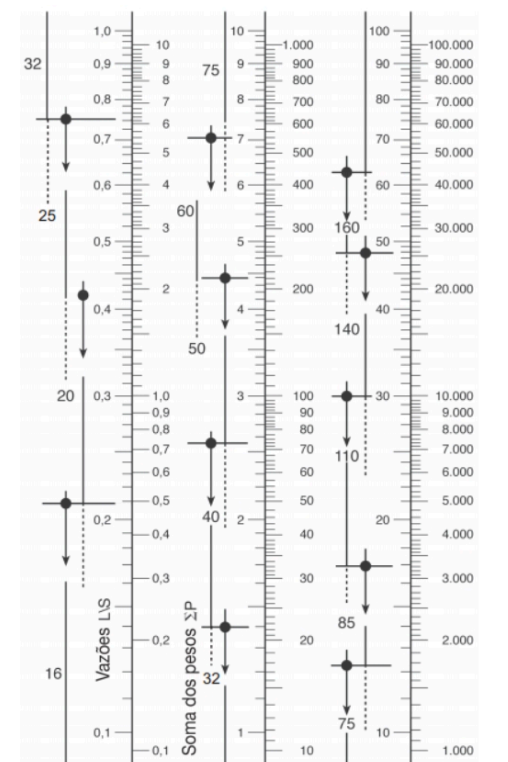


Figura 29: Tabela – Ábaco para dimensionamento dos sub-ramais de água fria e quente – Retirado das literaturas de referência

### 2.9.5. ESTIMATIVA DE VOLUME DE CONSUMO E ARMAZENAMENTO DE ÁGUA POTÁVEL

As premissas para as estimativas de volume de consumo são:

- Consumo diário de água potável por aluno em regime de externato – 50 litros; porém será considerado 40 litros no cálculo devido à parcela da água bruta disponibilizada para o reuso;
- Consumo diário de água potável por servidor – 50 litros; porém será considerado 40 litros no cálculo devido à parcela da água bruta disponibilizada para o reuso;
- Consumo diário de água potável por visitantes – 10 litros; porém será considerado 5 litros no cálculo devido à parcela da água bruta disponibilizada para o reuso;
- Deverá ser considerado o armazenamento para 2 dias como contingência devido às situações de falta de abastecimento;
- Percentagem de 60% do volume total de armazenamento para a cisterna;
- Percentagem de 40% do volume total de armazenamento para a(s) caixa(s) d'água;

A população foi contabilizada de duas formas:

- Pelo layout do anteprojeto arquitetônico;
- Para os ambientes sem layout, conforme NT/001 e NT/005 do CBMCE, foi estimada a população por m<sup>2</sup>.

PAVIMENTO	DIVISÃO	DESCRIÇÃO	POPULAÇÃO
PAV. SUBSOLO	F-1	Museus, centro de documentos históricos, bibliotecas e assemelhados	1 pessoa por 3m <sup>2</sup> de área
	D-4	Laboratórios de análises clínicas sem internação, laboratórios químicos, fotográficos e assemelhados	1 pessoa por 7m <sup>2</sup> de área
	J-3	Depósitos com carga de incêndio de risco médio - Todo tipo de depósito	1 pessoa por 30m <sup>2</sup> de área
PAV. TÉRREO	E-1	Escolas de ensino fundamental, médio e superior, cursos supletivos, pré-universitários e assemelhados	1 pessoa por 1,5m <sup>2</sup> de área
1º PAV.			
2º PAV.			

**Figura 30:** Tabela – Enquadramento por pavimento para estimativa das populações (NT'S DO CBMCE)

Uma parcela da população foi estimada conforme a Figura 30, com a informação da área de cada ambiente conforme anteprojeto arquitetônico e dos respectivos enquadramentos. A outra parcela foi estimada diretamente pelo layout mostrado nas plantas baixas. Desta forma foram encontradas as seguintes estimativas:

População (alunos): 1430;

População (servidores): 250;

População flutuante (visitantes): 1200.

Conforme as premissas que foram apresentadas, temos o quadro resumo abaixo com as informações de consumo, vazão de abastecimento e volume dos reservatórios.



TIPO / OCUPAÇÃO	QUANTIDADES		REFERÊNCIAS		VOLUME DIÁRIO
consumo alunos	1430	pessoas	40	l/aluno - não internato	57200 litros
consumo funcionários	250	pessoas	40	l/servidor	10000 litros
consumo limpeza	-		-		15000 litros
consumo público flutuante	1200	pessoas	5	l/visitante	6000 litros
<b>TOTAL DIÁRIO</b>					<b>88200</b> litros
P/ 2 DIAS					176400 litros
VOL. DE ARMAZENAMENTO CISTERNAS					105840 litros
VOL. DE ARMAZENAMENTO CXS. D'ÁGUA					70560 litros
VAZÃO ESTIMADA CAGECE (abastecimento)					17640,00 l/h
					17,64 m³/h
					4,90 l/s

**Figura 31:** Tabela – Volume de consumo diário de água potável / Volume estimado de armazenamento nos reservatórios

A Figura 31 mostra que no cálculo estimado para consumo diário foi encontrado um volume de consumo igual a 88.200 litros. Foi considerado neste cálculo, uma estimativa adicional de água para lavagem/limpeza dos ambientes (15.000 litros). Como contingência para os períodos de falta de abastecimento, este volume foi elevado para 176.400 litros (2 dias de consumo). A tabela também mostra o volume de armazenamento adotado para o reservatório inferior (cisterna) igual a 105.840 litros e reservatório superior (cx. d'água) igual a 70.560 litros. Conforme mencionado em 3.2.1.2, para cálculo da vazão de abastecimento pelo alimentador predial, foi considerado um tempo de enchimento de 6 horas. Desta forma, conforme resultado encontrado na tabela da Figura 31, a vazão de abastecimento será igual a 4,90 l/s. De posse dos resultados até aqui, vamos adotar para os reservatórios de água potável:

- RESERVATÓRIO SUPERIOR LADO LESTE: 36m<sup>3</sup>;
- RESERVATÓRIO SUPERIOR LADO OESTE: 36m<sup>3</sup>;
- RESERVATÓRIO INFERIOR: 110m<sup>3</sup>.

### 2.9.6. ESTIMATIVA DE VOLUME DE CONSUMO E ARMAZENAMENTO DE ÁGUA BRUTA

As premissas para as estimativas são:

- Consumo de água por descarga de vaso sanitário – 6 litros;
- Consumo de água por descarga de mictório – 2 litros;
- Quantidade de bacias sanitárias conforme layout dos banheiros e vestiários – 120 unidades;
- Quantidade de mictórios conforme layout dos banheiros e vestiários – 34 unidades;
- Consumo de água de irrigação manual por m<sup>2</sup> de área de paisagismo – 1,5 l/m<sup>2</sup>;
- Área de paisagismo conforme anteprojeto arquitetônico – em torno de 5.000 m<sup>2</sup>.

Conforme as premissas que foram apresentadas, temos o quadro resumo abaixo com as informações de consumo diário de água bruta.

APARELHOS	QUANTIDADES	REFERÊNCIAS	NÚMERO ESTIMADO DE DESCARGAS/DIA POR APARELHO	VOLUME DE CONSUMO DIÁRIO (L)
BACIAS SANITÁRIAS	120 UND	6 litros / descarga	30	21600
MICTÓRIOS	34 UND	2 litros / descarga	30	2040
IRRIGAÇÃO	5000 m <sup>2</sup>	1,5 litros / m <sup>2</sup>	-	7500
<b>VOLUME TOTAL DE CONSUMO DIÁRIO ESTIMADO DE ÁGUA BRUTA (L)</b>				<b>31140</b>

**Figura 32:** Tabela – Volume de consumo diário de água bruta

Conforme a Figura 32, a estimativa de volume de consumo diário é de 31.140 litros de água bruta.

Com este volume de consumo diário, vamos adotar para efeito de cálculo uma contingência de 2 dias de armazenamento, totalizando um volume de 62.280 litros e um percentual de 40% para armazenamento nos reservatórios superiores. Desta forma, o volume total armazenado nos reservatórios superiores será de 24.912 litros. Conforme as premissas de 3.2.1.3, cada reservatório superior de água bruta terá um volume de 12.456 litros.

A próxima premissa será a estimativa do volume de captação da água bruta que atenderá as demandas mensais da edificação.

A água bruta será captada de duas formas:

- Através da captação da água descartada pelos drenos do sistema de climatização;
- Através do sistema de drenagem (água pluvial) com uso de ralos nas lajes impermeabilizadas do terraço da edificação;

Para fazer uma estimativa do volume captado na primeira alternativa, serão seguidas as seguintes premissas:

- Área construída – 20.000 m<sup>2</sup>;
- Capacidade de refrigeração – 500 BTU/h por m<sup>2</sup>;
- Fator de conversão BTU/h para TR – 12.000;
- Volume de água de descarte – 0,7 litros de água por hora por TR;
- Horas de funcionamento diário – 10.

volume estimado de coleta dos drenos de ar-condicionado	área construída aproximada	20000 m <sup>2</sup>
	capacidade de refrigeração	500 BTU/h por m <sup>2</sup>
	estimativa de carga térmica	10000000 BTU/h
	estimativa de carga térmica calculada	833,33 TR
	carga térmica adotada	1000 TR
	estimativa do volume de água de descarte	0,7 l/h por TR
	tempo de funcionamento das máquinas	10 h
	VOLUME DE CAPTAÇÃO DIÁRIO	7000 litros

**Figura 33:** Tabela – Volume de água bruta captado nos drenos de ar-condicionado

A Figura 33 mostra os cálculos da estimativa do volume de água a ser captado pelos drenos do sistema de climatização. Obtemos uma estimativa de captação de 7.000 litros de água bruta por dia.

Para fazer uma estimativa do volume captado na segunda alternativa, drenagem das águas pluviais, serão seguidas as seguintes premissas:

- Conforme NBR 15527:2019 – Aproveitamento de água de chuva de coberturas para fins não potáveis – Requisitos, temos uma sequência de cálculos para estimativa de volume disponível em função do tempo;  $V = P \times A \times C \times \hat{t}$ , onde:





V – Volume disponível mensal, em litros;

P – Precipitação média mensal, em milímetros;

A – área de coleta; será adotada uma área de 4.400 m<sup>2</sup>, referente ao terraço da edificação;

C – Coeficiente de escoamento superficial, será adotado 0,9;

η – eficiência do sistema de captação, será adotado 0,85.

- Para a adoção dos valores de precipitação, serão utilizadas as informações dos valores médios mensais retirados da série histórica de 30 anos da cidade de Fortaleza (ver Figura 34).

Mês	Mínima (°C)	Máxima (°C)	Precipitação (mm)
Janeiro	25°	29°	101
Fevereiro	24°	28°	139
Março	25°	28°	202
Abril	25°	28°	250
Maio	25°	29°	136
Junho	25°	29°	79
Julho	24°	29°	43
Agosto	24°	30°	12
Setembro	25°	30°	7
Outubro	25°	30°	10
Novembro	25°	30°	13
Dezembro	25°	30°	37

Figura 34: Informações retiradas de: <https://www.climatempo.com.br/climatologia/60/fortaleza-ce>

MÊS	MEDIA MENSAL - mm	VOL CHUVA APROVEITÁVEL (litros) - (Q)
jan	101	339.966
fev	139	467.874
mar	202	679.932
abr	250	841.500
mai	136	457.776
jun	79	265.914
jul	43	144.738
ago	12	40.392
set	7	23.562
out	10	33.660
nov	13	43.758
dez	37	124.542

Figura 35: Tabela – Volume mensal de chuva aproveitável

A Figura 35 mostra estimativa de todos os volumes mensais de água bruta da chuva que podem ser captados nas lajes de cobertura do terraço da edificação e encaminhados para armazenamento em cisterna de água bruta, conforme as premissas já mencionadas.

Para cálculo do volume do armazenamento de água bruta na cisterna, temos as seguintes premissas:

- Serão considerados para efeito de cálculo mensal, 22 dias de funcionamento da edificação;



- Conforme a Figura 32, temos uma demanda diária de 31.140 litros de água bruta, totalizando 685.080 litros/mês;

- Conforme a Figura 33, temos um volume de captação diário a partir dos drenos de ar-condicionado igual a 7.000 litros de água bruta, totalizando 154.000 litros/mês;

Subtraindo da demanda necessária a água gerada pelos drenos de ar-condicionado, temos uma estimativa de demanda mensal de água bruta igual a [685.080 litros/mês – 154.000 litros/mês = 531.080 litros/mês];

- Estimando os períodos de férias e menor movimento, será adotada para os meses de janeiro e dezembro uma redução na demanda de 531.080 litros/mês para 100.000 litros/mês. Para o mês de julho será considerada uma redução para 250.000 litros/mês. A tabela abaixo mostra o resumo das demandas mensais de água bruta.

MÊS	DEMANDA (D) - litros
jan	100.000
fev	531.080
mar	531.080
abr	531.080
mai	531.080
jun	531.080
jul	250.000
ago	531.080
set	531.080
out	531.080
nov	531.080
dez	100.000

Figura 36: Tabela – Volumes mensais de demanda de água bruta

A Figura 36 mostra o resumo das demandas mensais de água bruta, conforme premissas e cálculos apresentados.

Com os dados encontrados até aqui, serão calculadas as diferenças entre o volume mensal de água bruta captada da chuva e a demanda mensal de consumo. E também o volume de armazenamento do reservatório de água bruta.

ESTIMATIVA DO VOLUME DE ARMAZENAMENTO DO RESERVATÓRIO DE ÁGUA BRUTA							
MÊS	MEDIA MENSAL - mm	VOL CHUVA APROVEITÁVEL (litros) - (Q)	DEMANDA (D) - litros	S(t) = D(t) - Q(t)	S(t) - DIFERENÇA ENTRE VOL. APROVEITADO E DEMANDA (litros)		VOL. DO RESERVATÓRIO (litros)
jan	101	339.966	100.000	-	239.966,00	SOBRA -	239.966,00
fev	139	467.874	531.080	-	63.206,00	SOBRA -	176.760,00
mar	202	679.932	531.080	-	148.852,00	SOBRA -	325.612,00
abr	250	841.500	531.080	-	310.420,00	SOBRA -	636.032,00
mai	136	457.776	531.080	-	73.304,00	DÉFICIT -	562.728,00
jun	79	265.914	531.080	-	265.166,00	DÉFICIT -	297.562,00
jul	43	144.738	250.000	-	105.262,00	DÉFICIT -	192.300,00
ago	12	40.392	531.080	-	490.688,00	DÉFICIT -	298.388,00
set	7	23.562	531.080	-	507.518,00	DÉFICIT -	805.906,00
out	10	33.660	531.080	-	497.420,00	DÉFICIT -	1.303.326,00
nov	13	43.758	531.080	-	487.322,00	DÉFICIT -	1.790.648,00
dez	37	124.542	100.000	-	24.542,00	DÉFICIT -	1.766.106,00
		3.463.614,00	5.229.720,00		1.766.106,00	COMPLEMENTO ANUAL DE ÁGUA POTÁVEL	

Figura 37: Tabela – Cálculo do volume da cisterna de armazenamento de água bruta



A Figura **37** mostra o resumo mês a mês com a situação do reservatório, sendo “déficit” quando houver necessidade de complemento de água potável para atendimento à demanda mensal e “sobra” quando o volume de chuva aproveitável for maior que a demanda. A tabela também mostra uma estimativa de economia no volume de água anual igual a 3.463.614 litros. Este volume estimado seria gasto com água potável caso não houvesse captação e armazenamento de água bruta. Destacado em vermelho na tabela temos um volume estimado de 1.766.106 litros de água potável a serem usados para complemento na cisterna de água bruta devido aos períodos de estiagem. A tabela também nos mostra que o reservatório teria um volume aproximado de 636.000 litros (observar a célula em verde). Este é o maior volume que seria acumulado (no mês de abril) no reservatório sendo a referência do volume de armazenamento. Como já existe uma estrutura no subsolo (tanque de água do mar) com um volume aproximado de 940.000 litros, sugerimos o uso deste equipamento para o armazenamento de água bruta. Este reservatório também teria a função de armazenar a reserva técnica de incêndio (ver o volume calculado no tópico referente a esta disciplina).

De posse dos resultados até aqui, vamos adotar para os reservatórios de água bruta:

- RESERVATÓRIO SUPERIOR LADO LESTE: 13m<sup>3</sup>;
- RESERVATÓRIO SUPERIOR LADO OESTE: 13m<sup>3</sup>;
- RESERVATÓRIO INFERIOR: 700m<sup>3</sup> (DEMANDA DE ÁGUA BRUTA PARA CONSUMO + RESERVA TÉCNICA DE INCÊNDIO).

### 2.9.7. LOCALIZAÇÃO DAS CISTERNAS DE ÁGUA POTÁVEL E ÁGUA BRUTA

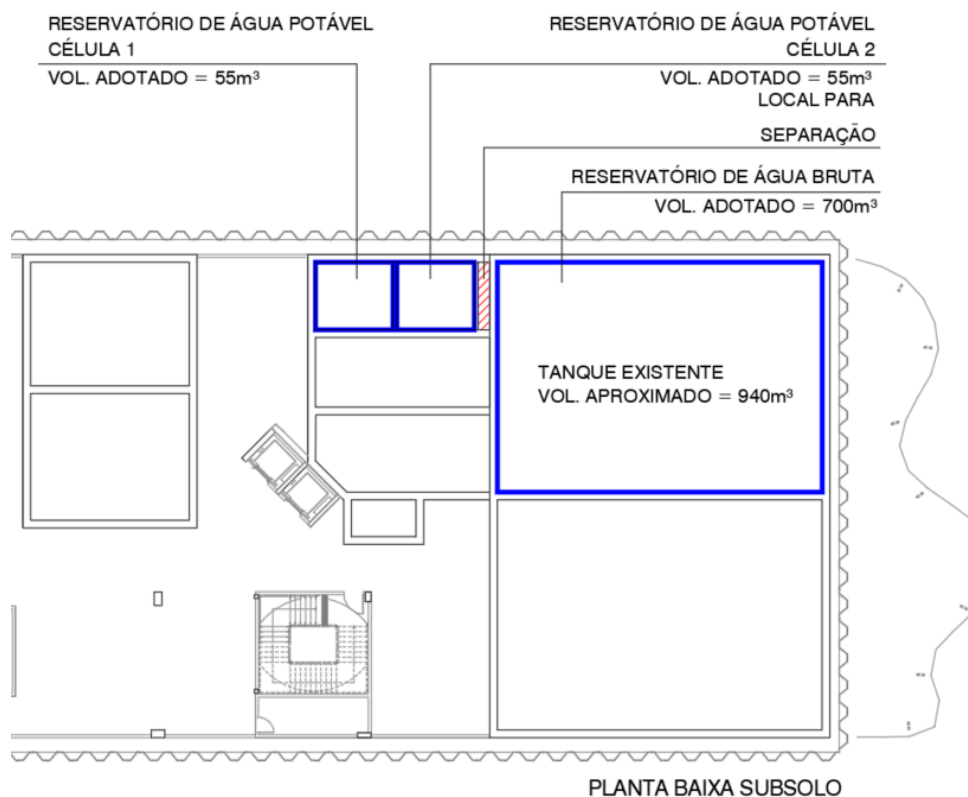


Figura 38: Locais sugeridos para os reservatórios inferiores

### 2.9.8. LOCALIZAÇÃO DOS RESERVATÓRIOS SUPERIORES DE ÁGUA POTÁVEL E ÁGUA BRUTA

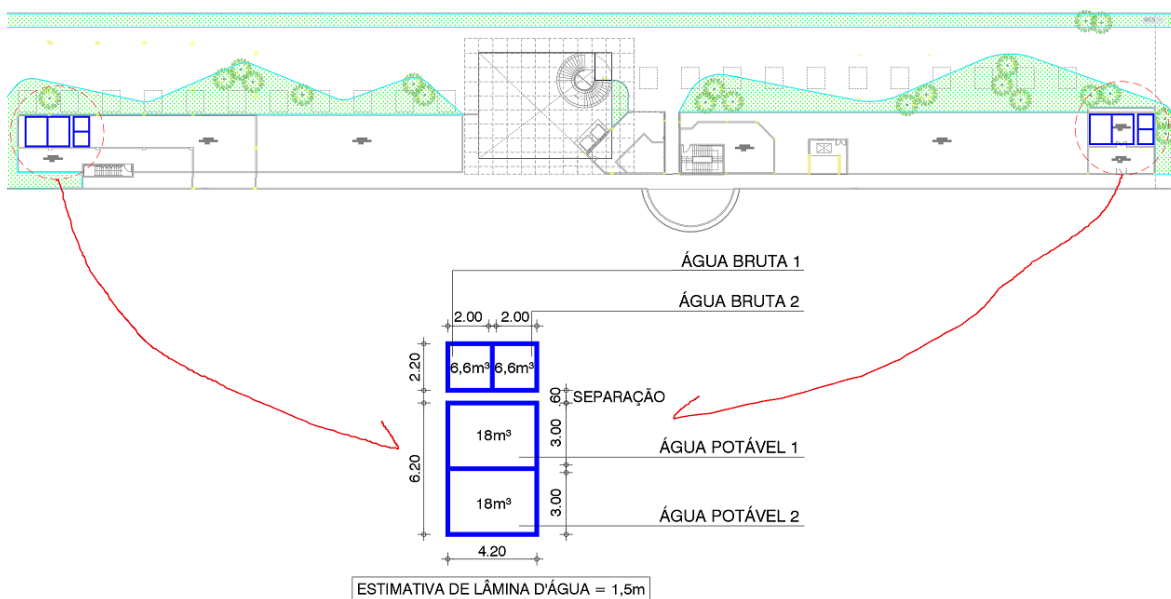


Figura 39: Locais sugeridos para os reservatórios superiores

## 2.10. INSTALAÇÕES SANITÁRIAS

### 2.10.1. DESCRIÇÃO GERAL DO SISTEMA

O projeto da rede de esgoto da edificação terá como premissa o destino dos efluentes na rede pública de esgotos, através da caixa coletora que será instalada no passeio da Av. dos Tabajaras. Importante a verificação junto à Concessionária através de DVT (Declaração de Viabilidade Técnica) para obtenção das informações técnicas referentes.

O sistema de esgotamento sanitário da edificação será concebido de forma a encaminhar os efluentes por gravidade, com uso nas áreas externas das caixas de inspeção para coleta e encaminhamento dos efluentes provenientes dos banheiros e vestiários, caixas de gordura para os efluentes gerados nas copas e cozinhas, caixas de sabão para os efluentes gerados nas áreas de lavagem, lavanderias, DMLs, caixas de retenção para os efluentes gerados nas pias dos laboratórios, caixas de resfriamento no caso dos efluentes provenientes de autoclaves e outros equipamentos que geram efluentes com altas temperaturas, caixas de grade para os efluentes gerados nas pias de expurgo e caixas de passagem para a junção e encaminhamento dos subsistemas de esgoto. Após passagem nos dispositivos mencionados, o esgoto vai à caixa coletora localizada no passeio da edificação para interligação com a rede pública.

Para os pontos de consumo dos níveis abaixo da via pública (subsolo), será prevista em projeto uma EEE (Estação Elevatória de Esgotos) para que o esgoto seja bombeado até a rede de subcoletores que funciona por gravidade no nível do pavimento térreo.

Será prevista rede independente de coleta e encaminhamento dos pontos de esgoto das áreas de laboratórios, caso os efluentes tenham características distintas do esgoto comum, de forma que a destinação desses efluentes seja um pré-tratamento antes do descarte na rede pública, conforme necessidade.

### 2.10.2. PREMISSAS PARA DIMENSIONAMENTO

O projeto utilizará as recomendações da NBR 8160 – Sistemas prediais de esgoto sanitário – Projeto e execução, conforme as tabelas que se seguem:

APARELHO SANITÁRIO	UHC	Ø MIN.	
BACIA SANITÁRIA	6	100	
BANHEIRA DE RESIDÊNCIA	2	40	
BEBEDOURO	0,5		
BIDÊ	1		
CHUVEIRO DE RESIDÊNCIA	2		
CHUVEIRO COLETIVO	4		
LAVATÓRIO DE RESIDÊNCIA	1		
LAVATÓRIO DE USO GERAL	2		
TANQUE DE LAVAR ROUPAS	3		
MICTÓRIO COM VÁLVULA	6		75
MICTÓRIO COM CAIXA DESCARGA	5		50
MICTÓRIO COM DESCARGA AUTOMÁTICA	2	40	
MICTÓRIO CALHA (P/M)	2	50	
PIA DE COZINHA RESIDENCIAL	3		
PIA DE COZINHA INDUSTRIAL PREPARO	3		
PIA DE COZINHA INDUSTRIAL LAVANDERIA	4		
MÁQUINA DE LAVAR LOUÇAS	2		
MÁQUINA DE LAVAR ROUPAS	3		

Figura 40: Unidades hunter e diâmetro mínimo dos ramais de descarga – Retirado da NBR 8160



Diâmetro nominal mínimo do tubo <i>DN</i>	Número máximo de unidades de Hunter de contribuição UHC
40	3
50	6
75	20
100	160

**Figura 41:** Dimensionamento dos ramais de esgoto – Retirado da NBR 8160

GRUPO DE APARELHOS SEM BACIAS SANITÁRIAS		GRUPO DE APARELHOS COM BACIAS SANITÁRIAS	
NÚMERO DE UNIDADES DE HUNTER DE CONTRIBUIÇÃO	DIÂMETRO NOMINAL DO RAMAL DE VENTILAÇÃO	NÚMERO DE UNIDADES DE HUNTER DE CONTRIBUIÇÃO	DIÂMETRO NOMINAL DO RAMAL DE VENTILAÇÃO
Até 12	40	Até 17	50
13 a 18	50	18 a 60	75
19 a 36	75	-	-

**Figura 42:** Dimensionamento dos ramais de ventilação – Retirado da NBR 8160

DIÂMETRO NOMINAL DO TUBO DE QUEDA OU RAMAL DE ESGOTO	UCH	DIÂMETRO NOMINAL MÍNIMO DO TUBO DE VENTILAÇÃO							
		40	50	75	100	150	200	250	300
		COMPRIMENTO PERMITIDO (m)							
50	12	23	64	-	-	-	-	-	-
50	20	15	46	-	-	-	-	-	-
75	21	10	33	247	-	-	-	-	-
75	53	8	29	207	-	-	-	-	-
75	102	8	26	189	-	-	-	-	-
100	43	-	11	76	299	-	-	-	-
100	140	-	8	61	229	-	-	-	-
100	320	-	7	52	195	-	-	-	-
100	530	-	6	46	177	-	-	-	-

**Figura 43:** Dimensionamento das colunas de ventilação – Retirado da NBR 8160

CAIXA DE GORDURA	DIAMETRO INTERNO (m)	PARTE SUBMERSA DO SEPTO (m)	CAPACIDADE DE RETENÇÃO (litros)	Ø NOMINAL DE SAÍDA
PEQUENA (CGP)	0,3	0,2	18	75
SIMPLES (CGS)	0,4	0,2	31	75
DUPLA (CGD)	0,6	0,35	120	100
ESPECIAL (CGE)	*	0,4	**	100

**Figura 44:** Dimensionamento das caixas de retenção e gordura – Retirado da NBR 8160

Diâmetro nominal do tubo <i>DN</i>	Número máximo de unidades de Hunter de contribuição em função das declividades mínimas (%)			
	0,5	1	2	4
100	-	180	216	250
150	-	700	840	1000
200	1400	1600	1920	2300
250	2500	2900	3500	4200
300	3900	4600	5600	6700
400	7000	8300	10000	12000

**Figura 45:** Dimensionamento dos subcoletores – Retirado da NBR 8160



### 2.10.3. SISTEMA DE VENTILAÇÃO

O conceito do projeto contemplará a ventilação secundária de todos os desconectores indicados em projeto. Este subsistema de ventilação consiste em dar continuidade aos ramais de ventilação até a cobertura através das colunas de ventilação. Dependendo de cada situação, será utilizada ventilação primária através do prolongamento até a cobertura dos tubos de queda de esgoto. Da mesma forma com o uso de barriletes de ventilação. Será previsto uso de “terminais de ventilação” nas extremidades superiores das tubulações de ventilação nas coberturas.

### 2.10.4. TUBULAÇÕES

Todas as tubulações serão especificadas em projeto de forma a atender as características dos efluentes que nelas serão transportados. Desta forma, serão utilizados tubos de PVC Série Normal para transporte do esgoto comum e das ventilações de esgoto.

No caso dos efluentes que tenham características específicas, como por exemplo descarte em altas temperaturas das autoclaves, serão utilizados tubos de cobre ou de ferro fundido para devido encaminhamento.

Para as redes pressurizadas de esgoto, serão adotados tubos de polietileno de alta densidade, PEAD, para bombeamento dos efluentes do subsolo para a rede gravitatoria no térreo.

### 2.10.5. ESTIMATIVA DE VAZÃO DE PROJETO / UNIDADES HUNTER DE CONTRIBUIÇÃO

Conforme estimado em 3.2.1.5 e 3.2.1.6 temos um uso diário de água potável igual a 88.200 litros e um uso diário de água de reuso igual a 23.640 litros, totalizando um consumo total diário  $C = 111.840$  litros. Estas são as duas parcelas de água que vão se transformar em esgoto. Serão seguidas as seguintes premissas:

- Consumo diário de água ( $C$ ) = 111.840 litros;
- Coeficiente de retorno ( $Cr$ ) = 0,8;
- Coeficiente de máxima vazão diária ( $k1$ ) = 1,2;
- Coeficiente de máxima vazão horária ( $k2$ ) = 1,5.

Portanto, teremos:

- Vazão média de esgoto ( $Q_{med}$ ) =  $((C / 24) / 1.000) \times Cr = ((111.840 / 24) / 1.000) \times 0,8 = 3,73 \text{ m}^3/\text{h} = 1,04 \text{ l/s}$ ;

Aplicando os coeficientes das vazões máximas:

- Vazão máxima de esgoto  $Q_{max} = Q_{med} \times k1 \times k2 = 3,73 \times 1,2 \times 1,5 = 6,711 \text{ m}^3/\text{h} = 1,86 \text{ l/s}$ .

Conforme contabilização das Unidades Hunter de Contribuição (UHC) obtidas pelo estudo do layout arquitetônico, encontrou-se um total de 1.616 UHC's. Conforme tabela 7 (Figura 45) da NBR 8160, uma tubulação de PVC Série Normal de 250mm para interligar o esgoto da caixa coletora à rede pública.





### **2.10.6. REDE PRESSURIZADA DE ESGOTO**

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A rede pressurizada será instalada a partir do subsolo na EEE (Estação Elevatória de Esgotos) e terá a função de transportar os efluentes gerados para a cota topográfica superior, que é a conexão com a rede de esgoto que estará no nível do passeio. Para esse transporte serão especificados tubos PEAD, conforme NBR 15561 – Tubulação de polietileno PE 80 e PE 100 para transporte de água e esgoto sob pressão – Requisitos, e bombas submersíveis com as seguintes características:

- Rotor à prova de entupimento;
- Temperatura máxima líquido bombeado igual a 40°C;
- Motor elétrico IP-68 com eixo em aço inox 316;
- Rotor e placa de fundo em ferro fundido GG-15;
- Selo mecânico constituído de aço inox AISI-304, buna N, grafite e cerâmica.

### **2.11. INSTALAÇÕES DE ÁGUAS PLUVIAIS**

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#### **2.11.1. DESCRIÇÃO GERAL DO SISTEMA**

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O conceito do projeto de captação, coleta e encaminhamento das águas pluviais parte da premissa do reaproveitamento das águas coletadas nas lajes de cobertura, calhas superiores e nas lajes verdes. Serão previstos para os pontos de coleta, ralos hemisféricos em ferro fundido e grelhas de ferro conectados às tubulações que farão o transporte, por gravidade, dos efluentes até a cisterna de água bruta localizada no subsolo (ver Figura 38). Também serão captados os efluentes dos drenos dos ar-condicionado, conforme estimativas de volume diário (ver Figura 33). A escolha do local para a cisterna de água bruta se deve ao aproveitamento da estrutura de concreto existente onde a função era o armazenamento da água do mar para o Aquário (ver Figura 46). Conforme estudo feito em 3.2.1, temos uma previsão de volume máximo de armazenamento (drenos de ar-condicionado + água de chuva) em torno de 636m<sup>3</sup>. Como a capacidade deste tanque é de aproximadamente 940m<sup>3</sup>, atenderá a este volume máximo de armazenamento. Toda a água bruta armazenada será reaproveitada para reuso em descargas nos vasos sanitários, mictórios e para uso na irrigação manual dos jardins. A água será bombeada da cisterna para os reservatórios superiores de água bruta localizados no terraço da edificação. Dos reservatórios superiores será encaminhada aos pontos de consumo por gravidade. No caso de armazenamento acima da lâmina máxima de água do reservatório, a água será encaminhada através dos extravasores para a rede de drenagem da via.

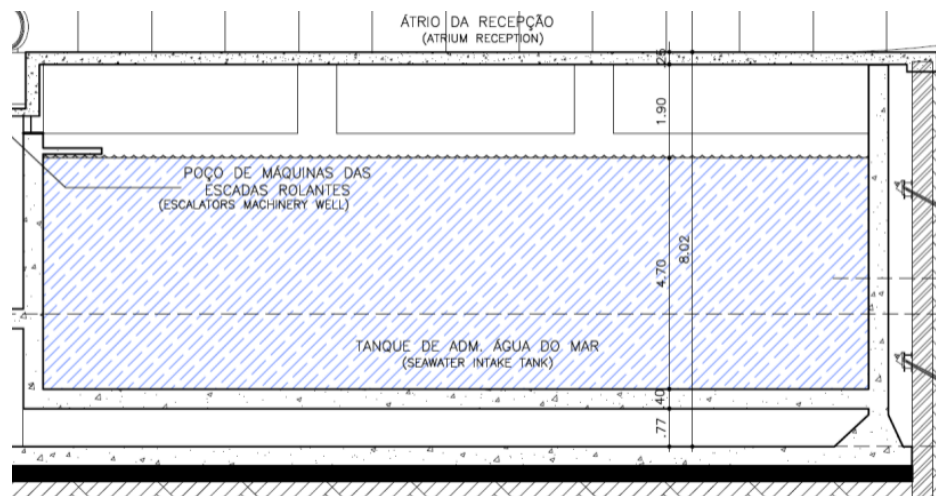


Figura 46: Características do tanque existente no subsolo

### 2.11.2. PREMISSAS DE DIMENSIONAMENTO

O dimensionamento será elaborado a partir das recomendações da NBR 10844 – Instalações Prediais de Águas Pluviais. Serão considerados:

- Período de retorno  $T = 25$  anos;
- $I = 180\text{mm/h}$ , conforme Tab. 5 da NBR 10844;
- $A$  – Área de contribuição, em  $\text{m}^2$ ;
- Vazão de projeto em  $\text{l/min}$ ,  $Q = (I \times A) / 60$ .

Para o dimensionamento das calhas serão seguidas as seguintes premissas:

$$- Q = K \frac{S}{n} Rh^{2/3} i^{1/2}, \text{ onde:}$$

- $Q$  = vazão de projeto, em  $\text{l/min}$ ;
- $S$  = área da seção molhada, em  $\text{m}^2$ ;
- $n$  = coeficiente de rugosidade:
  - para plástico, aço e metais = 0,011;
  - para concreto alisado e alvenaria revestida = 0,012;
  - para cerâmica e concreto não-alisado = 0,013;
  - para alvenaria de tijolos não-revestida = 0,015;
- $Rh$  = raio hidráulico, em  $\text{m}$ ;
- $i$  = declividade da calha, em  $\text{m/m}$ ;
- $K = 60.000$  (conversão de  $\text{m}^3/\text{s}$  para  $\text{l/min}$ );

Além disso, considera-se que:

$$Rh = \frac{S}{P}, \text{ onde:}$$

- $Rh$  = raio hidráulico, em  $\text{m}$ ;

- $S$  = área da seção molhada, em  $m^2$ ;
- $P$  = perímetro molhado, em m.

Para o dimensionamento dos condutores verticais, será usado o ábaco abaixo para referência:

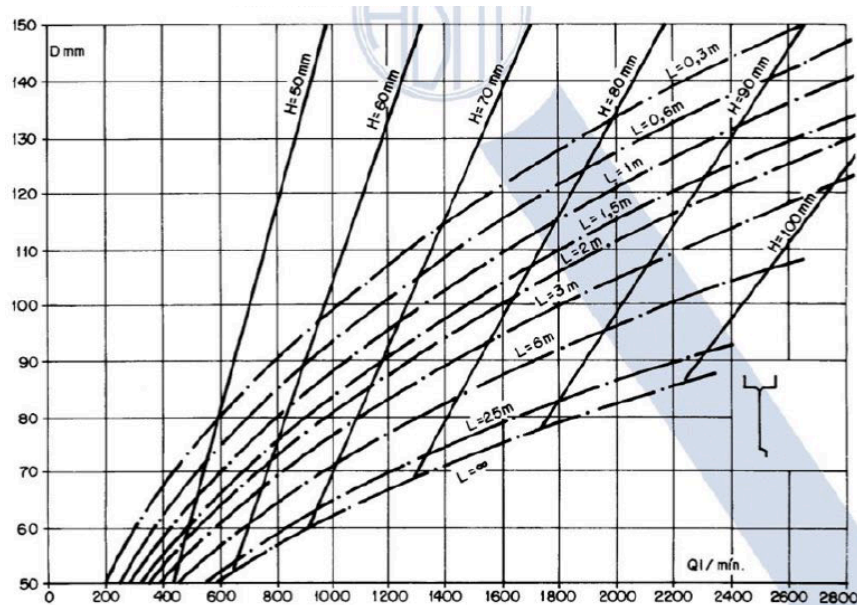


Figura 47: Ábaco para a determinação de diâmetros de condutores verticais – Retirado da NBR 10844

Para o dimensionamento dos condutores horizontais, será usada a tabela 4 da NBR 10844 (ver Figura 48).

Diâmetro interno (D) (mm)	$n = 0,011$				$n = 0,012$				$n = 0,013$			
	0,5 %	1 %	2 %	4 %	0,5 %	1 %	2 %	4 %	0,5 %	1 %	2 %	4 %
1	2	3	4	5	6	7	8	9	10	11	12	13
50	32	45	64	90	29	41	59	83	27	38	54	76
75	95	133	188	267	87	122	172	245	80	113	159	226
100	204	287	405	575	187	264	372	527	173	243	343	486
125	370	521	735	1.040	339	478	674	956	313	441	622	882
150	602	847	1.190	1.690	552	777	1.100	1.550	509	717	1.010	1.430
200	1.300	1.820	2.570	3.650	1.190	1.670	2.360	3.350	1.100	1.540	2.180	3.040
250	2.350	3.310	4.660	6.620	2.150	3.030	4.280	6.070	1.990	2.800	3.950	5.600
300	3.820	5.380	7.590	10.800	3.500	4.930	6.960	9.870	3.230	4.550	6.420	9.110

Figura 48: Ábaco para a determinação de diâmetros de condutores verticais – Retirado da NBR 10844



### **2.11.3. TUBULAÇÕES**

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Todas as tubulações serão especificadas em projeto de forma a atender as características dos efluentes que nelas serão transportados. Desta forma, serão utilizados tubos de PVC Série Reforçada para transporte das águas de chuva coletadas nos ralos e grelhas.

Para o sistema de drenagem de ar-condicionado, onde os tubos são de menores bitolas, serão utilizados tubos de PVC Soldável Marrom para encaminhamento à cisterna de água bruta.

Fortaleza, 21 de agosto de 2024.



UNIVERSIDADE  
FEDERAL DO CEARÁ

Diretrizes de serviço de arquitetura e engenharia visando à construção da Nova Sede  
do Instituto de Ciências do Mar - LABOMAR/Centro Tecnológico De Ciências Naturais  
- *Campus Iracema* - UFC

# **ANEXO I**

## **CARGA TÉRMICA - VRF**

AGOSTO/2024

agosto de 2024.

# Air System Sizing Summary for 1P-ANÁLISE DE DADOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-ANÁLISE DE DADOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **18,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,8** kW  
Sensible coil load ..... **1,9** kW  
Coil L/s at Dec 1400 ..... **155** L/s  
Max block L/s ..... **155** L/s  
Sum of peak zone L/s ..... **155** L/s  
Sensible heat ratio ..... **0,659**  
L/(s kW) ..... **54,7**  
m<sup>2</sup>/kW ..... **6,5**  
W/m<sup>2</sup> ..... **153,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0500 ..... **155** L/s  
Max coil L/s ..... **155** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **50,2**  
Ent. DB / Lvg DB ..... **14,8 / 19,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **155** L/s  
Standard L/s ..... **155** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,38** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **30** L/s  
L/(s·m<sup>2</sup>) ..... **1,62** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-ANÁLISE DE DADOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-ANÁLISE DE DADOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **18,5 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	155	155	8,38	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,4	Jan 1800	0,0	18,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-ANÁLISE DE DADOS	1	1,4	Jan 1800	155	0,0	18,5	8,38



## Ventilation Sizing Summary for 1P-ANÁLISE DE DADOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **30** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-ANÁLISE DE DADOS	1	18,5	4,0	155,0	7,50	0,00	0,0	0,0	30,0
<b>Totals (incl. Space Multipliers)</b>				<b>155,0</b>					<b>30,0</b>

# Air System Sizing Summary for 1P-BIOENS ZOOPLANCTONS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ... **1P-BIOENS ZOOPLANCTONS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,2** kW  
Sensible coil load ..... **1,0** kW  
Coil L/s at Dec 1600 ..... **109** L/s  
Max block L/s ..... **109** L/s  
Sum of peak zone L/s ..... **109** L/s  
Sensible heat ratio ..... **0,867**  
L/(s kW) ..... **90,6**  
m<sup>2</sup>/kW ..... **3,8**  
W/m<sup>2</sup> ..... **262,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **22,8 / 17,6** °C  
Leaving DB / WB ..... **14,8 / 14,4** °C  
Coil ADP ..... **14,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at Oct 0600 ..... **109** L/s  
Max coil L/s ..... **109** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Oct 0600**  
W/m<sup>2</sup> ..... **159,0**  
Ent. DB / Lvg DB ..... **15,0 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **109** L/s  
Standard L/s ..... **109** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **23,76** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **5** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

# Zone Sizing Summary for 1P-BIOENS ZOOPLANCTONS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

## Air System Information

Air System Name ... **1P-BIOENS ZOOPLANCTONS**  
 Equipment Class ..... **SPLT AHU**  
 Air System Type ..... **SZCAV**

Number of zones ..... **1**  
 Floor Area ..... **4,6 m<sup>2</sup>**  
 Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
 Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
 Space L/s Sizing ..... **Individual peak space loads**

## Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	109	109	23,76	0,0	-	0,0	-	0

## Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,0	May 1800	0,0	4,6

## Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-BIOENS.ZOOPLANCTONS	1	1,0	May 1800	109	0,0	4,6	23,76

## Ventilation Sizing Summary for 1P-BIOENS ZOOPLANCTONS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **5 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-BIOENS.ZOOPLANCTONS	1	4,6	0,7	109,3	7,50	0,00	0,0	0,0	4,9
<b>Totals (incl. Space Multipliers)</b>				<b>109,3</b>					<b>4,9</b>

# Air System Sizing Summary for 1P-BIOENSAIOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... <b>1P-BIOENSAIOS</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>10,3</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>1,1</b> kW	Load occurs at ..... <b>Dec 1500</b>
Sensible coil load ..... <b>0,8</b> kW	OA DB / WB ..... <b>31,7 / 25,6</b> °C
Coil L/s at Dec 1500 ..... <b>67</b> L/s	Entering DB / WB ..... <b>24,0 / 18,9</b> °C
Max block L/s ..... <b>67</b> L/s	Leaving DB / WB ..... <b>14,4 / 13,9</b> °C
Sum of peak zone L/s ..... <b>67</b> L/s	Coil ADP ..... <b>13,3</b> °C
Sensible heat ratio ..... <b>0,686</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>59,1</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>9,1</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>110,0</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>0,5</b> kW	Load occurs at ..... <b>May 0600</b>
Coil L/s at May 0600 ..... <b>67</b> L/s	W/m <sup>2</sup> ..... <b>45,3</b>
Max coil L/s ..... <b>67</b> L/s	Ent. DB / Lvg DB ..... <b>14,7 / 20,5</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>67</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>67</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>6,50</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>11</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>1,07</b> L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for 1P-BIOENSAIOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-BIOENSAIOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	67	67	6,50	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,6	Jan 1800	0,0	10,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-BIOENSAIOS	1	0,6	Jan 1800	67	0,0	10,3	6,50

## Ventilation Sizing Summary for 1P-BIOENSAIOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **11 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-BIOENSAIOS	1	10,3	1,5	67,0	7,50	0,00	0,0	0,0	11,0
<b>Totals (incl. Space Multipliers)</b>				<b>67,0</b>					<b>11,0</b>



# Air System Sizing Summary for 1P-C.DIAG.ENF.CEDE

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-C.DIAG.ENF.CEDE**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **87,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **17,2** kW  
Sensible coil load ..... **12,3** kW  
Coil L/s at Dec 1400 ..... **1112** L/s  
Max block L/s ..... **1112** L/s  
Sum of peak zone L/s ..... **1112** L/s  
Sensible heat ratio ..... **0,717**  
L/(s kW) ..... **64,7**  
m<sup>2</sup>/kW ..... **5,1**  
W/m<sup>2</sup> ..... **197,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,7 / 18,6** °C  
Leaving DB / WB ..... **14,5 / 14,0** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **8,2** kW  
Coil L/s at Jul 0600 ..... **1112** L/s  
Max coil L/s ..... **1112** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0600**  
W/m<sup>2</sup> ..... **94,1**  
Ent. DB / Lvg DB ..... **14,9 / 21,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **1112** L/s  
Standard L/s ..... **1108** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **12,78** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **150** L/s  
L/(s·m<sup>2</sup>) ..... **1,72** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-C.DIAG.ENF.CEDE

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-C.DIAG.ENF.CEDE**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **87,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	1112	1112	12,78	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	10,1	Dec 1800	0,0	87,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-C.DIAG.ENFER.CEDECAM	1	10,1	Dec 1800	1112	0,0	87,0	12,78

## Ventilation Sizing Summary for 1P-C.DIAG.ENF.CEDE

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **150** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-C.DIAG.ENFER.CEDECAM	1	87,0	20,0	1111,6	7,50	0,00	0,0	0,0	150,0
<b>Totals (incl. Space Multipliers)</b>				<b>1111,6</b>					<b>150,0</b>

# Air System Sizing Summary for 1P-CEPAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-CEPAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **5,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,0** kW  
Sensible coil load ..... **0,8** kW  
Coil L/s at Dec 1600 ..... **83** L/s  
Max block L/s ..... **83** L/s  
Sum of peak zone L/s ..... **83** L/s  
Sensible heat ratio ..... **0,818**  
L/(s kW) ..... **82,1**  
m<sup>2</sup>/kW ..... **5,3**  
W/m<sup>2</sup> ..... **189,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,2 / 18,0** °C  
Leaving DB / WB ..... **14,9 / 14,4** °C  
Coil ADP ..... **14,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0600 ..... **83** L/s  
Max coil L/s ..... **83** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **107,0**  
Ent. DB / Lvg DB ..... **14,8 / 20,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **83** L/s  
Standard L/s ..... **82** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **15,57** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **6** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-CEPAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-CEPAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **5,3 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	83	83	15,57	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	5,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-CEPAS	1	0,8	Jan 1800	83	0,0	5,3	15,57

## Ventilation Sizing Summary for 1P-CEPAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **6 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-CEPAS	1	5,3	0,8	82,5	7,50	0,00	0,0	0,0	5,7
<b>Totals (incl. Space Multipliers)</b>				<b>82,5</b>					<b>5,7</b>

# Air System Sizing Summary for 1P-COORDENAÇÃO 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-COORDENAÇÃO 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,6** kW  
Sensible coil load ..... **1,6** kW  
Coil L/s at Dec 1500 ..... **128** L/s  
Max block L/s ..... **128** L/s  
Sum of peak zone L/s ..... **128** L/s  
Sensible heat ratio ..... **0,630**  
L/(s kW) ..... **49,3**  
m<sup>2</sup>/kW ..... **6,8**  
W/m<sup>2</sup> ..... **147,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,8 / 19,6** °C  
Leaving DB / WB ..... **14,2 / 13,7** °C  
Coil ADP ..... **13,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0700 ..... **128** L/s  
Max coil L/s ..... **128** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **43,2**  
Ent. DB / Lvg DB ..... **14,8 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **128** L/s  
Standard L/s ..... **127** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,26** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **30** L/s  
L/(s·m<sup>2</sup>) ..... **1,70** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 1P-COORDENAÇÃO 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-COORDENAÇÃO 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	128	128	7,26	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	17,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-COORDENAÇÃO 01	1	1,2	Jan 1800	128	0,0	17,6	7,26

## Ventilation Sizing Summary for 1P-COORDENAÇÃO 01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **30 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-COORDENAÇÃO 01	1	17,6	4,0	127,9	7,50	0,00	0,0	0,0	30,0
<b>Totals (incl. Space Multipliers)</b>				<b>127,9</b>					<b>30,0</b>

# Air System Sizing Summary for 1P-COORDENAÇÃO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-COORDENAÇÃO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,5** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1500 ..... **111** L/s  
Max block L/s ..... **111** L/s  
Sum of peak zone L/s ..... **111** L/s  
Sensible heat ratio ..... **0,606**  
L/(s kW) ..... **45,2**  
m<sup>2</sup>/kW ..... **7,2**  
W/m<sup>2</sup> ..... **139,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,0 / 19,8** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at Jul 0700 ..... **111** L/s  
Max coil L/s ..... **111** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **42,3**  
Ent. DB / Lvg DB ..... **14,8 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **111** L/s  
Standard L/s ..... **111** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,30** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **30** L/s  
L/(s·m<sup>2</sup>) ..... **1,70** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-COORDENAÇÃO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-COORDENAÇÃO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	111	111	6,30	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,0	Jan 1800	0,0	17,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-COORDENAÇÃO 02	1	1,0	Jan 1800	111	0,0	17,6	6,30

## Ventilation Sizing Summary for 1P-COORDENAÇÃO 02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **30 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-COORDENAÇÃO 02	1	17,6	4,0	110,9	7,50	0,00	0,0	0,0	30,0
<b>Totals (incl. Space Multipliers)</b>				<b>110,9</b>					<b>30,0</b>

# Air System Sizing Summary for 1P-COORDENAÇÃO 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-COORDENAÇÃO 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,5** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1500 ..... **111** L/s  
Max block L/s ..... **111** L/s  
Sum of peak zone L/s ..... **111** L/s  
Sensible heat ratio ..... **0,606**  
L/(s kW) ..... **45,2**  
m<sup>2</sup>/kW ..... **7,2**  
W/m<sup>2</sup> ..... **139,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,0 / 19,8** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at Jul 0700 ..... **111** L/s  
Max coil L/s ..... **111** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **42,3**  
Ent. DB / Lvg DB ..... **14,8 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **111** L/s  
Standard L/s ..... **111** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,30** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **30** L/s  
L/(s·m<sup>2</sup>) ..... **1,70** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-COORDENAÇÃO 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-COORDENAÇÃO 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	111	111	6,30	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,0	Jan 1800	0,0	17,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-COORDENAÇÃO 03	1	1,0	Jan 1800	111	0,0	17,6	6,30



## Ventilation Sizing Summary for 1P-COORDENAÇÃO 03

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **30 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-COORDENAÇÃO 03	1	17,6	4,0	110,9	7,50	0,00	0,0	0,0	30,0
<b>Totals (incl. Space Multipliers)</b>				<b>110,9</b>					<b>30,0</b>

# Air System Sizing Summary for 1P-COORDENAÇÃO 04

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-COORDENAÇÃO 04**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,5** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1500 ..... **111** L/s  
Max block L/s ..... **111** L/s  
Sum of peak zone L/s ..... **111** L/s  
Sensible heat ratio ..... **0,606**  
L/(s kW) ..... **45,2**  
m<sup>2</sup>/kW ..... **7,2**  
W/m<sup>2</sup> ..... **139,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,0 / 19,8** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at Jul 0700 ..... **111** L/s  
Max coil L/s ..... **111** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **42,3**  
Ent. DB / Lvg DB ..... **14,8 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **111** L/s  
Standard L/s ..... **111** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,30** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **30** L/s  
L/(s·m<sup>2</sup>) ..... **1,70** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-COORDENAÇÃO 04

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-COORDENAÇÃO 04**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	111	111	6,30	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,0	Jan 1800	0,0	17,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-COORDENAÇÃO 04	1	1,0	Jan 1800	111	0,0	17,6	6,30

## Ventilation Sizing Summary for 1P-COORDENAÇÃO 04

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **30 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-COORDENAÇÃO 04	1	17,6	4,0	110,9	7,50	0,00	0,0	0,0	30,0
<b>Totals (incl. Space Multipliers)</b>				<b>110,9</b>					<b>30,0</b>

# Air System Sizing Summary for 1P-COORDENAÇÃO 05

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-COORDENAÇÃO 05**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,5** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1500 ..... **111** L/s  
Max block L/s ..... **111** L/s  
Sum of peak zone L/s ..... **111** L/s  
Sensible heat ratio ..... **0,606**  
L/(s kW) ..... **45,2**  
m<sup>2</sup>/kW ..... **7,2**  
W/m<sup>2</sup> ..... **139,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,0 / 19,8** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at Jul 0700 ..... **111** L/s  
Max coil L/s ..... **111** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **42,3**  
Ent. DB / Lvg DB ..... **14,8 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **111** L/s  
Standard L/s ..... **111** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,30** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **30** L/s  
L/(s·m<sup>2</sup>) ..... **1,70** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-COORDENAÇÃO 05

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-COORDENAÇÃO 05**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	111	111	6,30	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,0	Jan 1800	0,0	17,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-COORDENAÇÃO 05	1	1,0	Jan 1800	111	0,0	17,6	6,30

## Ventilation Sizing Summary for 1P-COORDENAÇÃO 05

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **30 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-COORDENAÇÃO 05	1	17,6	4,0	110,9	7,50	0,00	0,0	0,0	30,0
<b>Totals (incl. Space Multipliers)</b>				<b>110,9</b>					<b>30,0</b>

# Air System Sizing Summary for 1P-COORDENAÇÃO 06

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-COORDENAÇÃO 06**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,5** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1500 ..... **111** L/s  
Max block L/s ..... **111** L/s  
Sum of peak zone L/s ..... **111** L/s  
Sensible heat ratio ..... **0,606**  
L/(s kW) ..... **45,2**  
m<sup>2</sup>/kW ..... **7,2**  
W/m<sup>2</sup> ..... **139,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,0 / 19,8** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at Jul 0700 ..... **111** L/s  
Max coil L/s ..... **111** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **42,3**  
Ent. DB / Lvg DB ..... **14,8 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **111** L/s  
Standard L/s ..... **111** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,30** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **30** L/s  
L/(s·m<sup>2</sup>) ..... **1,70** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 1P-COORDENAÇÃO 06

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-COORDENAÇÃO 06**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	111	111	6,30	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,0	Jan 1800	0,0	17,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-COORDENAÇÃO 06	1	1,0	Jan 1800	111	0,0	17,6	6,30

## Ventilation Sizing Summary for 1P-COORDENAÇÃO 06

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **30 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-COORDENAÇÃO 06	1	17,6	4,0	110,9	7,50	0,00	0,0	0,0	30,0
<b>Totals (incl. Space Multipliers)</b>				<b>110,9</b>					<b>30,0</b>

# Air System Sizing Summary for 1P-CO-WORKING

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-CO-WORKING**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **61,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,4** kW  
Sensible coil load ..... **3,3** kW  
Coil L/s at Dec 1400 ..... **246** L/s  
Max block L/s ..... **246** L/s  
Sum of peak zone L/s ..... **246** L/s  
Sensible heat ratio ..... **0,607**  
L/(s kW) ..... **45,6**  
m<sup>2</sup>/kW ..... **11,4**  
W/m<sup>2</sup> ..... **87,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **25,0 / 19,8** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **246** L/s  
Max coil L/s ..... **246** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **27,2**  
Ent. DB / Lvg DB ..... **14,7 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **246** L/s  
Standard L/s ..... **245** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **3,99** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **66** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-CO-WORKING

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-CO-WORKING**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **61,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	246	246	3,99	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,2	Jan 1800	0,0	61,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-CO-WORKING	1	2,2	Jan 1800	246	0,0	61,6	3,99

## Ventilation Sizing Summary for 1P-CO-WORKING

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **66** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-CO-WORKING	1	61,6	8,8	246,0	7,50	0,00	0,0	0,0	66,0
<b>Totals (incl. Space Multipliers)</b>				<b>246,0</b>					<b>66,0</b>

# Air System Sizing Summary for 1P-DEP. AMOSTRAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-DEP. AMOSTRAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **0,9** kW  
Sensible coil load ..... **0,8** kW  
Coil L/s at Dec 1600 ..... **77** L/s  
Max block L/s ..... **77** L/s  
Sum of peak zone L/s ..... **77** L/s  
Sensible heat ratio ..... **0,830**  
L/(s kW) ..... **84,1**  
m<sup>2</sup>/kW ..... **4,9**  
W/m<sup>2</sup> ..... **202,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,1 / 17,9** °C  
Leaving DB / WB ..... **14,9 / 14,4** °C  
Coil ADP ..... **14,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0600 ..... **77** L/s  
Max coil L/s ..... **77** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **122,3**  
Ent. DB / Lvg DB ..... **14,8 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **77** L/s  
Standard L/s ..... **77** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **17,06** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **5** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-DEP. AMOSTRAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-DEP. AMOSTRAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,5 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	77	77	17,06	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,7	Jan 1800	0,0	4,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-DEP.AMOSTRAS	1	0,7	Jan 1800	77	0,0	4,5	17,06

## Ventilation Sizing Summary for 1P-DEP. AMOSTRAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **5 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-DEP.AMOSTRAS	1	4,5	0,6	77,3	7,50	0,00	0,0	0,0	4,9
<b>Totals (incl. Space Multipliers)</b>				<b>77,3</b>					<b>4,9</b>



# Air System Sizing Summary for 1P-DEP.EQUIP.CAMPO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-DEP.EQUIP.CAMPO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **0,9** kW  
Sensible coil load ..... **0,8** kW  
Coil L/s at Dec 1600 ..... **77** L/s  
Max block L/s ..... **77** L/s  
Sum of peak zone L/s ..... **77** L/s  
Sensible heat ratio ..... **0,830**  
L/(s kW) ..... **84,1**  
m<sup>2</sup>/kW ..... **4,9**  
W/m<sup>2</sup> ..... **202,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,1 / 17,9** °C  
Leaving DB / WB ..... **14,9 / 14,4** °C  
Coil ADP ..... **14,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0600 ..... **77** L/s  
Max coil L/s ..... **77** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **122,3**  
Ent. DB / Lvg DB ..... **14,8 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **77** L/s  
Standard L/s ..... **77** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **17,06** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **5** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-DEP.EQUIP.CAMPO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-DEP.EQUIP.CAMPO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,5 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	77	77	17,06	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,7	Jan 1800	0,0	4,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-DEP.EQUIP.CAMPO	1	0,7	Jan 1800	77	0,0	4,5	17,06

## Ventilation Sizing Summary for 1P-DEP.EQUIP.CAMPO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **5 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-DEP.EQUIP.CAMPO	1	4,5	0,6	77,3	7,50	0,00	0,0	0,0	4,9
<b>Totals (incl. Space Multipliers)</b>				<b>77,3</b>					<b>4,9</b>

# Air System Sizing Summary for 1P-DIRETOR

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-DIRETOR**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **31,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **6,2** kW  
Sensible coil load ..... **4,0** kW  
Coil L/s at Dec 1500 ..... **325** L/s  
Max block L/s ..... **325** L/s  
Sum of peak zone L/s ..... **325** L/s  
Sensible heat ratio ..... **0,648**  
L/(s kW) ..... **52,5**  
m<sup>2</sup>/kW ..... **5,1**  
W/m<sup>2</sup> ..... **196,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,4 / 19,3** °C  
Leaving DB / WB ..... **14,2 / 13,7** °C  
Coil ADP ..... **13,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at Oct 0700 ..... **325** L/s  
Max coil L/s ..... **325** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Oct 0700**  
W/m<sup>2</sup> ..... **53,8**  
Ent. DB / Lvg DB ..... **14,8 / 19,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **325** L/s  
Standard L/s ..... **324** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,29** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **68** L/s  
L/(s·m<sup>2</sup>) ..... **2,14** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-DIRETOR

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-DIRETOR**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **31,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	325	325	10,29	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,0	May 1800	0,0	31,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-DIRETOR	1	3,0	May 1800	325	0,0	31,6	10,29

## Ventilation Sizing Summary for 1P-DIRETOR

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **68** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-DIRETOR	1	31,6	9,0	325,1	7,50	0,00	0,0	0,0	67,5
<b>Totals (incl. Space Multipliers)</b>				<b>325,1</b>					<b>67,5</b>

# Air System Sizing Summary for 1P-EPIFLUORESCENCIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-EPIFLUORESCENCIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,1** kW  
Sensible coil load ..... **0,9** kW  
Coil L/s at Dec 1500 ..... **86** L/s  
Max block L/s ..... **86** L/s  
Sum of peak zone L/s ..... **86** L/s  
Sensible heat ratio ..... **0,787**  
L/(s kW) ..... **76,6**  
m<sup>2</sup>/kW ..... **4,1**  
W/m<sup>2</sup> ..... **244,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,5 / 18,3** °C  
Leaving DB / WB ..... **15,0 / 14,5** °C  
Coil ADP ..... **14,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0700 ..... **86** L/s  
Max coil L/s ..... **86** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **128,3**  
Ent. DB / Lvg DB ..... **14,9 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **86** L/s  
Standard L/s ..... **86** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **18,68** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **8** L/s  
L/(s·m<sup>2</sup>) ..... **1,63** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-EPIFLUORESCENCIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-EPIFLUORESCENCIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	86	86	18,68	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	4,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-EPIFLUORESCÊNCIA	1	0,8	Jan 1800	86	0,0	4,6	18,68



## Ventilation Sizing Summary for 1P-EPIFLUORESCENCIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-EPIFLUORESCÊNCIA	1	4,6	1,0	85,9	7,50	0,00	0,0	0,0	7,5
<b>Totals (incl. Space Multipliers)</b>				<b>85,9</b>					<b>7,5</b>

# Air System Sizing Summary for 1P-EXTRAÇÃO DNA/RNA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-EXTRAÇÃO DNA/RNA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **6,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,9** kW  
Sensible coil load ..... **1,7** kW  
Coil L/s at Feb 1500 ..... **173** L/s  
Max block L/s ..... **173** L/s  
Sum of peak zone L/s ..... **173** L/s  
Sensible heat ratio ..... **0,878**  
L/(s kW) ..... **91,9**  
m<sup>2</sup>/kW ..... **3,6**  
W/m<sup>2</sup> ..... **276,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **22,9 / 17,7** °C  
Leaving DB / WB ..... **15,0 / 14,5** °C  
Coil ADP ..... **14,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,2** kW  
Coil L/s at Jul 0700 ..... **173** L/s  
Max coil L/s ..... **173** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **180,6**  
Ent. DB / Lvg DB ..... **14,9 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **173** L/s  
Standard L/s ..... **172** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **25,44** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **7** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-EXTRAÇÃO DNA/RNA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... 1P-EXTRAÇÃO DNA/RNA  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 6,8 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	173	173	25,44	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,6	Dec 1800	0,0	6,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-EXTRAÇÃO DNA/RNA	1	1,6	Dec 1800	173	0,0	6,8	25,44

## Ventilation Sizing Summary for 1P-EXTRAÇÃO DNA/RNA

Project Name: LABOMAR-VRF

08/22/2024

Prepared by:

08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**

Design Ventilation Airflow Rate ..... **7 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-EXTRAÇÃO DNA/RNA	1	6,8	1,0	173,0	7,50	0,00	0,0	0,0	7,3
<b>Totals (incl. Space Multipliers)</b>				<b>173,0</b>					<b>7,3</b>

# Air System Sizing Summary for 1P-HUB ECONOMIA AZUL

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-HUB ECONOMIA AZUL**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **56,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,3** kW  
Sensible coil load ..... **3,3** kW  
Coil L/s at Dec 1400 ..... **264** L/s  
Max block L/s ..... **264** L/s  
Sum of peak zone L/s ..... **264** L/s  
Sensible heat ratio ..... **0,631**  
L/(s kW) ..... **49,8**  
m<sup>2</sup>/kW ..... **10,7**  
W/m<sup>2</sup> ..... **93,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,6 / 19,5** °C  
Leaving DB / WB ..... **14,1 / 13,7** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,6** kW  
Coil L/s at May 0700 ..... **264** L/s  
Max coil L/s ..... **264** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **28,5**  
Ent. DB / Lvg DB ..... **14,7 / 19,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **264** L/s  
Standard L/s ..... **263** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **4,65** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **61** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-HUB ECONOMIA AZUL

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-HUB ECONOMIA AZUL**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **56,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	264	264	4,65	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,4	Jan 1800	0,0	56,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-HUB ECONOMIA AZUL	1	2,4	Jan 1800	264	0,0	56,7	4,65

## Ventilation Sizing Summary for 1P-HUB ECONOMIA AZUL

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **61 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-HUB ECONOMIA AZUL	1	56,7	8,1	263,5	7,50	0,00	0,0	0,0	60,7
<b>Totals (incl. Space Multipliers)</b>				<b>263,5</b>					<b>60,7</b>

# Air System Sizing Summary for 1P-ISOL. RECICLAGEM

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... <b>1P-ISOL. RECICLAGEM</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>10,3</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>2,3</b> kW	Load occurs at ..... <b>Feb 1500</b>
Sensible coil load ..... <b>1,9</b> kW	OA DB / WB ..... <b>32,2 / 25,6</b> °C
Coil L/s at Feb 1500 ..... <b>199</b> L/s	Entering DB / WB ..... <b>23,1 / 17,9</b> °C
Max block L/s ..... <b>199</b> L/s	Leaving DB / WB ..... <b>14,9 / 14,4</b> °C
Sum of peak zone L/s ..... <b>199</b> L/s	Coil ADP ..... <b>14,0</b> °C
Sensible heat ratio ..... <b>0,848</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>86,6</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>4,5</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>222,6</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>1,5</b> kW	Load occurs at ..... <b>Jul 0700</b>
Coil L/s at Jul 0700 ..... <b>199</b> L/s	W/m <sup>2</sup> ..... <b>143,1</b>
Max coil L/s ..... <b>199</b> L/s	Ent. DB / Lvg DB ..... <b>14,6 / 20,8</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>199</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>198</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>19,29</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>11</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>1,07</b> L/(s·m <sup>2</sup> )	



## Zone Sizing Summary for 1P-ISOL. RECICLAGEM

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-ISOL. RECICLAGEM**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	199	199	19,29	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,8	Dec 1800	0,0	10,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-ISOL. RECICLAGEM	1	1,8	Dec 1800	199	0,0	10,3	19,29

## Ventilation Sizing Summary for 1P-ISOL. RECICLAGEM

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **11 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-ISOL. RECICLAGEM	1	10,3	1,5	198,7	7,50	0,00	0,0	0,0	11,0
<b>Totals (incl. Space Multipliers)</b>				<b>198,7</b>					<b>11,0</b>

# Air System Sizing Summary for 1P-LAB. BIOENSAIOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB. BIOENSAIOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **7,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,1** kW  
Sensible coil load ..... **0,9** kW  
Coil L/s at Dec 1400 ..... **85** L/s  
Max block L/s ..... **85** L/s  
Sum of peak zone L/s ..... **85** L/s  
Sensible heat ratio ..... **0,773**  
L/(s kW) ..... **74,3**  
m<sup>2</sup>/kW ..... **6,6**  
W/m<sup>2</sup> ..... **152,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,4 / 18,2** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0600 ..... **85** L/s  
Max coil L/s ..... **85** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **81,6**  
Ent. DB / Lvg DB ..... **14,8 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **85** L/s  
Standard L/s ..... **84** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **11,30** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **8** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB. BIOENSAIOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB. BIOENSAIOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **7,5 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	85	85	11,30	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	7,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB. BIOENSAIOS	1	0,8	Jan 1800	85	0,0	7,5	11,30

## Ventilation Sizing Summary for 1P-LAB. BIOENSAIOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB. BIOENSAIOS	1	7,5	1,1	84,7	7,50	0,00	0,0	0,0	8,0
<b>Totals (incl. Space Multipliers)</b>				<b>84,7</b>					<b>8,0</b>

# Air System Sizing Summary for 1P-LAB. EXPANSÃO 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB. EXPANSÃO 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,7** kW  
Sensible coil load ..... **3,3** kW  
Coil L/s at Dec 1600 ..... **233** L/s  
Max block L/s ..... **233** L/s  
Sum of peak zone L/s ..... **233** L/s  
Sensible heat ratio ..... **0,579**  
L/(s kW) ..... **40,5**  
m<sup>2</sup>/kW ..... **6,9**  
W/m<sup>2</sup> ..... **145,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **25,4 / 20,3** °C  
Leaving DB / WB ..... **13,6 / 13,2** °C  
Coil ADP ..... **12,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,5** kW  
Coil L/s at May 0600 ..... **233** L/s  
Max coil L/s ..... **233** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **38,3**  
Ent. DB / Lvg DB ..... **14,7 / 20,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **233** L/s  
Standard L/s ..... **232** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,90** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **1,90** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB. EXPANSÃO 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB. EXPANSÃO 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	233	233	5,90	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	39,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB. EXPANSÃO 01	1	2,1	Jan 1800	233	0,0	39,4	5,90

## Ventilation Sizing Summary for 1P-LAB. EXPANSÃO 01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB. EXPANSÃO 01	1	39,4	10,0	232,6	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>232,6</b>					<b>75,0</b>



# Air System Sizing Summary for 1P-LAB. EXPANSÃO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB. EXPANSÃO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,7** kW  
Sensible coil load ..... **3,3** kW  
Coil L/s at Dec 1600 ..... **233** L/s  
Max block L/s ..... **233** L/s  
Sum of peak zone L/s ..... **233** L/s  
Sensible heat ratio ..... **0,579**  
L/(s kW) ..... **40,5**  
m<sup>2</sup>/kW ..... **6,9**  
W/m<sup>2</sup> ..... **145,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **25,4 / 20,3** °C  
Leaving DB / WB ..... **13,6 / 13,2** °C  
Coil ADP ..... **12,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,5** kW  
Coil L/s at May 0600 ..... **233** L/s  
Max coil L/s ..... **233** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **38,3**  
Ent. DB / Lvg DB ..... **14,7 / 20,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **233** L/s  
Standard L/s ..... **232** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,90** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **1,90** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB. EXPANSÃO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB. EXPANSÃO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	233	233	5,90	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	39,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB. EXPANSÃO 02	1	2,1	Jan 1800	233	0,0	39,4	5,90

## Ventilation Sizing Summary for 1P-LAB. EXPANSÃO 02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB. EXPANSÃO 02	1	39,4	10,0	232,6	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>232,6</b>					<b>75,0</b>

# Air System Sizing Summary for 1P-LAB. EXPANSÃO 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB. EXPANSÃO 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,9** kW  
Sensible coil load ..... **3,5** kW  
Coil L/s at Dec 1600 ..... **256** L/s  
Max block L/s ..... **256** L/s  
Sum of peak zone L/s ..... **256** L/s  
Sensible heat ratio ..... **0,593**  
L/(s kW) ..... **43,1**  
m<sup>2</sup>/kW ..... **6,6**  
W/m<sup>2</sup> ..... **150,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **25,2 / 20,0** °C  
Leaving DB / WB ..... **13,8 / 13,4** °C  
Coil ADP ..... **12,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,6** kW  
Coil L/s at May 0600 ..... **256** L/s  
Max coil L/s ..... **256** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **39,5**  
Ent. DB / Lvg DB ..... **14,7 / 19,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **256** L/s  
Standard L/s ..... **255** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,49** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **1,90** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB. EXPANSÃO 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB. EXPANSÃO 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	256	256	6,49	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,3	Jan 1800	0,0	39,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB. EXPANSÃO 03	1	2,3	Jan 1800	256	0,0	39,4	6,49

## Ventilation Sizing Summary for 1P-LAB. EXPANSÃO 03

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB. EXPANSÃO 03	1	39,4	10,0	255,8	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>255,8</b>					<b>75,0</b>

# Air System Sizing Summary for 1P-LAB. PLANCTON

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB. PLANCTON**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **33,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,7** kW  
Sensible coil load ..... **3,8** kW  
Coil L/s at Dec 1400 ..... **312** L/s  
Max block L/s ..... **312** L/s  
Sum of peak zone L/s ..... **312** L/s  
Sensible heat ratio ..... **0,660**  
L/(s kW) ..... **54,8**  
m<sup>2</sup>/kW ..... **5,9**  
W/m<sup>2</sup> ..... **169,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,2** kW  
Coil L/s at Jul 0600 ..... **312** L/s  
Max coil L/s ..... **312** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0600**  
W/m<sup>2</sup> ..... **66,2**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **312** L/s  
Standard L/s ..... **311** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,31** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **60** L/s  
L/(s·m<sup>2</sup>) ..... **1,79** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB. PLANCTON

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB. PLANCTON**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **33,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	312	312	9,31	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,8	Dec 1800	0,0	33,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB. PLANCTON	1	2,8	Dec 1800	312	0,0	33,6	9,31



## Ventilation Sizing Summary for 1P-LAB. PLANCTON

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **60** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB. PLANCTON	1	33,6	8,0	312,3	7,50	0,00	0,0	0,0	60,0
<b>Totals (incl. Space Multipliers)</b>				<b>312,3</b>					<b>60,0</b>

# Air System Sizing Summary for 1P-LAB.BIOG.VEGET.BIOVEG

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ... **1P-LAB.BIOG.VEGET.BIOVEG**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **42,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **6,2** kW  
Sensible coil load ..... **3,8** kW  
Coil L/s at Dec 1500 ..... **286** L/s  
Max block L/s ..... **286** L/s  
Sum of peak zone L/s ..... **286** L/s  
Sensible heat ratio ..... **0,612**  
L/(s kW) ..... **46,1**  
m<sup>2</sup>/kW ..... **6,8**  
W/m<sup>2</sup> ..... **146,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,0 / 19,8** °C  
Leaving DB / WB ..... **14,0 / 13,5** °C  
Coil ADP ..... **12,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,9** kW  
Coil L/s at May 0600 ..... **286** L/s  
Max coil L/s ..... **286** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **44,7**  
Ent. DB / Lvg DB ..... **14,7 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **286** L/s  
Standard L/s ..... **285** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,77** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **1,78** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB.BIOG.VEGET.BIOVEG

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ... **1P-LAB.BIOG.VEGET.BIOVEG**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **42,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	286	286	6,77	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,6	Jan 1800	0,0	42,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB.BIOG.VEGET.BIOVEG	1	2,6	Jan 1800	286	0,0	42,2	6,77

## Ventilation Sizing Summary for 1P-LAB.BIOG.VEGET.BIOVEG

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB.BIOG.VEGET.BIOVEG	1	42,2	10,0	285,8	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>285,8</b>					<b>75,0</b>

# Air System Sizing Summary for 1P-LAB.DIN.POP.ECO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB.DIN.POP.ECO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **67,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **10,7** kW  
Sensible coil load ..... **6,4** kW  
Coil L/s at Dec 1500 ..... **462** L/s  
Max block L/s ..... **462** L/s  
Sum of peak zone L/s ..... **462** L/s  
Sensible heat ratio ..... **0,595**  
L/(s kW) ..... **43,1**  
m<sup>2</sup>/kW ..... **6,3**  
W/m<sup>2</sup> ..... **158,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,2 / 20,0** °C  
Leaving DB / WB ..... **13,8 / 13,3** °C  
Coil ADP ..... **12,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,9** kW  
Coil L/s at Jul 0400 ..... **462** L/s  
Max coil L/s ..... **462** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0400**  
W/m<sup>2</sup> ..... **43,5**  
Ent. DB / Lvg DB ..... **14,8 / 20,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **462** L/s  
Standard L/s ..... **461** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,83** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **135** L/s  
L/(s·m<sup>2</sup>) ..... **2,00** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB.DIN.POP.ECO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB.DIN.POP.ECO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **67,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	462	462	6,83	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,2	Jan 1800	0,0	67,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB.DIN.POP.ECO-DIPEM	1	4,2	Jan 1800	462	0,0	67,6	6,83

## Ventilation Sizing Summary for 1P-LAB.DIN.POP.ECO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **135 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB.DIN.POP.ECO-DIPEM	1	67,6	18,0	462,0	7,50	0,00	0,0	0,0	135,0
<b>Totals (incl. Space Multipliers)</b>				<b>462,0</b>					<b>135,0</b>

# Air System Sizing Summary for 1P-LAB.GEOFÍSICA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB.GEOFÍSICA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **59,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **13,1** kW  
Sensible coil load ..... **7,1** kW  
Coil L/s at Dec 1400 ..... **438** L/s  
Max block L/s ..... **438** L/s  
Sum of peak zone L/s ..... **438** L/s  
Sensible heat ratio ..... **0,539**  
L/(s kW) ..... **33,3**  
m<sup>2</sup>/kW ..... **4,5**  
W/m<sup>2</sup> ..... **219,8**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **26,4 / 21,2** °C  
Leaving DB / WB ..... **12,9 / 12,6** °C  
Coil ADP ..... **11,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,6** kW  
Coil L/s at Nov 0400 ..... **438** L/s  
Max coil L/s ..... **438** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Nov 0400**  
W/m<sup>2</sup> ..... **44,4**  
Ent. DB / Lvg DB ..... **14,7 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **438** L/s  
Standard L/s ..... **436** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,33** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **188** L/s  
L/(s·m<sup>2</sup>) ..... **3,14** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 1P-LAB.GEOFÍSICA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB.GEOFÍSICA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **59,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	438	438	7,33	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,0	Jan 1800	0,0	59,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB.GEOFÍSICA	1	4,0	Jan 1800	438	0,0	59,7	7,33

## Ventilation Sizing Summary for 1P-LAB.GEOFÍSICA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **188** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB.GEOFÍSICA	1	59,7	25,0	437,6	7,50	0,00	0,0	0,0	187,5
<b>Totals (incl. Space Multipliers)</b>				<b>437,6</b>					<b>187,5</b>

# Air System Sizing Summary for 1P-LAB.METROLOGIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB.METROLOGIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **68,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **15,9** kW  
Sensible coil load ..... **9,8** kW  
Coil L/s at Feb 1500 ..... **721** L/s  
Max block L/s ..... **721** L/s  
Sum of peak zone L/s ..... **721** L/s  
Sensible heat ratio ..... **0,614**  
L/(s kW) ..... **45,2**  
m<sup>2</sup>/kW ..... **4,3**  
W/m<sup>2</sup> ..... **232,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **25,2 / 19,8** °C  
Leaving DB / WB ..... **13,9 / 13,4** °C  
Coil ADP ..... **12,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **5,0** kW  
Coil L/s at Jul 0700 ..... **721** L/s  
Max coil L/s ..... **721** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **72,5**  
Ent. DB / Lvg DB ..... **14,7 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **721** L/s  
Standard L/s ..... **719** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,51** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **195** L/s  
L/(s·m<sup>2</sup>) ..... **2,84** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB.METROLOGIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB.METROLOGIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **68,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	721	721	10,51	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	6,6	Dec 1800	0,0	68,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB.METEOROLOGIA	1	6,6	Dec 1800	721	0,0	68,6	10,51

## Ventilation Sizing Summary for 1P-LAB.METROLOGIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **195 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB.METEOROLOGIA	1	68,6	26,0	720,7	7,50	0,00	0,0	0,0	195,0
<b>Totals (incl. Space Multipliers)</b>				<b>720,7</b>					<b>195,0</b>

# Air System Sizing Summary for 1P-LAB.MICRO.AMB-LAMAP1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ... **1P-LAB.MICRO.AMB-LAMAP1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **83,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **13,0** kW  
Sensible coil load ..... **7,2** kW  
Coil L/s at Dec 1400 ..... **467** L/s  
Max block L/s ..... **467** L/s  
Sum of peak zone L/s ..... **467** L/s  
Sensible heat ratio ..... **0,553**  
L/(s kW) ..... **36,0**  
m<sup>2</sup>/kW ..... **6,4**  
W/m<sup>2</sup> ..... **156,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **26,0 / 20,8** °C  
Leaving DB / WB ..... **13,2 / 12,8** °C  
Coil ADP ..... **11,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,9** kW  
Coil L/s at May 0700 ..... **467** L/s  
Max coil L/s ..... **467** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **34,9**  
Ent. DB / Lvg DB ..... **14,6 / 19,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **467** L/s  
Standard L/s ..... **466** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,63** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **180** L/s  
L/(s·m<sup>2</sup>) ..... **2,17** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB.MICRO.AMB-LAMAP1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ... **1P-LAB.MICRO.AMB-LAMAP1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **83,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	467	467	5,63	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,2	Jan 1800	0,0	83,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB.MICRO.AMB-LAMAP	1	4,2	Jan 1800	467	0,0	83,0	5,63

## Ventilation Sizing Summary for 1P-LAB.MICRO.AMB-LAMAP1

Project Name: LABOMAR-VRF

08/22/2024

Prepared by:

08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **180** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB.MICRO.AMB-LAMAP	1	83,0	24,0	466,9	7,50	0,00	0,0	0,0	180,0
<b>Totals (incl. Space Multipliers)</b>				<b>466,9</b>					<b>180,0</b>



# Air System Sizing Summary for 1P-LAB.MICRO.AMB-LAMAP2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ... **1P-LAB.MICRO.AMB-LAMAP2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,8** kW  
Sensible coil load ..... **4,2** kW  
Coil L/s at Dec 1500 ..... **435** L/s  
Max block L/s ..... **435** L/s  
Sum of peak zone L/s ..... **435** L/s  
Sensible heat ratio ..... **0,875**  
L/(s kW) ..... **91,6**  
m<sup>2</sup>/kW ..... **3,7**  
W/m<sup>2</sup> ..... **269,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,3 / 18,1** °C  
Leaving DB / WB ..... **15,4 / 14,9** °C  
Coil ADP ..... **14,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **0 of 1** OK  
Max zone temperature deviation ..... **0,1** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,4** kW  
Coil L/s at May 0700 ..... **435** L/s  
Max coil L/s ..... **435** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **195,7**  
Ent. DB / Lvg DB ..... **15,0 / 21,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **435** L/s  
Standard L/s ..... **434** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **24,73** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **19** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB.MICRO.AMB-LAMAP2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ... **1P-LAB.MICRO.AMB-LAMAP2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	435	435	24,73	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,0	Jan 1800	0,0	17,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB.MICRO.AMB-LAMAP2	1	4,0	Jan 1800	435	0,0	17,6	24,73

## Ventilation Sizing Summary for 1P-LAB.MICRO.AMB-LAMAP2

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **19 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB.MICRO.AMB-LAMAP2	1	17,6	2,5	435,3	7,50	0,00	0,0	0,0	18,9
<b>Totals (incl. Space Multipliers)</b>				<b>435,3</b>					<b>18,9</b>

# Air System Sizing Summary for 1P-LAB.MOD.NUMÉRICA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB.MOD.NUMÉRICA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **48,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **10,2** kW  
Sensible coil load ..... **6,1** kW  
Coil L/s at Feb 1500 ..... **440** L/s  
Max block L/s ..... **440** L/s  
Sum of peak zone L/s ..... **440** L/s  
Sensible heat ratio ..... **0,604**  
L/(s kW) ..... **43,3**  
m<sup>2</sup>/kW ..... **4,7**  
W/m<sup>2</sup> ..... **211,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **25,3 / 20,0** °C  
Leaving DB / WB ..... **13,8 / 13,3** °C  
Coil ADP ..... **12,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,2** kW  
Coil L/s at Jul 0700 ..... **440** L/s  
Max coil L/s ..... **440** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **65,8**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **440** L/s  
Standard L/s ..... **438** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,14** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **128** L/s  
L/(s·m<sup>2</sup>) ..... **2,65** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB.MOD.NUMÉRICA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB.MOD.NUMÉRICA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **48,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	440	440	9,14	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,0	Dec 1800	0,0	48,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB.MOD.NUMÉRICA	1	4,0	Dec 1800	440	0,0	48,1	9,14

## Ventilation Sizing Summary for 1P-LAB.MOD.NUMÉRICA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **128** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB.MOD.NUMÉRICA	1	48,1	17,0	439,8	7,50	0,00	0,0	0,0	127,5
<b>Totals (incl. Space Multipliers)</b>				<b>439,8</b>					<b>127,5</b>

# Air System Sizing Summary for 1P-LAB.OCE.FIS-LOF

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB.OCE.FIS-LOF**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **48,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **10,2** kW  
Sensible coil load ..... **6,1** kW  
Coil L/s at Feb 1500 ..... **440** L/s  
Max block L/s ..... **440** L/s  
Sum of peak zone L/s ..... **440** L/s  
Sensible heat ratio ..... **0,604**  
L/(s kW) ..... **43,3**  
m<sup>2</sup>/kW ..... **4,7**  
W/m<sup>2</sup> ..... **211,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **25,3 / 20,0** °C  
Leaving DB / WB ..... **13,8 / 13,3** °C  
Coil ADP ..... **12,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,2** kW  
Coil L/s at Jul 0700 ..... **440** L/s  
Max coil L/s ..... **440** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **65,8**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **440** L/s  
Standard L/s ..... **438** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,14** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **128** L/s  
L/(s·m<sup>2</sup>) ..... **2,65** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB.OCE.FIS-LOF

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB.OCE.FIS-LOF**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **48,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	440	440	9,14	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,0	Dec 1800	0,0	48,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB.OCE.FIS-LOF	1	4,0	Dec 1800	440	0,0	48,1	9,14



## Ventilation Sizing Summary for 1P-LAB.OCE.FIS-LOF

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **128** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB.OCE.FIS-LOF	1	48,1	17,0	439,8	7,50	0,00	0,0	0,0	127,5
<b>Totals (incl. Space Multipliers)</b>				<b>439,8</b>					<b>127,5</b>

# Air System Sizing Summary for 1P-LAB.SECO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAB.SECO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **24,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,3** kW  
Sensible coil load ..... **2,0** kW  
Coil L/s at Dec 1500 ..... **217** L/s  
Max block L/s ..... **217** L/s  
Sum of peak zone L/s ..... **217** L/s  
Sensible heat ratio ..... **0,894**  
L/(s kW) ..... **95,1**  
m<sup>2</sup>/kW ..... **10,6**  
W/m<sup>2</sup> ..... **94,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **22,9 / 17,7** °C  
Leaving DB / WB ..... **15,1 / 14,6** °C  
Coil ADP ..... **14,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,5** kW  
Coil L/s at Jul 0700 ..... **217** L/s  
Max coil L/s ..... **217** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **62,0**  
Ent. DB / Lvg DB ..... **14,9 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **217** L/s  
Standard L/s ..... **216** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,99** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **8** L/s  
L/(s·m<sup>2</sup>) ..... **0,31** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAB.SECO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAB.SECO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **24,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	217	217	8,99	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,0	Dec 1800	0,0	24,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAB.SECO	1	2,0	Dec 1800	217	0,0	24,1	8,99

## Ventilation Sizing Summary for 1P-LAB.SECO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAB.SECO	1	24,1	1,0	216,7	7,50	0,00	0,0	0,0	7,5
<b>Totals (incl. Space Multipliers)</b>				<b>216,7</b>					<b>7,5</b>

# Air System Sizing Summary for 1P-LAV.ESTERILIZAÇÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LAV.ESTERILIZAÇÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,7** kW  
Sensible coil load ..... **1,4** kW  
Coil L/s at Jan 1400 ..... **143** L/s  
Max block L/s ..... **143** L/s  
Sum of peak zone L/s ..... **143** L/s  
Sensible heat ratio ..... **0,825**  
L/(s kW) ..... **82,7**  
m<sup>2</sup>/kW ..... **5,2**  
W/m<sup>2</sup> ..... **194,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Jan 1400**  
OA DB / WB ..... **32,0 / 25,5** °C  
Entering DB / WB ..... **23,1 / 17,9** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,1** kW  
Coil L/s at Aug 0700 ..... **143** L/s  
Max coil L/s ..... **143** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Aug 0700**  
W/m<sup>2</sup> ..... **119,1**  
Ent. DB / Lvg DB ..... **14,9 / 21,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **143** L/s  
Standard L/s ..... **142** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **16,04** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **10** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LAV. ESTERILIZAÇÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LAV. ESTERILIZAÇÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,9 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	143	143	16,04	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,3	Dec 1800	0,0	8,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LAVAGEM/ESTERILIZAÇÃO	1	1,3	Dec 1800	143	0,0	8,9	16,04

## Ventilation Sizing Summary for 1P-LAV.ESTERILIZAÇÃO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **10 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LAVAGEM/ESTERILIZAÇÃO	1	8,9	1,3	142,8	7,50	0,00	0,0	0,0	9,5
<b>Totals (incl. Space Multipliers)</b>				<b>142,8</b>					<b>9,5</b>

# Air System Sizing Summary for 1P-LEDS.ECONOMIA ECO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LEDS.ECONOMIA ECO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **64,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **12,6** kW  
Sensible coil load ..... **6,6** kW  
Coil L/s at Dec 1500 ..... **383** L/s  
Max block L/s ..... **383** L/s  
Sum of peak zone L/s ..... **383** L/s  
Sensible heat ratio ..... **0,524**  
L/(s kW) ..... **30,4**  
m<sup>2</sup>/kW ..... **5,1**  
W/m<sup>2</sup> ..... **196,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **27,1 / 21,7** °C  
Leaving DB / WB ..... **12,8 / 12,4** °C  
Coil ADP ..... **11,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,7** kW  
Coil L/s at May 0600 ..... **383** L/s  
Max coil L/s ..... **383** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **41,7**  
Ent. DB / Lvg DB ..... **14,6 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **383** L/s  
Standard L/s ..... **382** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **188** L/s  
L/(s·m<sup>2</sup>) ..... **2,92** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 1P-LEDS.ECONOMIA ECO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LEDS.ECONOMIA ECO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **64,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	383	383	5,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,5	Jan 1800	0,0	64,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LEDS ECONOMIA ECO	1	3,5	Jan 1800	383	0,0	64,2	5,97

## Ventilation Sizing Summary for 1P-LEDS.ECONOMIA ECO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **188** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LEDS ECONOMIA ECO	1	64,2	25,0	383,3	7,50	0,00	0,0	0,0	187,5
<b>Totals (incl. Space Multipliers)</b>				<b>383,3</b>					<b>187,5</b>

# Air System Sizing Summary for 1P-LMN CLUSTER

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LMN CLUSTER**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **0,9** kW  
Sensible coil load ..... **0,7** kW  
Coil L/s at Dec 1400 ..... **75** L/s  
Max block L/s ..... **75** L/s  
Sum of peak zone L/s ..... **75** L/s  
Sensible heat ratio ..... **0,839**  
L/(s kW) ..... **85,6**  
m<sup>2</sup>/kW ..... **4,7**  
W/m<sup>2</sup> ..... **213,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,1 / 18,0** °C  
Leaving DB / WB ..... **15,0 / 14,5** °C  
Coil ADP ..... **14,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,5** kW  
Coil L/s at May 0500 ..... **75** L/s  
Max coil L/s ..... **75** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **131,2**  
Ent. DB / Lvg DB ..... **14,8 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **75** L/s  
Standard L/s ..... **75** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **18,26** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **4** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LMN CLUSTER

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LMN CLUSTER**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,1 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	75	75	18,26	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,7	Jan 1800	0,0	4,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LMN CLUSTER	1	0,7	Jan 1800	75	0,0	4,1	18,26

## Ventilation Sizing Summary for 1P-LMN CLUSTER

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **4 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LMN CLUSTER	1	4,1	0,6	74,9	7,50	0,00	0,0	0,0	4,4
<b>Totals (incl. Space Multipliers)</b>				<b>74,9</b>					<b>4,4</b>

# Air System Sizing Summary for 1P-LMN DOUTORADO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LMN DOUTORADO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,7** kW  
Sensible coil load ..... **1,4** kW  
Coil L/s at Feb 1500 ..... **133** L/s  
Max block L/s ..... **133** L/s  
Sum of peak zone L/s ..... **133** L/s  
Sensible heat ratio ..... **0,794**  
L/(s kW) ..... **77,1**  
m<sup>2</sup>/kW ..... **6,1**  
W/m<sup>2</sup> ..... **164,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **23,3 / 18,1** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,0** kW  
Coil L/s at Jul 0700 ..... **133** L/s  
Max coil L/s ..... **133** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **94,6**  
Ent. DB / Lvg DB ..... **14,7 / 20,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **133** L/s  
Standard L/s ..... **133** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **12,69** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **11** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LMN DOUTORADO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LMN DOUTORADO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	133	133	12,69	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Dec 1800	0,0	10,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LMN DOUTORADO	1	1,2	Dec 1800	133	0,0	10,5	12,69

## Ventilation Sizing Summary for 1P-LMN DOUTORADO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **11 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LMN DOUTORADO	1	10,5	1,5	133,4	7,50	0,00	0,0	0,0	11,3
<b>Totals (incl. Space Multipliers)</b>				<b>133,4</b>					<b>11,3</b>



# Air System Sizing Summary for 1P-LMN MESTRADO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LMN MESTRADO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **14,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **3,9** kW  
Sensible coil load ..... **2,5** kW  
Coil L/s at Jan 1400 ..... **197** L/s  
Max block L/s ..... **197** L/s  
Sum of peak zone L/s ..... **197** L/s  
Sensible heat ratio ..... **0,639**  
L/(s kW) ..... **50,0**  
m<sup>2</sup>/kW ..... **3,8**  
W/m<sup>2</sup> ..... **266,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Jan 1400**  
OA DB / WB ..... **32,0 / 25,5** °C  
Entering DB / WB ..... **24,7 / 19,4** °C  
Leaving DB / WB ..... **14,1 / 13,6** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,4** kW  
Coil L/s at Jul 0700 ..... **197** L/s  
Max coil L/s ..... **197** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **91,5**  
Ent. DB / Lvg DB ..... **14,8 / 20,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **197** L/s  
Standard L/s ..... **197** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,33** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **3,04** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LMN MESTRADO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

### Air System Information

Air System Name ..... **1P-LMN MESTRADO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **14,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	197	197	13,33	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,8	Dec 1800	0,0	14,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LMN MESTRADO	1	1,8	Dec 1800	197	0,0	14,8	13,33

## Ventilation Sizing Summary for 1P-LMN MESTRADO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:37

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LMN MESTRADO	1	14,8	6,0	197,4	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>197,4</b>					<b>45,0</b>

# Air System Sizing Summary for 1P-LOF DOUTORADO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:37

## Air System Information

Air System Name ..... **1P-LOF DOUTORADO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **14,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **3,7** kW  
Sensible coil load ..... **2,3** kW  
Coil L/s at Feb 1400 ..... **170** L/s  
Max block L/s ..... **170** L/s  
Sum of peak zone L/s ..... **170** L/s  
Sensible heat ratio ..... **0,616**  
L/(s kW) ..... **45,8**  
m<sup>2</sup>/kW ..... **4,0**  
W/m<sup>2</sup> ..... **250,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1400**  
OA DB / WB ..... **32,0 / 25,5** °C  
Entering DB / WB ..... **25,0 / 19,7** °C  
Leaving DB / WB ..... **13,8 / 13,4** °C  
Coil ADP ..... **12,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,3** kW  
Coil L/s at Jul 0700 ..... **170** L/s  
Max coil L/s ..... **170** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **87,1**  
Ent. DB / Lvg DB ..... **14,5 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **170** L/s  
Standard L/s ..... **170** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **11,49** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **3,04** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LOF DOUTORADO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-LOF DOUTORADO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **14,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	170	170	11,49	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,5	Dec 1800	0,0	14,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LOF DOUTORADO	1	1,5	Dec 1800	170	0,0	14,8	11,49

## Ventilation Sizing Summary for 1P-LOF DOUTORADO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LOF DOUTORADO	1	14,8	6,0	170,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>170,0</b>					<b>45,0</b>

# Air System Sizing Summary for 1P-LOF MESTRADO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-LOF MESTRADO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **14,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **3,8** kW  
Sensible coil load ..... **2,4** kW  
Coil L/s at Feb 1400 ..... **180** L/s  
Max block L/s ..... **180** L/s  
Sum of peak zone L/s ..... **180** L/s  
Sensible heat ratio ..... **0,624**  
L/(s kW) ..... **47,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **256,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1400**  
OA DB / WB ..... **32,0 / 25,5** °C  
Entering DB / WB ..... **24,9 / 19,6** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,3** kW  
Coil L/s at Jul 0600 ..... **180** L/s  
Max coil L/s ..... **180** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0600**  
W/m<sup>2</sup> ..... **89,2**  
Ent. DB / Lvg DB ..... **14,8 / 20,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **180** L/s  
Standard L/s ..... **179** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **12,14** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **3,04** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-LOF MESTRADO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-LOF MESTRADO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **14,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	180	180	12,14	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,6	Dec 1800	0,0	14,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-LOF MESTRADO	1	1,6	Dec 1800	180	0,0	14,8	12,14



## Ventilation Sizing Summary for 1P-LOF MESTRADO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-LOF MESTRADO	1	14,8	6,0	179,6	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>179,6</b>					<b>45,0</b>

# Air System Sizing Summary for 1P-MICROSCOPIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-MICROSCOPIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,1** kW  
Sensible coil load ..... **0,8** kW  
Coil L/s at Dec 1500 ..... **74** L/s  
Max block L/s ..... **74** L/s  
Sum of peak zone L/s ..... **74** L/s  
Sensible heat ratio ..... **0,720**  
L/(s kW) ..... **65,0**  
m<sup>2</sup>/kW ..... **8,2**  
W/m<sup>2</sup> ..... **122,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,9 / 18,7** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,5** kW  
Coil L/s at Nov 0300 ..... **74** L/s  
Max coil L/s ..... **74** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Nov 0300**  
W/m<sup>2</sup> ..... **50,1**  
Ent. DB / Lvg DB ..... **14,9 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **74** L/s  
Standard L/s ..... **74** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,96** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **10** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-MICROSCOPIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-MICROSCOPIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,3 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	74	74	7,96	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,7	Jan 1800	0,0	9,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-MICROSCOPIA	1	0,7	Jan 1800	74	0,0	9,3	7,96

## Ventilation Sizing Summary for 1P-MICROSCOPIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **10 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-MICROSCOPIA	1	9,3	1,3	74,0	7,50	0,00	0,0	0,0	10,0
<b>Totals (incl. Space Multipliers)</b>				<b>74,0</b>					<b>10,0</b>

# Air System Sizing Summary for 1P-OPEN OFFICE

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-OPEN OFFICE**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **93,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **13,1** kW  
Sensible coil load ..... **8,7** kW  
Coil L/s at Dec 1500 ..... **730** L/s  
Max block L/s ..... **730** L/s  
Sum of peak zone L/s ..... **730** L/s  
Sensible heat ratio ..... **0,667**  
L/(s kW) ..... **55,8**  
m<sup>2</sup>/kW ..... **7,2**  
W/m<sup>2</sup> ..... **139,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,2 / 19,1** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **4,8** kW  
Coil L/s at May 0600 ..... **730** L/s  
Max coil L/s ..... **730** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **50,7**  
Ent. DB / Lvg DB ..... **14,8 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **730** L/s  
Standard L/s ..... **728** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,79** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **135** L/s  
L/(s·m<sup>2</sup>) ..... **1,44** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-OPEN OFFICE

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-OPEN OFFICE**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **93,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	730	730	7,79	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	6,6	Jan 1800	0,0	93,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-OPEN OFFICE	1	6,6	Jan 1800	730	0,0	93,7	7,79

## Ventilation Sizing Summary for 1P-OPEN OFFICE

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **135 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-OPEN OFFICE	1	93,7	18,0	730,0	7,50	0,00	0,0	0,0	135,0
<b>Totals (incl. Space Multipliers)</b>				<b>730,0</b>					<b>135,0</b>

# Air System Sizing Summary for 1P-PCL

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... <b>1P-PCL</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>9,2</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>3,0</b> kW	Load occurs at ..... <b>Dec 1500</b>
Sensible coil load ..... <b>1,8</b> kW	OA DB / WB ..... <b>31,7 / 25,6</b> °C
Coil L/s at Dec 1500 ..... <b>129</b> L/s	Entering DB / WB ..... <b>25,2 / 20,0</b> °C
Max block L/s ..... <b>129</b> L/s	Leaving DB / WB ..... <b>13,8 / 13,4</b> °C
Sum of peak zone L/s ..... <b>129</b> L/s	Coil ADP ..... <b>12,5</b> °C
Sensible heat ratio ..... <b>0,596</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>43,3</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>3,1</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>324,2</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>0,9</b> kW	Load occurs at ..... <b>Jul 0700</b>
Coil L/s at Jul 0700 ..... <b>129</b> L/s	W/m <sup>2</sup> ..... <b>93,4</b>
Max coil L/s ..... <b>129</b> L/s	Ent. DB / Lvg DB ..... <b>14,7 / 20,2</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>129</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>129</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>14,03</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>38</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>4,08</b> L/(s·m <sup>2</sup> )	



## Zone Sizing Summary for 1P-PCL

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-PCL**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,2 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	129	129	14,03	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	9,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-PCL	1	1,2	Jan 1800	129	0,0	9,2	14,03

## Ventilation Sizing Summary for 1P-PCL

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **38 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-PCL	1	9,2	5,0	129,1	7,50	0,00	0,0	0,0	37,5
<b>Totals (incl. Space Multipliers)</b>				<b>129,1</b>					<b>37,5</b>

# Air System Sizing Summary for 1P-PRÉMIX

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-PRÉMIX**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,3** kW  
Sensible coil load ..... **1,1** kW  
Coil L/s at Dec 1400 ..... **102** L/s  
Max block L/s ..... **102** L/s  
Sum of peak zone L/s ..... **102** L/s  
Sensible heat ratio ..... **0,782**  
L/(s kW) ..... **75,9**  
m<sup>2</sup>/kW ..... **6,3**  
W/m<sup>2</sup> ..... **157,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,4 / 18,3** °C  
Leaving DB / WB ..... **14,9 / 14,4** °C  
Coil ADP ..... **13,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at May 0600 ..... **102** L/s  
Max coil L/s ..... **102** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **85,2**  
Ent. DB / Lvg DB ..... **14,8 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **102** L/s  
Standard L/s ..... **102** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **11,96** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **9** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-PRÉMIX

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-PRÉMIX**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,5 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	102	102	11,96	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,9	Jan 1800	0,0	8,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-PRÉ-MIX	1	0,9	Jan 1800	102	0,0	8,5	11,96

## Ventilation Sizing Summary for 1P-PRÉMIX

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **9 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-PRÉ-MIX	1	8,5	1,2	102,0	7,50	0,00	0,0	0,0	9,1
<b>Totals (incl. Space Multipliers)</b>				<b>102,0</b>					<b>9,1</b>

# Air System Sizing Summary for 1P-PREP.SOLUÇÕES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-PREP.SOLUÇÕES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,3** kW  
Sensible coil load ..... **1,0** kW  
Coil L/s at Dec 1400 ..... **94** L/s  
Max block L/s ..... **94** L/s  
Sum of peak zone L/s ..... **94** L/s  
Sensible heat ratio ..... **0,768**  
L/(s kW) ..... **73,5**  
m<sup>2</sup>/kW ..... **6,7**  
W/m<sup>2</sup> ..... **148,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,5 / 18,3** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0600 ..... **94** L/s  
Max coil L/s ..... **94** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **73,8**  
Ent. DB / Lvg DB ..... **14,8 / 20,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **94** L/s  
Standard L/s ..... **94** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,91** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **9** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-PREP.SOLUÇÕES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... 1P-PREP.SOLUÇÕES  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 8,6 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	94	94	10,91	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,9	Jan 1800	0,0	8,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-REPARO SOLUÇÕES	1	0,9	Jan 1800	94	0,0	8,6	10,91

## Ventilation Sizing Summary for 1P-PREP.SOLUÇÕES

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **9 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-REPARO SOLUÇÕES	1	8,6	1,2	94,0	7,50	0,00	0,0	0,0	9,2
<b>Totals (incl. Space Multipliers)</b>				<b>94,0</b>					<b>9,2</b>



# Air System Sizing Summary for 1P-PROC.AMOSTRAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-PROC.AMOSTRAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,0** kW  
Sensible coil load ..... **0,7** kW  
Coil L/s at Dec 1500 ..... **63** L/s  
Max block L/s ..... **63** L/s  
Sum of peak zone L/s ..... **63** L/s  
Sensible heat ratio ..... **0,699**  
L/(s kW) ..... **61,4**  
m<sup>2</sup>/kW ..... **8,8**  
W/m<sup>2</sup> ..... **113,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,1 / 18,9** °C  
Leaving DB / WB ..... **14,6 / 14,2** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,5** kW  
Coil L/s at May 0600 ..... **63** L/s  
Max coil L/s ..... **63** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **50,7**  
Ent. DB / Lvg DB ..... **14,8 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **63** L/s  
Standard L/s ..... **63** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,98** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **10** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-PROC.AMOSTRAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-PROC.AMOSTRAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	63	63	6,98	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,6	Jan 1800	0,0	9,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-PROCES.AMOSTRAS	1	0,6	Jan 1800	63	0,0	9,0	6,98

## Ventilation Sizing Summary for 1P-PROC.AMOSTRAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **10 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-PROCES.AMOSTRAS	1	9,0	1,3	62,8	7,50	0,00	0,0	0,0	9,6
<b>Totals (incl. Space Multipliers)</b>				<b>62,8</b>					<b>9,6</b>

# Air System Sizing Summary for 1P-S.CONV.INTERN.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-S.CONV.INTERN.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **31,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,3** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **234** L/s  
Max block L/s ..... **234** L/s  
Sum of peak zone L/s ..... **234** L/s  
Sensible heat ratio ..... **0,661**  
L/(s kW) ..... **54,9**  
m<sup>2</sup>/kW ..... **7,4**  
W/m<sup>2</sup> ..... **135,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,6** kW  
Coil L/s at May 0500 ..... **234** L/s  
Max coil L/s ..... **234** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **50,2**  
Ent. DB / Lvg DB ..... **14,8 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **234** L/s  
Standard L/s ..... **234** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,47** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **1,43** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-S.CONV.INTERN.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-S.CONV.INTERN.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **31,4 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	234	234	7,47	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	31,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-S.CONV.INTERN.	1	2,1	Jan 1800	234	0,0	31,4	7,47

## Ventilation Sizing Summary for 1P-S.CONV.INTERN.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-S.CONV.INTERN.	1	31,4	6,0	234,4	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>234,4</b>					<b>45,0</b>

# Air System Sizing Summary for 1P-SALA CPA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA CPA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **24,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **12,4** kW  
Sensible coil load ..... **10,1** kW  
Coil L/s at Dec 1500 ..... **1000** L/s  
Max block L/s ..... **1000** L/s  
Sum of peak zone L/s ..... **1000** L/s  
Sensible heat ratio ..... **0,810**  
L/(s kW) ..... **80,5**  
m<sup>2</sup>/kW ..... **1,9**  
W/m<sup>2</sup> ..... **516,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,6 / 18,4** °C  
Leaving DB / WB ..... **15,2 / 14,7** °C  
Coil ADP ..... **14,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **0 of 1** OK  
Max zone temperature deviation ..... **0,1** K

## Central Heating Coil Sizing Data

Max coil load ..... **7,8** kW  
Coil L/s at May 0700 ..... **1000** L/s  
Max coil L/s ..... **1000** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **325,9**  
Ent. DB / Lvg DB ..... **14,9 / 21,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **1000** L/s  
Standard L/s ..... **997** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **41,55** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **3,12** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA CPA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA CPA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **24,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	1000	1000	41,55	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	9,1	Jan 1800	0,0	24,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA CPA	1	9,1	Jan 1800	1000	0,0	24,1	41,55



## Ventilation Sizing Summary for 1P-SALA CPA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA CPA	1	24,1	10,0	1000,0	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>1000,0</b>					<b>75,0</b>

# Air System Sizing Summary for 1P-SALA DE ÁGUAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... <b>1P-SALA DE ÁGUAS</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>10,0</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>1,6</b> kW	Load occurs at ..... <b>Dec 1500</b>
Sensible coil load ..... <b>1,3</b> kW	OA DB / WB ..... <b>31,7 / 25,6</b> °C
Coil L/s at Dec 1500 ..... <b>127</b> L/s	Entering DB / WB ..... <b>23,3 / 18,1</b> °C
Max block L/s ..... <b>127</b> L/s	Leaving DB / WB ..... <b>14,8 / 14,3</b> °C
Sum of peak zone L/s ..... <b>127</b> L/s	Coil ADP ..... <b>13,8</b> °C
Sensible heat ratio ..... <b>0,790</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>77,1</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>6,1</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>164,3</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>0,7</b> kW	Load occurs at ..... <b>May 0700</b>
Coil L/s at May 0700 ..... <b>127</b> L/s	W/m <sup>2</sup> ..... <b>71,7</b>
Max coil L/s ..... <b>127</b> L/s	Ent. DB / Lvg DB ..... <b>15,0 / 19,7</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>127</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>126</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>12,66</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>11</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>1,07</b> L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for 1P-SALA DE ÁGUAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DE ÁGUAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	127	127	12,66	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	10,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA DE ÁGUAS	1	1,2	Jan 1800	127	0,0	10,0	12,66

## Ventilation Sizing Summary for 1P-SALA DE ÁGUAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **11 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA DE ÁGUAS	1	10,0	1,4	126,6	7,50	0,00	0,0	0,0	10,7
<b>Totals (incl. Space Multipliers)</b>				<b>126,6</b>					<b>10,7</b>

# Air System Sizing Summary for 1P-SALA DE AQUÁRIOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA DE AQUÁRIOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **42,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **3,7** kW  
Sensible coil load ..... **2,3** kW  
Coil L/s at Dec 1500 ..... **173** L/s  
Max block L/s ..... **173** L/s  
Sum of peak zone L/s ..... **173** L/s  
Sensible heat ratio ..... **0,612**  
L/(s kW) ..... **46,3**  
m<sup>2</sup>/kW ..... **11,3**  
W/m<sup>2</sup> ..... **88,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,0 / 19,8** °C  
Leaving DB / WB ..... **14,0 / 13,6** °C  
Coil ADP ..... **12,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,3** kW  
Coil L/s at Jul 0600 ..... **173** L/s  
Max coil L/s ..... **173** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0600**  
W/m<sup>2</sup> ..... **30,3**  
Ent. DB / Lvg DB ..... **14,7 / 20,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **173** L/s  
Standard L/s ..... **172** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **4,09** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA DE AQUÁRIOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DE AQUÁRIOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **42,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	173	173	4,09	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,6	Jan 1800	0,0	42,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA AQUÁRIOS	1	1,6	Jan 1800	173	0,0	42,2	4,09

## Ventilation Sizing Summary for 1P-SALA DE AQUÁRIOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA AQUÁRIOS	1	42,2	6,0	172,7	7,50	0,00	0,0	0,0	45,2
<b>Totals (incl. Space Multipliers)</b>				<b>172,7</b>					<b>45,2</b>

# Air System Sizing Summary for 1P-SALA DE AULA 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA DE AULA 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,8** kW  
Sensible coil load ..... **9,9** kW  
Coil L/s at Dec 1600 ..... **517** L/s  
Max block L/s ..... **517** L/s  
Sum of peak zone L/s ..... **517** L/s  
Sensible heat ratio ..... **0,499**  
L/(s kW) ..... **26,1**  
m<sup>2</sup>/kW ..... **2,9**  
W/m<sup>2</sup> ..... **343,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **27,8 / 22,5** °C  
Leaving DB / WB ..... **11,9 / 11,7** °C  
Coil ADP ..... **10,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,6** kW  
Coil L/s at May 0700 ..... **517** L/s  
Max coil L/s ..... **517** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **62,7**  
Ent. DB / Lvg DB ..... **14,5 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **517** L/s  
Standard L/s ..... **515** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,96** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,33** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 1P-SALA DE AULA 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DE AULA 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	517	517	8,96	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,7	Jan 1800	0,0	57,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA DE AULA 01	1	4,7	Jan 1800	517	0,0	57,7	8,96

## Ventilation Sizing Summary for 1P-SALA DE AULA 01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA DE AULA 01	1	57,7	41,0	516,9	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>516,9</b>					<b>307,5</b>

# Air System Sizing Summary for 1P-SALA DE AULA 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA DE AULA 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,7** kW  
Sensible coil load ..... **9,8** kW  
Coil L/s at Dec 1500 ..... **500** L/s  
Max block L/s ..... **500** L/s  
Sum of peak zone L/s ..... **500** L/s  
Sensible heat ratio ..... **0,497**  
L/(s kW) ..... **25,3**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **327,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **28,2 / 22,7** °C  
Leaving DB / WB ..... **11,8 / 11,6** °C  
Coil ADP ..... **10,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,5** kW  
Coil L/s at Jul 0700 ..... **500** L/s  
Max coil L/s ..... **500** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **58,6**  
Ent. DB / Lvg DB ..... **14,5 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **500** L/s  
Standard L/s ..... **498** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,29** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,10** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA DE AULA 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DE AULA 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	500	500	8,29	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,5	Jan 1800	0,0	60,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA DE AULA 02	1	4,5	Jan 1800	500	0,0	60,3	8,29

## Ventilation Sizing Summary for 1P-SALA DE AULA 02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA DE AULA 02	1	60,3	41,0	499,6	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>499,6</b>					<b>307,5</b>

# Air System Sizing Summary for 1P-SALA DE AULA 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA DE AULA 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,7** kW  
Sensible coil load ..... **9,8** kW  
Coil L/s at Dec 1500 ..... **507** L/s  
Max block L/s ..... **507** L/s  
Sum of peak zone L/s ..... **507** L/s  
Sensible heat ratio ..... **0,499**  
L/(s kW) ..... **25,8**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **326,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **28,1 / 22,7** °C  
Leaving DB / WB ..... **12,0 / 11,8** °C  
Coil ADP ..... **10,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,6** kW  
Coil L/s at May 0600 ..... **507** L/s  
Max coil L/s ..... **507** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **59,0**  
Ent. DB / Lvg DB ..... **14,4 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **507** L/s  
Standard L/s ..... **505** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,41** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,10** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA DE AULA 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DE AULA 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	507	507	8,41	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,6	Jan 1800	0,0	60,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA DE AULA 03	1	4,6	Jan 1800	507	0,0	60,3	8,41

## Ventilation Sizing Summary for 1P-SALA DE AULA 03

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA DE AULA 03	1	60,3	41,0	506,9	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>506,9</b>					<b>307,5</b>



# Air System Sizing Summary for 1P-SALA DE AULA 04

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA DE AULA 04**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,6** kW  
Sensible coil load ..... **9,8** kW  
Coil L/s at Dec 1500 ..... **500** L/s  
Max block L/s ..... **500** L/s  
Sum of peak zone L/s ..... **500** L/s  
Sensible heat ratio ..... **0,498**  
L/(s kW) ..... **25,5**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **325,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **28,2 / 22,7** °C  
Leaving DB / WB ..... **12,0 / 11,7** °C  
Coil ADP ..... **10,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,5** kW  
Coil L/s at May 0700 ..... **500** L/s  
Max coil L/s ..... **500** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **58,9**  
Ent. DB / Lvg DB ..... **14,4 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **500** L/s  
Standard L/s ..... **498** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,28** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,10** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA DE AULA 04

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DE AULA 04**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	500	500	8,28	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,5	Jan 1800	0,0	60,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA DE AULA 04	1	4,5	Jan 1800	500	0,0	60,3	8,28

## Ventilation Sizing Summary for 1P-SALA DE AULA 04

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA DE AULA 04	1	60,3	41,0	499,5	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>499,5</b>					<b>307,5</b>

# Air System Sizing Summary for 1P-SALA DE AULA 05

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA DE AULA 05**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,6** kW  
Sensible coil load ..... **9,8** kW  
Coil L/s at Dec 1500 ..... **500** L/s  
Max block L/s ..... **500** L/s  
Sum of peak zone L/s ..... **500** L/s  
Sensible heat ratio ..... **0,498**  
L/(s kW) ..... **25,5**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **325,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **28,2 / 22,7** °C  
Leaving DB / WB ..... **12,0 / 11,7** °C  
Coil ADP ..... **10,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,5** kW  
Coil L/s at May 0700 ..... **500** L/s  
Max coil L/s ..... **500** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **58,9**  
Ent. DB / Lvg DB ..... **14,4 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **500** L/s  
Standard L/s ..... **498** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,28** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,10** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA DE AULA 05

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DE AULA 05**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	500	500	8,28	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,5	Jan 1800	0,0	60,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA DE AULA 05	1	4,5	Jan 1800	500	0,0	60,3	8,28

## Ventilation Sizing Summary for 1P-SALA DE AULA 05

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA DE AULA 05	1	60,3	41,0	499,5	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>499,5</b>					<b>307,5</b>

# Air System Sizing Summary for 1P-SALA DE AULA 06

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA DE AULA 06**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,9** kW  
Sensible coil load ..... **10,0** kW  
Coil L/s at Dec 1400 ..... **527** L/s  
Max block L/s ..... **527** L/s  
Sum of peak zone L/s ..... **527** L/s  
Sensible heat ratio ..... **0,501**  
L/(s kW) ..... **26,4**  
m<sup>2</sup>/kW ..... **3,0**  
W/m<sup>2</sup> ..... **330,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **27,7 / 22,4** °C  
Leaving DB / WB ..... **12,0 / 11,7** °C  
Coil ADP ..... **10,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,6** kW  
Coil L/s at Jul 0600 ..... **527** L/s  
Max coil L/s ..... **527** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0600**  
W/m<sup>2</sup> ..... **59,5**  
Ent. DB / Lvg DB ..... **14,6 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **527** L/s  
Standard L/s ..... **525** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,73** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,10** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA DE AULA 06

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DE AULA 06**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	527	527	8,73	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,8	Jan 1800	0,0	60,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA DE AULA 06	1	4,8	Jan 1800	527	0,0	60,3	8,73



## Ventilation Sizing Summary for 1P-SALA DE AULA 06

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA DE AULA 06	1	60,3	41,0	526,7	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>526,7</b>					<b>307,5</b>

# Air System Sizing Summary for 1P-SALA DE ESTUFAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA DE ESTUFAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **55,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **7,2** kW  
Sensible coil load ..... **5,3** kW  
Coil L/s at Dec 1500 ..... **491** L/s  
Max block L/s ..... **491** L/s  
Sum of peak zone L/s ..... **491** L/s  
Sensible heat ratio ..... **0,737**  
L/(s kW) ..... **68,0**  
m<sup>2</sup>/kW ..... **7,6**  
W/m<sup>2</sup> ..... **131,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,6 / 18,5** °C  
Leaving DB / WB ..... **14,6 / 14,2** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,2** kW  
Coil L/s at Jul 0700 ..... **491** L/s  
Max coil L/s ..... **491** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **57,3**  
Ent. DB / Lvg DB ..... **14,9 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **491** L/s  
Standard L/s ..... **490** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,93** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **59** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA DE ESTUFAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DE ESTUFAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **55,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	491	491	8,93	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,5	Dec 1800	0,0	55,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA DE ESTUFAS E AC	1	4,5	Dec 1800	491	0,0	55,0	8,93

## Ventilation Sizing Summary for 1P-SALA DE ESTUFAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **59** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA DE ESTUFAS E AC	1	55,0	7,9	491,3	7,50	0,00	0,0	0,0	59,0
<b>Totals (incl. Space Multipliers)</b>				<b>491,3</b>					<b>59,0</b>

# Air System Sizing Summary for 1P-SALA DE REUNIÕES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA DE REUNIÕES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **29,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **7,5** kW  
Sensible coil load ..... **4,5** kW  
Coil L/s at Dec 1400 ..... **342** L/s  
Max block L/s ..... **342** L/s  
Sum of peak zone L/s ..... **342** L/s  
Sensible heat ratio ..... **0,609**  
L/(s kW) ..... **45,9**  
m<sup>2</sup>/kW ..... **4,0**  
W/m<sup>2</sup> ..... **250,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,8 / 19,7** °C  
Leaving DB / WB ..... **13,8 / 13,4** °C  
Coil ADP ..... **12,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,0** kW  
Coil L/s at Oct 0700 ..... **342** L/s  
Max coil L/s ..... **342** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Oct 0700**  
W/m<sup>2</sup> ..... **68,9**  
Ent. DB / Lvg DB ..... **14,8 / 19,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **342** L/s  
Standard L/s ..... **341** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **11,51** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **90** L/s  
L/(s·m<sup>2</sup>) ..... **3,03** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA DE REUNIÕES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DE REUNIÕES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **29,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	342	342	11,51	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,1	May 1800	0,0	29,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA DE REUNIÕES	1	3,1	May 1800	342	0,0	29,7	11,51

## Ventilation Sizing Summary for 1P-SALA DE REUNIÕES

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **90** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA DE REUNIÕES	1	29,7	12,0	342,3	7,50	0,00	0,0	0,0	90,0
<b>Totals (incl. Space Multipliers)</b>				<b>342,3</b>					<b>90,0</b>

# Air System Sizing Summary for 1P-SALA DO CONSELHO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA DO CONSELHO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **33,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **8,0** kW  
Sensible coil load ..... **5,1** kW  
Coil L/s at Dec 1500 ..... **403** L/s  
Max block L/s ..... **403** L/s  
Sum of peak zone L/s ..... **403** L/s  
Sensible heat ratio ..... **0,636**  
L/(s kW) ..... **50,4**  
m<sup>2</sup>/kW ..... **4,2**  
W/m<sup>2</sup> ..... **240,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,6 / 19,4** °C  
Leaving DB / WB ..... **14,1 / 13,6** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,4** kW  
Coil L/s at Jul 0700 ..... **403** L/s  
Max coil L/s ..... **403** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **73,1**  
Ent. DB / Lvg DB ..... **14,9 / 19,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **403** L/s  
Standard L/s ..... **402** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **12,10** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **90** L/s  
L/(s·m<sup>2</sup>) ..... **2,70** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 1P-SALA DO CONSELHO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA DO CONSELHO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **33,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	403	403	12,10	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,7	Feb 1800	0,0	33,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA DO CONSELHO	1	3,7	Feb 1800	403	0,0	33,3	12,10

## Ventilation Sizing Summary for 1P-SALA DO CONSELHO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **90** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA DO CONSELHO	1	33,3	12,0	402,9	7,50	0,00	0,0	0,0	90,0
<b>Totals (incl. Space Multipliers)</b>				<b>402,9</b>					<b>90,0</b>

# Air System Sizing Summary for 1P-SALA EXPANSÃO 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA EXPANSÃO 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,0** kW  
Sensible coil load ..... **2,6** kW  
Coil L/s at Dec 1400 ..... **220** L/s  
Max block L/s ..... **220** L/s  
Sum of peak zone L/s ..... **220** L/s  
Sensible heat ratio ..... **0,661**  
L/(s kW) ..... **55,0**  
m<sup>2</sup>/kW ..... **9,8**  
W/m<sup>2</sup> ..... **101,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,9** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,3** kW  
Coil L/s at May 0600 ..... **220** L/s  
Max coil L/s ..... **220** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **32,7**  
Ent. DB / Lvg DB ..... **14,8 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **220** L/s  
Standard L/s ..... **220** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,60** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **42** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA EXPANSÃO 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA EXPANSÃO 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	220	220	5,60	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,0	Jan 1800	0,0	39,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA EXPANSÃO 01	1	2,0	Jan 1800	220	0,0	39,4	5,60

## Ventilation Sizing Summary for 1P-SALA EXPANSÃO 01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **42 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA EXPANSÃO 01	1	39,4	5,6	220,5	7,50	0,00	0,0	0,0	42,2
<b>Totals (incl. Space Multipliers)</b>				<b>220,5</b>					<b>42,2</b>

# Air System Sizing Summary for 1P-SALA EXPANSÃO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA EXPANSÃO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **3,8** kW  
Sensible coil load ..... **2,5** kW  
Coil L/s at Dec 1400 ..... **203** L/s  
Max block L/s ..... **203** L/s  
Sum of peak zone L/s ..... **203** L/s  
Sensible heat ratio ..... **0,647**  
L/(s kW) ..... **52,6**  
m<sup>2</sup>/kW ..... **10,2**  
W/m<sup>2</sup> ..... **97,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,4 / 19,3** °C  
Leaving DB / WB ..... **14,2 / 13,8** °C  
Coil ADP ..... **13,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,3** kW  
Coil L/s at May 0700 ..... **203** L/s  
Max coil L/s ..... **203** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **33,3**  
Ent. DB / Lvg DB ..... **14,8 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **203** L/s  
Standard L/s ..... **202** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,14** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **42** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA EXPANSÃO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA EXPANSÃO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	203	203	5,14	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,8	Jan 1800	0,0	39,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA EXPANSÃO 02	1	1,8	Jan 1800	203	0,0	39,4	5,14

## Ventilation Sizing Summary for 1P-SALA EXPANSÃO 02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **42 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA EXPANSÃO 02	1	39,4	5,6	202,5	7,50	0,00	0,0	0,0	42,2
<b>Totals (incl. Space Multipliers)</b>				<b>202,5</b>					<b>42,2</b>



# Air System Sizing Summary for 1P-SALA EXPANSÃO 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA EXPANSÃO 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,9** kW  
Sensible coil load ..... **3,5** kW  
Coil L/s at Dec 1500 ..... **251** L/s  
Max block L/s ..... **251** L/s  
Sum of peak zone L/s ..... **251** L/s  
Sensible heat ratio ..... **0,592**  
L/(s kW) ..... **42,6**  
m<sup>2</sup>/kW ..... **6,7**  
W/m<sup>2</sup> ..... **149,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,4 / 20,2** °C  
Leaving DB / WB ..... **13,8 / 13,4** °C  
Coil ADP ..... **12,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,5** kW  
Coil L/s at May 0700 ..... **251** L/s  
Max coil L/s ..... **251** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **38,4**  
Ent. DB / Lvg DB ..... **14,7 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **251** L/s  
Standard L/s ..... **250** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,36** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **1,90** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA EXPANSÃO 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA EXPANSÃO 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	251	251	6,36	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,3	Jan 1800	0,0	39,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA EXPANSÃO 03	1	2,3	Jan 1800	251	0,0	39,4	6,36

## Ventilation Sizing Summary for 1P-SALA EXPANSÃO 03

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA EXPANSÃO 03	1	39,4	10,0	250,6	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>250,6</b>					<b>75,0</b>

# Air System Sizing Summary for 1P-SALA VIDEO CONF.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SALA VIDEO CONF.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **94,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **9,1** kW  
Sensible coil load ..... **5,8** kW  
Coil L/s at Dec 1500 ..... **464** L/s  
Max block L/s ..... **464** L/s  
Sum of peak zone L/s ..... **464** L/s  
Sensible heat ratio ..... **0,640**  
L/(s kW) ..... **51,0**  
m<sup>2</sup>/kW ..... **10,4**  
W/m<sup>2</sup> ..... **96,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,5 / 19,4** °C  
Leaving DB / WB ..... **14,1 / 13,7** °C  
Coil ADP ..... **13,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,5** kW  
Coil L/s at May 0500 ..... **464** L/s  
Max coil L/s ..... **464** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **26,0**  
Ent. DB / Lvg DB ..... **14,8 / 19,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **464** L/s  
Standard L/s ..... **463** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **4,90** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **101** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SALA VIDEO CONF.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SALA VIDEO CONF.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **94,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	464	464	4,90	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,2	Jan 1800	0,0	94,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SALA VIDEO CONF.	1	4,2	Jan 1800	464	0,0	94,7	4,90

## Ventilation Sizing Summary for 1P-SALA VIDEO CONF.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **101 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SALA VIDEO CONF.	1	94,7	13,5	463,9	7,50	0,00	0,0	0,0	101,5
<b>Totals (incl. Space Multipliers)</b>				<b>463,9</b>					<b>101,5</b>

# Air System Sizing Summary for 1P-SECRETARIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-SECRETARIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **31,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,9** kW  
Sensible coil load ..... **3,4** kW  
Coil L/s at Dec 1500 ..... **300** L/s  
Max block L/s ..... **300** L/s  
Sum of peak zone L/s ..... **300** L/s  
Sensible heat ratio ..... **0,701**  
L/(s kW) ..... **61,7**  
m<sup>2</sup>/kW ..... **6,4**  
W/m<sup>2</sup> ..... **156,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,9 / 18,7** °C  
Leaving DB / WB ..... **14,4 / 14,0** °C  
Coil ADP ..... **13,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,6** kW  
Coil L/s at Sep 0600 ..... **300** L/s  
Max coil L/s ..... **300** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Sep 0600**  
W/m<sup>2</sup> ..... **52,0**  
Ent. DB / Lvg DB ..... **14,9 / 19,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **300** L/s  
Standard L/s ..... **299** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,66** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **1,45** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-SECRETARIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-SECRETARIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **31,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	300	300	9,66	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,7	May 1800	0,0	31,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-SECRETARIA	1	2,7	May 1800	300	0,0	31,1	9,66



## Ventilation Sizing Summary for 1P-SECRETARIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-SECRETARIA	1	31,1	6,0	300,4	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>300,4</b>					<b>45,0</b>

# Air System Sizing Summary for 1P-VICE-DIRETOR

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **1P-VICE-DIRETOR**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **23,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1500 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,656**  
L/(s kW) ..... **53,8**  
m<sup>2</sup>/kW ..... **5,6**  
W/m<sup>2</sup> ..... **179,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,2 / 19,1** °C  
Leaving DB / WB ..... **14,1 / 13,7** °C  
Coil ADP ..... **13,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,3** kW  
Coil L/s at Oct 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Oct 0700**  
W/m<sup>2</sup> ..... **55,8**  
Ent. DB / Lvg DB ..... **14,9 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,64** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **1,90** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 1P-VICE-DIRETOR

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **1P-VICE-DIRETOR**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **23,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	9,64	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	May 1800	0,0	23,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
1P-VICE-DIRETOR	1	2,1	May 1800	229	0,0	23,7	9,64

## Ventilation Sizing Summary for 1P-VICE-DIRETOR

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
1P-VICE-DIRETOR	1	23,7	6,0	228,6	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>228,6</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-???

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... 2P-???	Number of zones ..... 1
Equipment Class ..... SPLT AHU	Floor Area ..... 23,2 m <sup>2</sup>
Air System Type ..... SZCAV	Location ..... Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months ..... Jan to Dec	Zone L/s Sizing ..... Sum of space airflow rates
Sizing Data ..... Calculated	Space L/s Sizing ..... Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load ..... 2,5 kW	Load occurs at ..... Dec 1500
Sensible coil load ..... 1,7 kW	OA DB / WB ..... 31,7 / 25,6 °C
Coil L/s at Dec 1500 ..... 149 L/s	Entering DB / WB ..... 24,1 / 18,9 °C
Max block L/s ..... 149 L/s	Leaving DB / WB ..... 14,4 / 13,9 °C
Sum of peak zone L/s ..... 149 L/s	Coil ADP ..... 13,3 °C
Sensible heat ratio ..... 0,685	Bypass Factor ..... 0,100
L/(s kW) ..... 58,9	Resulting RH ..... 60 %
m <sup>2</sup> /kW ..... 9,1	Design supply temp. .... 14,4 °C
W/m <sup>2</sup> ..... 109,5	Zone T-stat Check ..... 1 of 1 OK
Water flow @ 5,6 K rise ..... N/A	Max zone temperature deviation ..... 0,0 K

## Central Heating Coil Sizing Data

Max coil load ..... 0,9 kW	Load occurs at ..... Nov 0300
Coil L/s at Nov 0300 ..... 149 L/s	W/m <sup>2</sup> ..... 40,1
Max coil L/s ..... 149 L/s	Ent. DB / Lvg DB ..... 14,9 / 20,1 °C
Water flow @ 11,1 K drop ..... N/A	

## Supply Fan Sizing Data

Actual max L/s ..... 149 L/s	Fan motor BHP ..... 0,00 BHP
Standard L/s ..... 149 L/s	Fan motor kW ..... 0,00 kW
Actual max L/(s·m <sup>2</sup> ) ..... 6,44 L/(s·m <sup>2</sup> )	Fan static ..... 0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... 25 L/s	L/s/person ..... 7,50 L/s/person
L/(s·m <sup>2</sup> ) ..... 1,07 L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for 2P-???

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... 2P-???  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 23,2 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	149	149	6,44	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,4	Jan 1800	0,0	23,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-???	1	1,4	Jan 1800	149	0,0	23,2	6,44

## Ventilation Sizing Summary for 2P-???

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **25 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-????	1	23,2	3,3	149,5	7,50	0,00	0,0	0,0	24,9
<b>Totals (incl. Space Multipliers)</b>				<b>149,5</b>					<b>24,9</b>

# Air System Sizing Summary for 2P-ADM.ARQ.ACAD

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **2P-ADM.ARQ.ACAD**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **29,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,6** kW  
Sensible coil load ..... **1,4** kW  
Coil L/s at Dec 1500 ..... **145** L/s  
Max block L/s ..... **145** L/s  
Sum of peak zone L/s ..... **145** L/s  
Sensible heat ratio ..... **0,854**  
L/(s kW) ..... **88,2**  
m<sup>2</sup>/kW ..... **17,8**  
W/m<sup>2</sup> ..... **56,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,1 / 17,9** °C  
Leaving DB / WB ..... **15,1 / 14,6** °C  
Coil ADP ..... **14,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0700 ..... **145** L/s  
Max coil L/s ..... **145** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **30,2**  
Ent. DB / Lvg DB ..... **14,9 / 20,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **145** L/s  
Standard L/s ..... **145** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **4,95** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **8** L/s  
L/(s·m<sup>2</sup>) ..... **0,26** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 2P-ADM.ARQ.ACAD

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **2P-ADM.ARQ.ACAD**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **29,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	145	145	4,95	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,3	Jan 1800	0,0	29,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-ADM. ARQ. ACAD.	1	1,3	Jan 1800	145	0,0	29,4	4,95

## Ventilation Sizing Summary for 2P-ADM.ARQ.ACAD

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-ADM. ARQ. ACAD.	1	29,4	1,0	145,5	7,50	0,00	0,0	0,0	7,5
<b>Totals (incl. Space Multipliers)</b>				<b>145,5</b>					<b>7,5</b>

# Air System Sizing Summary for 2P-ADM.CONT.TERC.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **2P-ADM.CONT.TERC.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,9** kW  
Sensible coil load ..... **1,4** kW  
Coil L/s at Dec 1400 ..... **134** L/s  
Max block L/s ..... **134** L/s  
Sum of peak zone L/s ..... **134** L/s  
Sensible heat ratio ..... **0,748**  
L/(s kW) ..... **70,0**  
m<sup>2</sup>/kW ..... **10,1**  
W/m<sup>2</sup> ..... **99,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,5 / 18,4** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0700 ..... **134** L/s  
Max coil L/s ..... **134** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **46,1**  
Ent. DB / Lvg DB ..... **14,8 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **134** L/s  
Standard L/s ..... **134** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,96** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **0,78** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-ADM.CONT.TERC.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **2P-ADM.CONT.TERC.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	134	134	6,96	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	19,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-ADM. CONT.TERC.	1	1,2	Jan 1800	134	0,0	19,3	6,96

## Ventilation Sizing Summary for 2P-ADM.CONT.TERC.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-ADM. CONT.TERC.	1	19,3	2,0	134,4	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>134,4</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-ADM.GESTÃO.ARQ

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **2P-ADM.GESTÃO.ARQ**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,1** kW  
Sensible coil load ..... **1,6** kW  
Coil L/s at Dec 1500 ..... **150** L/s  
Max block L/s ..... **150** L/s  
Sum of peak zone L/s ..... **150** L/s  
Sensible heat ratio ..... **0,765**  
L/(s kW) ..... **72,8**  
m<sup>2</sup>/kW ..... **10,2**  
W/m<sup>2</sup> ..... **97,8**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,5 / 18,3** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0600 ..... **150** L/s  
Max coil L/s ..... **150** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **43,8**  
Ent. DB / Lvg DB ..... **14,8 / 19,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **150** L/s  
Standard L/s ..... **149** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,12** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **0,71** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-ADM.GESTÃO.ARQ

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **2P-ADM.GESTÃO.ARQ**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	150	150	7,12	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,4	Jan 1800	0,0	21,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-ADM. GESTÃO ARQ.	1	1,4	Jan 1800	150	0,0	21,0	7,12

## Ventilation Sizing Summary for 2P-ADM.GESTÃO.ARQ

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### 1. Summary

Ventilation Sizing Method ..... Sum of Space OA Airflows  
Design Ventilation Airflow Rate ..... 15 L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-ADM. GESTÃO ARQ.	1	21,0	2,0	149,5	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>149,5</b>					<b>15,0</b>



# Air System Sizing Summary for 2P-ADM.GESTÃO.TI

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **2P-ADM.GESTÃO.TI**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,1** kW  
Sensible coil load ..... **1,6** kW  
Coil L/s at Dec 1500 ..... **157** L/s  
Max block L/s ..... **157** L/s  
Sum of peak zone L/s ..... **157** L/s  
Sensible heat ratio ..... **0,773**  
L/(s kW) ..... **74,2**  
m<sup>2</sup>/kW ..... **10,2**  
W/m<sup>2</sup> ..... **98,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,5 / 18,3** °C  
Leaving DB / WB ..... **14,8 / 14,4** °C  
Coil ADP ..... **13,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,0** kW  
Coil L/s at May 0700 ..... **157** L/s  
Max coil L/s ..... **157** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **44,2**  
Ent. DB / Lvg DB ..... **14,9 / 19,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **157** L/s  
Standard L/s ..... **157** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,27** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **0,69** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-ADM.GESTÃO.TI

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... 2P-ADM.GESTÃO.TI  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 21,6 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	157	157	7,27	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,4	Jan 1800	0,0	21,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-ADM. GESTÃO TI	1	1,4	Jan 1800	157	0,0	21,6	7,27

## Ventilation Sizing Summary for 2P-ADM.GESTÃO.TI

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-ADM. GESTÃO TI	1	21,6	2,0	157,1	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>157,1</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-ADM.INFRA.CAMPUS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **2P-ADM.INFRA.CAMPUS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,9** kW  
Sensible coil load ..... **1,4** kW  
Coil L/s at Dec 1500 ..... **134** L/s  
Max block L/s ..... **134** L/s  
Sum of peak zone L/s ..... **134** L/s  
Sensible heat ratio ..... **0,750**  
L/(s kW) ..... **70,2**  
m<sup>2</sup>/kW ..... **10,1**  
W/m<sup>2</sup> ..... **99,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,7 / 18,5** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0600 ..... **134** L/s  
Max coil L/s ..... **134** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **45,8**  
Ent. DB / Lvg DB ..... **14,8 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **134** L/s  
Standard L/s ..... **134** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,96** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **0,78** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-ADM.INFRA.CAMPUS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **2P-ADM.INFRA.CAMPUS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	134	134	6,96	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	19,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-ADM. INFRA CAMPUS	1	1,2	Jan 1800	134	0,0	19,3	6,96

## Ventilation Sizing Summary for 2P-ADM.INFRA.CAMPUS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-ADM. INFRA CAMPUS	1	19,3	2,0	134,3	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>134,3</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-ADM.RH.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **2P-ADM.RH.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,1** kW  
Sensible coil load ..... **1,6** kW  
Coil L/s at Dec 1500 ..... **152** L/s  
Max block L/s ..... **152** L/s  
Sum of peak zone L/s ..... **152** L/s  
Sensible heat ratio ..... **0,768**  
L/(s kW) ..... **73,3**  
m<sup>2</sup>/kW ..... **9,3**  
W/m<sup>2</sup> ..... **107,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,6 / 18,4** °C  
Leaving DB / WB ..... **14,9 / 14,4** °C  
Coil ADP ..... **13,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0700 ..... **152** L/s  
Max coil L/s ..... **152** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **47,0**  
Ent. DB / Lvg DB ..... **14,8 / 19,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **152** L/s  
Standard L/s ..... **151** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,85** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **0,78** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-ADM.RH.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **2P-ADM.RH.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	152	152	7,85	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,4	Jan 1800	0,0	19,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-ADM. RH 01	1	1,4	Jan 1800	152	0,0	19,3	7,85



## Ventilation Sizing Summary for 2P-ADM.RH.01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-ADM. RH 01	1	19,3	2,0	151,6	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>151,6</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-ADM.RH.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **2P-ADM.RH.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,9** kW  
Sensible coil load ..... **1,4** kW  
Coil L/s at Dec 1500 ..... **134** L/s  
Max block L/s ..... **134** L/s  
Sum of peak zone L/s ..... **134** L/s  
Sensible heat ratio ..... **0,750**  
L/(s kW) ..... **70,2**  
m<sup>2</sup>/kW ..... **10,1**  
W/m<sup>2</sup> ..... **99,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,7 / 18,5** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0600 ..... **134** L/s  
Max coil L/s ..... **134** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **45,8**  
Ent. DB / Lvg DB ..... **14,8 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **134** L/s  
Standard L/s ..... **134** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,96** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **0,78** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-ADM.RH.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **2P-ADM.RH.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	134	134	6,96	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	19,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-ADM. RH 02	1	1,2	Jan 1800	134	0,0	19,3	6,96

## Ventilation Sizing Summary for 2P-ADM.RH.02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-ADM. RH 02	1	19,3	2,0	134,3	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>134,3</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-ANT.TEXT.SOLOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **2P-ANT.TEXT.SOLOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,9** kW  
Sensible coil load ..... **1,7** kW  
Coil L/s at Dec 1500 ..... **178** L/s  
Max block L/s ..... **178** L/s  
Sum of peak zone L/s ..... **178** L/s  
Sensible heat ratio ..... **0,876**  
L/(s kW) ..... **91,9**  
m<sup>2</sup>/kW ..... **4,5**  
W/m<sup>2</sup> ..... **222,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,0 / 17,8** °C  
Leaving DB / WB ..... **15,1 / 14,6** °C  
Coil ADP ..... **14,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,3** kW  
Coil L/s at May 0600 ..... **178** L/s  
Max coil L/s ..... **178** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **146,0**  
Ent. DB / Lvg DB ..... **14,9 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **178** L/s  
Standard L/s ..... **177** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **20,41** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **8** L/s  
L/(s·m<sup>2</sup>) ..... **0,86** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-ANT.TEXT.SOLOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **2P-ANT.TEXT.SOLOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,7 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	178	178	20,41	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,6	Jan 1800	0,0	8,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-AN.TEXT.SOLOS	1	1,6	Jan 1800	178	0,0	8,7	20,41

## Ventilation Sizing Summary for 2P-ANT.TEXT.SOLOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-AN.TEXT.SOLOS	1	8,7	1,0	177,5	7,50	0,00	0,0	0,0	7,5
<b>Totals (incl. Space Multipliers)</b>				<b>177,5</b>					<b>7,5</b>

# Air System Sizing Summary for 2P-APOIO HISTOLOGIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

## Air System Information

Air System Name ..... **2P-APOIO HISTOLOGIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **3,1** kW  
Sensible coil load ..... **2,7** kW  
Coil L/s at Dec 1400 ..... **273** L/s  
Max block L/s ..... **273** L/s  
Sum of peak zone L/s ..... **273** L/s  
Sensible heat ratio ..... **0,849**  
L/(s kW) ..... **87,2**  
m<sup>2</sup>/kW ..... **3,4**  
W/m<sup>2</sup> ..... **297,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,4 / 18,2** °C  
Leaving DB / WB ..... **15,3 / 14,8** °C  
Coil ADP ..... **14,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **0 of 1** OK  
Max zone temperature deviation ..... **0,1** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,2** kW  
Coil L/s at May 0700 ..... **273** L/s  
Max coil L/s ..... **273** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **207,6**  
Ent. DB / Lvg DB ..... **14,9 / 21,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **273** L/s  
Standard L/s ..... **272** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **25,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **1,43** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 2P-APOIO HISTOLOGIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:38

### Air System Information

Air System Name ..... **2P-APOIO HISTOLOGIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	273	273	25,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,5	Jan 1800	0,0	10,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-APOIO HISTOLOGIA	1	2,5	Jan 1800	273	0,0	10,5	25,97

## Ventilation Sizing Summary for 2P-APOIO HISTOLOGIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:38

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-APOIO HISTOLOGIA	1	10,5	2,0	272,7	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>272,7</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-APIO MICROSCOPIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-APIO MICROSCOPIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,7** kW  
Sensible coil load ..... **1,2** kW  
Coil L/s at Dec 1500 ..... **111** L/s  
Max block L/s ..... **111** L/s  
Sum of peak zone L/s ..... **111** L/s  
Sensible heat ratio ..... **0,719**  
L/(s kW) ..... **64,9**  
m<sup>2</sup>/kW ..... **5,3**  
W/m<sup>2</sup> ..... **190,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,9 / 18,7** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0600 ..... **111** L/s  
Max coil L/s ..... **111** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **86,4**  
Ent. DB / Lvg DB ..... **14,8 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **111** L/s  
Standard L/s ..... **111** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **12,36** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **1,67** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-APOIO MICROSCOPIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-APOIO MICROSCOPIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	111	111	12,36	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,0	Jan 1800	0,0	9,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-APOIO MICROSCOPIA	1	1,0	Jan 1800	111	0,0	9,0	12,36

## Ventilation Sizing Summary for 2P-APIO MICROSCOPIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-APIO MICROSCOPIA	1	9,0	2,0	111,2	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>111,2</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-APOIO SALA FREEZER

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-APOIO SALA FREEZER**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,4** kW  
Sensible coil load ..... **1,7** kW  
Coil L/s at Dec 1500 ..... **141** L/s  
Max block L/s ..... **141** L/s  
Sum of peak zone L/s ..... **141** L/s  
Sensible heat ratio ..... **0,678**  
L/(s kW) ..... **57,8**  
m<sup>2</sup>/kW ..... **9,3**  
W/m<sup>2</sup> ..... **107,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,1 / 19,0** °C  
Leaving DB / WB ..... **14,4 / 13,9** °C  
Coil ADP ..... **13,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0500 ..... **141** L/s  
Max coil L/s ..... **141** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **40,2**  
Ent. DB / Lvg DB ..... **14,8 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **141** L/s  
Standard L/s ..... **141** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,19** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **24** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-APIO SALA FREEZER

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-APIO SALA FREEZER**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	141	141	6,19	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,3	Jan 1800	0,0	22,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-APIO SALA DE FREEZER	1	1,3	Jan 1800	141	0,0	22,8	6,19

## Ventilation Sizing Summary for 2P-APIO SALA FREEZER

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **24 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-APIO SALA DE FREEZER	1	22,8	3,3	141,3	7,50	0,00	0,0	0,0	24,5
<b>Totals (incl. Space Multipliers)</b>				<b>141,3</b>					<b>24,5</b>



# Air System Sizing Summary for 2P-APOIO SALA REUNIÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-APOIO SALA REUNIÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **33,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **7,9** kW  
Sensible coil load ..... **5,0** kW  
Coil L/s at Dec 1400 ..... **389** L/s  
Max block L/s ..... **389** L/s  
Sum of peak zone L/s ..... **389** L/s  
Sensible heat ratio ..... **0,629**  
L/(s kW) ..... **49,4**  
m<sup>2</sup>/kW ..... **4,2**  
W/m<sup>2</sup> ..... **236,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,5 / 19,4** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,3** kW  
Coil L/s at Jul 0700 ..... **389** L/s  
Max coil L/s ..... **389** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **70,2**  
Ent. DB / Lvg DB ..... **14,8 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **389** L/s  
Standard L/s ..... **388** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **11,70** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **90** L/s  
L/(s·m<sup>2</sup>) ..... **2,71** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-APOIO SALA REUNIÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-APOIO SALA REUNIÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **33,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	389	389	11,70	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,5	Feb 1800	0,0	33,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-APOIO SALA REUNIÃO	1	3,5	Feb 1800	389	0,0	33,3	11,70

## Ventilation Sizing Summary for 2P-APOIO SALA REUNIÃO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **90** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-APOIO SALA REUNIÃO	1	33,3	12,0	388,9	7,50	0,00	0,0	0,0	90,0
<b>Totals (incl. Space Multipliers)</b>				<b>388,9</b>					<b>90,0</b>

# Air System Sizing Summary for 2P-APOIO SL.CONV.PROF.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-APOIO SL.CONV.PROF.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **78,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **9,6** kW  
Sensible coil load ..... **6,9** kW  
Coil L/s at Dec 1500 ..... **618** L/s  
Max block L/s ..... **618** L/s  
Sum of peak zone L/s ..... **618** L/s  
Sensible heat ratio ..... **0,718**  
L/(s kW) ..... **64,6**  
m<sup>2</sup>/kW ..... **8,2**  
W/m<sup>2</sup> ..... **122,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,8 / 18,6** °C  
Leaving DB / WB ..... **14,5 / 14,1** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,3** kW  
Coil L/s at Jul 0700 ..... **618** L/s  
Max coil L/s ..... **618** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **42,4**  
Ent. DB / Lvg DB ..... **15,0 / 19,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **618** L/s  
Standard L/s ..... **616** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,90** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **84** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-APOIO SL.CONV.PROF.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-APOIO SL.CONV.PROF.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **78,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	618	618	7,90	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	5,6	Feb 1800	0,0	78,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-APOIO SL. CONV.PROF	1	5,6	Feb 1800	618	0,0	78,2	7,90

## Ventilation Sizing Summary for 2P-APOIO SL.CONV.PROF.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **84** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-APOIO SL. CONV.PROF	1	78,2	11,2	617,8	7,50	0,00	0,0	0,0	83,8
<b>Totals (incl. Space Multipliers)</b>				<b>617,8</b>					<b>83,8</b>

# Air System Sizing Summary for 2P-ARMAZENAMENTO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... 2P-ARMAZENAMENTO  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 6,0 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load ..... 1,5 kW  
Sensible coil load ..... 1,3 kW  
Coil L/s at Feb 1400 ..... 128 L/s  
Max block L/s ..... 128 L/s  
Sum of peak zone L/s ..... 128 L/s  
Sensible heat ratio ..... 0,841  
L/(s kW) ..... 85,6  
m<sup>2</sup>/kW ..... 4,0  
W/m<sup>2</sup> ..... 250,7  
Water flow @ 5,6 K rise ..... N/A

Load occurs at ..... Feb 1400  
OA DB / WB ..... 32,0 / 25,5 °C  
Entering DB / WB ..... 23,0 / 17,8 °C  
Leaving DB / WB ..... 14,8 / 14,3 °C  
Coil ADP ..... 13,9 °C  
Bypass Factor ..... 0,100  
Resulting RH ..... 60 %  
Design supply temp. .... 14,4 °C  
Zone T-stat Check ..... 1 of 1 OK  
Max zone temperature deviation ..... 0,0 K

## Central Heating Coil Sizing Data

Max coil load ..... 1,0 kW  
Coil L/s at Jul 0700 ..... 128 L/s  
Max coil L/s ..... 128 L/s  
Water flow @ 11,1 K drop ..... N/A

Load occurs at ..... Jul 0700  
W/m<sup>2</sup> ..... 164,8  
Ent. DB / Lvg DB ..... 14,7 / 21,1 °C

## Supply Fan Sizing Data

Actual max L/s ..... 128 L/s  
Standard L/s ..... 128 L/s  
Actual max L/(s·m<sup>2</sup>) ..... 21,45 L/(s·m<sup>2</sup>)

Fan motor BHP ..... 0,00 BHP  
Fan motor kW ..... 0,00 kW  
Fan static ..... 0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... 8 L/s  
L/(s·m<sup>2</sup>) ..... 1,25 L/(s·m<sup>2</sup>)

L/s/person ..... 7,50 L/s/person

## Zone Sizing Summary for 2P-ARMAZENAMENTO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... 2P-ARMAZENAMENTO  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 6,0 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	128	128	21,45	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Dec 1800	0,0	6,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-ARMAZENAMENTO	1	1,2	Dec 1800	128	0,0	6,0	21,45



## Ventilation Sizing Summary for 2P-ARMAZENAMENTO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-ARMAZENAMENTO	1	6,0	1,0	128,3	7,50	0,00	0,0	0,0	7,5
<b>Totals (incl. Space Multipliers)</b>				<b>128,3</b>					<b>7,5</b>

# Air System Sizing Summary for 2P-BOLSISTAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name	2P-BOLSISTAS	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	22,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	5,6 kW	Load occurs at	Dec 1500
Sensible coil load	3,2 kW	OA DB / WB	31,7 / 25,6 °C
Coil L/s at Dec 1500	216 L/s	Entering DB / WB	25,7 / 20,5 °C
Max block L/s	216 L/s	Leaving DB / WB	13,5 / 13,1 °C
Sum of peak zone L/s	216 L/s	Coil ADP	12,1 °C
Sensible heat ratio	0,569	Bypass Factor	0,100
L/(s kW)	38,6	Resulting RH	60 %
m <sup>2</sup> /kW	4,0	Design supply temp.	14,4 °C
W/m <sup>2</sup>	249,9	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,4 kW	Load occurs at	Jul 0700
Coil L/s at Jul 0700	216 L/s	W/m <sup>2</sup>	61,0
Max coil L/s	216 L/s	Ent. DB / Lvg DB	14,8 / 20,0 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	216 L/s	Fan motor BHP	0,00 BHP
Standard L/s	215 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	9,64 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	75 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	3,35 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for 2P-BOLSISTAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-BOLSISTAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	216	216	9,64	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,0	Jan 1800	0,0	22,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-BOLSISTAS	1	2,0	Jan 1800	216	0,0	22,4	9,64

## Ventilation Sizing Summary for 2P-BOLSISTAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-BOLSISTAS	1	22,4	10,0	216,0	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>216,0</b>					<b>75,0</b>

# Air System Sizing Summary for 2P-DEP.AMOSTRAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DEP.AMOSTRAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,0** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1400 ..... **138** L/s  
Max block L/s ..... **138** L/s  
Sum of peak zone L/s ..... **138** L/s  
Sensible heat ratio ..... **0,752**  
L/(s kW) ..... **70,7**  
m<sup>2</sup>/kW ..... **5,3**  
W/m<sup>2</sup> ..... **189,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,5 / 18,3** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,1** kW  
Coil L/s at May 0700 ..... **138** L/s  
Max coil L/s ..... **138** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **103,3**  
Ent. DB / Lvg DB ..... **14,7 / 21,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **138** L/s  
Standard L/s ..... **137** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,38** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **1,46** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DEP.AMOSTRAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DEP.AMOSTRAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	138	138	13,38	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,3	Jan 1800	0,0	10,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DEP. AMOSTRAS	1	1,3	Jan 1800	138	0,0	10,3	13,38

## Ventilation Sizing Summary for 2P-DEP.AMOSTRAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DEP. AMOSTRAS	1	10,3	2,0	137,8	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>137,8</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-DEP.EQUIPAMENTOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DEP.EQUIPAMENTOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,2** kW  
Sensible coil load ..... **0,9** kW  
Coil L/s at Dec 1500 ..... **92** L/s  
Max block L/s ..... **92** L/s  
Sum of peak zone L/s ..... **92** L/s  
Sensible heat ratio ..... **0,796**  
L/(s kW) ..... **78,2**  
m<sup>2</sup>/kW ..... **7,3**  
W/m<sup>2</sup> ..... **137,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,4 / 18,2** °C  
Leaving DB / WB ..... **14,9 / 14,4** °C  
Coil ADP ..... **14,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0700 ..... **92** L/s  
Max coil L/s ..... **92** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **73,6**  
Ent. DB / Lvg DB ..... **14,9 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **92** L/s  
Standard L/s ..... **92** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,73** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **8** L/s  
L/(s·m<sup>2</sup>) ..... **0,87** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 2P-DEP.EQUIPAMENTOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DEP.EQUIPAMENTOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	92	92	10,73	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	8,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DEP. EQUIPAMENTOS	1	0,8	Jan 1800	92	0,0	8,6	10,73

## Ventilation Sizing Summary for 2P-DEP.EQUIPAMENTOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DEP. EQUIPAMENTOS	1	8,6	1,0	92,3	7,50	0,00	0,0	0,0	7,5
<b>Totals (incl. Space Multipliers)</b>				<b>92,3</b>					<b>7,5</b>

# Air System Sizing Summary for 2P-DID.ALUN.POS.GRAD.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.ALUN.POS.GRAD.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,8** kW  
Sensible coil load ..... **3,5** kW  
Coil L/s at Dec 1500 ..... **312** L/s  
Max block L/s ..... **312** L/s  
Sum of peak zone L/s ..... **312** L/s  
Sensible heat ratio ..... **0,717**  
L/(s kW) ..... **64,6**  
m<sup>2</sup>/kW ..... **8,2**  
W/m<sup>2</sup> ..... **122,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,8 / 18,6** °C  
Leaving DB / WB ..... **14,5 / 14,1** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,8** kW  
Coil L/s at Aug 0700 ..... **312** L/s  
Max coil L/s ..... **312** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Aug 0700**  
W/m<sup>2</sup> ..... **44,9**  
Ent. DB / Lvg DB ..... **14,9 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **312** L/s  
Standard L/s ..... **311** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,89** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **42** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.ALUN.POS.GRAD.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.ALUN.POS.GRAD.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	312	312	7,89	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,8	May 1800	0,0	39,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.ALUN.POS.GRAD.01	1	2,8	May 1800	312	0,0	39,6	7,89

## Ventilation Sizing Summary for 2P-DID.ALUN.POS.GRAD.01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **42 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.ALUN.POS.GRAD.01	1	39,6	5,7	312,1	7,50	0,00	0,0	0,0	42,4
<b>Totals (incl. Space Multipliers)</b>				<b>312,1</b>					<b>42,4</b>

# Air System Sizing Summary for 2P-DID.ALUN.POS.GRAD.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.ALUN.POS.GRAD.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **41,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,0** kW  
Sensible coil load ..... **3,6** kW  
Coil L/s at Feb 1500 ..... **318** L/s  
Max block L/s ..... **318** L/s  
Sum of peak zone L/s ..... **318** L/s  
Sensible heat ratio ..... **0,719**  
L/(s kW) ..... **63,8**  
m<sup>2</sup>/kW ..... **8,3**  
W/m<sup>2</sup> ..... **120,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **23,9 / 18,7** °C  
Leaving DB / WB ..... **14,5 / 14,1** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,9** kW  
Coil L/s at Sep 0700 ..... **318** L/s  
Max coil L/s ..... **318** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Sep 0700**  
W/m<sup>2</sup> ..... **44,7**  
Ent. DB / Lvg DB ..... **14,9 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **318** L/s  
Standard L/s ..... **317** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,67** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **44** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.ALUN.POS.GRAD.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.ALUN.POS.GRAD.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **41,5 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	318	318	7,67	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,9	May 1800	0,0	41,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.ALUN.POS.GRAD.02	1	2,9	May 1800	318	0,0	41,5	7,67

## Ventilation Sizing Summary for 2P-DID.ALUN.POS.GRAD.02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **44** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.ALUN.POS.GRAD.02	1	41,5	5,9	317,9	7,50	0,00	0,0	0,0	44,4
<b>Totals (incl. Space Multipliers)</b>				<b>317,9</b>					<b>44,4</b>



# Air System Sizing Summary for 2P-DID.ALUN.POS.INF.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.ALUN.POS.INF.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **86,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **35,9** kW  
Sensible coil load ..... **27,1** kW  
Coil L/s at Dec 1500 ..... **2556** L/s  
Max block L/s ..... **2556** L/s  
Sum of peak zone L/s ..... **2556** L/s  
Sensible heat ratio ..... **0,756**  
L/(s kW) ..... **71,2**  
m<sup>2</sup>/kW ..... **2,4**  
W/m<sup>2</sup> ..... **417,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,8 / 18,6** °C  
Leaving DB / WB ..... **15,0 / 14,5** °C  
Coil ADP ..... **14,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **0 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **20,3** kW  
Coil L/s at May 0700 ..... **2556** L/s  
Max coil L/s ..... **2556** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **235,5**  
Ent. DB / Lvg DB ..... **14,8 / 21,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **2556** L/s  
Standard L/s ..... **2549** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **29,72** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **278** L/s  
L/(s·m<sup>2</sup>) ..... **3,23** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.ALUN.POS.INF.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.ALUN.POS.INF.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **86,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	2556	2556	29,72	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	23,2	Jan 1800	0,0	86,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.LAB.DID.INF.01	1	23,2	Jan 1800	2556	0,0	86,0	29,72

## Ventilation Sizing Summary for 2P-DID.ALUN.POS.INF.01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **278 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.LAB.DID.INF.01	1	86,0	37,0	2556,1	7,50	0,00	0,0	0,0	277,5
<b>Totals (incl. Space Multipliers)</b>				<b>2556,1</b>					<b>277,5</b>

# Air System Sizing Summary for 2P-DID.ALUN.POS.INF.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.ALUN.POS.INF.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **86,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **35,9** kW  
Sensible coil load ..... **27,1** kW  
Coil L/s at Dec 1500 ..... **2556** L/s  
Max block L/s ..... **2556** L/s  
Sum of peak zone L/s ..... **2556** L/s  
Sensible heat ratio ..... **0,756**  
L/(s kW) ..... **71,2**  
m<sup>2</sup>/kW ..... **2,4**  
W/m<sup>2</sup> ..... **417,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,8 / 18,6** °C  
Leaving DB / WB ..... **15,0 / 14,5** °C  
Coil ADP ..... **14,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **0 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **20,3** kW  
Coil L/s at May 0700 ..... **2556** L/s  
Max coil L/s ..... **2556** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **235,5**  
Ent. DB / Lvg DB ..... **14,8 / 21,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **2556** L/s  
Standard L/s ..... **2549** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **29,72** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **278** L/s  
L/(s·m<sup>2</sup>) ..... **3,23** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.ALUN.POS.INF.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.ALUN.POS.INF.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **86,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	2556	2556	29,72	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	23,2	Jan 1800	0,0	86,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.LAB.DID.INF.02	1	23,2	Jan 1800	2556	0,0	86,0	29,72

## Ventilation Sizing Summary for 2P-DID.ALUN.POS.INF.02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **278 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.LAB.DID.INF.02	1	86,0	37,0	2556,3	7,50	0,00	0,0	0,0	277,5
<b>Totals (incl. Space Multipliers)</b>				<b>2556,3</b>					<b>277,5</b>

# Air System Sizing Summary for 2P-DID.LAB.INF.EST.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.LAB.INF.EST.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **56,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **16,8** kW  
Sensible coil load ..... **11,6** kW  
Coil L/s at Dec 1500 ..... **1008** L/s  
Max block L/s ..... **1008** L/s  
Sum of peak zone L/s ..... **1008** L/s  
Sensible heat ratio ..... **0,690**  
L/(s kW) ..... **59,8**  
m<sup>2</sup>/kW ..... **3,3**  
W/m<sup>2</sup> ..... **298,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **0 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **7,6** kW  
Coil L/s at May 0700 ..... **1008** L/s  
Max coil L/s ..... **1008** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **134,3**  
Ent. DB / Lvg DB ..... **14,5 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **1008** L/s  
Standard L/s ..... **1005** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **17,87** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **165** L/s  
L/(s·m<sup>2</sup>) ..... **2,93** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.LAB.INF.EST.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.LAB.INF.EST.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **56,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	1008	1008	17,87	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	9,2	Jan 1800	0,0	56,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.LAB.INF.EST.	1	9,2	Jan 1800	1008	0,0	56,4	17,87



## Ventilation Sizing Summary for 2P-DID.LAB.INF.EST.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **165** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.LAB.INF.EST.	1	56,4	22,0	1007,8	7,50	0,00	0,0	0,0	165,0
<b>Totals (incl. Space Multipliers)</b>				<b>1007,8</b>					<b>165,0</b>

# Air System Sizing Summary for 2P-DID.LAB.OBS.EOLLAB

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.LAB.OBS.EOLLAB**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **63,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **11,9** kW  
Sensible coil load ..... **7,6** kW  
Coil L/s at Dec 1400 ..... **600** L/s  
Max block L/s ..... **600** L/s  
Sum of peak zone L/s ..... **600** L/s  
Sensible heat ratio ..... **0,635**  
L/(s kW) ..... **50,5**  
m<sup>2</sup>/kW ..... **5,3**  
W/m<sup>2</sup> ..... **188,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,6 / 19,4** °C  
Leaving DB / WB ..... **14,1 / 13,7** °C  
Coil ADP ..... **13,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **4,3** kW  
Coil L/s at May 0700 ..... **600** L/s  
Max coil L/s ..... **600** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **68,3**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **600** L/s  
Standard L/s ..... **599** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,51** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **135** L/s  
L/(s·m<sup>2</sup>) ..... **2,14** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.LAB.OBS.EOLLAB

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.LAB.OBS.EOLLAB**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **63,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	600	600	9,51	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	5,5	Jan 1800	0,0	63,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.LAB.OBS.EOLLAB	1	5,5	Jan 1800	600	0,0	63,2	9,51

## Ventilation Sizing Summary for 2P-DID.LAB.OBS.EOLLAB

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **135 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.LAB.OBS.EOLLAB	1	63,2	18,0	600,3	7,50	0,00	0,0	0,0	135,0
<b>Totals (incl. Space Multipliers)</b>				<b>600,3</b>					<b>135,0</b>

# Air System Sizing Summary for 2P-DID.LAB.ZOOBENTOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.LAB.ZOOBENTOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **7,3** kW  
Sensible coil load ..... **4,9** kW  
Coil L/s at Dec 1500 ..... **413** L/s  
Max block L/s ..... **413** L/s  
Sum of peak zone L/s ..... **413** L/s  
Sensible heat ratio ..... **0,671**  
L/(s kW) ..... **56,6**  
m<sup>2</sup>/kW ..... **5,4**  
W/m<sup>2</sup> ..... **184,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,4 / 14,0** °C  
Coil ADP ..... **13,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,0** kW  
Coil L/s at Jul 0700 ..... **413** L/s  
Max coil L/s ..... **413** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **76,5**  
Ent. DB / Lvg DB ..... **14,8 / 20,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **413** L/s  
Standard L/s ..... **412** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,45** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **1,90** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.LAB.ZOOBENTOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.LAB.ZOOBENTOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **39,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	413	413	10,45	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,8	Jan 1800	0,0	39,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.LAB.ZOOBENTOS	1	3,8	Jan 1800	413	0,0	39,5	10,45

## Ventilation Sizing Summary for 2P-DID.LAB.ZOOBENTOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.LAB.ZOOBENTOS	1	39,5	10,0	412,9	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>412,9</b>					<b>75,0</b>

# Air System Sizing Summary for 2P-DID.PROF.VIS.POS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.PROF.VIS.POS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **45,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **6,2** kW  
Sensible coil load ..... **4,7** kW  
Coil L/s at Dec 1500 ..... **434** L/s  
Max block L/s ..... **434** L/s  
Sum of peak zone L/s ..... **434** L/s  
Sensible heat ratio ..... **0,746**  
L/(s kW) ..... **69,4**  
m<sup>2</sup>/kW ..... **7,3**  
W/m<sup>2</sup> ..... **136,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,5 / 18,4** °C  
Leaving DB / WB ..... **14,6 / 14,1** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,4** kW  
Coil L/s at Oct 0700 ..... **434** L/s  
Max coil L/s ..... **434** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Oct 0700**  
W/m<sup>2</sup> ..... **51,9**  
Ent. DB / Lvg DB ..... **15,0 / 19,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **434** L/s  
Standard L/s ..... **433** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,45** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **49** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 2P-DID.PROF.VIS.POS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... 2P-DID.PROF.VIS.POS  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 45,9 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	434	434	9,45	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,9	May 1800	0,0	45,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.PROF.VIS.POS	1	3,9	May 1800	434	0,0	45,9	9,45

## Ventilation Sizing Summary for 2P-DID.PROF.VIS.POS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **49** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.PROF.VIS.POS	1	45,9	6,6	433,8	7,50	0,00	0,0	0,0	49,2
<b>Totals (incl. Space Multipliers)</b>				<b>433,8</b>					<b>49,2</b>

# Air System Sizing Summary for 2P-DID.SALA.AULA.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.SALA.AULA.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,8** kW  
Sensible coil load ..... **9,9** kW  
Coil L/s at Dec 1600 ..... **513** L/s  
Max block L/s ..... **513** L/s  
Sum of peak zone L/s ..... **513** L/s  
Sensible heat ratio ..... **0,499**  
L/(s kW) ..... **26,0**  
m<sup>2</sup>/kW ..... **2,9**  
W/m<sup>2</sup> ..... **343,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **27,9 / 22,6** °C  
Leaving DB / WB ..... **11,9 / 11,7** °C  
Coil ADP ..... **10,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,6** kW  
Coil L/s at Jun 0700 ..... **513** L/s  
Max coil L/s ..... **513** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **61,9**  
Ent. DB / Lvg DB ..... **14,5 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **513** L/s  
Standard L/s ..... **512** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,93** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,35** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.SALA.AULA.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.SALA.AULA.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	513	513	8,93	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,7	Jan 1800	0,0	57,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.SALA.AULA.01	1	4,7	Jan 1800	513	0,0	57,5	8,93

## Ventilation Sizing Summary for 2P-DID.SALA.AULA.01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.SALA.AULA.01	1	57,5	41,0	513,1	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>513,1</b>					<b>307,5</b>

# Air System Sizing Summary for 2P-DID.SALA.AULA.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.SALA.AULA.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,5** kW  
Sensible coil load ..... **9,7** kW  
Coil L/s at Dec 1500 ..... **492** L/s  
Max block L/s ..... **492** L/s  
Sum of peak zone L/s ..... **492** L/s  
Sensible heat ratio ..... **0,496**  
L/(s kW) ..... **25,2**  
m<sup>2</sup>/kW ..... **2,9**  
W/m<sup>2</sup> ..... **340,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **28,3 / 22,8** °C  
Leaving DB / WB ..... **11,9 / 11,7** °C  
Coil ADP ..... **10,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,5** kW  
Coil L/s at Jun 0700 ..... **492** L/s  
Max coil L/s ..... **492** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **61,1**  
Ent. DB / Lvg DB ..... **14,5 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **492** L/s  
Standard L/s ..... **490** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,56** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,35** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.SALA.AULA.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.SALA.AULA.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	492	492	8,56	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,5	Jan 1800	0,0	57,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.SALA.AULA.02	1	4,5	Jan 1800	492	0,0	57,5	8,56

## Ventilation Sizing Summary for 2P-DID.SALA.AULA.02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.SALA.AULA.02	1	57,5	41,0	491,9	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>491,9</b>					<b>307,5</b>



# Air System Sizing Summary for 2P-DID.SALA.AULA.03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.SALA.AULA.03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,5** kW  
Sensible coil load ..... **9,7** kW  
Coil L/s at Dec 1500 ..... **492** L/s  
Max block L/s ..... **492** L/s  
Sum of peak zone L/s ..... **492** L/s  
Sensible heat ratio ..... **0,496**  
L/(s kW) ..... **25,2**  
m<sup>2</sup>/kW ..... **2,9**  
W/m<sup>2</sup> ..... **340,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **28,3 / 22,8** °C  
Leaving DB / WB ..... **11,9 / 11,7** °C  
Coil ADP ..... **10,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,5** kW  
Coil L/s at Jun 0700 ..... **492** L/s  
Max coil L/s ..... **492** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **61,1**  
Ent. DB / Lvg DB ..... **14,5 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **492** L/s  
Standard L/s ..... **490** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,56** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,35** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.SALA.AULA.03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.SALA.AULA.03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	492	492	8,56	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,5	Jan 1800	0,0	57,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.SALA.AULA.03	1	4,5	Jan 1800	492	0,0	57,5	8,56

## Ventilation Sizing Summary for 2P-DID.SALA.AULA.03

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.SALA.AULA.03	1	57,5	41,0	491,9	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>491,9</b>					<b>307,5</b>

# Air System Sizing Summary for 2P-DID.SALA.AULA.04

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.SALA.AULA.04**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **52,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **17,3** kW  
Sensible coil load ..... **8,6** kW  
Coil L/s at Dec 1500 ..... **445** L/s  
Max block L/s ..... **445** L/s  
Sum of peak zone L/s ..... **445** L/s  
Sensible heat ratio ..... **0,499**  
L/(s kW) ..... **25,8**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **326,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **28,1 / 22,7** °C  
Leaving DB / WB ..... **12,0 / 11,8** °C  
Coil ADP ..... **10,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,2** kW  
Coil L/s at May 0600 ..... **445** L/s  
Max coil L/s ..... **445** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **59,7**  
Ent. DB / Lvg DB ..... **14,4 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **445** L/s  
Standard L/s ..... **444** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,42** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **270** L/s  
L/(s·m<sup>2</sup>) ..... **5,11** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.SALA.AULA.04

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.SALA.AULA.04**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **52,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	445	445	8,42	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,0	Jan 1800	0,0	52,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.SALA.AULA.04	1	4,0	Jan 1800	445	0,0	52,9	8,42

## Ventilation Sizing Summary for 2P-DID.SALA.AULA.04

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **270 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.SALA.AULA.04	1	52,9	36,0	445,2	7,50	0,00	0,0	0,0	270,0
<b>Totals (incl. Space Multipliers)</b>				<b>445,2</b>					<b>270,0</b>

# Air System Sizing Summary for 2P-DID.SALA.DOUT.PHD

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.SALA.DOUT.PHD**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,3** kW  
Sensible coil load ..... **1,6** kW  
Coil L/s at Dec 1500 ..... **139** L/s  
Max block L/s ..... **139** L/s  
Sum of peak zone L/s ..... **139** L/s  
Sensible heat ratio ..... **0,689**  
L/(s kW) ..... **59,6**  
m<sup>2</sup>/kW ..... **9,0**  
W/m<sup>2</sup> ..... **110,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,0 / 18,9** °C  
Leaving DB / WB ..... **14,4 / 14,0** °C  
Coil ADP ..... **13,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0700 ..... **139** L/s  
Max coil L/s ..... **139** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **41,6**  
Ent. DB / Lvg DB ..... **14,7 / 20,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **139** L/s  
Standard L/s ..... **139** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,62** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **23** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.SALA.DOUT.PHD

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... 2P-DID.SALA.DOUT.PHD  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 21,0 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	139	139	6,62	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,3	Jan 1800	0,0	21,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.SALA.DOUT.PHD	1	1,3	Jan 1800	139	0,0	21,0	6,62



## Ventilation Sizing Summary for 2P-DID.SALA.DOUT.PHD

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **23** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.SALA.DOUT.PHD	1	21,0	3,0	138,9	7,50	0,00	0,0	0,0	22,5
<b>Totals (incl. Space Multipliers)</b>				<b>138,9</b>					<b>22,5</b>

# Air System Sizing Summary for 2P-DID.SALA.ESC.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.SALA.ESC.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **70,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,4** kW  
Sensible coil load ..... **10,5** kW  
Coil L/s at Dec 1500 ..... **648** L/s  
Max block L/s ..... **648** L/s  
Sum of peak zone L/s ..... **648** L/s  
Sensible heat ratio ..... **0,541**  
L/(s kW) ..... **33,5**  
m<sup>2</sup>/kW ..... **3,6**  
W/m<sup>2</sup> ..... **274,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **26,5 / 21,2** °C  
Leaving DB / WB ..... **13,1 / 12,7** °C  
Coil ADP ..... **11,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **4,3** kW  
Coil L/s at Jun 0700 ..... **648** L/s  
Max coil L/s ..... **648** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **61,3**  
Ent. DB / Lvg DB ..... **14,6 / 20,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **648** L/s  
Standard L/s ..... **646** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,19** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **278** L/s  
L/(s·m<sup>2</sup>) ..... **3,93** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.SALA.ESC.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.SALA.ESC.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **70,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	648	648	9,19	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	5,9	Feb 1800	0,0	70,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.SALA.ESC.01	1	5,9	Feb 1800	648	0,0	70,5	9,19

## Ventilation Sizing Summary for 2P-DID.SALA.ESC.01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **278** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.SALA.ESC.01	1	70,5	37,0	648,3	7,50	0,00	0,0	0,0	277,5
<b>Totals (incl. Space Multipliers)</b>				<b>648,3</b>					<b>277,5</b>

# Air System Sizing Summary for 2P-DID.SALA.ESC.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.SALA.ESC.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **70,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,4** kW  
Sensible coil load ..... **10,5** kW  
Coil L/s at Dec 1500 ..... **648** L/s  
Max block L/s ..... **648** L/s  
Sum of peak zone L/s ..... **648** L/s  
Sensible heat ratio ..... **0,541**  
L/(s kW) ..... **33,5**  
m<sup>2</sup>/kW ..... **3,6**  
W/m<sup>2</sup> ..... **274,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **26,5 / 21,2** °C  
Leaving DB / WB ..... **13,1 / 12,7** °C  
Coil ADP ..... **11,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **4,3** kW  
Coil L/s at Jun 0700 ..... **648** L/s  
Max coil L/s ..... **648** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **61,3**  
Ent. DB / Lvg DB ..... **14,6 / 20,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **648** L/s  
Standard L/s ..... **646** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,19** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **278** L/s  
L/(s·m<sup>2</sup>) ..... **3,93** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-DID.SALA.ESC.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.SALA.ESC.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **70,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	648	648	9,19	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	5,9	Feb 1800	0,0	70,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.SALA.ESC.02	1	5,9	Feb 1800	648	0,0	70,5	9,19

## Ventilation Sizing Summary for 2P-DID.SALA.ESC.02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:39

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **278** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.SALA.ESC.02	1	70,5	37,0	648,3	7,50	0,00	0,0	0,0	277,5
<b>Totals (incl. Space Multipliers)</b>				<b>648,3</b>					<b>277,5</b>

# Air System Sizing Summary for 2P-DID.SALA.PESQ.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

## Air System Information

Air System Name ..... **2P-DID.SALA.PESQ.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,3** kW  
Sensible coil load ..... **1,6** kW  
Coil L/s at Dec 1500 ..... **139** L/s  
Max block L/s ..... **139** L/s  
Sum of peak zone L/s ..... **139** L/s  
Sensible heat ratio ..... **0,689**  
L/(s kW) ..... **59,6**  
m<sup>2</sup>/kW ..... **9,0**  
W/m<sup>2</sup> ..... **110,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,0 / 18,9** °C  
Leaving DB / WB ..... **14,4 / 14,0** °C  
Coil ADP ..... **13,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0700 ..... **139** L/s  
Max coil L/s ..... **139** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **42,0**  
Ent. DB / Lvg DB ..... **14,7 / 20,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **139** L/s  
Standard L/s ..... **139** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,61** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **23** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 2P-DID.SALA.PESQ.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:39

### Air System Information

Air System Name ..... **2P-DID.SALA.PESQ.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	139	139	6,61	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,3	Jan 1800	0,0	21,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-DID.SALA.PESQ.	1	1,3	Jan 1800	139	0,0	21,0	6,61

## Ventilation Sizing Summary for 2P-DID.SALA.PESQ.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **23** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-DID.SALA.PESQ.	1	21,0	3,0	139,0	7,50	0,00	0,0	0,0	22,5
<b>Totals (incl. Space Multipliers)</b>				<b>139,0</b>					<b>22,5</b>

# Air System Sizing Summary for 2P-EXP.MINERALOGIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-EXP.MINERALOGIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,8** kW  
Sensible coil load ..... **1,3** kW  
Coil L/s at Dec 1400 ..... **123** L/s  
Max block L/s ..... **123** L/s  
Sum of peak zone L/s ..... **123** L/s  
Sensible heat ratio ..... **0,734**  
L/(s kW) ..... **67,6**  
m<sup>2</sup>/kW ..... **9,5**  
W/m<sup>2</sup> ..... **105,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,6 / 18,5** °C  
Leaving DB / WB ..... **14,6 / 14,1** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0700 ..... **123** L/s  
Max coil L/s ..... **123** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **50,9**  
Ent. DB / Lvg DB ..... **14,8 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **123** L/s  
Standard L/s ..... **123** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,11** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **0,87** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-EXP.MINERALOGIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... 2P-EXP.MINERALOGIA  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 17,3 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	123	123	7,11	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,1	Jan 1800	0,0	17,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-EXP.MINERALOGIA	1	1,1	Jan 1800	123	0,0	17,3	7,11

## Ventilation Sizing Summary for 2P-EXP.MINERALOGIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-EXP.MINERALOGIA	1	17,3	2,0	123,1	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>123,1</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-EXP.SEDIMENTAÇÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-EXP.SEDIMENTAÇÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,0** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1500 ..... **140** L/s  
Max block L/s ..... **140** L/s  
Sum of peak zone L/s ..... **140** L/s  
Sensible heat ratio ..... **0,755**  
L/(s kW) ..... **71,1**  
m<sup>2</sup>/kW ..... **8,8**  
W/m<sup>2</sup> ..... **113,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,6 / 18,4** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0600 ..... **140** L/s  
Max coil L/s ..... **140** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **52,5**  
Ent. DB / Lvg DB ..... **14,9 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **140** L/s  
Standard L/s ..... **139** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,07** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **0,87** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-EXP.SEDIMENTAÇÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-EXP.SEDIMENTAÇÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	140	140	8,07	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,3	Jan 1800	0,0	17,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b> 2P-EXP.SEDIMENTAÇÃO	1	1,3	Jan 1800	140	0,0	17,3	8,07

## Ventilation Sizing Summary for 2P-EXP.SEDIMENTAÇÃO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-EXP.SEDIMENTAÇÃO	1	17,3	2,0	139,5	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>139,5</b>					<b>15,0</b>



# Air System Sizing Summary for 2P-EXPERIMENTOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-EXPERIMENTOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,5** kW  
Sensible coil load ..... **1,0** kW  
Coil L/s at Dec 1500 ..... **89** L/s  
Max block L/s ..... **89** L/s  
Sum of peak zone L/s ..... **89** L/s  
Sensible heat ratio ..... **0,684**  
L/(s kW) ..... **58,8**  
m<sup>2</sup>/kW ..... **5,7**  
W/m<sup>2</sup> ..... **176,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,2 / 19,0** °C  
Leaving DB / WB ..... **14,6 / 14,1** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at May 0400 ..... **89** L/s  
Max coil L/s ..... **89** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0400**  
W/m<sup>2</sup> ..... **77,7**  
Ent. DB / Lvg DB ..... **14,9 / 21,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **89** L/s  
Standard L/s ..... **89** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,36** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **1,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-EXPERIMENTOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-EXPERIMENTOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	89	89	10,36	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	8,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-EXPERIMENTOS	1	0,8	Jan 1800	89	0,0	8,6	10,36

## Ventilation Sizing Summary for 2P-EXPERIMENTOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-EXPERIMENTOS	1	8,6	2,0	89,2	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>89,2</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-GABINETE 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-GABINETE 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,4** kW  
Sensible coil load ..... **2,9** kW  
Coil L/s at Dec 1500 ..... **246** L/s  
Max block L/s ..... **246** L/s  
Sum of peak zone L/s ..... **246** L/s  
Sensible heat ratio ..... **0,670**  
L/(s kW) ..... **56,3**  
m<sup>2</sup>/kW ..... **3,8**  
W/m<sup>2</sup> ..... **266,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,4 / 14,0** °C  
Coil ADP ..... **13,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **246** L/s  
Max coil L/s ..... **246** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **103,8**  
Ent. DB / Lvg DB ..... **14,8 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **246** L/s  
Standard L/s ..... **245** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **15,01** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	246	246	15,01	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,2	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 01	1	2,2	Jan 1800	246	0,0	16,4	15,01

## Ventilation Sizing Summary for 2P-GABINETE 01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 01	1	16,4	6,0	246,2	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>246,2</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-GABINETE 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,2**  
Ent. DB / Lvg DB ..... **14,7 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 02	1	2,1	Jan 1800	229	0,0	16,4	13,97



## Ventilation Sizing Summary for 2P-GABINETE 02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 02	1	16,4	6,0	229,1	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,1</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... <b>2P-GABINETE 03</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>16,4</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>4,2</b> kW	Load occurs at ..... <b>Dec 1400</b>
Sensible coil load ..... <b>2,8</b> kW	OA DB / WB ..... <b>31,5 / 25,5</b> °C
Coil L/s at Dec 1400 ..... <b>229</b> L/s	Entering DB / WB ..... <b>24,3 / 19,2</b> °C
Max block L/s ..... <b>229</b> L/s	Leaving DB / WB ..... <b>14,3 / 13,8</b> °C
Sum of peak zone L/s ..... <b>229</b> L/s	Coil ADP ..... <b>13,2</b> °C
Sensible heat ratio ..... <b>0,657</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>54,3</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>3,9</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>257,2</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>1,7</b> kW	Load occurs at ..... <b>May 0700</b>
Coil L/s at May 0700 ..... <b>229</b> L/s	W/m <sup>2</sup> ..... <b>101,2</b>
Max coil L/s ..... <b>229</b> L/s	Ent. DB / Lvg DB ..... <b>14,7 / 20,8</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>229</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>228</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>13,97</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>45</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>2,74</b> L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for 2P-GABINETE 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 03	1	2,1	Jan 1800	229	0,0	16,4	13,97

# Ventilation Sizing Summary for 2P-GABINETE 03

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

**1. Summary**

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

**2. Space Ventilation Analysis**

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 03	1	16,4	6,0	229,1	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,1</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 04

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-GABINETE 04**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,2**  
Ent. DB / Lvg DB ..... **14,7 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 04

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 04**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 04	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 04

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 04	1	16,4	6,0	229,1	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,1</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 05

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-GABINETE 05**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,2**  
Ent. DB / Lvg DB ..... **14,7 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 2P-GABINETE 05

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 05**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 05	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 05

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 05	1	16,4	6,0	229,1	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,1</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 06

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... <b>2P-GABINETE 06</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>16,4</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>4,2</b> kW	Load occurs at ..... <b>Dec 1400</b>
Sensible coil load ..... <b>2,8</b> kW	OA DB / WB ..... <b>31,5 / 25,5</b> °C
Coil L/s at Dec 1400 ..... <b>229</b> L/s	Entering DB / WB ..... <b>24,3 / 19,2</b> °C
Max block L/s ..... <b>229</b> L/s	Leaving DB / WB ..... <b>14,3 / 13,8</b> °C
Sum of peak zone L/s ..... <b>229</b> L/s	Coil ADP ..... <b>13,2</b> °C
Sensible heat ratio ..... <b>0,657</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>54,3</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>3,9</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>257,2</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>1,7</b> kW	Load occurs at ..... <b>May 0700</b>
Coil L/s at May 0700 ..... <b>229</b> L/s	W/m <sup>2</sup> ..... <b>101,2</b>
Max coil L/s ..... <b>229</b> L/s	Ent. DB / Lvg DB ..... <b>14,7 / 20,8</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>229</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>228</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>13,97</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>45</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>2,74</b> L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for 2P-GABINETE 06

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 06**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 06	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 06

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

**1. Summary**

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

**2. Space Ventilation Analysis**

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 06	1	16,4	6,0	229,1	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,1</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 07

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-GABINETE 07**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1500 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,659**  
L/(s kW) ..... **54,4**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **256,8**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,5 / 19,3** °C  
Leaving DB / WB ..... **14,4 / 13,9** °C  
Coil ADP ..... **13,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at Jun 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **101,8**  
Ent. DB / Lvg DB ..... **14,8 / 20,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 07

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 07**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 07	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 07

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 07	1	16,4	6,0	229,1	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,1</b>					<b>45,0</b>



# Air System Sizing Summary for 2P-GABINETE 08

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name	2P-GABINETE 08	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	16,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	4,2 kW	Load occurs at	Dec 1400
Sensible coil load	2,8 kW	OA DB / WB	31,5 / 25,5 °C
Coil L/s at Dec 1400	229 L/s	Entering DB / WB	24,3 / 19,2 °C
Max block L/s	229 L/s	Leaving DB / WB	14,3 / 13,8 °C
Sum of peak zone L/s	229 L/s	Coil ADP	13,2 °C
Sensible heat ratio	0,657	Bypass Factor	0,100
L/(s kW)	54,3	Resulting RH	60 %
m <sup>2</sup> /kW	3,9	Design supply temp.	14,4 °C
W/m <sup>2</sup>	257,2	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,7 kW	Load occurs at	May 0700
Coil L/s at May 0700	229 L/s	W/m <sup>2</sup>	101,2
Max coil L/s	229 L/s	Ent. DB / Lvg DB	14,7 / 20,8 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	229 L/s	Fan motor BHP	0,00 BHP
Standard L/s	228 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	13,97 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	45 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	2,74 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for 2P-GABINETE 08

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 08**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 08	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 08

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 08	1	16,4	6,0	229,1	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,1</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 09

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... <b>2P-GABINETE 09</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>16,4</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>4,2</b> kW	Load occurs at ..... <b>Dec 1500</b>
Sensible coil load ..... <b>2,8</b> kW	OA DB / WB ..... <b>31,7 / 25,6</b> °C
Coil L/s at Dec 1500 ..... <b>229</b> L/s	Entering DB / WB ..... <b>24,5 / 19,3</b> °C
Max block L/s ..... <b>229</b> L/s	Leaving DB / WB ..... <b>14,4 / 13,9</b> °C
Sum of peak zone L/s ..... <b>229</b> L/s	Coil ADP ..... <b>13,3</b> °C
Sensible heat ratio ..... <b>0,659</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>54,4</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>3,9</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>256,8</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>1,7</b> kW	Load occurs at ..... <b>Jun 0700</b>
Coil L/s at Jun 0700 ..... <b>229</b> L/s	W/m <sup>2</sup> ..... <b>101,8</b>
Max coil L/s ..... <b>229</b> L/s	Ent. DB / Lvg DB ..... <b>14,8 / 20,9</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>229</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>228</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>13,97</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>45</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>2,74</b> L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for 2P-GABINETE 09

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 09**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 09	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 09

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 09	1	16,4	6,0	229,1	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,1</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 10

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... <b>2P-GABINETE 10</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>16,4</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>4,2</b> kW	Load occurs at ..... <b>Dec 1500</b>
Sensible coil load ..... <b>2,8</b> kW	OA DB / WB ..... <b>31,7 / 25,6</b> °C
Coil L/s at Dec 1500 ..... <b>229</b> L/s	Entering DB / WB ..... <b>24,5 / 19,3</b> °C
Max block L/s ..... <b>229</b> L/s	Leaving DB / WB ..... <b>14,4 / 13,9</b> °C
Sum of peak zone L/s ..... <b>229</b> L/s	Coil ADP ..... <b>13,3</b> °C
Sensible heat ratio ..... <b>0,659</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>54,4</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>3,9</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>256,8</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>1,7</b> kW	Load occurs at ..... <b>Jun 0700</b>
Coil L/s at Jun 0700 ..... <b>229</b> L/s	W/m <sup>2</sup> ..... <b>101,8</b>
Max coil L/s ..... <b>229</b> L/s	Ent. DB / Lvg DB ..... <b>14,8 / 20,9</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>229</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>228</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>13,97</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>45</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>2,74</b> L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for 2P-GABINETE 10

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 10**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 10	1	2,1	Jan 1800	229	0,0	16,4	13,97



## Ventilation Sizing Summary for 2P-GABINETE 10

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 10	1	16,4	6,0	229,1	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,1</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 11

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-GABINETE 11**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,4** kW  
Sensible coil load ..... **2,9** kW  
Coil L/s at Dec 1500 ..... **246** L/s  
Max block L/s ..... **246** L/s  
Sum of peak zone L/s ..... **246** L/s  
Sensible heat ratio ..... **0,670**  
L/(s kW) ..... **56,3**  
m<sup>2</sup>/kW ..... **3,8**  
W/m<sup>2</sup> ..... **266,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,4 / 14,0** °C  
Coil ADP ..... **13,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **246** L/s  
Max coil L/s ..... **246** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **103,8**  
Ent. DB / Lvg DB ..... **14,8 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **246** L/s  
Standard L/s ..... **245** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **15,01** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 11

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 11**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	246	246	15,01	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,2	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 11	1	2,2	Jan 1800	246	0,0	16,4	15,01

## Ventilation Sizing Summary for 2P-GABINETE 11

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 11	1	16,4	6,0	246,2	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>246,2</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 12

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-GABINETE 12**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,4** kW  
Sensible coil load ..... **2,9** kW  
Coil L/s at Dec 1500 ..... **246** L/s  
Max block L/s ..... **246** L/s  
Sum of peak zone L/s ..... **246** L/s  
Sensible heat ratio ..... **0,670**  
L/(s kW) ..... **56,3**  
m<sup>2</sup>/kW ..... **3,8**  
W/m<sup>2</sup> ..... **266,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,4 / 14,0** °C  
Coil ADP ..... **13,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **246** L/s  
Max coil L/s ..... **246** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **103,8**  
Ent. DB / Lvg DB ..... **14,8 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **246** L/s  
Standard L/s ..... **245** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **15,01** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 12

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 12**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	246	246	15,01	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,2	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 12	1	2,2	Jan 1800	246	0,0	16,4	15,01

## Ventilation Sizing Summary for 2P-GABINETE 12

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 12	1	16,4	6,0	246,2	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>246,2</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 13

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name	2P-GABINETE 13	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	16,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	4,2 kW	Load occurs at	Dec 1400
Sensible coil load	2,8 kW	OA DB / WB	31,5 / 25,5 °C
Coil L/s at Dec 1400	229 L/s	Entering DB / WB	24,3 / 19,2 °C
Max block L/s	229 L/s	Leaving DB / WB	14,3 / 13,8 °C
Sum of peak zone L/s	229 L/s	Coil ADP	13,2 °C
Sensible heat ratio	0,657	Bypass Factor	0,100
L/(s kW)	54,3	Resulting RH	60 %
m <sup>2</sup> /kW	3,9	Design supply temp.	14,4 °C
W/m <sup>2</sup>	257,2	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,7 kW	Load occurs at	May 0700
Coil L/s at May 0700	229 L/s	W/m <sup>2</sup>	101,1
Max coil L/s	229 L/s	Ent. DB / Lvg DB	14,7 / 20,7 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	229 L/s	Fan motor BHP	0,00 BHP
Standard L/s	228 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	13,97 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	45 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	2,74 L/(s·m <sup>2</sup> )		



## Zone Sizing Summary for 2P-GABINETE 13

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 13**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 13	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 13

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 13	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 14

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-GABINETE 14**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 14

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 14**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 14	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 14

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:40

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 14	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 15

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

## Air System Information

Air System Name ..... **2P-GABINETE 15**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 15

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:40

### Air System Information

Air System Name ..... **2P-GABINETE 15**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 15	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 15

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 15	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>



# Air System Sizing Summary for 2P-GABINETE 16

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name ..... **2P-GABINETE 16**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 16

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 16**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 16	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 16

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 16	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 17

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name ..... **2P-GABINETE 17**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 17

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 17**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 17	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 17

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 17	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 18

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name	2P-GABINETE 18	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	16,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	4,2 kW	Load occurs at	Dec 1400
Sensible coil load	2,8 kW	OA DB / WB	31,5 / 25,5 °C
Coil L/s at Dec 1400	229 L/s	Entering DB / WB	24,3 / 19,2 °C
Max block L/s	229 L/s	Leaving DB / WB	14,3 / 13,8 °C
Sum of peak zone L/s	229 L/s	Coil ADP	13,2 °C
Sensible heat ratio	0,657	Bypass Factor	0,100
L/(s kW)	54,3	Resulting RH	60 %
m <sup>2</sup> /kW	3,9	Design supply temp.	14,4 °C
W/m <sup>2</sup>	257,2	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,7 kW	Load occurs at	May 0700
Coil L/s at May 0700	229 L/s	W/m <sup>2</sup>	101,1
Max coil L/s	229 L/s	Ent. DB / Lvg DB	14,7 / 20,7 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	229 L/s	Fan motor BHP	0,00 BHP
Standard L/s	228 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	13,97 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	45 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	2,74 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for 2P-GABINETE 18

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 18**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 18	1	2,1	Jan 1800	229	0,0	16,4	13,97



## Ventilation Sizing Summary for 2P-GABINETE 18

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 18	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 19

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name ..... <b>2P-GABINETE 19</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>16,4</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>4,2</b> kW	Load occurs at ..... <b>Dec 1400</b>
Sensible coil load ..... <b>2,8</b> kW	OA DB / WB ..... <b>31,5 / 25,5</b> °C
Coil L/s at Dec 1400 ..... <b>229</b> L/s	Entering DB / WB ..... <b>24,3 / 19,2</b> °C
Max block L/s ..... <b>229</b> L/s	Leaving DB / WB ..... <b>14,3 / 13,8</b> °C
Sum of peak zone L/s ..... <b>229</b> L/s	Coil ADP ..... <b>13,2</b> °C
Sensible heat ratio ..... <b>0,657</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>54,3</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>3,9</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>257,2</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>1,7</b> kW	Load occurs at ..... <b>May 0700</b>
Coil L/s at May 0700 ..... <b>229</b> L/s	W/m <sup>2</sup> ..... <b>101,1</b>
Max coil L/s ..... <b>229</b> L/s	Ent. DB / Lvg DB ..... <b>14,7 / 20,7</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>229</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>228</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>13,97</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>45</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>2,74</b> L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for 2P-GABINETE 19

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 19**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 19	1	2,1	Jan 1800	229	0,0	16,4	13,97

# Ventilation Sizing Summary for 2P-GABINETE 19

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

**1. Summary**

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

**2. Space Ventilation Analysis**

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 19	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 20

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name ..... **2P-GABINETE 20**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 20

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 20**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 20	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 20

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 20	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 21

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name	2P-GABINETE 21	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	16,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	4,2 kW	Load occurs at	Dec 1400
Sensible coil load	2,8 kW	OA DB / WB	31,5 / 25,5 °C
Coil L/s at Dec 1400	229 L/s	Entering DB / WB	24,3 / 19,2 °C
Max block L/s	229 L/s	Leaving DB / WB	14,3 / 13,8 °C
Sum of peak zone L/s	229 L/s	Coil ADP	13,2 °C
Sensible heat ratio	0,657	Bypass Factor	0,100
L/(s kW)	54,3	Resulting RH	60 %
m <sup>2</sup> /kW	3,9	Design supply temp.	14,4 °C
W/m <sup>2</sup>	257,2	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,7 kW	Load occurs at	May 0700
Coil L/s at May 0700	229 L/s	W/m <sup>2</sup>	101,1
Max coil L/s	229 L/s	Ent. DB / Lvg DB	14,7 / 20,7 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	229 L/s	Fan motor BHP	0,00 BHP
Standard L/s	228 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	13,97 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	45 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	2,74 L/(s·m <sup>2</sup> )		



## Zone Sizing Summary for 2P-GABINETE 21

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 21**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 21	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 21

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 21	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 22

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name	2P-GABINETE 22	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	16,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	4,4 kW	Load occurs at	Dec 1500
Sensible coil load	2,9 kW	OA DB / WB	31,7 / 25,6 °C
Coil L/s at Dec 1500	246 L/s	Entering DB / WB	24,3 / 19,1 °C
Max block L/s	246 L/s	Leaving DB / WB	14,4 / 14,0 °C
Sum of peak zone L/s	246 L/s	Coil ADP	13,3 °C
Sensible heat ratio	0,670	Bypass Factor	0,100
L/(s kW)	56,3	Resulting RH	60 %
m <sup>2</sup> /kW	3,8	Design supply temp.	14,4 °C
W/m <sup>2</sup>	266,4	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,7 kW	Load occurs at	May 0700
Coil L/s at May 0700	246 L/s	W/m <sup>2</sup>	103,8
Max coil L/s	246 L/s	Ent. DB / Lvg DB	14,8 / 20,6 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	246 L/s	Fan motor BHP	0,00 BHP
Standard L/s	245 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	15,01 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	45 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	2,74 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for 2P-GABINETE 22

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 22**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	246	246	15,01	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,2	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 22	1	2,2	Jan 1800	246	0,0	16,4	15,01

## Ventilation Sizing Summary for 2P-GABINETE 22

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

**1. Summary**

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

**2. Space Ventilation Analysis**

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 22	1	16,4	6,0	246,2	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>246,2</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 23

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name	2P-GABINETE 23	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	16,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	4,4 kW	Load occurs at	Dec 1500
Sensible coil load	2,9 kW	OA DB / WB	31,7 / 25,6 °C
Coil L/s at Dec 1500	246 L/s	Entering DB / WB	24,3 / 19,1 °C
Max block L/s	246 L/s	Leaving DB / WB	14,4 / 14,0 °C
Sum of peak zone L/s	246 L/s	Coil ADP	13,3 °C
Sensible heat ratio	0,670	Bypass Factor	0,100
L/(s kW)	56,3	Resulting RH	60 %
m <sup>2</sup> /kW	3,8	Design supply temp.	14,4 °C
W/m <sup>2</sup>	266,4	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,7 kW	Load occurs at	May 0700
Coil L/s at May 0700	246 L/s	W/m <sup>2</sup>	103,8
Max coil L/s	246 L/s	Ent. DB / Lvg DB	14,8 / 20,6 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	246 L/s	Fan motor BHP	0,00 BHP
Standard L/s	245 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	15,01 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	45 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	2,74 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for 2P-GABINETE 23

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 23**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	246	246	15,01	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,2	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 23	1	2,2	Jan 1800	246	0,0	16,4	15,01

## Ventilation Sizing Summary for 2P-GABINETE 23

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 23	1	16,4	6,0	246,2	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>246,2</b>					<b>45,0</b>



# Air System Sizing Summary for 2P-GABINETE 24

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name ..... **2P-GABINETE 24**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 24

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 24**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 24	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 24

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 24	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 25

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name	2P-GABINETE 25	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	16,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	4,2 kW	Load occurs at	Dec 1400
Sensible coil load	2,8 kW	OA DB / WB	31,5 / 25,5 °C
Coil L/s at Dec 1400	229 L/s	Entering DB / WB	24,3 / 19,2 °C
Max block L/s	229 L/s	Leaving DB / WB	14,3 / 13,8 °C
Sum of peak zone L/s	229 L/s	Coil ADP	13,2 °C
Sensible heat ratio	0,657	Bypass Factor	0,100
L/(s kW)	54,3	Resulting RH	60 %
m <sup>2</sup> /kW	3,9	Design supply temp.	14,4 °C
W/m <sup>2</sup>	257,2	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,7 kW	Load occurs at	May 0700
Coil L/s at May 0700	229 L/s	W/m <sup>2</sup>	101,1
Max coil L/s	229 L/s	Ent. DB / Lvg DB	14,7 / 20,7 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	229 L/s	Fan motor BHP	0,00 BHP
Standard L/s	228 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	13,97 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	45 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	2,74 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for 2P-GABINETE 25

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 25**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 25	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 25

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 25	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 26

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name	2P-GABINETE 26	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	16,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	4,2 kW	Load occurs at	Dec 1400
Sensible coil load	2,8 kW	OA DB / WB	31,5 / 25,5 °C
Coil L/s at Dec 1400	229 L/s	Entering DB / WB	24,3 / 19,2 °C
Max block L/s	229 L/s	Leaving DB / WB	14,3 / 13,8 °C
Sum of peak zone L/s	229 L/s	Coil ADP	13,2 °C
Sensible heat ratio	0,657	Bypass Factor	0,100
L/(s kW)	54,3	Resulting RH	60 %
m <sup>2</sup> /kW	3,9	Design supply temp.	14,4 °C
W/m <sup>2</sup>	257,2	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,7 kW	Load occurs at	May 0700
Coil L/s at May 0700	229 L/s	W/m <sup>2</sup>	101,1
Max coil L/s	229 L/s	Ent. DB / Lvg DB	14,7 / 20,7 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	229 L/s	Fan motor BHP	0,00 BHP
Standard L/s	228 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	13,97 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	45 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	2,74 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for 2P-GABINETE 26

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 26**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 26	1	2,1	Jan 1800	229	0,0	16,4	13,97



## Ventilation Sizing Summary for 2P-GABINETE 26

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 26	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 27

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name ..... **2P-GABINETE 27**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 27

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 27**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 27	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 27

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 27	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 28

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name ..... **2P-GABINETE 28**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 28

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 28**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 28	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 28

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 28	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 29

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name ..... <b>2P-GABINETE 29</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>16,4</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>4,2</b> kW	Load occurs at ..... <b>Dec 1400</b>
Sensible coil load ..... <b>2,8</b> kW	OA DB / WB ..... <b>31,5 / 25,5</b> °C
Coil L/s at Dec 1400 ..... <b>229</b> L/s	Entering DB / WB ..... <b>24,3 / 19,2</b> °C
Max block L/s ..... <b>229</b> L/s	Leaving DB / WB ..... <b>14,3 / 13,8</b> °C
Sum of peak zone L/s ..... <b>229</b> L/s	Coil ADP ..... <b>13,2</b> °C
Sensible heat ratio ..... <b>0,657</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>54,3</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>3,9</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>257,2</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>1,7</b> kW	Load occurs at ..... <b>May 0700</b>
Coil L/s at May 0700 ..... <b>229</b> L/s	W/m <sup>2</sup> ..... <b>101,1</b>
Max coil L/s ..... <b>229</b> L/s	Ent. DB / Lvg DB ..... <b>14,7 / 20,7</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>229</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>228</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>13,97</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>45</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>2,74</b> L/(s·m <sup>2</sup> )	



## Zone Sizing Summary for 2P-GABINETE 29

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 29**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 29	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 29

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:41

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 29	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 30

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

## Air System Information

Air System Name ..... **2P-GABINETE 30**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 30

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:41

### Air System Information

Air System Name ..... **2P-GABINETE 30**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 30	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 30

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 30	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 31

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name	2P-GABINETE 31	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	16,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	4,2 kW	Load occurs at	Dec 1400
Sensible coil load	2,8 kW	OA DB / WB	31,5 / 25,5 °C
Coil L/s at Dec 1400	229 L/s	Entering DB / WB	24,3 / 19,2 °C
Max block L/s	229 L/s	Leaving DB / WB	14,3 / 13,8 °C
Sum of peak zone L/s	229 L/s	Coil ADP	13,2 °C
Sensible heat ratio	0,657	Bypass Factor	0,100
L/(s kW)	54,3	Resulting RH	60 %
m <sup>2</sup> /kW	3,9	Design supply temp.	14,4 °C
W/m <sup>2</sup>	257,2	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,7 kW	Load occurs at	May 0700
Coil L/s at May 0700	229 L/s	W/m <sup>2</sup>	101,1
Max coil L/s	229 L/s	Ent. DB / Lvg DB	14,7 / 20,7 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	229 L/s	Fan motor BHP	0,00 BHP
Standard L/s	228 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	13,97 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	45 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	2,74 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for 2P-GABINETE 31

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... **2P-GABINETE 31**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 31	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 31

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 31	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>



# Air System Sizing Summary for 2P-GABINETE 32

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name ..... **2P-GABINETE 32**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 32

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... **2P-GABINETE 32**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 32	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 32

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 32	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-GABINETE 33

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name ..... **2P-GABINETE 33**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1400 ..... **229** L/s  
Max block L/s ..... **229** L/s  
Sum of peak zone L/s ..... **229** L/s  
Sensible heat ratio ..... **0,657**  
L/(s kW) ..... **54,3**  
m<sup>2</sup>/kW ..... **3,9**  
W/m<sup>2</sup> ..... **257,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,7** kW  
Coil L/s at May 0700 ..... **229** L/s  
Max coil L/s ..... **229** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **101,1**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **229** L/s  
Standard L/s ..... **228** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,74** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-GABINETE 33

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... **2P-GABINETE 33**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	229	229	13,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,1	Jan 1800	0,0	16,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-GABINETE 33	1	2,1	Jan 1800	229	0,0	16,4	13,97

## Ventilation Sizing Summary for 2P-GABINETE 33

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-GABINETE 33	1	16,4	6,0	229,0	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>229,0</b>					<b>45,0</b>

# Air System Sizing Summary for 2P-HIDRO.COSTEIRA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name ..... **2P-HIDRO.COSTEIRA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,5** kW  
Sensible coil load ..... **3,1** kW  
Coil L/s at Dec 1400 ..... **202** L/s  
Max block L/s ..... **202** L/s  
Sum of peak zone L/s ..... **202** L/s  
Sensible heat ratio ..... **0,558**  
L/(s kW) ..... **36,9**  
m<sup>2</sup>/kW ..... **3,5**  
W/m<sup>2</sup> ..... **283,8**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **25,9 / 20,7** °C  
Leaving DB / WB ..... **13,3 / 12,9** °C  
Coil ADP ..... **11,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,3** kW  
Coil L/s at May 0700 ..... **202** L/s  
Max coil L/s ..... **202** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **67,3**  
Ent. DB / Lvg DB ..... **14,6 / 20,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **202** L/s  
Standard L/s ..... **201** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,47** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **3,89** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-HIDRO.COSTEIRA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... **2P-HIDRO.COSTEIRA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	202	202	10,47	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,8	Jan 1800	0,0	19,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-HIDRO. COSTEIRA	1	1,8	Jan 1800	202	0,0	19,3	10,47



## Ventilation Sizing Summary for 2P-HIDRO.COSTEIRA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-HIDRO. COSTEIRA	1	19,3	10,0	202,0	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>202,0</b>					<b>75,0</b>

# Air System Sizing Summary for 2P-INTERLAB.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name	2P-INTERLAB.01	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	29,5 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	4,9 kW	Load occurs at	Dec 1500
Sensible coil load	4,5 kW	OA DB / WB	31,7 / 25,6 °C
Coil L/s at Dec 1500	476 L/s	Entering DB / WB	23,1 / 17,8 °C
Max block L/s	476 L/s	Leaving DB / WB	15,3 / 14,8 °C
Sum of peak zone L/s	476 L/s	Coil ADP	14,4 °C
Sensible heat ratio	0,903	Bypass Factor	0,100
L/(s kW)	96,6	Resulting RH	60 %
m <sup>2</sup> /kW	6,0	Design supply temp.	14,4 °C
W/m <sup>2</sup>	167,3	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	3,5 kW	Load occurs at	May 0700
Coil L/s at May 0700	476 L/s	W/m <sup>2</sup>	117,6
Max coil L/s	476 L/s	Ent. DB / Lvg DB	14,7 / 20,8 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	476 L/s	Fan motor BHP	0,00 BHP
Standard L/s	475 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	16,15 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	15 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	0,51 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for 2P-INTERLAB.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... **2P-INTERLAB.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **29,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	476	476	16,15	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,3	Jan 1800	0,0	29,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-INTERLAB 01	1	4,3	Jan 1800	476	0,0	29,5	16,15

## Ventilation Sizing Summary for 2P-INTERLAB.01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-INTERLAB 01	1	29,5	2,0	476,5	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>476,5</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-INTERLAB.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name	2P-INTERLAB.02	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	14,0 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	2,4 kW	Load occurs at	Dec 1600
Sensible coil load	1,9 kW	OA DB / WB	31,5 / 25,5 °C
Coil L/s at Dec 1600	188 L/s	Entering DB / WB	23,3 / 18,1 °C
Max block L/s	188 L/s	Leaving DB / WB	14,9 / 14,4 °C
Sum of peak zone L/s	188 L/s	Coil ADP	13,9 °C
Sensible heat ratio	0,798	Bypass Factor	0,100
L/(s kW)	78,7	Resulting RH	60 %
m <sup>2</sup> /kW	5,9	Design supply temp.	14,4 °C
W/m <sup>2</sup>	170,7	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,4 kW	Load occurs at	May 0700
Coil L/s at May 0700	188 L/s	W/m <sup>2</sup>	97,3
Max coil L/s	188 L/s	Ent. DB / Lvg DB	14,7 / 20,7 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	188 L/s	Fan motor BHP	0,00 BHP
Standard L/s	187 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	13,43 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	15 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	1,07 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for 2P-INTERLAB.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... **2P-INTERLAB.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **14,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	188	188	13,43	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,7	Jan 1800	0,0	14,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-INTERLAB 02 (ARMAZ.)	1	1,7	Jan 1800	188	0,0	14,0	13,43

## Ventilation Sizing Summary for 2P-INTERLAB.02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-INTERLAB 02 (ARMAZ.)	1	14,0	2,0	188,0	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>188,0</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-LAB.DID.GEOLOGIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name ..... **2P-LAB.DID.GEOLOGIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **42,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **6,9** kW  
Sensible coil load ..... **4,5** kW  
Coil L/s at Dec 1500 ..... **362** L/s  
Max block L/s ..... **362** L/s  
Sum of peak zone L/s ..... **362** L/s  
Sensible heat ratio ..... **0,649**  
L/(s kW) ..... **52,6**  
m<sup>2</sup>/kW ..... **6,1**  
W/m<sup>2</sup> ..... **163,8**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,4 / 19,3** °C  
Leaving DB / WB ..... **14,2 / 13,7** °C  
Coil ADP ..... **13,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,5** kW  
Coil L/s at Jul 0500 ..... **362** L/s  
Max coil L/s ..... **362** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0500**  
W/m<sup>2</sup> ..... **59,9**  
Ent. DB / Lvg DB ..... **14,9 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **362** L/s  
Standard L/s ..... **361** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,61** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **1,78** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 2P-LAB.DID.GEOLOGIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... **2P-LAB.DID.GEOLOGIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **42,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	362	362	8,61	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,3	Dec 1800	0,0	42,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-LAB.DID.GEOLOGIA	1	3,3	Dec 1800	362	0,0	42,1	8,61

## Ventilation Sizing Summary for 2P-LAB.DID.GEOLOGIA

Project Name: LABOMAR-VRF

08/22/2024

Prepared by:

08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**

Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-LAB.DID.GEOLOGIA	1	42,1	10,0	362,2	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>362,2</b>					<b>75,0</b>

# Air System Sizing Summary for 2P-LAB.DID.OCEAN.BIO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name ..... **2P-LAB.DID.OCEAN.BIO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **67,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **12,8** kW  
Sensible coil load ..... **8,0** kW  
Coil L/s at Dec 1500 ..... **622** L/s  
Max block L/s ..... **622** L/s  
Sum of peak zone L/s ..... **622** L/s  
Sensible heat ratio ..... **0,625**  
L/(s kW) ..... **48,5**  
m<sup>2</sup>/kW ..... **5,2**  
W/m<sup>2</sup> ..... **190,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,8 / 19,6** °C  
Leaving DB / WB ..... **14,1 / 13,6** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **4,4** kW  
Coil L/s at Jul 0600 ..... **622** L/s  
Max coil L/s ..... **622** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0600**  
W/m<sup>2</sup> ..... **65,4**  
Ent. DB / Lvg DB ..... **14,8 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **622** L/s  
Standard L/s ..... **621** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,23** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **150** L/s  
L/(s·m<sup>2</sup>) ..... **2,22** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-LAB.DID.OCEAN.BIO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... 2P-LAB.DID.OCEAN.BIO  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 67,4 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	622	622	9,23	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	5,7	Dec 1800	0,0	67,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-LAB.DID.OCEAN.BIO	1	5,7	Dec 1800	622	0,0	67,4	9,23

## Ventilation Sizing Summary for 2P-LAB.DID.OCEAN.BIO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **150** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-LAB.DID.OCEAN.BIO	1	67,4	20,0	622,5	7,50	0,00	0,0	0,0	150,0
<b>Totals (incl. Space Multipliers)</b>				<b>622,5</b>					<b>150,0</b>

# Air System Sizing Summary for 2P-LAB.DID.QUIMICA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name ..... **2P-LAB.DID.QUIMICA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **62,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **12,6** kW  
Sensible coil load ..... **7,9** kW  
Coil L/s at Jan 1500 ..... **592** L/s  
Max block L/s ..... **592** L/s  
Sum of peak zone L/s ..... **592** L/s  
Sensible heat ratio ..... **0,624**  
L/(s kW) ..... **47,0**  
m<sup>2</sup>/kW ..... **4,9**  
W/m<sup>2</sup> ..... **202,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Jan 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **25,0 / 19,7** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **4,1** kW  
Coil L/s at Jun 0600 ..... **592** L/s  
Max coil L/s ..... **592** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0600**  
W/m<sup>2</sup> ..... **65,3**  
Ent. DB / Lvg DB ..... **14,8 / 20,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **592** L/s  
Standard L/s ..... **590** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,50** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **150** L/s  
L/(s·m<sup>2</sup>) ..... **2,41** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-LAB.DID.QUIMICA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... 2P-LAB.DID.QUIMICA  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 62,4 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

### Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	592	592	9,50	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	5,4	Dec 1800	0,0	62,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-LAB.DID.QUIMICA	1	5,4	Dec 1800	592	0,0	62,4	9,50

## Ventilation Sizing Summary for 2P-LAB.DID.QUIMICA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **150** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-LAB.DID.QUIMICA	1	62,4	20,0	592,1	7,50	0,00	0,0	0,0	150,0
<b>Totals (incl. Space Multipliers)</b>				<b>592,1</b>					<b>150,0</b>



# Air System Sizing Summary for 2P-LAB.ECO.PESQUEIRA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name ..... **2P-LAB.ECO.PESQUEIRA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **63,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **12,4** kW  
Sensible coil load ..... **8,4** kW  
Coil L/s at Jan 1500 ..... **699** L/s  
Max block L/s ..... **699** L/s  
Sum of peak zone L/s ..... **699** L/s  
Sensible heat ratio ..... **0,676**  
L/(s kW) ..... **56,3**  
m<sup>2</sup>/kW ..... **5,1**  
W/m<sup>2</sup> ..... **197,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Jan 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **24,3 / 19,0** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **4,9** kW  
Coil L/s at Jun 0700 ..... **699** L/s  
Max coil L/s ..... **699** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **77,7**  
Ent. DB / Lvg DB ..... **14,8 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **699** L/s  
Standard L/s ..... **697** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **11,08** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **128** L/s  
L/(s·m<sup>2</sup>) ..... **2,02** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-LAB.ECO.PESQUEIRA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... **2P-LAB.ECO.PESQUEIRA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **63,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	699	699	11,08	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	6,4	Dec 1800	0,0	63,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-LAB.ECO.PESQUEIRA	1	6,4	Dec 1800	699	0,0	63,1	11,08

## Ventilation Sizing Summary for 2P-LAB.ECO.PESQUEIRA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **128** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-LAB.ECO.PESQUEIRA	1	63,1	17,0	699,1	7,50	0,00	0,0	0,0	127,5
<b>Totals (incl. Space Multipliers)</b>				<b>699,1</b>					<b>127,5</b>

# Air System Sizing Summary for 2P-MICROSCOPIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name ..... **2P-MICROSCOPIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **72,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **13,1** kW  
Sensible coil load ..... **8,3** kW  
Coil L/s at Dec 1500 ..... **651** L/s  
Max block L/s ..... **651** L/s  
Sum of peak zone L/s ..... **651** L/s  
Sensible heat ratio ..... **0,632**  
L/(s kW) ..... **49,7**  
m<sup>2</sup>/kW ..... **5,5**  
W/m<sup>2</sup> ..... **181,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,7 / 19,5** °C  
Leaving DB / WB ..... **14,1 / 13,7** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **4,3** kW  
Coil L/s at Jul 0700 ..... **651** L/s  
Max coil L/s ..... **651** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **59,4**  
Ent. DB / Lvg DB ..... **14,8 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **651** L/s  
Standard L/s ..... **649** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,01** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **150** L/s  
L/(s·m<sup>2</sup>) ..... **2,08** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-MICROSCOPIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... **2P-MICROSCOPIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **72,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	651	651	9,01	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	5,9	Dec 1800	0,0	72,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b> 2P-MICROSCOPIA	1	5,9	Dec 1800	651	0,0	72,3	9,01

## Ventilation Sizing Summary for 2P-MICROSCOPIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **150 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-MICROSCOPIA	1	72,3	20,0	651,3	7,50	0,00	0,0	0,0	150,0
<b>Totals (incl. Space Multipliers)</b>				<b>651,3</b>					<b>150,0</b>

# Air System Sizing Summary for 2P-MOD.PROC.EOLICOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name ..... **2P-MOD.PROC.EOLICOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **6,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,1** kW  
Sensible coil load ..... **0,9** kW  
Coil L/s at Dec 1400 ..... **90** L/s  
Max block L/s ..... **90** L/s  
Sum of peak zone L/s ..... **90** L/s  
Sensible heat ratio ..... **0,795**  
L/(s kW) ..... **78,1**  
m<sup>2</sup>/kW ..... **5,9**  
W/m<sup>2</sup> ..... **168,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,3 / 18,1** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0600 ..... **90** L/s  
Max coil L/s ..... **90** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **88,1**  
Ent. DB / Lvg DB ..... **14,9 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **90** L/s  
Standard L/s ..... **89** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,15** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **7** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-MOD.PROC.EOLICOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

### Air System Information

Air System Name ..... **2P-MOD.PROC.EOLICOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **6,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	90	90	13,15	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	6,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-MOD.PROC.EOLICOS	1	0,8	Jan 1800	90	0,0	6,8	13,15



## Ventilation Sizing Summary for 2P-MOD.PROC.EOLICOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:42

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **7 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-MOD.PROC.EOLICOS	1	6,8	1,0	89,7	7,50	0,00	0,0	0,0	7,3
<b>Totals (incl. Space Multipliers)</b>				<b>89,7</b>					<b>7,3</b>

# Air System Sizing Summary for 2P-SERV.COPA.FUNC.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:42

## Air System Information

Air System Name ..... **2P-SERV.COPA.FUNC.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,3** kW  
Sensible coil load ..... **3,4** kW  
Coil L/s at Feb 1600 ..... **272** L/s  
Max block L/s ..... **272** L/s  
Sum of peak zone L/s ..... **272** L/s  
Sensible heat ratio ..... **0,644**  
L/(s kW) ..... **50,8**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **326,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1600**  
OA DB / WB ..... **32,0 / 25,5** °C  
Entering DB / WB ..... **24,6 / 19,3** °C  
Leaving DB / WB ..... **14,1 / 13,6** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,8** kW  
Coil L/s at Jun 0700 ..... **272** L/s  
Max coil L/s ..... **272** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **112,4**  
Ent. DB / Lvg DB ..... **14,8 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **272** L/s  
Standard L/s ..... **271** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **16,62** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **60** L/s  
L/(s·m<sup>2</sup>) ..... **3,67** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-SERV.COPA.FUNC.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **2P-SERV.COPA.FUNC.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	272	272	16,62	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,5	Dec 1800	0,0	16,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-SERV.COPA.FUNC.	1	2,5	Dec 1800	272	0,0	16,3	16,62

## Ventilation Sizing Summary for 2P-SERV.COPA.FUNC.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **60** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-SERV.COPA.FUNC.	1	16,3	8,0	271,6	7,50	0,00	0,0	0,0	60,0
<b>Totals (incl. Space Multipliers)</b>				<b>271,6</b>					<b>60,0</b>

# Air System Sizing Summary for 2P-SERV.COPA.PROF.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... **2P-SERV.COPA.PROF.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **24,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,3** kW  
Sensible coil load ..... **3,3** kW  
Coil L/s at Dec 1500 ..... **261** L/s  
Max block L/s ..... **261** L/s  
Sum of peak zone L/s ..... **261** L/s  
Sensible heat ratio ..... **0,632**  
L/(s kW) ..... **49,6**  
m<sup>2</sup>/kW ..... **4,6**  
W/m<sup>2</sup> ..... **217,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,6 / 19,5** °C  
Leaving DB / WB ..... **14,0 / 13,6** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,6** kW  
Coil L/s at Jun 0700 ..... **261** L/s  
Max coil L/s ..... **261** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **65,9**  
Ent. DB / Lvg DB ..... **14,8 / 19,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **261** L/s  
Standard L/s ..... **260** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,78** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **60** L/s  
L/(s·m<sup>2</sup>) ..... **2,48** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-SERV.COPA.PROF.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **2P-SERV.COPA.PROF.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **24,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	261	261	10,78	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,4	Feb 1800	0,0	24,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-SERV.COPA.PROF.	1	2,4	Feb 1800	261	0,0	24,2	10,78

## Ventilation Sizing Summary for 2P-SERV.COPA.PROF.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **60** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-SERV.COPA.PROF.	1	24,2	8,0	261,1	7,50	0,00	0,0	0,0	60,0
<b>Totals (incl. Space Multipliers)</b>				<b>261,1</b>					<b>60,0</b>

# Air System Sizing Summary for 2P-SERV.SERVIDORES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... **2P-SERV.SERVIDORES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,2** kW  
Sensible coil load ..... **0,9** kW  
Coil L/s at Dec 1600 ..... **88** L/s  
Max block L/s ..... **88** L/s  
Sum of peak zone L/s ..... **88** L/s  
Sensible heat ratio ..... **0,766**  
L/(s kW) ..... **73,2**  
m<sup>2</sup>/kW ..... **6,8**  
W/m<sup>2</sup> ..... **147,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,4 / 18,2** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0700 ..... **88** L/s  
Max coil L/s ..... **88** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **77,5**  
Ent. DB / Lvg DB ..... **14,8 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **88** L/s  
Standard L/s ..... **88** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,82** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **9** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for 2P-SERV.SERVIDORES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **2P-SERV.SERVIDORES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,1 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	88	88	10,82	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	8,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-SERV.SERVIDORES	1	0,8	Jan 1800	88	0,0	8,1	10,82

## Ventilation Sizing Summary for 2P-SERV.SERVIDORES

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **9 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-SERV.SERVIDORES	1	8,1	1,2	88,1	7,50	0,00	0,0	0,0	8,7
<b>Totals (incl. Space Multipliers)</b>				<b>88,1</b>					<b>8,7</b>

# Air System Sizing Summary for 2P-TEC.CALIB.EQ.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... **2P-TEC.CALIB.EQ.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,7** kW  
Sensible coil load ..... **1,2** kW  
Coil L/s at Dec 1600 ..... **112** L/s  
Max block L/s ..... **112** L/s  
Sum of peak zone L/s ..... **112** L/s  
Sensible heat ratio ..... **0,719**  
L/(s kW) ..... **65,1**  
m<sup>2</sup>/kW ..... **9,8**  
W/m<sup>2</sup> ..... **101,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,8 / 18,6** °C  
Leaving DB / WB ..... **14,6 / 14,1** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0700 ..... **112** L/s  
Max coil L/s ..... **112** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **45,7**  
Ent. DB / Lvg DB ..... **14,7 / 20,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **112** L/s  
Standard L/s ..... **111** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,61** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **0,89** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-TEC.CALIB.EQ.01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **2P-TEC.CALIB.EQ.01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	112	112	6,61	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,0	Jan 1800	0,0	16,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-TEC.CALIB.EQ.01	1	1,0	Jan 1800	112	0,0	16,9	6,61

## Ventilation Sizing Summary for 2P-TEC.CALIB.EQ.01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-TEC.CALIB.EQ.01	1	16,9	2,0	111,7	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>111,7</b>					<b>15,0</b>

# Air System Sizing Summary for 2P-TEC.CALIB.EQ.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... **2P-TEC.CALIB.EQ.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,7** kW  
Sensible coil load ..... **1,2** kW  
Coil L/s at Dec 1500 ..... **112** L/s  
Max block L/s ..... **112** L/s  
Sum of peak zone L/s ..... **112** L/s  
Sensible heat ratio ..... **0,720**  
L/(s kW) ..... **65,1**  
m<sup>2</sup>/kW ..... **9,9**  
W/m<sup>2</sup> ..... **101,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,9 / 18,7** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0700 ..... **112** L/s  
Max coil L/s ..... **112** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **45,4**  
Ent. DB / Lvg DB ..... **14,7 / 20,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **112** L/s  
Standard L/s ..... **111** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,60** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **0,89** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-TEC.CALIB.EQ.02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **2P-TEC.CALIB.EQ.02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	112	112	6,60	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,0	Jan 1800	0,0	16,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-TEC.CALIB.EQ.02	1	1,0	Jan 1800	112	0,0	16,9	6,60

## Ventilation Sizing Summary for 2P-TEC.CALIB.EQ.02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-TEC.CALIB.EQ.02	1	16,9	2,0	111,5	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>111,5</b>					<b>15,0</b>



# Air System Sizing Summary for 2P-TRAT.DE DADOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... **2P-TRAT.DE DADOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **3,3** kW  
Sensible coil load ..... **2,1** kW  
Coil L/s at Dec 1400 ..... **167** L/s  
Max block L/s ..... **167** L/s  
Sum of peak zone L/s ..... **167** L/s  
Sensible heat ratio ..... **0,635**  
L/(s kW) ..... **50,4**  
m<sup>2</sup>/kW ..... **6,0**  
W/m<sup>2</sup> ..... **166,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,6 / 19,4** °C  
Leaving DB / WB ..... **14,1 / 13,7** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,0** kW  
Coil L/s at May 0600 ..... **167** L/s  
Max coil L/s ..... **167** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **51,4**  
Ent. DB / Lvg DB ..... **14,8 / 19,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **167** L/s  
Standard L/s ..... **166** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,39** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **38** L/s  
L/(s·m<sup>2</sup>) ..... **1,89** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for 2P-TRAT.DE DADOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **2P-TRAT.DE DADOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	167	167	8,39	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,5	Jan 1800	0,0	19,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
2P-TRAT. DE DADOS	1	1,5	Jan 1800	167	0,0	19,9	8,39

## Ventilation Sizing Summary for 2P-TRAT.DE DADOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **38 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
2P-TRAT. DE DADOS	1	19,9	5,0	166,7	7,50	0,00	0,0	0,0	37,5
<b>Totals (incl. Space Multipliers)</b>				<b>166,7</b>					<b>37,5</b>

# Air System Sizing Summary for SS-AUDITÓRIO+PALCO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... **SS-AUDITÓRIO+PALCO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **479,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **168,9** kW  
Sensible coil load ..... **81,4** kW  
Coil L/s at Dec 1400 ..... **3900** L/s  
Max block L/s ..... **3900** L/s  
Sum of peak zone L/s ..... **3900** L/s  
Sensible heat ratio ..... **0,482**  
L/(s kW) ..... **23,1**  
m<sup>2</sup>/kW ..... **2,8**  
W/m<sup>2</sup> ..... **352,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **28,9 / 23,4** °C  
Leaving DB / WB ..... **11,5 / 11,4** °C  
Coil ADP ..... **9,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **28,9** kW  
Coil L/s at Jun 0700 ..... **3900** L/s  
Max coil L/s ..... **3900** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **60,2**  
Ent. DB / Lvg DB ..... **14,3 / 20,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **3900** L/s  
Standard L/s ..... **3888** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,14** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **2775** L/s  
L/(s·m<sup>2</sup>) ..... **5,79** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-AUDITÓRIO+PALCO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **SS-AUDITÓRIO+PALCO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **479,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	3900	3900	8,14	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	35,5	Jan 1800	0,0	479,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-AUDITÓRIO + PALCO	1	35,5	Jan 1800	3900	0,0	479,2	8,14

## Ventilation Sizing Summary for SS-AUDITÓRIO+PALCO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **2775 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-AUDITÓRIO + PALCO	1	479,2	370,0	3899,6	7,50	0,00	0,0	0,0	2775,0
<b>Totals (incl. Space Multipliers)</b>				<b>3899,6</b>					<b>2775,0</b>

# Air System Sizing Summary for SS-BANCO DE AMOSTRAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... **SS-BANCO DE AMOSTRAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **74,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **7,0** kW  
Sensible coil load ..... **4,5** kW  
Coil L/s at Dec 1500 ..... **358** L/s  
Max block L/s ..... **358** L/s  
Sum of peak zone L/s ..... **358** L/s  
Sensible heat ratio ..... **0,640**  
L/(s kW) ..... **51,2**  
m<sup>2</sup>/kW ..... **10,7**  
W/m<sup>2</sup> ..... **93,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,6 / 19,4** °C  
Leaving DB / WB ..... **14,2 / 13,8** °C  
Coil ADP ..... **13,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,9** kW  
Coil L/s at Nov 0300 ..... **358** L/s  
Max coil L/s ..... **358** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Nov 0300**  
W/m<sup>2</sup> ..... **25,1**  
Ent. DB / Lvg DB ..... **14,9 / 19,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **358** L/s  
Standard L/s ..... **357** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **4,79** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **80** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-BANCO DE AMOSTRAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **SS-BANCO DE AMOSTRAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **74,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	358	358	4,79	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,3	Jan 1800	0,0	74,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-BANCO DE AMOSTRAS	1	3,3	Jan 1800	358	0,0	74,7	4,79



## Ventilation Sizing Summary for SS-BANCO DE AMOSTRAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **80** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-BANCO DE AMOSTRAS	1	74,7	10,7	358,2	7,50	0,00	0,0	0,0	80,0
<b>Totals (incl. Space Multipliers)</b>				<b>358,2</b>					<b>80,0</b>

# Air System Sizing Summary for SS-CAMARIM 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... **SS-CAMARIM 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,2** kW  
Sensible coil load ..... **0,9** kW  
Coil L/s at Dec 1500 ..... **94** L/s  
Max block L/s ..... **94** L/s  
Sum of peak zone L/s ..... **94** L/s  
Sensible heat ratio ..... **0,801**  
L/(s kW) ..... **79,1**  
m<sup>2</sup>/kW ..... **7,3**  
W/m<sup>2</sup> ..... **137,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,3 / 18,1** °C  
Leaving DB / WB ..... **14,9 / 14,4** °C  
Coil ADP ..... **14,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0700 ..... **94** L/s  
Max coil L/s ..... **94** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **68,2**  
Ent. DB / Lvg DB ..... **14,9 / 20,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **94** L/s  
Standard L/s ..... **93** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,88** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **8** L/s  
L/(s·m<sup>2</sup>) ..... **0,87** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-CAMARIM 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **SS-CAMARIM 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **8,6 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	94	94	10,88	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,9	Jan 1800	0,0	8,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-CAMARIM 01	1	0,9	Jan 1800	94	0,0	8,6	10,88

## Ventilation Sizing Summary for SS-CAMARIM 01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-CAMARIM 01	1	8,6	1,0	93,5	7,50	0,00	0,0	0,0	7,5
<b>Totals (incl. Space Multipliers)</b>				<b>93,5</b>					<b>7,5</b>

# Air System Sizing Summary for SS-CAMARIM 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... **SS-CAMARIM 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **14,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,2** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1500 ..... **123** L/s  
Max block L/s ..... **123** L/s  
Sum of peak zone L/s ..... **123** L/s  
Sensible heat ratio ..... **0,674**  
L/(s kW) ..... **57,2**  
m<sup>2</sup>/kW ..... **6,7**  
W/m<sup>2</sup> ..... **148,8**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,5 / 14,0** °C  
Coil ADP ..... **13,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0500 ..... **123** L/s  
Max coil L/s ..... **123** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **52,3**  
Ent. DB / Lvg DB ..... **14,8 / 19,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **123** L/s  
Standard L/s ..... **123** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,52** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **23** L/s  
L/(s·m<sup>2</sup>) ..... **1,55** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-CAMARIM 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **SS-CAMARIM 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **14,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	123	123	8,52	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,1	Jan 1800	0,0	14,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-CAMARIM 02	1	1,1	Jan 1800	123	0,0	14,5	8,52

## Ventilation Sizing Summary for SS-CAMARIM 02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **23** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-CAMARIM 02	1	14,5	3,0	123,5	7,50	0,00	0,0	0,0	22,5
<b>Totals (incl. Space Multipliers)</b>				<b>123,5</b>					<b>22,5</b>

# Air System Sizing Summary for SS-CIRC 02 / EXPO.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... **SS-CIRC 02 / EXPO.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **694,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **157,2** kW  
Sensible coil load ..... **75,7** kW  
Coil L/s at Dec 1400 ..... **3611** L/s  
Max block L/s ..... **3611** L/s  
Sum of peak zone L/s ..... **3611** L/s  
Sensible heat ratio ..... **0,481**  
L/(s kW) ..... **23,0**  
m<sup>2</sup>/kW ..... **4,4**  
W/m<sup>2</sup> ..... **226,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **29,0 / 23,5** °C  
Leaving DB / WB ..... **11,6 / 11,4** °C  
Coil ADP ..... **9,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **26,7** kW  
Coil L/s at May 0800 ..... **3611** L/s  
Max coil L/s ..... **3611** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0800**  
W/m<sup>2</sup> ..... **38,4**  
Ent. DB / Lvg DB ..... **11,2 / 17,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **3611** L/s  
Standard L/s ..... **3600** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,20** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **2603** L/s  
L/(s·m<sup>2</sup>) ..... **3,75** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for SS-CIRC 02 / EXPO.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

### Air System Information

Air System Name ..... **SS-CIRC 02 / EXPO.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **694,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	3611	3611	5,20	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	32,8	Jan 1800	0,0	694,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-CIRC. 02/Corr. Exp.	1	32,8	Jan 1800	3611	0,0	694,0	5,20

## Ventilation Sizing Summary for SS-CIRC 02 / EXPO.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:43

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **2603 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-CIRC. 02/Corr. Exp.	1	694,0	347,0	3610,9	7,50	0,00	0,0	0,0	2602,5
<b>Totals (incl. Space Multipliers)</b>				<b>3610,9</b>					<b>2602,5</b>

# Air System Sizing Summary for SS-COLEÇÕES SECAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:43

## Air System Information

Air System Name ..... <b>SS-COLEÇÕES SECAS</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>57,8</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>5,3</b> kW	Load occurs at ..... <b>Dec 1500</b>
Sensible coil load ..... <b>3,4</b> kW	OA DB / WB ..... <b>31,7 / 25,6</b> °C
Coil L/s at Dec 1500 ..... <b>269</b> L/s	Entering DB / WB ..... <b>24,7 / 19,5</b> °C
Max block L/s ..... <b>269</b> L/s	Leaving DB / WB ..... <b>14,2 / 13,8</b> °C
Sum of peak zone L/s ..... <b>269</b> L/s	Coil ADP ..... <b>13,1</b> °C
Sensible heat ratio ..... <b>0,636</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>50,5</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>10,8</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>92,2</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>1,5</b> kW	Load occurs at ..... <b>May 0500</b>
Coil L/s at May 0500 ..... <b>269</b> L/s	W/m <sup>2</sup> ..... <b>26,3</b>
Max coil L/s ..... <b>269</b> L/s	Ent. DB / Lvg DB ..... <b>14,8 / 19,5</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>269</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>269</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>4,66</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>62</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>1,07</b> L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for SS-COLEÇÕES SECAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

### Air System Information

Air System Name ..... **SS-COLEÇÕES SECAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	269	269	4,66	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,4	Jan 1800	0,0	57,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-COLEÇÕES SECAS	1	2,4	Jan 1800	269	0,0	57,8	4,66

## Ventilation Sizing Summary for SS-COLEÇÕES SECAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:44

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **62 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-COLEÇÕES SECAS	1	57,8	8,3	269,4	7,50	0,00	0,0	0,0	61,9
<b>Totals (incl. Space Multipliers)</b>				<b>269,4</b>					<b>61,9</b>

# Air System Sizing Summary for SS-COLEÇÕES ÚMIDAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ..... <b>SS-COLEÇÕES ÚMIDAS</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>85,4</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>6,9</b> kW	Load occurs at ..... <b>Dec 1500</b>
Sensible coil load ..... <b>4,0</b> kW	OA DB / WB ..... <b>31,7 / 25,6</b> °C
Coil L/s at Dec 1500 ..... <b>284</b> L/s	Entering DB / WB ..... <b>25,5 / 20,3</b> °C
Max block L/s ..... <b>284</b> L/s	Leaving DB / WB ..... <b>13,8 / 13,4</b> °C
Sum of peak zone L/s ..... <b>284</b> L/s	Coil ADP ..... <b>12,5</b> °C
Sensible heat ratio ..... <b>0,583</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>41,3</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>12,4</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>80,6</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>1,6</b> kW	Load occurs at ..... <b>May 0700</b>
Coil L/s at May 0700 ..... <b>284</b> L/s	W/m <sup>2</sup> ..... <b>19,2</b>
Max coil L/s ..... <b>284</b> L/s	Ent. DB / Lvg DB ..... <b>14,7 / 19,5</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>284</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>283</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>3,33</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>92</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>1,07</b> L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for SS-COLEÇÕES ÚMIDAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

### Air System Information

Air System Name ..... **SS-COLEÇÕES ÚMIDAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **85,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	284	284	3,33	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,6	Jan 1800	0,0	85,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-COLEÇÕES ÚMIDAS	1	2,6	Jan 1800	284	0,0	85,4	3,33

## Ventilation Sizing Summary for SS-COLEÇÕES ÚMIDAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:44

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **92 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-COLEÇÕES ÚMIDAS	1	85,4	12,2	284,2	7,50	0,00	0,0	0,0	91,5
<b>Totals (incl. Space Multipliers)</b>				<b>284,2</b>					<b>91,5</b>



# Air System Sizing Summary for SS-CONTROLE DE EXIBIÇÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ... **SS-CONTROLE DE EXIBIÇÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **51,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,7** kW  
Sensible coil load ..... **3,0** kW  
Coil L/s at Dec 1500 ..... **240** L/s  
Max block L/s ..... **240** L/s  
Sum of peak zone L/s ..... **240** L/s  
Sensible heat ratio ..... **0,636**  
L/(s kW) ..... **50,5**  
m<sup>2</sup>/kW ..... **10,9**  
W/m<sup>2</sup> ..... **92,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,7 / 19,5** °C  
Leaving DB / WB ..... **14,2 / 13,8** °C  
Coil ADP ..... **13,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,4** kW  
Coil L/s at May 0700 ..... **240** L/s  
Max coil L/s ..... **240** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **27,7**  
Ent. DB / Lvg DB ..... **14,8 / 19,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **240** L/s  
Standard L/s ..... **239** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **4,64** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **55** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-CONTROLE DE EXIBIÇÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

### Air System Information

Air System Name ... **SS-CONTROLE DE EXIBIÇÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **51,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	240	240	4,64	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,2	Jan 1800	0,0	51,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-CONTROLE DE EXIBIÇÃO	1	2,2	Jan 1800	240	0,0	51,6	4,64

## Ventilation Sizing Summary for SS-CONTROLE DE EXIBIÇÃO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:44

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **55 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-CONTROLE DE EXIBIÇÃO	1	51,6	7,4	239,5	7,50	0,00	0,0	0,0	55,3
<b>Totals (incl. Space Multipliers)</b>				<b>239,5</b>					<b>55,3</b>

# Air System Sizing Summary for SS-DIREÇÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ..... **SS-DIREÇÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **51,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,8** kW  
Sensible coil load ..... **3,1** kW  
Coil L/s at Dec 1500 ..... **245** L/s  
Max block L/s ..... **245** L/s  
Sum of peak zone L/s ..... **245** L/s  
Sensible heat ratio ..... **0,640**  
L/(s kW) ..... **51,2**  
m<sup>2</sup>/kW ..... **10,7**  
W/m<sup>2</sup> ..... **93,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,6 / 19,5** °C  
Leaving DB / WB ..... **14,2 / 13,8** °C  
Coil ADP ..... **13,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,4** kW  
Coil L/s at May 0500 ..... **245** L/s  
Max coil L/s ..... **245** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **27,1**  
Ent. DB / Lvg DB ..... **14,8 / 19,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **245** L/s  
Standard L/s ..... **244** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **4,78** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **55** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-DIREÇÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

### Air System Information

Air System Name ..... **SS-DIREÇÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **51,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	245	245	4,78	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,2	Jan 1800	0,0	51,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-DIREÇÃO	1	2,2	Jan 1800	245	0,0	51,2	4,78

## Ventilation Sizing Summary for SS-DIREÇÃO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:44

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **55 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-DIREÇÃO	1	51,2	7,3	244,7	7,50	0,00	0,0	0,0	54,9
<b>Totals (incl. Space Multipliers)</b>				<b>244,7</b>					<b>54,9</b>

# Air System Sizing Summary for SS-ESPAÇO / ESPERA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ..... **SS-ESPAÇO / ESPERA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,3** kW  
Sensible coil load ..... **0,9** kW  
Coil L/s at Dec 1600 ..... **88** L/s  
Max block L/s ..... **88** L/s  
Sum of peak zone L/s ..... **88** L/s  
Sensible heat ratio ..... **0,744**  
L/(s kW) ..... **69,4**  
m<sup>2</sup>/kW ..... **7,6**  
W/m<sup>2</sup> ..... **131,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,6 / 18,5** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0700 ..... **88** L/s  
Max coil L/s ..... **88** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **63,5**  
Ent. DB / Lvg DB ..... **14,9 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **88** L/s  
Standard L/s ..... **88** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,10** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **10** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-ESPAÇO / ESPERA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

### Air System Information

Air System Name ..... **SS-ESPAÇO / ESPERA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,7 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	88	88	9,10	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	9,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-ESTAR / ESPERA	1	0,8	Jan 1800	88	0,0	9,7	9,10



## Ventilation Sizing Summary for SS-ESPAÇO / ESPERA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:44

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **10 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-ESTAR / ESPERA	1	9,7	1,4	88,3	7,50	0,00	0,0	0,0	10,4
<b>Totals (incl. Space Multipliers)</b>				<b>88,3</b>					<b>10,4</b>

# Air System Sizing Summary for SS-ESPAÇO FAMILIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ..... **SS-ESPAÇO FAMILIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **11,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,6** kW  
Sensible coil load ..... **1,2** kW  
Coil L/s at Dec 1500 ..... **117** L/s  
Max block L/s ..... **117** L/s  
Sum of peak zone L/s ..... **117** L/s  
Sensible heat ratio ..... **0,758**  
L/(s kW) ..... **71,7**  
m<sup>2</sup>/kW ..... **7,2**  
W/m<sup>2</sup> ..... **138,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,6 / 18,4** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at Nov 0400 ..... **117** L/s  
Max coil L/s ..... **117** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Nov 0400**  
W/m<sup>2</sup> ..... **58,2**  
Ent. DB / Lvg DB ..... **15,0 / 19,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **117** L/s  
Standard L/s ..... **117** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,93** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **13** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-ESPAÇO FAMILIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

### Air System Information

Air System Name ..... **SS-ESPAÇO FAMILIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **11,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	117	117	9,93	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,1	Jan 1800	0,0	11,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-ESPAÇO FAMILIA	1	1,1	Jan 1800	117	0,0	11,8	9,93

## Ventilation Sizing Summary for SS-ESPAÇO FAMILIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:44

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **13 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-ESPAÇO FAMÍLIA	1	11,8	1,7	117,2	7,50	0,00	0,0	0,0	12,6
<b>Totals (incl. Space Multipliers)</b>				<b>117,2</b>					<b>12,6</b>

# Air System Sizing Summary for SS-ESTÚDIO ÁUDIO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ..... <b>SS-ESTÚDIO ÁUDIO</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>53,0</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>5,1</b> kW	Load occurs at ..... <b>Dec 1500</b>
Sensible coil load ..... <b>3,3</b> kW	OA DB / WB ..... <b>31,7 / 25,6</b> °C
Coil L/s at Dec 1500 ..... <b>274</b> L/s	Entering DB / WB ..... <b>24,5 / 19,3</b> °C
Max block L/s ..... <b>274</b> L/s	Leaving DB / WB ..... <b>14,4 / 13,9</b> °C
Sum of peak zone L/s ..... <b>274</b> L/s	Coil ADP ..... <b>13,3</b> °C
Sensible heat ratio ..... <b>0,654</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>53,6</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>10,4</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>96,6</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>1,5</b> kW	Load occurs at ..... <b>May 0700</b>
Coil L/s at May 0700 ..... <b>274</b> L/s	W/m <sup>2</sup> ..... <b>28,4</b>
Max coil L/s ..... <b>274</b> L/s	Ent. DB / Lvg DB ..... <b>14,8 / 19,4</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>274</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>274</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>5,18</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>57</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>1,07</b> L/(s·m <sup>2</sup> )	

# Zone Sizing Summary for SS-ESTÚDIO ÁUDIO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ..... **SS-ESTÚDIO ÁUDIO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **53,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	274	274	5,18	0,0	-	0,0	-	0

## Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,5	Jan 1800	0,0	53,0

## Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-ESTÚDIO ÁUDIO	1	2,5	Jan 1800	274	0,0	53,0	5,18

## Ventilation Sizing Summary for SS-ESTÚDIO ÁUDIO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:44

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **57 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-ESTÚDIO ÁUDIO	1	53,0	7,6	274,4	7,50	0,00	0,0	0,0	56,8
<b>Totals (incl. Space Multipliers)</b>				<b>274,4</b>					<b>56,8</b>

# Air System Sizing Summary for SS-EXPANSÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ..... **SS-EXPANSÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **84,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **7,5** kW  
Sensible coil load ..... **4,6** kW  
Coil L/s at Dec 1500 ..... **357** L/s  
Max block L/s ..... **357** L/s  
Sum of peak zone L/s ..... **357** L/s  
Sensible heat ratio ..... **0,620**  
L/(s kW) ..... **47,8**  
m<sup>2</sup>/kW ..... **11,3**  
W/m<sup>2</sup> ..... **88,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,8 / 19,7** °C  
Leaving DB / WB ..... **14,1 / 13,6** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,0** kW  
Coil L/s at May 0700 ..... **357** L/s  
Max coil L/s ..... **357** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **23,6**  
Ent. DB / Lvg DB ..... **14,7 / 19,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **357** L/s  
Standard L/s ..... **356** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **4,24** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **90** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for SS-EXPANSÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

### Air System Information

Air System Name ..... **SS-EXPANSÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **84,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	357	357	4,24	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,2	Jan 1800	0,0	84,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b> SS-EXPANSÃO	1	3,2	Jan 1800	357	0,0	84,2	4,24

## Ventilation Sizing Summary for SS-EXPANSÃO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:44

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **90** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-EXPANSÃO	1	84,2	12,0	357,0	7,50	0,00	0,0	0,0	90,2
<b>Totals (incl. Space Multipliers)</b>				<b>357,0</b>					<b>90,2</b>

# Air System Sizing Summary for SS-EXPOSIÇÃO UFC

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ..... **SS-EXPOSIÇÃO UFC**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **96,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **8,2** kW  
Sensible coil load ..... **5,0** kW  
Coil L/s at Dec 1500 ..... **373** L/s  
Max block L/s ..... **373** L/s  
Sum of peak zone L/s ..... **373** L/s  
Sensible heat ratio ..... **0,606**  
L/(s kW) ..... **45,4**  
m<sup>2</sup>/kW ..... **11,8**  
W/m<sup>2</sup> ..... **84,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,2 / 20,0** °C  
Leaving DB / WB ..... **14,1 / 13,7** °C  
Coil ADP ..... **12,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,2** kW  
Coil L/s at May 0700 ..... **373** L/s  
Max coil L/s ..... **373** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **23,1**  
Ent. DB / Lvg DB ..... **14,7 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **373** L/s  
Standard L/s ..... **372** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **3,85** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **104** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-EXPOSIÇÃO UFC

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

### Air System Information

Air System Name ..... **SS-EXPOSIÇÃO UFC**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **96,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	373	373	3,85	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,4	Jan 1800	0,0	96,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-EXPOSIÇÃO UFC	1	3,4	Jan 1800	373	0,0	96,9	3,85

## Ventilation Sizing Summary for SS-EXPOSIÇÃO UFC

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:44

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **104** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-EXPOSIÇÃO UFC	1	96,9	13,8	373,1	7,50	0,00	0,0	0,0	103,8
<b>Totals (incl. Space Multipliers)</b>				<b>373,1</b>					<b>103,8</b>

# Air System Sizing Summary for SS-EXPOSIÇÕES COLEÇÕES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ... **SS-EXPOSIÇÕES COLEÇÕES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **23,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,5** kW  
Sensible coil load ..... **1,8** kW  
Coil L/s at Dec 1500 ..... **154** L/s  
Max block L/s ..... **154** L/s  
Sum of peak zone L/s ..... **154** L/s  
Sensible heat ratio ..... **0,694**  
L/(s kW) ..... **60,6**  
m<sup>2</sup>/kW ..... **9,1**  
W/m<sup>2</sup> ..... **109,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,1 / 18,9** °C  
Leaving DB / WB ..... **14,5 / 14,1** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0500 ..... **154** L/s  
Max coil L/s ..... **154** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **37,9**  
Ent. DB / Lvg DB ..... **14,9 / 19,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **154** L/s  
Standard L/s ..... **154** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,64** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **25** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-EXPOSIÇÕES COLEÇÕES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

### Air System Information

Air System Name ... **SS-EXPOSIÇÕES COLEÇÕES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **23,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	154	154	6,64	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,4	Jan 1800	0,0	23,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-EXPOSIÇÕES COLEÇÕES	1	1,4	Jan 1800	154	0,0	23,2	6,64

# Ventilation Sizing Summary for SS-EXPOSIÇÕES COLEÇÕES

Project Name: LABOMAR-VRF

08/22/2024

Prepared by:

08:44

## 1. Summary

Ventilation Sizing Method ..... Sum of Space OA Airflows

Design Ventilation Airflow Rate ..... 25 L/s

## 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-EXPOSIÇÕES COLEÇÕES	1	23,2	3,3	154,1	7,50	0,00	0,0	0,0	24,9
<b>Totals (incl. Space Multipliers)</b>				<b>154,1</b>					<b>24,9</b>



# Air System Sizing Summary for SS-LABORATÓRIO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

## Air System Information

Air System Name ..... **SS-LABORATÓRIO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **51,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,0** kW  
Sensible coil load ..... **3,3** kW  
Coil L/s at Dec 1500 ..... **268** L/s  
Max block L/s ..... **268** L/s  
Sum of peak zone L/s ..... **268** L/s  
Sensible heat ratio ..... **0,655**  
L/(s kW) ..... **53,9**  
m<sup>2</sup>/kW ..... **10,3**  
W/m<sup>2</sup> ..... **97,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,5 / 19,3** °C  
Leaving DB / WB ..... **14,4 / 13,9** °C  
Coil ADP ..... **13,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,5** kW  
Coil L/s at May 0700 ..... **268** L/s  
Max coil L/s ..... **268** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **29,2**  
Ent. DB / Lvg DB ..... **14,9 / 19,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **268** L/s  
Standard L/s ..... **267** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,23** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **55** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-LABORATÓRIO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:44

### Air System Information

Air System Name ..... **SS-LABORATÓRIO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **51,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	268	268	5,23	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,4	Jan 1800	0,0	51,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-LABORATÓRIO 02	1	2,4	Jan 1800	268	0,0	51,3	5,23

## Ventilation Sizing Summary for SS-LABORATÓRIO 02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:45

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **55 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-LABORATÓRIO 02	1	51,3	7,3	268,1	7,50	0,00	0,0	0,0	55,0
<b>Totals (incl. Space Multipliers)</b>				<b>268,1</b>					<b>55,0</b>

# Air System Sizing Summary for SS-LOJINHA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

## Air System Information

Air System Name ..... **SS-LOJINHA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **23,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,5** kW  
Sensible coil load ..... **1,7** kW  
Coil L/s at Dec 1400 ..... **149** L/s  
Max block L/s ..... **149** L/s  
Sum of peak zone L/s ..... **149** L/s  
Sensible heat ratio ..... **0,689**  
L/(s kW) ..... **59,9**  
m<sup>2</sup>/kW ..... **9,2**  
W/m<sup>2</sup> ..... **108,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,0 / 18,9** °C  
Leaving DB / WB ..... **14,5 / 14,0** °C  
Coil ADP ..... **13,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0700 ..... **149** L/s  
Max coil L/s ..... **149** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **38,2**  
Ent. DB / Lvg DB ..... **14,8 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **149** L/s  
Standard L/s ..... **149** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,49** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **25** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-LOJINHA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

### Air System Information

Air System Name ..... **SS-LOJINHA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **23,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	149	149	6,49	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,4	Jan 1800	0,0	23,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-LOJINHA	1	1,4	Jan 1800	149	0,0	23,0	6,49

## Ventilation Sizing Summary for SS-LOJINHA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:45

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **25 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-LOJINHA	1	23,0	3,3	149,4	7,50	0,00	0,0	0,0	24,6
<b>Totals (incl. Space Multipliers)</b>				<b>149,4</b>					<b>24,6</b>

# Air System Sizing Summary for SS-RACK

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

## Air System Information

Air System Name ..... **SS-RACK**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,0** kW  
Sensible coil load ..... **2,0** kW  
Coil L/s at Jan 1800 ..... **222** L/s  
Max block L/s ..... **222** L/s  
Sum of peak zone L/s ..... **222** L/s  
Sensible heat ratio ..... **1,000**  
L/(s kW) ..... **113,8**  
m<sup>2</sup>/kW ..... **2,3**  
W/m<sup>2</sup> ..... **443,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Jan 1800**  
OA DB / WB ..... **30,9 / 25,2** °C  
Entering DB / WB ..... **23,0 / 7,3** °C  
Leaving DB / WB ..... **15,7 / 3,6** °C  
Coil ADP ..... **14,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **0** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **0 of 1** OK  
Max zone temperature deviation ..... **0,1** K

## Central Heating Coil Sizing Data

**No central heating coil loads occurred during this calculation.**

## Supply Fan Sizing Data

Actual max L/s ..... **222** L/s  
Standard L/s ..... **221** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **50,47** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **0** L/s  
L/(s·m<sup>2</sup>) ..... **0,00** L/(s·m<sup>2</sup>)

L/s/person ..... **0,00** L/s/person

## Zone Sizing Summary for SS-RACK

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

### Air System Information

Air System Name ..... **SS-RACK**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,4 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	222	222	50,47	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,0	Jan 1800	0,0	4,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-RACK	1	2,0	Jan 1800	222	0,0	4,4	50,47



## Ventilation Sizing Summary for SS-RACK

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:45

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **0** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-RACK	1	4,4	0,0	222,1	7,50	0,00	0,0	0,0	0,0
<b>Totals (incl. Space Multipliers)</b>				<b>222,1</b>					<b>0,0</b>

# Air System Sizing Summary for SS-RESERVA TÉCNICA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

## Air System Information

Air System Name ..... **SS-RESERVA TÉCNICA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,2** kW  
Sensible coil load ..... **3,3** kW  
Coil L/s at Dec 1500 ..... **255** L/s  
Max block L/s ..... **255** L/s  
Sum of peak zone L/s ..... **255** L/s  
Sensible heat ratio ..... **0,628**  
L/(s kW) ..... **49,1**  
m<sup>2</sup>/kW ..... **11,1**  
W/m<sup>2</sup> ..... **90,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,8 / 19,6** °C  
Leaving DB / WB ..... **14,2 / 13,7** °C  
Coil ADP ..... **13,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,5** kW  
Coil L/s at May 0500 ..... **255** L/s  
Max coil L/s ..... **255** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **26,0**  
Ent. DB / Lvg DB ..... **14,8 / 19,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **255** L/s  
Standard L/s ..... **254** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **4,44** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **62** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-RESERVA TÉCNICA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

### Air System Information

Air System Name ..... **SS-RESERVA TÉCNICA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,5 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	255	255	4,44	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,3	Jan 1800	0,0	57,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-RESERVA TÉCNICA	1	2,3	Jan 1800	255	0,0	57,5	4,44

## Ventilation Sizing Summary for SS-RESERVA TÉCNICA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:45

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **62** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-RESERVA TÉCNICA	1	57,5	8,2	255,2	7,50	0,00	0,0	0,0	61,6
<b>Totals (incl. Space Multipliers)</b>				<b>255,2</b>					<b>61,6</b>

# Air System Sizing Summary for SS-SALA DE CONTROLE

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

## Air System Information

Air System Name ..... **SS-SALA DE CONTROLE**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **12,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,5** kW  
Sensible coil load ..... **1,1** kW  
Coil L/s at Dec 1500 ..... **92** L/s  
Max block L/s ..... **92** L/s  
Sum of peak zone L/s ..... **92** L/s  
Sensible heat ratio ..... **0,693**  
L/(s kW) ..... **60,5**  
m<sup>2</sup>/kW ..... **7,9**  
W/m<sup>2</sup> ..... **127,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,1 / 19,0** °C  
Leaving DB / WB ..... **14,6 / 14,2** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at May 0400 ..... **92** L/s  
Max coil L/s ..... **92** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0400**  
W/m<sup>2</sup> ..... **54,2**  
Ent. DB / Lvg DB ..... **14,9 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **92** L/s  
Standard L/s ..... **92** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,68** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **1,25** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-SALA DE CONTROLE

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

### Air System Information

Air System Name ..... **SS-SALA DE CONTROLE**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **12,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	92	92	7,68	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	12,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-SALA DE CONTROLE	1	0,8	Jan 1800	92	0,0	12,0	7,68

## Ventilation Sizing Summary for SS-SALA DE CONTROLE

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:45

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-SALA DE CONTROLE	1	12,0	2,0	92,2	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>92,2</b>					<b>15,0</b>

# Air System Sizing Summary for SS-SALA DE EXIBIÇÃO 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

## Air System Information

Air System Name ..... **SS-SALA DE EXIBIÇÃO 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **54,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **13,3** kW  
Sensible coil load ..... **6,9** kW  
Coil L/s at Dec 1500 ..... **385** L/s  
Max block L/s ..... **385** L/s  
Sum of peak zone L/s ..... **385** L/s  
Sensible heat ratio ..... **0,515**  
L/(s kW) ..... **28,9**  
m<sup>2</sup>/kW ..... **4,1**  
W/m<sup>2</sup> ..... **242,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **27,4 / 22,1** °C  
Leaving DB / WB ..... **12,6 / 12,3** °C  
Coil ADP ..... **11,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,5** kW  
Coil L/s at May 0700 ..... **385** L/s  
Max coil L/s ..... **385** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **46,3**  
Ent. DB / Lvg DB ..... **14,5 / 20,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **385** L/s  
Standard L/s ..... **384** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,01** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **206** L/s  
L/(s·m<sup>2</sup>) ..... **3,75** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for SS-SALA DE EXIBIÇÃO 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

### Air System Information

Air System Name ..... **SS-SALA DE EXIBIÇÃO 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **54,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	385	385	7,01	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,5	Jan 1800	0,0	54,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-SALA DE EXIBIÇÃO 01	1	3,5	Jan 1800	385	0,0	54,9	7,01

## Ventilation Sizing Summary for SS-SALA DE EXIBIÇÃO 01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:45

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **206** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-SALA DE EXIBIÇÃO 01	1	54,9	27,5	384,8	7,50	0,00	0,0	0,0	205,9
<b>Totals (incl. Space Multipliers)</b>				<b>384,8</b>					<b>205,9</b>

## Air System Sizing Summary for SS-SALA DE EXIBIÇÃO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

### Air System Information

Air System Name ..... **SS-SALA DE EXIBIÇÃO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **52,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Central Cooling Coil Sizing Data

Total coil load ..... **12,8** kW  
Sensible coil load ..... **6,6** kW  
Coil L/s at Dec 1500 ..... **373** L/s  
Max block L/s ..... **373** L/s  
Sum of peak zone L/s ..... **373** L/s  
Sensible heat ratio ..... **0,516**  
L/(s kW) ..... **29,1**  
m<sup>2</sup>/kW ..... **4,1**  
W/m<sup>2</sup> ..... **243,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **27,4 / 22,0** °C  
Leaving DB / WB ..... **12,7 / 12,4** °C  
Coil ADP ..... **11,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

### Central Heating Coil Sizing Data

Max coil load ..... **2,4** kW  
Coil L/s at May 0700 ..... **373** L/s  
Max coil L/s ..... **373** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **46,5**  
Ent. DB / Lvg DB ..... **14,5 / 19,9** °C

### Supply Fan Sizing Data

Actual max L/s ..... **373** L/s  
Standard L/s ..... **372** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,09** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

### Outdoor Ventilation Air Data

Design airflow L/s ..... **197** L/s  
L/(s·m<sup>2</sup>) ..... **3,75** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-SALA DE EXIBIÇÃO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

### Air System Information

Air System Name ..... **SS-SALA DE EXIBIÇÃO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **52,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	373	373	7,09	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,4	Jan 1800	0,0	52,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-SALA DE EXIBIÇÃO 02	1	3,4	Jan 1800	373	0,0	52,6	7,09

## Ventilation Sizing Summary for SS-SALA DE EXIBIÇÃO 02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:45

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **197 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-SALA DE EXIBIÇÃO 02	1	52,6	26,3	372,9	7,50	0,00	0,0	0,0	197,3
<b>Totals (incl. Space Multipliers)</b>				<b>372,9</b>					<b>197,3</b>

# Air System Sizing Summary for SS-SALA DE EXIBIÇÃO 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

## Air System Information

Air System Name ..... <b>SS-SALA DE EXIBIÇÃO 03</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>57,5</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>13,8</b> kW	Load occurs at ..... <b>Dec 1400</b>
Sensible coil load ..... <b>7,0</b> kW	OA DB / WB ..... <b>31,5 / 25,5</b> °C
Coil L/s at Dec 1400 ..... <b>384</b> L/s	Entering DB / WB ..... <b>27,6 / 22,2</b> °C
Max block L/s ..... <b>384</b> L/s	Leaving DB / WB ..... <b>12,4 / 12,1</b> °C
Sum of peak zone L/s ..... <b>384</b> L/s	Coil ADP ..... <b>10,7</b> °C
Sensible heat ratio ..... <b>0,507</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>27,8</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>4,2</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>239,6</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>2,6</b> kW	Load occurs at ..... <b>May 0600</b>
Coil L/s at May 0600 ..... <b>384</b> L/s	W/m <sup>2</sup> ..... <b>44,9</b>
Max coil L/s ..... <b>384</b> L/s	Ent. DB / Lvg DB ..... <b>14,5 / 20,1</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>384</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>383</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>6,67</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>216</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>3,75</b> L/(s·m <sup>2</sup> )	

## Zone Sizing Summary for SS-SALA DE EXIBIÇÃO 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

### Air System Information

Air System Name ..... **SS-SALA DE EXIBIÇÃO 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	384	384	6,67	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,5	Jan 1800	0,0	57,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-SALA DE EXIBIÇÃO 03	1	3,5	Jan 1800	384	0,0	57,5	6,67

## Ventilation Sizing Summary for SS-SALA DE EXIBIÇÃO 03

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:45

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **216** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-SALA DE EXIBIÇÃO 03	1	57,5	28,8	383,7	7,50	0,00	0,0	0,0	215,6
<b>Totals (incl. Space Multipliers)</b>				<b>383,7</b>					<b>215,6</b>



# Air System Sizing Summary for SS-SALA DE EXIBIÇÃO 04

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

## Air System Information

Air System Name ..... **SS-SALA DE EXIBIÇÃO 04**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **13,7** kW  
Sensible coil load ..... **6,9** kW  
Coil L/s at Dec 1500 ..... **372** L/s  
Max block L/s ..... **372** L/s  
Sum of peak zone L/s ..... **372** L/s  
Sensible heat ratio ..... **0,505**  
L/(s kW) ..... **27,1**  
m<sup>2</sup>/kW ..... **4,2**  
W/m<sup>2</sup> ..... **237,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **27,9 / 22,5** °C  
Leaving DB / WB ..... **12,4 / 12,1** °C  
Coil ADP ..... **10,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,6** kW  
Coil L/s at May 0500 ..... **372** L/s  
Max coil L/s ..... **372** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **44,6**  
Ent. DB / Lvg DB ..... **14,5 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **372** L/s  
Standard L/s ..... **371** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,43** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **217** L/s  
L/(s·m<sup>2</sup>) ..... **3,75** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-SALA DE EXIBIÇÃO 04

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

### Air System Information

Air System Name ..... **SS-SALA DE EXIBIÇÃO 04**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	372	372	6,43	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,4	Jan 1800	0,0	57,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-SALA DE EXIBIÇÃO 04	1	3,4	Jan 1800	372	0,0	57,8	6,43

## Ventilation Sizing Summary for SS-SALA DE EXIBIÇÃO 04

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:45

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **217 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-SALA DE EXIBIÇÃO 04	1	57,8	28,9	371,7	7,50	0,00	0,0	0,0	216,8
<b>Totals (incl. Space Multipliers)</b>				<b>371,7</b>					<b>216,8</b>

# Air System Sizing Summary for SS-SALA DE EXIBIÇÃO 05

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

## Air System Information

Air System Name ..... **SS-SALA DE EXIBIÇÃO 05**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **13,7** kW  
Sensible coil load ..... **6,9** kW  
Coil L/s at Dec 1500 ..... **372** L/s  
Max block L/s ..... **372** L/s  
Sum of peak zone L/s ..... **372** L/s  
Sensible heat ratio ..... **0,505**  
L/(s kW) ..... **27,1**  
m<sup>2</sup>/kW ..... **4,2**  
W/m<sup>2</sup> ..... **237,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **27,9 / 22,5** °C  
Leaving DB / WB ..... **12,4 / 12,1** °C  
Coil ADP ..... **10,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,6** kW  
Coil L/s at May 0500 ..... **372** L/s  
Max coil L/s ..... **372** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **44,6**  
Ent. DB / Lvg DB ..... **14,5 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **372** L/s  
Standard L/s ..... **371** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,43** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **217** L/s  
L/(s·m<sup>2</sup>) ..... **3,75** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-SALA DE EXIBIÇÃO 05

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:45

### Air System Information

Air System Name ..... **SS-SALA DE EXIBIÇÃO 05**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	372	372	6,43	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,4	Jan 1800	0,0	57,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-SALA DE EXIBIÇÃO 05	1	3,4	Jan 1800	372	0,0	57,8	6,43

## Ventilation Sizing Summary for SS-SALA DE EXIBIÇÃO 05

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:46

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **217 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-SALA DE EXIBIÇÃO 05	1	57,8	28,9	371,7	7,50	0,00	0,0	0,0	216,8
<b>Totals (incl. Space Multipliers)</b>				<b>371,7</b>					<b>216,8</b>

# Air System Sizing Summary for SS-SALA DE TREINAMENTO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

## Air System Information

Air System Name ..... **SS-SALA DE TREINAMENTO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **51,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,8** kW  
Sensible coil load ..... **3,1** kW  
Coil L/s at Dec 1500 ..... **247** L/s  
Max block L/s ..... **247** L/s  
Sum of peak zone L/s ..... **247** L/s  
Sensible heat ratio ..... **0,643**  
L/(s kW) ..... **51,7**  
m<sup>2</sup>/kW ..... **10,7**  
W/m<sup>2</sup> ..... **93,8**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,6 / 19,4** °C  
Leaving DB / WB ..... **14,3 / 13,8** °C  
Coil ADP ..... **13,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,4** kW  
Coil L/s at May 0700 ..... **247** L/s  
Max coil L/s ..... **247** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **28,3**  
Ent. DB / Lvg DB ..... **14,8 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **247** L/s  
Standard L/s ..... **246** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **4,85** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **55** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-SALA DE TREINAMENTO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

### Air System Information

Air System Name ..... **SS-SALA DE TREINAMENTO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **51,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	247	247	4,85	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,2	Jan 1800	0,0	51,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-SALA DE TREINAMENTO	1	2,2	Jan 1800	247	0,0	51,0	4,85



## Ventilation Sizing Summary for SS-SALA DE TREINAMENTO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:46

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **55 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-SALA DE TREINAMENTO	1	51,0	7,3	247,2	7,50	0,00	0,0	0,0	54,6
<b>Totals (incl. Space Multipliers)</b>				<b>247,2</b>					<b>54,6</b>

# Air System Sizing Summary for SS-SALA IMERSIVA PRINC.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

## Air System Information

Air System Name ..... **SS-SALA IMERSIVA PRINC.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **299,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **69,9** kW  
Sensible coil load ..... **34,7** kW  
Coil L/s at Dec 1500 ..... **1780** L/s  
Max block L/s ..... **1780** L/s  
Sum of peak zone L/s ..... **1780** L/s  
Sensible heat ratio ..... **0,496**  
L/(s kW) ..... **25,5**  
m<sup>2</sup>/kW ..... **4,3**  
W/m<sup>2</sup> ..... **233,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **28,3 / 22,8** °C  
Leaving DB / WB ..... **12,1 / 11,9** °C  
Coil ADP ..... **10,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **12,0** kW  
Coil L/s at Jul 0700 ..... **1780** L/s  
Max coil L/s ..... **1780** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **40,1**  
Ent. DB / Lvg DB ..... **14,5 / 20,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **1780** L/s  
Standard L/s ..... **1775** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,94** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **1124** L/s  
L/(s·m<sup>2</sup>) ..... **3,75** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-SALA IMERSIVA PRINC.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

### Air System Information

Air System Name ..... **SS-SALA IMERSIVA PRINC.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **299,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	1780	1780	5,94	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	16,2	Jan 1800	0,0	299,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-SALA IMERSIVA PRINC.	1	16,2	Jan 1800	1780	0,0	299,6	5,94

## Ventilation Sizing Summary for SS-SALA IMERSIVA PRINC.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:46

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **1124** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-SALA IMERSIVA PRINC.	1	299,6	149,8	1779,8	7,50	0,00	0,0	0,0	1123,5
<b>Totals (incl. Space Multipliers)</b>				<b>1779,8</b>					<b>1123,5</b>

# Air System Sizing Summary for SS-TRADUÇÃO (AUDITÓRIO)

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

## Air System Information

Air System Name .... **SS-TRADUÇÃO (AUDITÓRIO)**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **5,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,0** kW  
Sensible coil load ..... **0,8** kW  
Coil L/s at Dec 1600 ..... **75** L/s  
Max block L/s ..... **75** L/s  
Sum of peak zone L/s ..... **75** L/s  
Sensible heat ratio ..... **0,768**  
L/(s kW) ..... **73,6**  
m<sup>2</sup>/kW ..... **5,3**  
W/m<sup>2</sup> ..... **187,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,5 / 18,3** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,5** kW  
Coil L/s at May 0700 ..... **75** L/s  
Max coil L/s ..... **75** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **99,3**  
Ent. DB / Lvg DB ..... **14,8 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **75** L/s  
Standard L/s ..... **74** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **13,80** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **8** L/s  
L/(s·m<sup>2</sup>) ..... **1,39** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for SS-TRADUÇÃO (AUDITÓRIO)

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

### Air System Information

Air System Name .... **SS-TRADUÇÃO (AUDITÓRIO)**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **5,4 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	75	75	13,80	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,7	Jan 1800	0,0	5,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
SS-TRADUÇÃO (AUDITÓRIO)	1	0,7	Jan 1800	75	0,0	5,4	13,80

## Ventilation Sizing Summary for SS-TRADUÇÃO (AUDITÓRIO)

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:46

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
SS-TRADUÇÃO (AUDITÓRIO)	1	5,4	1,0	74,5	7,50	0,00	0,0	0,0	7,5
<b>Totals (incl. Space Multipliers)</b>				<b>74,5</b>					<b>7,5</b>

# Air System Sizing Summary for TE-ADM

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

## Air System Information

Air System Name ..... **TE-ADM**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **13,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,5** kW  
Sensible coil load ..... **1,0** kW  
Coil L/s at Dec 1500 ..... **87** L/s  
Max block L/s ..... **87** L/s  
Sum of peak zone L/s ..... **87** L/s  
Sensible heat ratio ..... **0,680**  
L/(s kW) ..... **58,0**  
m<sup>2</sup>/kW ..... **8,7**  
W/m<sup>2</sup> ..... **115,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,2 / 19,0** °C  
Leaving DB / WB ..... **14,5 / 14,0** °C  
Coil ADP ..... **13,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,6** kW  
Coil L/s at May 0700 ..... **87** L/s  
Max coil L/s ..... **87** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **43,9**  
Ent. DB / Lvg DB ..... **14,8 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **87** L/s  
Standard L/s ..... **87** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,69** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **1,15** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for TE-ADM

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

### Air System Information

Air System Name ..... **TE-ADM**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **13,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	87	87	6,69	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	13,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-ADM	1	0,8	Jan 1800	87	0,0	13,0	6,69

## Ventilation Sizing Summary for TE-ADM

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:46

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-ADM	1	13,0	2,0	87,0	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>87,0</b>					<b>15,0</b>

# Air System Sizing Summary for TE-AMAMENTAÇÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

## Air System Information

Air System Name	TE-AMAMENTAÇÃO	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	15,6 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	2,1 kW	Load occurs at	Dec 1500
Sensible coil load	1,6 kW	OA DB / WB	31,7 / 25,6 °C
Coil L/s at Dec 1500	144 L/s	Entering DB / WB	23,7 / 18,5 °C
Max block L/s	144 L/s	Leaving DB / WB	14,8 / 14,3 °C
Sum of peak zone L/s	144 L/s	Coil ADP	13,8 °C
Sensible heat ratio	0,744	Bypass Factor	0,100
L/(s kW)	69,1	Resulting RH	60 %
m <sup>2</sup> /kW	7,5	Design supply temp.	14,4 °C
W/m <sup>2</sup>	133,8	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	0,4 kW	Load occurs at	May 0700
Coil L/s at May 0700	144 L/s	W/m <sup>2</sup>	24,2
Max coil L/s	144 L/s	Ent. DB / Lvg DB	15,1 / 17,3 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	144 L/s	Fan motor BHP	0,00 BHP
Standard L/s	144 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	9,25 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	17 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	1,07 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for TE-AMAMENTAÇÃO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

### Air System Information

Air System Name ..... **TE-AMAMENTAÇÃO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **15,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	144	144	9,25	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,3	Jan 1800	0,0	15,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-AMAMENTAÇÃO	1	1,3	Jan 1800	144	0,0	15,6	9,25

## Ventilation Sizing Summary for TE-AMAMENTAÇÃO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:46

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **17 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-AMAMENTAÇÃO	1	15,6	2,2	144,2	7,50	0,00	0,0	0,0	16,7
<b>Totals (incl. Space Multipliers)</b>				<b>144,2</b>					<b>16,7</b>

# Air System Sizing Summary for TE-ANÁLISE DE ÁGUA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

## Air System Information

Air System Name ..... **TE-ANÁLISE DE ÁGUA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **18,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,1** kW  
Sensible coil load ..... **1,4** kW  
Coil L/s at Dec 1500 ..... **126** L/s  
Max block L/s ..... **126** L/s  
Sum of peak zone L/s ..... **126** L/s  
Sensible heat ratio ..... **0,693**  
L/(s kW) ..... **60,4**  
m<sup>2</sup>/kW ..... **9,0**  
W/m<sup>2</sup> ..... **111,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,1 / 18,9** °C  
Leaving DB / WB ..... **14,6 / 14,1** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0500 ..... **126** L/s  
Max coil L/s ..... **126** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **45,4**  
Ent. DB / Lvg DB ..... **14,9 / 20,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **126** L/s  
Standard L/s ..... **125** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,75** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **20** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-ANÁLISE DE ÁGUA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

### Air System Information

Air System Name ..... **TE-ANÁLISE DE ÁGUA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **18,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	126	126	6,75	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,1	Jan 1800	0,0	18,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-ANÁLISE DE ÁGUA	1	1,1	Jan 1800	126	0,0	18,6	6,75

## Ventilation Sizing Summary for TE-ANÁLISE DE ÁGUA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:46

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **20** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-ANÁLISE DE ÁGUA	1	18,6	2,7	125,6	7,50	0,00	0,0	0,0	19,9
<b>Totals (incl. Space Multipliers)</b>				<b>125,6</b>					<b>19,9</b>



# Air System Sizing Summary for TE-ANÁLISE DE ESGOTO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

## Air System Information

Air System Name ..... **TE-ANÁLISE DE ESGOTO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **18,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,2** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1500 ..... **135** L/s  
Max block L/s ..... **135** L/s  
Sum of peak zone L/s ..... **135** L/s  
Sensible heat ratio ..... **0,703**  
L/(s kW) ..... **62,0**  
m<sup>2</sup>/kW ..... **8,6**  
W/m<sup>2</sup> ..... **115,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,9 / 18,8** °C  
Leaving DB / WB ..... **14,5 / 14,0** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0400 ..... **135** L/s  
Max coil L/s ..... **135** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0400**  
W/m<sup>2</sup> ..... **44,2**  
Ent. DB / Lvg DB ..... **14,8 / 20,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **135** L/s  
Standard L/s ..... **135** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,19** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **20** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-ANÁLISE DE ESGOTO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

### Air System Information

Air System Name ..... **TE-ANÁLISE DE ESGOTO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **18,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	135	135	7,19	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	18,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-ANÁLISE DE ESGOTO	1	1,2	Jan 1800	135	0,0	18,8	7,19

## Ventilation Sizing Summary for TE-ANÁLISE DE ESGOTO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:46

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **20** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-ANÁLISE DE ESGOTO	1	18,8	2,7	135,1	7,50	0,00	0,0	0,0	20,1
<b>Totals (incl. Space Multipliers)</b>				<b>135,1</b>					<b>20,1</b>

# Air System Sizing Summary for TE-ANTECÂMARA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

## Air System Information

Air System Name ..... **TE-ANTECÂMARA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **0,7** kW  
Sensible coil load ..... **0,5** kW  
Coil L/s at Dec 1400 ..... **41** L/s  
Max block L/s ..... **41** L/s  
Sum of peak zone L/s ..... **41** L/s  
Sensible heat ratio ..... **0,669**  
L/(s kW) ..... **56,4**  
m<sup>2</sup>/kW ..... **6,2**  
W/m<sup>2</sup> ..... **162,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,2 / 19,1** °C  
Leaving DB / WB ..... **14,3 / 13,9** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,2** kW  
Coil L/s at May 0500 ..... **41** L/s  
Max coil L/s ..... **41** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **48,4**  
Ent. DB / Lvg DB ..... **14,9 / 19,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **41** L/s  
Standard L/s ..... **41** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,13** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **8** L/s  
L/(s·m<sup>2</sup>) ..... **1,67** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-ANTECÂMARA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:46

### Air System Information

Air System Name ..... **TE-ANTECÂMARA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,5 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	41	41	9,13	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,4	Jan 1800	0,0	4,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-ANTECÂMARA	1	0,4	Jan 1800	41	0,0	4,5	9,13

## Ventilation Sizing Summary for TE-ANTECÂMARA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:46

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-ANTECÂMARA	1	4,5	1,0	41,1	7,50	0,00	0,0	0,0	7,5
<b>Totals (incl. Space Multipliers)</b>				<b>41,1</b>					<b>7,5</b>

# Air System Sizing Summary for TE-ARMÁRIOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

## Air System Information

Air System Name ..... **TE-ARMÁRIOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **25,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,9** kW  
Sensible coil load ..... **2,0** kW  
Coil L/s at Jan 1600 ..... **170** L/s  
Max block L/s ..... **170** L/s  
Sum of peak zone L/s ..... **170** L/s  
Sensible heat ratio ..... **0,693**  
L/(s kW) ..... **59,6**  
m<sup>2</sup>/kW ..... **9,1**  
W/m<sup>2</sup> ..... **110,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Jan 1600**  
OA DB / WB ..... **32,0 / 25,5** °C  
Entering DB / WB ..... **24,0 / 18,8** °C  
Leaving DB / WB ..... **14,4 / 13,9** °C  
Coil ADP ..... **13,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at Oct 0700 ..... **170** L/s  
Max coil L/s ..... **170** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Oct 0700**  
W/m<sup>2</sup> ..... **33,7**  
Ent. DB / Lvg DB ..... **14,9 / 19,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **170** L/s  
Standard L/s ..... **169** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,58** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **28** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-ARMÁRIOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

### Air System Information

Air System Name ..... **TE-ARMÁRIOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **25,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	170	170	6,58	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,5	May 1800	0,0	25,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-ARMÁRIOS	1	1,5	May 1800	170	0,0	25,8	6,58



## Ventilation Sizing Summary for TE-ARMÁRIOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:47

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **28** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-ARMÁRIOS	1	25,8	3,7	169,7	7,50	0,00	0,0	0,0	27,6
<b>Totals (incl. Space Multipliers)</b>				<b>169,7</b>					<b>27,6</b>

# Air System Sizing Summary for TE-ARMAZENAMENTO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

## Air System Information

Air System Name ..... TE-ARMAZENAMENTO  
Equipment Class ..... SPLT AHU  
Air System Type ..... SZCAV

Number of zones ..... 1  
Floor Area ..... 21,8 m<sup>2</sup>  
Location ..... Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months ..... Jan to Dec  
Sizing Data ..... Calculated

Zone L/s Sizing ..... Sum of space airflow rates  
Space L/s Sizing ..... Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load ..... 1,1 kW  
Sensible coil load ..... 1,1 kW  
Coil L/s at Jan 1600 ..... 133 L/s  
Max block L/s ..... 133 L/s  
Sum of peak zone L/s ..... 133 L/s  
Sensible heat ratio ..... 1,000  
L/(s kW) ..... 124,4  
m<sup>2</sup>/kW ..... 20,3  
W/m<sup>2</sup> ..... 49,2  
Water flow @ 5,6 K rise ..... N/A

Load occurs at ..... Jan 1600  
OA DB / WB ..... 32,0 / 25,5 °C  
Entering DB / WB ..... 22,6 / 7,1 °C  
Leaving DB / WB ..... 15,9 / 3,7 °C  
Coil ADP ..... 15,2 °C  
Bypass Factor ..... 0,100  
Resulting RH ..... 0 %  
Design supply temp. .... 14,4 °C  
Zone T-stat Check ..... 1 of 1 OK  
Max zone temperature deviation ..... 0,0 K

## Central Heating Coil Sizing Data

**No central heating coil loads occurred during this calculation.**

## Supply Fan Sizing Data

Actual max L/s ..... 133 L/s  
Standard L/s ..... 133 L/s  
Actual max L/(s·m<sup>2</sup>) ..... 6,12 L/(s·m<sup>2</sup>)

Fan motor BHP ..... 0,00 BHP  
Fan motor kW ..... 0,00 kW  
Fan static ..... 0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... 0 L/s  
L/(s·m<sup>2</sup>) ..... 0,00 L/(s·m<sup>2</sup>)

L/s/person ..... 0,00 L/s/person

## Zone Sizing Summary for TE-ARMAZENAMENTO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

### Air System Information

Air System Name ..... **TE-ARMAZENAMENTO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	133	133	6,12	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	21,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-ARMAZENAMENTO	1	1,2	Jan 1800	133	0,0	21,8	6,12

## Ventilation Sizing Summary for TE-ARMAZENAMENTO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:47

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **0** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-ARMAZENAMENTO	1	21,8	0,0	133,1	7,50	0,00	0,0	0,0	0,0
<b>Totals (incl. Space Multipliers)</b>				<b>133,1</b>					<b>0,0</b>

# Air System Sizing Summary for TE-BIBLIOTECA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

## Air System Information

Air System Name ..... **TE-BIBLIOTECA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **196,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **22,6** kW  
Sensible coil load ..... **13,8** kW  
Coil L/s at Dec 1600 ..... **1055** L/s  
Max block L/s ..... **1055** L/s  
Sum of peak zone L/s ..... **1055** L/s  
Sensible heat ratio ..... **0,614**  
L/(s kW) ..... **46,8**  
m<sup>2</sup>/kW ..... **8,7**  
W/m<sup>2</sup> ..... **114,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,8 / 19,7** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **6,5** kW  
Coil L/s at Sep 0700 ..... **1055** L/s  
Max coil L/s ..... **1055** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Sep 0700**  
W/m<sup>2</sup> ..... **33,1**  
Ent. DB / Lvg DB ..... **14,8 / 20,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **1055** L/s  
Standard L/s ..... **1052** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,36** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **270** L/s  
L/(s·m<sup>2</sup>) ..... **1,37** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-BIBLIOTECA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

### Air System Information

Air System Name ..... **TE-BIBLIOTECA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **196,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	1055	1055	5,36	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	9,6	May 1800	0,0	196,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-BIBLIOTECA	1	9,6	May 1800	1055	0,0	196,9	5,36

## Ventilation Sizing Summary for TE-BIBLIOTECA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
Design Ventilation Airflow Rate ..... **270 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-BIBLIOTECA	1	196,9	36,0	1055,2	7,50	0,00	0,0	0,0	270,0
<b>Totals (incl. Space Multipliers)</b>				<b>1055,2</b>					<b>270,0</b>

# Air System Sizing Summary for TE-CENTRO ACADÊMICO 1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

## Air System Information

Air System Name ..... **TE-CENTRO ACADÊMICO 1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,5** kW  
Sensible coil load ..... **1,7** kW  
Coil L/s at Dec 1500 ..... **146** L/s  
Max block L/s ..... **146** L/s  
Sum of peak zone L/s ..... **146** L/s  
Sensible heat ratio ..... **0,686**  
L/(s kW) ..... **59,1**  
m<sup>2</sup>/kW ..... **9,1**  
W/m<sup>2</sup> ..... **109,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,1 / 19,0** °C  
Leaving DB / WB ..... **14,5 / 14,0** °C  
Coil ADP ..... **13,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0700 ..... **146** L/s  
Max coil L/s ..... **146** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **34,9**  
Ent. DB / Lvg DB ..... **14,9 / 19,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **146** L/s  
Standard L/s ..... **146** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,47** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **24** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for TE-CENTRO ACADÊMICO 1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

### Air System Information

Air System Name ..... **TE-CENTRO ACADÊMICO 1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	146	146	6,47	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,3	Jan 1800	0,0	22,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-CENTRO ACADÊMICO 1	1	1,3	Jan 1800	146	0,0	22,6	6,47

# Ventilation Sizing Summary for TE-CENTRO ACADÊMICO 1

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:47

## 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **24 L/s**

## 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-CENTRO ACADÊMICO 1	1	22,6	3,2	146,2	7,50	0,00	0,0	0,0	24,2
<b>Totals (incl. Space Multipliers)</b>				<b>146,2</b>					<b>24,2</b>

# Air System Sizing Summary for TE-CENTRO ACADÊMICO 2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

## Air System Information

Air System Name ..... **TE-CENTRO ACADÊMICO 2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,3** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1400 ..... **127** L/s  
Max block L/s ..... **127** L/s  
Sum of peak zone L/s ..... **127** L/s  
Sensible heat ratio ..... **0,662**  
L/(s kW) ..... **55,1**  
m<sup>2</sup>/kW ..... **9,8**  
W/m<sup>2</sup> ..... **101,8**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,3 / 13,9** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at May 0600 ..... **127** L/s  
Max coil L/s ..... **127** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **33,0**  
Ent. DB / Lvg DB ..... **14,8 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **127** L/s  
Standard L/s ..... **126** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,61** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **24** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-CENTRO ACADÊMICO 2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

### Air System Information

Air System Name ..... **TE-CENTRO ACADÊMICO 2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	127	127	5,61	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	22,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-CENTRO ACADÊMICO 2	1	1,2	Jan 1800	127	0,0	22,6	5,61

## Ventilation Sizing Summary for TE-CENTRO ACADÊMICO 2

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:47

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **24 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-CENTRO ACADÊMICO 2	1	22,6	3,2	126,8	7,50	0,00	0,0	0,0	24,2
<b>Totals (incl. Space Multipliers)</b>				<b>126,8</b>					<b>24,2</b>

# Air System Sizing Summary for TE-CENTRO ACADÊMICO 3

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

## Air System Information

Air System Name ..... **TE-CENTRO ACADÊMICO 3**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,3** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1400 ..... **127** L/s  
Max block L/s ..... **127** L/s  
Sum of peak zone L/s ..... **127** L/s  
Sensible heat ratio ..... **0,662**  
L/(s kW) ..... **55,1**  
m<sup>2</sup>/kW ..... **9,8**  
W/m<sup>2</sup> ..... **101,8**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,3 / 13,9** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at May 0600 ..... **127** L/s  
Max coil L/s ..... **127** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **33,0**  
Ent. DB / Lvg DB ..... **14,8 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **127** L/s  
Standard L/s ..... **126** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,61** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **24** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-CENTRO ACADÊMICO 3

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

### Air System Information

Air System Name ..... **TE-CENTRO ACADÊMICO 3**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	127	127	5,61	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	22,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-CENTRO ACADÊMICO 3	1	1,2	Jan 1800	127	0,0	22,6	5,61

## Ventilation Sizing Summary for TE-CENTRO ACADÊMICO 3

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:47

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **24** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-CENTRO ACADÊMICO 3	1	22,6	3,2	126,8	7,50	0,00	0,0	0,0	24,2
<b>Totals (incl. Space Multipliers)</b>				<b>126,8</b>					<b>24,2</b>



# Air System Sizing Summary for TE-CENTRO ACADÊMICO 4

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

## Air System Information

Air System Name ..... **TE-CENTRO ACADÊMICO 4**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,3** kW  
Sensible coil load ..... **1,5** kW  
Coil L/s at Dec 1400 ..... **127** L/s  
Max block L/s ..... **127** L/s  
Sum of peak zone L/s ..... **127** L/s  
Sensible heat ratio ..... **0,662**  
L/(s kW) ..... **55,1**  
m<sup>2</sup>/kW ..... **9,8**  
W/m<sup>2</sup> ..... **101,8**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,3 / 13,9** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at May 0600 ..... **127** L/s  
Max coil L/s ..... **127** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **33,0**  
Ent. DB / Lvg DB ..... **14,8 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **127** L/s  
Standard L/s ..... **126** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,61** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **24** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-CENTRO ACADÊMICO 4

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

### Air System Information

Air System Name ..... **TE-CENTRO ACADÊMICO 4**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **22,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	127	127	5,61	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	22,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-CENTRO ACADÊMICO 4	1	1,2	Jan 1800	127	0,0	22,6	5,61

## Ventilation Sizing Summary for TE-CENTRO ACADÊMICO 4

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:47

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **24 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-CENTRO ACADÊMICO 4	1	22,6	3,2	126,8	7,50	0,00	0,0	0,0	24,2
<b>Totals (incl. Space Multipliers)</b>				<b>126,8</b>					<b>24,2</b>

# Air System Sizing Summary for TE-CIRCULAÇÃO 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

## Air System Information

Air System Name ..... **TE-CIRCULAÇÃO 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **35,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **3,9** kW  
Sensible coil load ..... **2,4** kW  
Coil L/s at Dec 1500 ..... **191** L/s  
Max block L/s ..... **191** L/s  
Sum of peak zone L/s ..... **191** L/s  
Sensible heat ratio ..... **0,628**  
L/(s kW) ..... **48,9**  
m<sup>2</sup>/kW ..... **9,1**  
W/m<sup>2</sup> ..... **109,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,7 / 19,5** °C  
Leaving DB / WB ..... **14,0 / 13,6** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,0** kW  
Coil L/s at May 0600 ..... **191** L/s  
Max coil L/s ..... **191** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **27,2**  
Ent. DB / Lvg DB ..... **14,9 / 19,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **191** L/s  
Standard L/s ..... **190** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,36** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **1,26** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-CIRCULAÇÃO 01

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:47

### Air System Information

Air System Name ..... **TE-CIRCULAÇÃO 01**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **35,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	191	191	5,36	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,7	Jan 1800	0,0	35,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-CIRCULAÇÃO I (REF.)	1	1,7	Jan 1800	191	0,0	35,6	5,36

## Ventilation Sizing Summary for TE-CIRCULAÇÃO 01

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:48

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-CIRCULAÇÃO I (REF.)	1	35,6	6,0	190,8	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>190,8</b>					<b>45,0</b>

# Air System Sizing Summary for TE-CIRCULAÇÃO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

## Air System Information

Air System Name ..... **TE-CIRCULAÇÃO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **76,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **9,1** kW  
Sensible coil load ..... **5,5** kW  
Coil L/s at Dec 1500 ..... **402** L/s  
Max block L/s ..... **402** L/s  
Sum of peak zone L/s ..... **402** L/s  
Sensible heat ratio ..... **0,602**  
L/(s kW) ..... **44,4**  
m<sup>2</sup>/kW ..... **8,4**  
W/m<sup>2</sup> ..... **118,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,2 / 20,0** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,0** kW  
Coil L/s at May 0700 ..... **402** L/s  
Max coil L/s ..... **402** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **26,7**  
Ent. DB / Lvg DB ..... **14,8 / 19,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **402** L/s  
Standard L/s ..... **401** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,28** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **113** L/s  
L/(s·m<sup>2</sup>) ..... **1,48** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-CIRCULAÇÃO 02

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

### Air System Information

Air System Name ..... **TE-CIRCULAÇÃO 02**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **76,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	402	402	5,28	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,7	Jan 1800	0,0	76,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-CIRCULAÇÃO II (REF.)	1	3,7	Jan 1800	402	0,0	76,2	5,28



## Ventilation Sizing Summary for TE-CIRCULAÇÃO 02

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:48

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **113** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-CIRCULAÇÃO II (REF.)	1	76,2	15,0	402,5	7,50	0,00	0,0	0,0	112,5
<b>Totals (incl. Space Multipliers)</b>				<b>402,5</b>					<b>112,5</b>

# Air System Sizing Summary for TE-CIRCULAÇÃO 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

## Air System Information

Air System Name ..... **TE-CIRCULAÇÃO 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **38,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,0** kW  
Sensible coil load ..... **2,6** kW  
Coil L/s at Dec 1500 ..... **206** L/s  
Max block L/s ..... **206** L/s  
Sum of peak zone L/s ..... **206** L/s  
Sensible heat ratio ..... **0,641**  
L/(s kW) ..... **51,2**  
m<sup>2</sup>/kW ..... **9,6**  
W/m<sup>2</sup> ..... **104,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,6 / 19,4** °C  
Leaving DB / WB ..... **14,2 / 13,7** °C  
Coil ADP ..... **13,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,0** kW  
Coil L/s at May 0400 ..... **206** L/s  
Max coil L/s ..... **206** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0400**  
W/m<sup>2</sup> ..... **25,9**  
Ent. DB / Lvg DB ..... **14,9 / 19,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **206** L/s  
Standard L/s ..... **206** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,34** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **1,17** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-CIRCULAÇÃO 03

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

### Air System Information

Air System Name ..... **TE-CIRCULAÇÃO 03**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **38,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	206	206	5,34	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,9	Jan 1800	0,0	38,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-CIRCULAÇÃO III (REF.)	1	1,9	Jan 1800	206	0,0	38,6	5,34

## Ventilation Sizing Summary for TE-CIRCULAÇÃO 03

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:48

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-CIRCULAÇÃO III (REF.)	1	38,6	6,0	206,2	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>206,2</b>					<b>45,0</b>

# Air System Sizing Summary for TE-CONT. RECEBIMENTO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

## Air System Information

Air System Name ..... **TE-CONT. RECEBIMENTO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,8** kW  
Sensible coil load ..... **1,3** kW  
Coil L/s at Feb 1600 ..... **120** L/s  
Max block L/s ..... **120** L/s  
Sum of peak zone L/s ..... **120** L/s  
Sensible heat ratio ..... **0,734**  
L/(s kW) ..... **66,8**  
m<sup>2</sup>/kW ..... **2,5**  
W/m<sup>2</sup> ..... **398,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1600**  
OA DB / WB ..... **32,0 / 25,5** °C  
Entering DB / WB ..... **23,6 / 18,4** °C  
Leaving DB / WB ..... **14,5 / 14,0** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at Jul 0600 ..... **120** L/s  
Max coil L/s ..... **120** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0600**  
W/m<sup>2</sup> ..... **175,2**  
Ent. DB / Lvg DB ..... **14,9 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **120** L/s  
Standard L/s ..... **119** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **26,62** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **3,33** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-CONT. RECEBIMENTO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

### Air System Information

Air System Name ..... **TE-CONT. RECEBIMENTO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **4,5 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	120	120	26,62	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,1	Dec 1800	0,0	4,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-CONTR. E RECEB.	1	1,1	Dec 1800	120	0,0	4,5	26,62

## Ventilation Sizing Summary for TE-CONT. RECEBIMENTO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:48

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-CONTR. E RECEB.	1	4,5	2,0	119,8	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>119,8</b>					<b>15,0</b>

# Air System Sizing Summary for TE-CROM. AMB. PET

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

## Air System Information

Air System Name ..... **TE-CROM. AMB. PET**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **25,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **3,2** kW  
Sensible coil load ..... **2,4** kW  
Coil L/s at Feb 1500 ..... **218** L/s  
Max block L/s ..... **218** L/s  
Sum of peak zone L/s ..... **218** L/s  
Sensible heat ratio ..... **0,737**  
L/(s kW) ..... **67,1**  
m<sup>2</sup>/kW ..... **7,8**  
W/m<sup>2</sup> ..... **128,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **23,7 / 18,5** °C  
Leaving DB / WB ..... **14,6 / 14,1** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,4** kW  
Coil L/s at Jun 0700 ..... **218** L/s  
Max coil L/s ..... **218** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **55,8**  
Ent. DB / Lvg DB ..... **14,8 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **218** L/s  
Standard L/s ..... **217** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,65** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **27** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for TE-CROM. AMB. PET

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

### Air System Information

Air System Name ..... **TE-CROM. AMB. PET**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **25,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	218	218	8,65	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,0	Dec 1800	0,0	25,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-CROM. AMB. PET.	1	2,0	Dec 1800	218	0,0	25,2	8,65

## Ventilation Sizing Summary for TE-CROM. AMB. PET

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:48

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **27 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-CROM. AMB. PET.	1	25,2	3,6	217,9	7,50	0,00	0,0	0,0	27,0
<b>Totals (incl. Space Multipliers)</b>				<b>217,9</b>					<b>27,0</b>

# Air System Sizing Summary for TE-DIRETORIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

## Air System Information

Air System Name ..... **TE-DIRETORIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,9** kW  
Sensible coil load ..... **2,7** kW  
Coil L/s at Dec 1500 ..... **175** L/s  
Max block L/s ..... **175** L/s  
Sum of peak zone L/s ..... **175** L/s  
Sensible heat ratio ..... **0,554**  
L/(s kW) ..... **35,8**  
m<sup>2</sup>/kW ..... **4,0**  
W/m<sup>2</sup> ..... **250,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **26,1 / 20,8** °C  
Leaving DB / WB ..... **13,2 / 12,8** °C  
Coil ADP ..... **11,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,1** kW  
Coil L/s at Sep 0600 ..... **175** L/s  
Max coil L/s ..... **175** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Sep 0600**  
W/m<sup>2</sup> ..... **57,9**  
Ent. DB / Lvg DB ..... **14,7 / 20,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **175** L/s  
Standard L/s ..... **174** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,95** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **68** L/s  
L/(s·m<sup>2</sup>) ..... **3,46** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-DIRETORIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

### Air System Information

Air System Name ..... **TE-DIRETORIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	175	175	8,95	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,6	May 1800	0,0	19,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-DIRETORIA	1	1,6	May 1800	175	0,0	19,5	8,95

## Ventilation Sizing Summary for TE-DIRETORIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:48

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **68** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-DIRETORIA	1	19,5	9,0	174,5	7,50	0,00	0,0	0,0	67,5
<b>Totals (incl. Space Multipliers)</b>				<b>174,5</b>					<b>67,5</b>

# Air System Sizing Summary for TE-EMP. JÚNIOR

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

## Air System Information

Air System Name ..... <b>TE-EMP. JÚNIOR</b>	Number of zones ..... <b>1</b>
Equipment Class ..... <b>SPLT AHU</b>	Floor Area ..... <b>23,9</b> m <sup>2</sup>
Air System Type ..... <b>SZCAV</b>	Location ..... <b>Fortaleza, Brazil</b>

## Sizing Calculation Information

Calculation Months ..... <b>Jan to Dec</b>	Zone L/s Sizing ..... <b>Sum of space airflow rates</b>
Sizing Data ..... <b>Calculated</b>	Space L/s Sizing ..... <b>Individual peak space loads</b>

## Central Cooling Coil Sizing Data

Total coil load ..... <b>2,4</b> kW	Load occurs at ..... <b>Dec 1500</b>
Sensible coil load ..... <b>1,6</b> kW	OA DB / WB ..... <b>31,7 / 25,6</b> °C
Coil L/s at Dec 1500 ..... <b>132</b> L/s	Entering DB / WB ..... <b>24,4 / 19,2</b> °C
Max block L/s ..... <b>132</b> L/s	Leaving DB / WB ..... <b>14,3 / 13,9</b> °C
Sum of peak zone L/s ..... <b>132</b> L/s	Coil ADP ..... <b>13,2</b> °C
Sensible heat ratio ..... <b>0,660</b>	Bypass Factor ..... <b>0,100</b>
L/(s kW) ..... <b>54,7</b>	Resulting RH ..... <b>60</b> %
m <sup>2</sup> /kW ..... <b>9,9</b>	Design supply temp. .... <b>14,4</b> °C
W/m <sup>2</sup> ..... <b>101,2</b>	Zone T-stat Check ..... <b>1 of 1</b> OK
Water flow @ 5,6 K rise ..... <b>N/A</b>	Max zone temperature deviation ..... <b>0,0</b> K

## Central Heating Coil Sizing Data

Max coil load ..... <b>0,8</b> kW	Load occurs at ..... <b>May 0500</b>
Coil L/s at May 0500 ..... <b>132</b> L/s	W/m <sup>2</sup> ..... <b>32,1</b>
Max coil L/s ..... <b>132</b> L/s	Ent. DB / Lvg DB ..... <b>14,8 / 19,7</b> °C
Water flow @ 11,1 K drop ..... <b>N/A</b>	

## Supply Fan Sizing Data

Actual max L/s ..... <b>132</b> L/s	Fan motor BHP ..... <b>0,00</b> BHP
Standard L/s ..... <b>132</b> L/s	Fan motor kW ..... <b>0,00</b> kW
Actual max L/(s·m <sup>2</sup> ) ..... <b>5,53</b> L/(s·m <sup>2</sup> )	Fan static ..... <b>0</b> Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... <b>26</b> L/s	L/s/person ..... <b>7,50</b> L/s/person
L/(s·m <sup>2</sup> ) ..... <b>1,07</b> L/(s·m <sup>2</sup> )	

# Zone Sizing Summary for TE-EMP. JÚNIOR

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

## Air System Information

Air System Name ..... **TE-EMP. JÚNIOR**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **23,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	132	132	5,53	0,0	-	0,0	-	0

## Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	23,9

## Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-EMPRESA JÚNIOR	1	1,2	Jan 1800	132	0,0	23,9	5,53

## Ventilation Sizing Summary for TE-EMP. JÚNIOR

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:48

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **26 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-EMPRESA JÚNIOR	1	23,9	3,4	132,2	7,50	0,00	0,0	0,0	25,6
<b>Totals (incl. Space Multipliers)</b>				<b>132,2</b>					<b>25,6</b>



# Air System Sizing Summary for TE-ESTUDO DE GRUPO 1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

## Air System Information

Air System Name ..... **TE-ESTUDO DE GRUPO 1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **12,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,1** kW  
Sensible coil load ..... **2,2** kW  
Coil L/s at Dec 1500 ..... **127** L/s  
Max block L/s ..... **127** L/s  
Sum of peak zone L/s ..... **127** L/s  
Sensible heat ratio ..... **0,528**  
L/(s kW) ..... **31,1**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **321,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **26,9 / 21,6** °C  
Leaving DB / WB ..... **12,8 / 12,4** °C  
Coil ADP ..... **11,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0700 ..... **127** L/s  
Max coil L/s ..... **127** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **70,9**  
Ent. DB / Lvg DB ..... **14,5 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **127** L/s  
Standard L/s ..... **127** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,01** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **60** L/s  
L/(s·m<sup>2</sup>) ..... **4,72** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

# Zone Sizing Summary for TE-ESTUDO DE GRUPO 1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:48

## Air System Information

Air System Name ..... **TE-ESTUDO DE GRUPO 1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **12,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	127	127	10,01	0,0	-	0,0	-	0

## Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	12,7

## Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-ESTUDO DE GRUPO 01	1	1,2	Jan 1800	127	0,0	12,7	10,01

## Ventilation Sizing Summary for TE-ESTUDO DE GRUPO 1

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:49

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **60 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-ESTUDO DE GRUPO 01	1	12,7	8,0	127,2	7,50	0,00	0,0	0,0	60,0
<b>Totals (incl. Space Multipliers)</b>				<b>127,2</b>					<b>60,0</b>

# Air System Sizing Summary for TE-ESTUDO DE GRUPO 2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

## Air System Information

Air System Name ..... **TE-ESTUDO DE GRUPO 2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **12,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,2** kW  
Coil L/s at Dec 1500 ..... **137** L/s  
Max block L/s ..... **137** L/s  
Sum of peak zone L/s ..... **137** L/s  
Sensible heat ratio ..... **0,538**  
L/(s kW) ..... **32,9**  
m<sup>2</sup>/kW ..... **3,0**  
W/m<sup>2</sup> ..... **336,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **26,6 / 21,3** °C  
Leaving DB / WB ..... **13,0 / 12,6** °C  
Coil ADP ..... **11,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at Jun 0700 ..... **137** L/s  
Max coil L/s ..... **137** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **74,2**  
Ent. DB / Lvg DB ..... **14,7 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **137** L/s  
Standard L/s ..... **137** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **11,07** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **60** L/s  
L/(s·m<sup>2</sup>) ..... **4,84** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-ESTUDO DE GRUPO 2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

### Air System Information

Air System Name ..... **TE-ESTUDO DE GRUPO 2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **12,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	137	137	11,07	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	12,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-ESTUDO DE GRUPO 02	1	1,2	Jan 1800	137	0,0	12,4	11,07

## Ventilation Sizing Summary for TE-ESTUDO DE GRUPO 2

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:49

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **60** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-ESTUDO DE GRUPO 02	1	12,4	8,0	137,3	7,50	0,00	0,0	0,0	60,0
<b>Totals (incl. Space Multipliers)</b>				<b>137,3</b>					<b>60,0</b>

# Air System Sizing Summary for TE-INFORMÁTICA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

## Air System Information

Air System Name ..... **TE-INFORMÁTICA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **32,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **10,7** kW  
Sensible coil load ..... **6,0** kW  
Coil L/s at Dec 1400 ..... **411** L/s  
Max block L/s ..... **411** L/s  
Sum of peak zone L/s ..... **411** L/s  
Sensible heat ratio ..... **0,567**  
L/(s kW) ..... **38,5**  
m<sup>2</sup>/kW ..... **3,0**  
W/m<sup>2</sup> ..... **328,0**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **25,6 / 20,5** °C  
Leaving DB / WB ..... **13,4 / 13,0** °C  
Coil ADP ..... **12,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,8** kW  
Coil L/s at Oct 0700 ..... **411** L/s  
Max coil L/s ..... **411** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Oct 0700**  
W/m<sup>2</sup> ..... **86,8**  
Ent. DB / Lvg DB ..... **14,5 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **411** L/s  
Standard L/s ..... **409** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **12,63** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **143** L/s  
L/(s·m<sup>2</sup>) ..... **4,38** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-INFORMÁTICA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

### Air System Information

Air System Name ..... **TE-INFORMÁTICA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **32,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	411	411	12,63	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,7	May 1800	0,0	32,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-INFORMÁTICA	1	3,7	May 1800	411	0,0	32,5	12,63



## Ventilation Sizing Summary for TE-INFORMÁTICA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:49

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **143** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-INFORMÁTICA	1	32,5	19,0	410,5	7,50	0,00	0,0	0,0	142,5
<b>Totals (incl. Space Multipliers)</b>				<b>410,5</b>					<b>142,5</b>

# Air System Sizing Summary for TE-LAB. BIOGEIQUI COS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

## Air System Information

Air System Name ..... **TE-LAB. BIOGEIQUI COS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **15,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,9** kW  
Sensible coil load ..... **1,4** kW  
Coil L/s at Dec 1500 ..... **128** L/s  
Max block L/s ..... **128** L/s  
Sum of peak zone L/s ..... **128** L/s  
Sensible heat ratio ..... **0,723**  
L/(s kW) ..... **65,6**  
m<sup>2</sup>/kW ..... **8,1**  
W/m<sup>2</sup> ..... **124,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,8 / 18,7** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at May 0700 ..... **128** L/s  
Max coil L/s ..... **128** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **41,4**  
Ent. DB / Lvg DB ..... **14,9 / 19,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **128** L/s  
Standard L/s ..... **127** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,14** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **17** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-LAB. BIOGEIQUI COS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

### Air System Information

Air System Name ..... **TE-LAB. BIOGEIQUI COS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **15,7 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	128	128	8,14	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	15,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-LAB. BIOGEIQUI COS	1	1,2	Jan 1800	128	0,0	15,7	8,14

## Ventilation Sizing Summary for TE-LAB. BIOEIQUI COS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:49

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **17 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-LAB. BIOEIOQUI COS	1	15,7	2,2	127,8	7,50	0,00	0,0	0,0	16,8
<b>Totals (incl. Space Multipliers)</b>				<b>127,8</b>					<b>16,8</b>

# Air System Sizing Summary for TE-LAB. CONT. ORG. LACOR

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

## Air System Information

Air System Name .... **TE-LAB. CONT. ORG. LACOR**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **85,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **9,9** kW  
Sensible coil load ..... **7,0** kW  
Coil L/s at Feb 1500 ..... **613** L/s  
Max block L/s ..... **613** L/s  
Sum of peak zone L/s ..... **613** L/s  
Sensible heat ratio ..... **0,708**  
L/(s kW) ..... **61,9**  
m<sup>2</sup>/kW ..... **8,6**  
W/m<sup>2</sup> ..... **116,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **23,9 / 18,7** °C  
Leaving DB / WB ..... **14,4 / 14,0** °C  
Coil ADP ..... **13,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **4,2** kW  
Coil L/s at Jul 0700 ..... **613** L/s  
Max coil L/s ..... **613** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **48,7**  
Ent. DB / Lvg DB ..... **14,8 / 20,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **613** L/s  
Standard L/s ..... **612** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,19** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **91** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-LAB. CONT. ORG. LACOR

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

### Air System Information

Air System Name .... **TE-LAB. CONT. ORG. LACOR**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **85,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	613	613	7,19	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	5,6	Dec 1800	0,0	85,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-LAB. CONT. ORG. LACOR	1	5,6	Dec 1800	613	0,0	85,3	7,19

## Ventilation Sizing Summary for TE-LAB. CONT. ORG. LACOR

Project Name: LABOMAR-VRF

08/22/2024

Prepared by:

08:49

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **91 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-LAB. CONT. ORG. LACOR	1	85,3	12,2	613,3	7,50	0,00	0,0	0,0	91,4
<b>Totals (incl. Space Multipliers)</b>				<b>613,3</b>					<b>91,4</b>

# Air System Sizing Summary for TE-LAB. EFLU E QUAL.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

## Air System Information

Air System Name ..... **TE-LAB. EFLU E QUAL.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **3,6** kW  
Sensible coil load ..... **2,2** kW  
Coil L/s at Dec 1500 ..... **161** L/s  
Max block L/s ..... **161** L/s  
Sum of peak zone L/s ..... **161** L/s  
Sensible heat ratio ..... **0,602**  
L/(s kW) ..... **44,4**  
m<sup>2</sup>/kW ..... **6,0**  
W/m<sup>2</sup> ..... **165,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,2 / 20,0** °C  
Leaving DB / WB ..... **13,9 / 13,5** °C  
Coil ADP ..... **12,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0600 ..... **161** L/s  
Max coil L/s ..... **161** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **43,1**  
Ent. DB / Lvg DB ..... **14,8 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **161** L/s  
Standard L/s ..... **160** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,35** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **45** L/s  
L/(s·m<sup>2</sup>) ..... **2,06** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for TE-LAB. EFLU E QUAL.

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

### Air System Information

Air System Name ..... **TE-LAB. EFLU E QUAL.**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	161	161	7,35	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,5	Jan 1800	0,0	21,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-LAB. EFLU. E QUAL.	1	1,5	Jan 1800	161	0,0	21,9	7,35

## Ventilation Sizing Summary for TE-LAB. EFLU E QUAL.

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:49

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **45** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-LAB. EFLU. E QUAL.	1	21,9	6,0	160,7	7,50	0,00	0,0	0,0	45,0
<b>Totals (incl. Space Multipliers)</b>				<b>160,7</b>					<b>45,0</b>

# Air System Sizing Summary for TE-LAB. ICTIOLOGIGA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

## Air System Information

Air System Name ..... **TE-LAB. ICTIOLOGIGA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **7,0** kW  
Sensible coil load ..... **5,0** kW  
Coil L/s at Feb 1500 ..... **446** L/s  
Max block L/s ..... **446** L/s  
Sum of peak zone L/s ..... **446** L/s  
Sensible heat ratio ..... **0,720**  
L/(s kW) ..... **64,2**  
m<sup>2</sup>/kW ..... **8,3**  
W/m<sup>2</sup> ..... **120,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **23,9 / 18,7** °C  
Leaving DB / WB ..... **14,6 / 14,1** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,9** kW  
Coil L/s at Jul 0600 ..... **446** L/s  
Max coil L/s ..... **446** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0600**  
W/m<sup>2</sup> ..... **49,7**  
Ent. DB / Lvg DB ..... **14,9 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **446** L/s  
Standard L/s ..... **445** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,74** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **62** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-LAB. ICTIOLOGIGA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

### Air System Information

Air System Name ..... **TE-LAB. ICTIOLOGIGA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **57,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	446	446	7,74	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,1	Dec 1800	0,0	57,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-LAB. ICTIOLOGIGA	1	4,1	Dec 1800	446	0,0	57,6	7,74

## Ventilation Sizing Summary for TE-LAB. ICTIOLOGIGA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:49

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **62 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-LAB. ICTIOLOGIGA	1	57,6	8,2	446,1	7,50	0,00	0,0	0,0	61,7
<b>Totals (incl. Space Multipliers)</b>				<b>446,1</b>					<b>61,7</b>

# Air System Sizing Summary for TE-LAB. MERGULHO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:49

## Air System Information

Air System Name ..... **TE-LAB. MERGULHO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,5** kW  
Sensible coil load ..... **1,8** kW  
Coil L/s at Dec 1500 ..... **163** L/s  
Max block L/s ..... **163** L/s  
Sum of peak zone L/s ..... **163** L/s  
Sensible heat ratio ..... **0,714**  
L/(s kW) ..... **64,0**  
m<sup>2</sup>/kW ..... **8,3**  
W/m<sup>2</sup> ..... **120,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,9 / 18,7** °C  
Leaving DB / WB ..... **14,6 / 14,2** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0500 ..... **163** L/s  
Max coil L/s ..... **163** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **43,8**  
Ent. DB / Lvg DB ..... **14,9 / 19,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **163** L/s  
Standard L/s ..... **163** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,69** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **23** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-LAB. MERGULHO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

### Air System Information

Air System Name ..... **TE-LAB. MERGULHO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **21,2 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	163	163	7,69	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,5	Jan 1800	0,0	21,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-LAB. MERGULHO	1	1,5	Jan 1800	163	0,0	21,2	7,69

## Ventilation Sizing Summary for TE-LAB. MERGULHO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:50

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **23** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-LAB. MERGULHO	1	21,2	3,0	163,1	7,50	0,00	0,0	0,0	22,7
<b>Totals (incl. Space Multipliers)</b>				<b>163,1</b>					<b>22,7</b>



# Air System Sizing Summary for TE-LABORATÓRIO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

## Air System Information

Air System Name ..... **TE-LABORATÓRIO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **20,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,1** kW  
Sensible coil load ..... **1,4** kW  
Coil L/s at Dec 1500 ..... **122** L/s  
Max block L/s ..... **122** L/s  
Sum of peak zone L/s ..... **122** L/s  
Sensible heat ratio ..... **0,674**  
L/(s kW) ..... **57,1**  
m<sup>2</sup>/kW ..... **9,5**  
W/m<sup>2</sup> ..... **105,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,3 / 19,1** °C  
Leaving DB / WB ..... **14,5 / 14,0** °C  
Coil ADP ..... **13,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0400 ..... **122** L/s  
Max coil L/s ..... **122** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0400**  
W/m<sup>2</sup> ..... **41,8**  
Ent. DB / Lvg DB ..... **14,8 / 20,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **122** L/s  
Standard L/s ..... **121** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,02** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **22** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-LABORATÓRIO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

### Air System Information

Air System Name ..... **TE-LABORATÓRIO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **20,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	122	122	6,02	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,1	Jan 1800	0,0	20,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-LABORATÓRIO	1	1,1	Jan 1800	122	0,0	20,2	6,02

## Ventilation Sizing Summary for TE-LABORATÓRIO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:50

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **22** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-LABORATÓRIO	1	20,2	2,9	121,5	7,50	0,00	0,0	0,0	21,6
<b>Totals (incl. Space Multipliers)</b>				<b>121,5</b>					<b>21,6</b>

# Air System Sizing Summary for TE-NO BREAK

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

## Air System Information

Air System Name ..... **TE-NO BREAK**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **6,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,8** kW  
Sensible coil load ..... **2,8** kW  
Coil L/s at Dec 1800 ..... **315** L/s  
Max block L/s ..... **315** L/s  
Sum of peak zone L/s ..... **315** L/s  
Sensible heat ratio ..... **1,000**  
L/(s kW) ..... **112,7**  
m<sup>2</sup>/kW ..... **2,3**  
W/m<sup>2</sup> ..... **437,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1800**  
OA DB / WB ..... **30,4 / 25,2** °C  
Entering DB / WB ..... **22,9 / 7,3** °C  
Leaving DB / WB ..... **15,5 / 3,5** °C  
Coil ADP ..... **14,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **0** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **0 of 1** OK  
Max zone temperature deviation ..... **0,1** K

## Central Heating Coil Sizing Data

**No central heating coil loads occurred during this calculation.**

## Supply Fan Sizing Data

Actual max L/s ..... **315** L/s  
Standard L/s ..... **315** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **49,29** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **0** L/s  
L/(s·m<sup>2</sup>) ..... **0,00** L/(s·m<sup>2</sup>)

L/s/person ..... **0,00** L/s/person

## Zone Sizing Summary for TE-NO BREAK

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

### Air System Information

Air System Name ..... **TE-NO BREAK**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **6,4 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	315	315	49,29	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,9	Dec 1800	0,0	6,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-NOBREAK	1	2,9	Dec 1800	315	0,0	6,4	49,29

## Ventilation Sizing Summary for TE-NO BREAK

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:50

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **0** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-NOBREAK	1	6,4	0,0	315,5	7,50	0,00	0,0	0,0	0,0
<b>Totals (incl. Space Multipliers)</b>				<b>315,5</b>					<b>0,0</b>

# Air System Sizing Summary for TE-PET 1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

## Air System Information

Air System Name ..... **TE-PET 1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **28,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,9** kW  
Sensible coil load ..... **3,5** kW  
Coil L/s at Dec 1500 ..... **254** L/s  
Max block L/s ..... **254** L/s  
Sum of peak zone L/s ..... **254** L/s  
Sensible heat ratio ..... **0,593**  
L/(s kW) ..... **42,8**  
m<sup>2</sup>/kW ..... **4,8**  
W/m<sup>2</sup> ..... **208,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,3 / 20,1** °C  
Leaving DB / WB ..... **13,8 / 13,3** °C  
Coil ADP ..... **12,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,5** kW  
Coil L/s at May 0700 ..... **254** L/s  
Max coil L/s ..... **254** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **53,3**  
Ent. DB / Lvg DB ..... **14,7 / 19,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **254** L/s  
Standard L/s ..... **253** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,95** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **2,64** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-PET 1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

### Air System Information

Air System Name ..... **TE-PET 1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **28,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	254	254	8,95	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,3	Jan 1800	0,0	28,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-PET 1	1	2,3	Jan 1800	254	0,0	28,4	8,95



## Ventilation Sizing Summary for TE-PET 1

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:50

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-PET 1	1	28,4	10,0	254,2	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>254,2</b>					<b>75,0</b>

# Air System Sizing Summary for TE-PET 2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

## Air System Information

Air System Name	TE-PET 2	Number of zones	1
Equipment Class	SPLT AHU	Floor Area	28,4 m <sup>2</sup>
Air System Type	SZCAV	Location	Fortaleza, Brazil

## Sizing Calculation Information

Calculation Months	Jan to Dec	Zone L/s Sizing	Sum of space airflow rates
Sizing Data	Calculated	Space L/s Sizing	Individual peak space loads

## Central Cooling Coil Sizing Data

Total coil load	5,8 kW	Load occurs at	Dec 1400
Sensible coil load	3,4 kW	OA DB / WB	31,5 / 25,5 °C
Coil L/s at Dec 1400	242 L/s	Entering DB / WB	25,3 / 20,2 °C
Max block L/s	242 L/s	Leaving DB / WB	13,6 / 13,2 °C
Sum of peak zone L/s	242 L/s	Coil ADP	12,3 °C
Sensible heat ratio	0,584	Bypass Factor	0,100
L/(s kW)	41,5	Resulting RH	60 %
m <sup>2</sup> /kW	4,9	Design supply temp.	14,4 °C
W/m <sup>2</sup>	205,1	Zone T-stat Check	1 of 1 OK
Water flow @ 5,6 K rise	N/A	Max zone temperature deviation	0,0 K

## Central Heating Coil Sizing Data

Max coil load	1,6 kW	Load occurs at	May 0600
Coil L/s at May 0600	242 L/s	W/m <sup>2</sup>	54,6
Max coil L/s	242 L/s	Ent. DB / Lvg DB	14,8 / 20,1 °C
Water flow @ 11,1 K drop	N/A		

## Supply Fan Sizing Data

Actual max L/s	242 L/s	Fan motor BHP	0,00 BHP
Standard L/s	241 L/s	Fan motor kW	0,00 kW
Actual max L/(s·m <sup>2</sup> )	8,52 L/(s·m <sup>2</sup> )	Fan static	0 Pa

## Outdoor Ventilation Air Data

Design airflow L/s	75 L/s	L/s/person	7,50 L/s/person
L/(s·m <sup>2</sup> )	2,64 L/(s·m <sup>2</sup> )		

## Zone Sizing Summary for TE-PET 2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

### Air System Information

Air System Name ..... **TE-PET 2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **28,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	242	242	8,52	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,2	Jan 1800	0,0	28,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-PET 2	1	2,2	Jan 1800	242	0,0	28,4	8,52

## Ventilation Sizing Summary for TE-PET 2

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:50

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-PET 2	1	28,4	10,0	241,9	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>241,9</b>					<b>75,0</b>

# Air System Sizing Summary for TE-PET 3

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

## Air System Information

Air System Name ..... **TE-PET 3**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **28,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **5,9** kW  
Sensible coil load ..... **3,5** kW  
Coil L/s at Dec 1500 ..... **254** L/s  
Max block L/s ..... **254** L/s  
Sum of peak zone L/s ..... **254** L/s  
Sensible heat ratio ..... **0,593**  
L/(s kW) ..... **42,8**  
m<sup>2</sup>/kW ..... **4,8**  
W/m<sup>2</sup> ..... **208,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **25,3 / 20,1** °C  
Leaving DB / WB ..... **13,8 / 13,3** °C  
Coil ADP ..... **12,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,5** kW  
Coil L/s at May 0700 ..... **254** L/s  
Max coil L/s ..... **254** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **53,3**  
Ent. DB / Lvg DB ..... **14,7 / 19,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **254** L/s  
Standard L/s ..... **253** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,95** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **75** L/s  
L/(s·m<sup>2</sup>) ..... **2,64** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-PET 3

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:50

### Air System Information

Air System Name ..... **TE-PET 3**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **28,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	254	254	8,95	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,3	Jan 1800	0,0	28,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-PET 3	1	2,3	Jan 1800	254	0,0	28,4	8,95

## Ventilation Sizing Summary for TE-PET 3

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:50

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **75 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-PET 3	1	28,4	10,0	254,2	7,50	0,00	0,0	0,0	75,0
<b>Totals (incl. Space Multipliers)</b>				<b>254,2</b>					<b>75,0</b>

# Air System Sizing Summary for TE-PID (PROG. IND. DOC)

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

## Air System Information

Air System Name ..... **TE-PID (PROG. IND. DOC)**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **23,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,4** kW  
Sensible coil load ..... **1,6** kW  
Coil L/s at Dec 1500 ..... **132** L/s  
Max block L/s ..... **132** L/s  
Sum of peak zone L/s ..... **132** L/s  
Sensible heat ratio ..... **0,660**  
L/(s kW) ..... **54,7**  
m<sup>2</sup>/kW ..... **9,9**  
W/m<sup>2</sup> ..... **101,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,4 / 19,2** °C  
Leaving DB / WB ..... **14,3 / 13,9** °C  
Coil ADP ..... **13,2** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0500 ..... **132** L/s  
Max coil L/s ..... **132** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **32,1**  
Ent. DB / Lvg DB ..... **14,8 / 19,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **132** L/s  
Standard L/s ..... **132** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **5,53** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **26** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for TE-PID (PROG. IND. DOC)

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

### Air System Information

Air System Name ..... **TE-PID (PROG. IND. DOC)**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **23,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	132	132	5,53	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	23,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-PID (PROG.IND. DOC)	1	1,2	Jan 1800	132	0,0	23,9	5,53

## Ventilation Sizing Summary for TE-PID (PROG. IND. DOC)

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:51

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **26 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-PID (PROG.IND. DOC)	1	23,9	3,4	132,2	7,50	0,00	0,0	0,0	25,6
<b>Totals (incl. Space Multipliers)</b>				<b>132,2</b>					<b>25,6</b>

# Air System Sizing Summary for TE-PROC. DE DADOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

## Air System Information

Air System Name ..... **TE-PROC. DE DADOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,6** kW  
Sensible coil load ..... **1,6** kW  
Coil L/s at Dec 1500 ..... **129** L/s  
Max block L/s ..... **129** L/s  
Sum of peak zone L/s ..... **129** L/s  
Sensible heat ratio ..... **0,630**  
L/(s kW) ..... **49,4**  
m<sup>2</sup>/kW ..... **4,0**  
W/m<sup>2</sup> ..... **251,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,7 / 19,5** °C  
Leaving DB / WB ..... **14,1 / 13,6** °C  
Coil ADP ..... **12,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0600 ..... **129** L/s  
Max coil L/s ..... **129** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **89,0**  
Ent. DB / Lvg DB ..... **14,7 / 20,7** °C

## Supply Fan Sizing Data

Actual max L/s ..... **129** L/s  
Standard L/s ..... **129** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **12,43** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **30** L/s  
L/(s·m<sup>2</sup>) ..... **2,88** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-PROC. DE DADOS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

### Air System Information

Air System Name ..... **TE-PROC. DE DADOS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,4** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	129	129	12,43	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	10,4

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-PROC. DE DADOS	1	1,2	Jan 1800	129	0,0	10,4	12,43

## Ventilation Sizing Summary for TE-PROC. DE DADOS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:51

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **30 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-PROC. DE DADOS	1	10,4	4,0	129,2	7,50	0,00	0,0	0,0	30,0
<b>Totals (incl. Space Multipliers)</b>				<b>129,2</b>					<b>30,0</b>

# Air System Sizing Summary for TE-REC. E LAV. AMOSTRAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

## Air System Information

Air System Name ..... **TE-REC. E LAV. AMOSTRAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **47,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **6,0** kW  
Sensible coil load ..... **4,4** kW  
Coil L/s at Feb 1500 ..... **393** L/s  
Max block L/s ..... **393** L/s  
Sum of peak zone L/s ..... **393** L/s  
Sensible heat ratio ..... **0,728**  
L/(s kW) ..... **65,6**  
m<sup>2</sup>/kW ..... **8,0**  
W/m<sup>2</sup> ..... **125,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1500**  
OA DB / WB ..... **32,2 / 25,6** °C  
Entering DB / WB ..... **23,7 / 18,5** °C  
Leaving DB / WB ..... **14,5 / 14,0** °C  
Coil ADP ..... **13,5** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **2,4** kW  
Coil L/s at Aug 0700 ..... **393** L/s  
Max coil L/s ..... **393** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Aug 0700**  
W/m<sup>2</sup> ..... **50,7**  
Ent. DB / Lvg DB ..... **14,9 / 20,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **393** L/s  
Standard L/s ..... **392** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,20** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **51** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-REC. E LAV. AMOSTRAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

### Air System Information

Air System Name ..... **TE-REC. E LAV. AMOSTRAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **47,9** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	393	393	8,20	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	3,6	Dec 1800	0,0	47,9

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-REC. E LAV. AMOSTRAS	1	3,6	Dec 1800	393	0,0	47,9	8,20

## Ventilation Sizing Summary for TE-REC. E LAV. AMOSTRAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:51

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **51 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-REC. E LAV. AMOSTRAS	1	47,9	6,8	392,8	7,50	0,00	0,0	0,0	51,3
<b>Totals (incl. Space Multipliers)</b>				<b>392,8</b>					<b>51,3</b>



# Air System Sizing Summary for TE-REFEITÓRIO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

## Air System Information

Air System Name ..... **TE-REFEITÓRIO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **299,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **101,3** kW  
Sensible coil load ..... **48,9** kW  
Coil L/s at Dec 1500 ..... **2288** L/s  
Max block L/s ..... **2288** L/s  
Sum of peak zone L/s ..... **2288** L/s  
Sensible heat ratio ..... **0,483**  
L/(s kW) ..... **22,6**  
m<sup>2</sup>/kW ..... **3,0**  
W/m<sup>2</sup> ..... **338,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **29,1 / 23,5** °C  
Leaving DB / WB ..... **11,3 / 11,1** °C  
Coil ADP ..... **9,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **17,2** kW  
Coil L/s at Jul 0800 ..... **2288** L/s  
Max coil L/s ..... **2288** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0800**  
W/m<sup>2</sup> ..... **57,5**  
Ent. DB / Lvg DB ..... **11,0 / 17,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **2288** L/s  
Standard L/s ..... **2281** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,64** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **1635** L/s  
L/(s·m<sup>2</sup>) ..... **5,46** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-REFEITÓRIO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

### Air System Information

Air System Name ..... **TE-REFEITÓRIO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **299,3** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	2288	2288	7,64	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	20,8	Jan 1800	0,0	299,3

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-REFEITÓRIO	1	20,8	Jan 1800	2288	0,0	299,3	7,64

## Ventilation Sizing Summary for TE-REFEITÓRIO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:51

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **1635 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-REFEITÓRIO	1	299,3	218,0	2287,8	7,50	0,00	0,0	0,0	1635,0
<b>Totals (incl. Space Multipliers)</b>				<b>2287,8</b>					<b>1635,0</b>

# Air System Sizing Summary for TE-SALA DE ÁGUAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

## Air System Information

Air System Name ..... **TE-SALA DE ÁGUAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,4** kW  
Sensible coil load ..... **1,1** kW  
Coil L/s at Dec 1500 ..... **105** L/s  
Max block L/s ..... **105** L/s  
Sum of peak zone L/s ..... **105** L/s  
Sensible heat ratio ..... **0,761**  
L/(s kW) ..... **72,2**  
m<sup>2</sup>/kW ..... **7,0**  
W/m<sup>2</sup> ..... **143,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,6 / 18,4** °C  
Leaving DB / WB ..... **14,9 / 14,4** °C  
Coil ADP ..... **13,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,5** kW  
Coil L/s at May 0700 ..... **105** L/s  
Max coil L/s ..... **105** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **53,0**  
Ent. DB / Lvg DB ..... **14,9 / 19,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **105** L/s  
Standard L/s ..... **104** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,36** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **11** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE ÁGUAS

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

### Air System Information

Air System Name ..... **TE-SALA DE ÁGUAS**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	105	105	10,36	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,0	Jan 1800	0,0	10,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE ÁGUAS	1	1,0	Jan 1800	105	0,0	10,1	10,36

## Ventilation Sizing Summary for TE-SALA DE ÁGUAS

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:51

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **11 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE ÁGUAS	1	10,1	1,4	104,6	7,50	0,00	0,0	0,0	10,8
<b>Totals (incl. Space Multipliers)</b>				<b>104,6</b>					<b>10,8</b>

# Air System Sizing Summary for TE-SALA DE AULA 1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

## Air System Information

Air System Name ..... **TE-SALA DE AULA 1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,7** kW  
Sensible coil load ..... **9,8** kW  
Coil L/s at Dec 1400 ..... **505** L/s  
Max block L/s ..... **505** L/s  
Sum of peak zone L/s ..... **505** L/s  
Sensible heat ratio ..... **0,497**  
L/(s kW) ..... **25,7**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **324,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **28,0 / 22,6** °C  
Leaving DB / WB ..... **11,9 / 11,6** °C  
Coil ADP ..... **10,1** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,4** kW  
Coil L/s at Jun 0700 ..... **505** L/s  
Max coil L/s ..... **505** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jun 0700**  
W/m<sup>2</sup> ..... **56,2**  
Ent. DB / Lvg DB ..... **14,5 / 20,1** °C

## Supply Fan Sizing Data

Actual max L/s ..... **505** L/s  
Standard L/s ..... **504** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,33** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE AULA 1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:51

### Air System Information

Air System Name ..... **TE-SALA DE AULA 1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	505	505	8,33	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,6	Jan 1800	0,0	60,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE AULA 01	1	4,6	Jan 1800	505	0,0	60,7	8,33



## Ventilation Sizing Summary for TE-SALA DE AULA 1

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:52

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE AULA 01	1	60,7	41,0	505,5	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>505,5</b>					<b>307,5</b>

# Air System Sizing Summary for TE-SALA DE AULA 2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

## Air System Information

Air System Name ..... **TE-SALA DE AULA 2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,5** kW  
Sensible coil load ..... **9,6** kW  
Coil L/s at Dec 1400 ..... **484** L/s  
Max block L/s ..... **484** L/s  
Sum of peak zone L/s ..... **484** L/s  
Sensible heat ratio ..... **0,493**  
L/(s kW) ..... **24,8**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **324,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **28,2 / 22,8** °C  
Leaving DB / WB ..... **11,7 / 11,5** °C  
Coil ADP ..... **9,9** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,4** kW  
Coil L/s at Jul 0700 ..... **484** L/s  
Max coil L/s ..... **484** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0700**  
W/m<sup>2</sup> ..... **56,8**  
Ent. DB / Lvg DB ..... **14,5 / 20,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **484** L/s  
Standard L/s ..... **482** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,04** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,11** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE AULA 2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

### Air System Information

Air System Name ..... **TE-SALA DE AULA 2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	484	484	8,04	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,4	Jan 1800	0,0	60,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE AULA 02	1	4,4	Jan 1800	484	0,0	60,1	8,04

## Ventilation Sizing Summary for TE-SALA DE AULA 2

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:52

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE AULA 02	1	60,1	41,0	483,7	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>483,7</b>					<b>307,5</b>

# Air System Sizing Summary for TE-SALA DE AULA 3

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

## Air System Information

Air System Name ..... **TE-SALA DE AULA 3**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,5** kW  
Sensible coil load ..... **9,6** kW  
Coil L/s at Dec 1500 ..... **477** L/s  
Max block L/s ..... **477** L/s  
Sum of peak zone L/s ..... **477** L/s  
Sensible heat ratio ..... **0,493**  
L/(s kW) ..... **24,4**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **324,9**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **28,4 / 22,9** °C  
Leaving DB / WB ..... **11,7 / 11,4** °C  
Coil ADP ..... **9,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,3** kW  
Coil L/s at May 0600 ..... **477** L/s  
Max coil L/s ..... **477** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **55,4**  
Ent. DB / Lvg DB ..... **14,4 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **477** L/s  
Standard L/s ..... **475** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,93** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,11** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE AULA 3

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

### Air System Information

Air System Name ..... **TE-SALA DE AULA 3**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	477	477	7,93	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,3	Jan 1800	0,0	60,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE AULA 03	1	4,3	Jan 1800	477	0,0	60,1	7,93

## Ventilation Sizing Summary for TE-SALA DE AULA 3

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:52

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE AULA 03	1	60,1	41,0	476,8	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>476,8</b>					<b>307,5</b>

# Air System Sizing Summary for TE-SALA DE AULA 4

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

## Air System Information

Air System Name ..... **TE-SALA DE AULA 4**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,6** kW  
Sensible coil load ..... **9,7** kW  
Coil L/s at Dec 1500 ..... **490** L/s  
Max block L/s ..... **490** L/s  
Sum of peak zone L/s ..... **490** L/s  
Sensible heat ratio ..... **0,496**  
L/(s kW) ..... **25,0**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **326,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **28,3 / 22,8** °C  
Leaving DB / WB ..... **11,8 / 11,6** °C  
Coil ADP ..... **10,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,4** kW  
Coil L/s at Aug 0700 ..... **490** L/s  
Max coil L/s ..... **490** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Aug 0700**  
W/m<sup>2</sup> ..... **56,5**  
Ent. DB / Lvg DB ..... **14,5 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **490** L/s  
Standard L/s ..... **489** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,16** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,11** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for TE-SALA DE AULA 4

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

### Air System Information

Air System Name ..... **TE-SALA DE AULA 4**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,1** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	490	490	8,16	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,5	Jan 1800	0,0	60,1

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE AULA 04	1	4,5	Jan 1800	490	0,0	60,1	8,16

## Ventilation Sizing Summary for TE-SALA DE AULA 4

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:52

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE AULA 04	1	60,1	41,0	490,4	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>490,4</b>					<b>307,5</b>

# Air System Sizing Summary for TE-SALA DE AULA 5

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

## Air System Information

Air System Name ..... **TE-SALA DE AULA 5**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **19,6** kW  
Sensible coil load ..... **9,7** kW  
Coil L/s at Dec 1400 ..... **499** L/s  
Max block L/s ..... **499** L/s  
Sum of peak zone L/s ..... **499** L/s  
Sensible heat ratio ..... **0,496**  
L/(s kW) ..... **25,4**  
m<sup>2</sup>/kW ..... **3,1**  
W/m<sup>2</sup> ..... **323,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **28,1 / 22,7** °C  
Leaving DB / WB ..... **11,8 / 11,6** °C  
Coil ADP ..... **10,0** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **3,4** kW  
Coil L/s at May 0700 ..... **499** L/s  
Max coil L/s ..... **499** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **55,7**  
Ent. DB / Lvg DB ..... **14,4 / 20,0** °C

## Supply Fan Sizing Data

Actual max L/s ..... **499** L/s  
Standard L/s ..... **497** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,22** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **308** L/s  
L/(s·m<sup>2</sup>) ..... **5,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE AULA 5

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

### Air System Information

Air System Name ..... **TE-SALA DE AULA 5**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **60,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	499	499	8,22	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	4,5	Jan 1800	0,0	60,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE AULA 05	1	4,5	Jan 1800	499	0,0	60,7	8,22

## Ventilation Sizing Summary for TE-SALA DE AULA 5

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:52

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **308** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE AULA 05	1	60,7	41,0	498,7	7,50	0,00	0,0	0,0	307,5
<b>Totals (incl. Space Multipliers)</b>				<b>498,7</b>					<b>307,5</b>

# Air System Sizing Summary for TE-SALA DE CARBONO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

## Air System Information

Air System Name ..... **TE-SALA DE CARBONO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **12,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,6** kW  
Sensible coil load ..... **1,1** kW  
Coil L/s at Dec 1600 ..... **101** L/s  
Max block L/s ..... **101** L/s  
Sum of peak zone L/s ..... **101** L/s  
Sensible heat ratio ..... **0,720**  
L/(s kW) ..... **65,3**  
m<sup>2</sup>/kW ..... **8,1**  
W/m<sup>2</sup> ..... **123,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1600**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,8 / 18,6** °C  
Leaving DB / WB ..... **14,6 / 14,1** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at May 0600 ..... **101** L/s  
Max coil L/s ..... **101** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **57,6**  
Ent. DB / Lvg DB ..... **14,9 / 20,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **101** L/s  
Standard L/s ..... **101** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,05** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **14** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE CARBONO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

### Air System Information

Air System Name ..... **TE-SALA DE CARBONO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **12,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	101	101	8,05	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,9	Jan 1800	0,0	12,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE CARBONO	1	0,9	Jan 1800	101	0,0	12,6	8,05

## Ventilation Sizing Summary for TE-SALA DE CARBONO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:52

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **14 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE CARBONO	1	12,6	1,8	101,5	7,50	0,00	0,0	0,0	13,5
<b>Totals (incl. Space Multipliers)</b>				<b>101,5</b>					<b>13,5</b>



# Air System Sizing Summary for TE-SALA DE ESTUDO 1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:52

## Air System Information

Air System Name ..... **TE-SALA DE ESTUDO 1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **31,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **8,6** kW  
Sensible coil load ..... **4,7** kW  
Coil L/s at Dec 1400 ..... **302** L/s  
Max block L/s ..... **302** L/s  
Sum of peak zone L/s ..... **302** L/s  
Sensible heat ratio ..... **0,548**  
L/(s kW) ..... **35,1**  
m<sup>2</sup>/kW ..... **3,7**  
W/m<sup>2</sup> ..... **270,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **26,0 / 20,9** °C  
Leaving DB / WB ..... **13,1 / 12,7** °C  
Coil ADP ..... **11,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **1,9** kW  
Coil L/s at Oct 0600 ..... **302** L/s  
Max coil L/s ..... **302** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Oct 0600**  
W/m<sup>2</sup> ..... **58,9**  
Ent. DB / Lvg DB ..... **14,7 / 19,8** °C

## Supply Fan Sizing Data

Actual max L/s ..... **302** L/s  
Standard L/s ..... **301** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,50** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **120** L/s  
L/(s·m<sup>2</sup>) ..... **3,77** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE ESTUDO 1

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

### Air System Information

Air System Name ..... **TE-SALA DE ESTUDO 1**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **31,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	302	302	9,50	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	2,7	May 1800	0,0	31,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE ESTUDO	1	2,7	May 1800	302	0,0	31,8	9,50

## Ventilation Sizing Summary for TE-SALA DE ESTUDO 1

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:53

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **120** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE ESTUDO	1	31,8	16,0	302,0	7,50	0,00	0,0	0,0	120,0
<b>Totals (incl. Space Multipliers)</b>				<b>302,0</b>					<b>120,0</b>

# Air System Sizing Summary for TE-SALA DE ESTUDO 2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

## Air System Information

Air System Name ..... **TE-SALA DE ESTUDO 2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,7** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **4,2** kW  
Sensible coil load ..... **2,3** kW  
Coil L/s at Dec 1500 ..... **141** L/s  
Max block L/s ..... **141** L/s  
Sum of peak zone L/s ..... **141** L/s  
Sensible heat ratio ..... **0,541**  
L/(s kW) ..... **33,5**  
m<sup>2</sup>/kW ..... **4,2**  
W/m<sup>2</sup> ..... **237,6**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **26,5 / 21,2** °C  
Leaving DB / WB ..... **13,0 / 12,7** °C  
Coil ADP ..... **11,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,8** kW  
Coil L/s at May 0500 ..... **141** L/s  
Max coil L/s ..... **141** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **46,3**  
Ent. DB / Lvg DB ..... **14,7 / 19,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **141** L/s  
Standard L/s ..... **141** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **7,97** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **60** L/s  
L/(s·m<sup>2</sup>) ..... **3,39** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE ESTUDO 2

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

### Air System Information

Air System Name ..... **TE-SALA DE ESTUDO 2**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **17,7 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	141	141	7,97	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,3	Jan 1800	0,0	17,7

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE ESTUDO 2	1	1,3	Jan 1800	141	0,0	17,7	7,97

## Ventilation Sizing Summary for TE-SALA DE ESTUDO 2

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:53

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **60** L/s

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE ESTUDO 2	1	17,7	8,0	141,0	7,50	0,00	0,0	0,0	60,0
<b>Totals (incl. Space Multipliers)</b>				<b>141,0</b>					<b>60,0</b>

# Air System Sizing Summary for TE-SALA DE NUTRIENTES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

## Air System Information

Air System Name ..... **TE-SALA DE NUTRIENTES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,3** kW  
Sensible coil load ..... **1,0** kW  
Coil L/s at Dec 1500 ..... **98** L/s  
Max block L/s ..... **98** L/s  
Sum of peak zone L/s ..... **98** L/s  
Sensible heat ratio ..... **0,767**  
L/(s kW) ..... **73,2**  
m<sup>2</sup>/kW ..... **6,8**  
W/m<sup>2</sup> ..... **148,1**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,5 / 18,3** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at May 0600 ..... **98** L/s  
Max coil L/s ..... **98** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0600**  
W/m<sup>2</sup> ..... **72,8**  
Ent. DB / Lvg DB ..... **14,9 / 20,5** °C

## Supply Fan Sizing Data

Actual max L/s ..... **98** L/s  
Standard L/s ..... **97** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,85** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **10** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE NUTRIENTES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

### Air System Information

Air System Name ..... **TE-SALA DE NUTRIENTES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **9,0** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	98	98	10,85	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,9	Jan 1800	0,0	9,0

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE NUTRIENTES	1	0,9	Jan 1800	98	0,0	9,0	10,85



## Ventilation Sizing Summary for TE-SALA DE NUTRIENTES

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:53

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **10 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE NUTRIENTES	1	9,0	1,3	97,6	7,50	0,00	0,0	0,0	9,6
<b>Totals (incl. Space Multipliers)</b>				<b>97,6</b>					<b>9,6</b>

# Air System Sizing Summary for TE-SALA DE PREPARO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

## Air System Information

Air System Name ..... **TE-SALA DE PREPARO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **20,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,3** kW  
Sensible coil load ..... **1,6** kW  
Coil L/s at Dec 1400 ..... **134** L/s  
Max block L/s ..... **134** L/s  
Sum of peak zone L/s ..... **134** L/s  
Sensible heat ratio ..... **0,686**  
L/(s kW) ..... **59,4**  
m<sup>2</sup>/kW ..... **9,1**  
W/m<sup>2</sup> ..... **110,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **24,0 / 18,9** °C  
Leaving DB / WB ..... **14,4 / 13,9** °C  
Coil ADP ..... **13,3** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0700 ..... **134** L/s  
Max coil L/s ..... **134** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **43,2**  
Ent. DB / Lvg DB ..... **14,8 / 20,3** °C

## Supply Fan Sizing Data

Actual max L/s ..... **134** L/s  
Standard L/s ..... **134** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **6,55** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **22** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE PREPARO

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

### Air System Information

Air System Name ..... **TE-SALA DE PREPARO**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **20,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	134	134	6,55	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,2	Jan 1800	0,0	20,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE PREPARO	1	1,2	Jan 1800	134	0,0	20,5	6,55

## Ventilation Sizing Summary for TE-SALA DE PREPARO

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:53

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **22 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE PREPARO	1	20,5	2,9	134,2	7,50	0,00	0,0	0,0	22,0
<b>Totals (incl. Space Multipliers)</b>				<b>134,2</b>					<b>22,0</b>

# Air System Sizing Summary for TE-SALA DE REATORES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

## Air System Information

Air System Name ..... **TE-SALA DE REATORES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **11,5** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,5** kW  
Sensible coil load ..... **1,1** kW  
Coil L/s at Dec 1400 ..... **99** L/s  
Max block L/s ..... **99** L/s  
Sum of peak zone L/s ..... **99** L/s  
Sensible heat ratio ..... **0,731**  
L/(s kW) ..... **67,1**  
m<sup>2</sup>/kW ..... **7,8**  
W/m<sup>2</sup> ..... **128,3**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1400**  
OA DB / WB ..... **31,5 / 25,5** °C  
Entering DB / WB ..... **23,7 / 18,5** °C  
Leaving DB / WB ..... **14,6 / 14,1** °C  
Coil ADP ..... **13,6** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,7** kW  
Coil L/s at May 0700 ..... **99** L/s  
Max coil L/s ..... **99** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **62,0**  
Ent. DB / Lvg DB ..... **14,9 / 20,9** °C

## Supply Fan Sizing Data

Actual max L/s ..... **99** L/s  
Standard L/s ..... **99** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,61** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **12** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA DE REATORES

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

### Air System Information

Air System Name ..... **TE-SALA DE REATORES**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **11,5 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	99	99	8,61	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,9	Jan 1800	0,0	11,5

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA DE REATORES	1	0,9	Jan 1800	99	0,0	11,5	8,61

## Ventilation Sizing Summary for TE-SALA DE REATORES

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:53

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **12 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA DE REATORES	1	11,5	1,6	99,0	7,50	0,00	0,0	0,0	12,3
<b>Totals (incl. Space Multipliers)</b>				<b>99,0</b>					<b>12,3</b>

# Air System Sizing Summary for TE-SALA ESCALONADA 3

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

## Air System Information

Air System Name ..... **TE-SALA ESCALONADA 3**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **71,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **20,1** kW  
Sensible coil load ..... **11,3** kW  
Coil L/s at Feb 1600 ..... **724** L/s  
Max block L/s ..... **724** L/s  
Sum of peak zone L/s ..... **724** L/s  
Sensible heat ratio ..... **0,562**  
L/(s kW) ..... **36,1**  
m<sup>2</sup>/kW ..... **3,6**  
W/m<sup>2</sup> ..... **280,2**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Feb 1600**  
OA DB / WB ..... **32,0 / 25,5** °C  
Entering DB / WB ..... **26,1 / 20,8** °C  
Leaving DB / WB ..... **13,2 / 12,8** °C  
Coil ADP ..... **11,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **4,9** kW  
Coil L/s at Jul 0600 ..... **724** L/s  
Max coil L/s ..... **724** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **Jul 0600**  
W/m<sup>2</sup> ..... **67,8**  
Ent. DB / Lvg DB ..... **14,7 / 20,2** °C

## Supply Fan Sizing Data

Actual max L/s ..... **724** L/s  
Standard L/s ..... **722** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **10,12** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **278** L/s  
L/(s·m<sup>2</sup>) ..... **3,88** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person



## Zone Sizing Summary for TE-SALA ESCALONADA 3

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:53

### Air System Information

Air System Name ..... **TE-SALA ESCALONADA 3**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **71,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	724	724	10,12	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	6,6	Dec 1800	0,0	71,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA ESCALONADA 03	1	6,6	Dec 1800	724	0,0	71,6	10,12

## Ventilation Sizing Summary for TE-SALA ESCALONADA 3

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:54

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **278 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA ESCALONADA 03	1	71,6	37,0	724,4	7,50	0,00	0,0	0,0	277,5
<b>Totals (incl. Space Multipliers)</b>				<b>724,4</b>					<b>277,5</b>

# Air System Sizing Summary for TE-SALA LIMPA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:54

## Air System Information

Air System Name ..... **TE-SALA LIMPA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **0,9** kW  
Sensible coil load ..... **0,7** kW  
Coil L/s at Dec 1500 ..... **64** L/s  
Max block L/s ..... **64** L/s  
Sum of peak zone L/s ..... **64** L/s  
Sensible heat ratio ..... **0,743**  
L/(s kW) ..... **69,0**  
m<sup>2</sup>/kW ..... **18,0**  
W/m<sup>2</sup> ..... **55,4**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,7 / 18,6** °C  
Leaving DB / WB ..... **14,8 / 14,3** °C  
Coil ADP ..... **13,8** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,4** kW  
Coil L/s at May 0700 ..... **64** L/s  
Max coil L/s ..... **64** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **21,7**  
Ent. DB / Lvg DB ..... **14,9 / 19,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **64** L/s  
Standard L/s ..... **64** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **3,82** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **8** L/s  
L/(s·m<sup>2</sup>) ..... **0,45** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA LIMPA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:54

### Air System Information

Air System Name ..... **TE-SALA LIMPA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **16,8** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	64	64	3,82	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,6	Jan 1800	0,0	16,8

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA LIMPA	1	0,6	Jan 1800	64	0,0	16,8	3,82

## Ventilation Sizing Summary for TE-SALA LIMPA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:54

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **8 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA LIMPA	1	16,8	1,0	64,3	7,50	0,00	0,0	0,0	7,5
<b>Totals (incl. Space Multipliers)</b>				<b>64,3</b>					<b>7,5</b>

# Air System Sizing Summary for TE-SALA NUTRICIONISTA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:54

## Air System Information

Air System Name ..... **TE-SALA NUTRICIONISTA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,2** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **1,6** kW  
Sensible coil load ..... **1,1** kW  
Coil L/s at Dec 1500 ..... **93** L/s  
Max block L/s ..... **93** L/s  
Sum of peak zone L/s ..... **93** L/s  
Sensible heat ratio ..... **0,690**  
L/(s kW) ..... **59,8**  
m<sup>2</sup>/kW ..... **6,5**  
W/m<sup>2</sup> ..... **152,7**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **24,0 / 18,9** °C  
Leaving DB / WB ..... **14,5 / 14,0** °C  
Coil ADP ..... **13,4** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,5** kW  
Coil L/s at May 0700 ..... **93** L/s  
Max coil L/s ..... **93** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0700**  
W/m<sup>2</sup> ..... **53,1**  
Ent. DB / Lvg DB ..... **14,8 / 19,6** °C

## Supply Fan Sizing Data

Actual max L/s ..... **93** L/s  
Standard L/s ..... **93** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **9,13** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **15** L/s  
L/(s·m<sup>2</sup>) ..... **1,47** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SALA NUTRICIONISTA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:54

### Air System Information

Air System Name ..... **TE-SALA NUTRICIONISTA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **10,2 m<sup>2</sup>**  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	93	93	9,13	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	0,8	Jan 1800	0,0	10,2

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SALA NUTRICIONISTA	1	0,8	Jan 1800	93	0,0	10,2	9,13

## Ventilation Sizing Summary for TE-SALA NUTRICIONISTA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:54

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **15 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SALA NUTRICIONISTA	1	10,2	2,0	93,1	7,50	0,00	0,0	0,0	15,0
<b>Totals (incl. Space Multipliers)</b>				<b>93,1</b>					<b>15,0</b>



# Air System Sizing Summary for TE-SECRETARIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:54

## Air System Information

Air System Name ..... **TE-SECRETARIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

## Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

## Central Cooling Coil Sizing Data

Total coil load ..... **2,5** kW  
Sensible coil load ..... **1,9** kW  
Coil L/s at Dec 1500 ..... **172** L/s  
Max block L/s ..... **172** L/s  
Sum of peak zone L/s ..... **172** L/s  
Sensible heat ratio ..... **0,735**  
L/(s kW) ..... **67,6**  
m<sup>2</sup>/kW ..... **7,7**  
W/m<sup>2</sup> ..... **129,5**  
Water flow @ 5,6 K rise ..... **N/A**

Load occurs at ..... **Dec 1500**  
OA DB / WB ..... **31,7 / 25,6** °C  
Entering DB / WB ..... **23,7 / 18,6** °C  
Leaving DB / WB ..... **14,7 / 14,2** °C  
Coil ADP ..... **13,7** °C  
Bypass Factor ..... **0,100**  
Resulting RH ..... **60** %  
Design supply temp. .... **14,4** °C  
Zone T-stat Check ..... **1 of 1** OK  
Max zone temperature deviation ..... **0,0** K

## Central Heating Coil Sizing Data

Max coil load ..... **0,9** kW  
Coil L/s at May 0500 ..... **172** L/s  
Max coil L/s ..... **172** L/s  
Water flow @ 11,1 K drop ..... **N/A**

Load occurs at ..... **May 0500**  
W/m<sup>2</sup> ..... **46,8**  
Ent. DB / Lvg DB ..... **14,9 / 19,4** °C

## Supply Fan Sizing Data

Actual max L/s ..... **172** L/s  
Standard L/s ..... **171** L/s  
Actual max L/(s·m<sup>2</sup>) ..... **8,75** L/(s·m<sup>2</sup>)

Fan motor BHP ..... **0,00** BHP  
Fan motor kW ..... **0,00** kW  
Fan static ..... **0** Pa

## Outdoor Ventilation Air Data

Design airflow L/s ..... **21** L/s  
L/(s·m<sup>2</sup>) ..... **1,07** L/(s·m<sup>2</sup>)

L/s/person ..... **7,50** L/s/person

## Zone Sizing Summary for TE-SECRETARIA

Project Name: LABOMAR-VRF  
Prepared by:

08/22/2024  
08:54

### Air System Information

Air System Name ..... **TE-SECRETARIA**  
Equipment Class ..... **SPLT AHU**  
Air System Type ..... **SZCAV**

Number of zones ..... **1**  
Floor Area ..... **19,6** m<sup>2</sup>  
Location ..... **Fortaleza, Brazil**

### Sizing Calculation Information

Calculation Months ..... **Jan to Dec**  
Sizing Data ..... **Calculated**

Zone L/s Sizing ..... **Sum of space airflow rates**  
Space L/s Sizing ..... **Individual peak space loads**

### Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (L/s)	Minimum Supply Airflow (L/s)	Zone L/(s·m <sup>2</sup> )	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 11,1 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 11,1 K	Mixing Box Fan Airflow (L/s)
Zone 1	172	172	8,75	0,0	-	0,0	-	0

### Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m <sup>2</sup> )
Zone 1	1,6	Jan 1800	0,0	19,6

### Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m <sup>2</sup> )	Space L/(s·m <sup>2</sup> )
<b>Zone 1</b>							
TE-SECRETARIA	1	1,6	Jan 1800	172	0,0	19,6	8,75

## Ventilation Sizing Summary for TE-SECRETARIA

Project Name: LABOMAR-VRF  
 Prepared by:

08/22/2024  
 08:54

### 1. Summary

Ventilation Sizing Method ..... **Sum of Space OA Airflows**  
 Design Ventilation Airflow Rate ..... **21 L/s**

### 2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m <sup>2</sup> )	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m <sup>2</sup> ))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
<b>Zone 1</b>									
TE-SECRETARIA	1	19,6	2,8	171,5	7,50	0,00	0,0	0,0	21,0
<b>Totals (incl. Space Multipliers)</b>				<b>171,5</b>					<b>21,0</b>



UNIVERSIDADE  
FEDERAL DO CEARÁ

Diretrizes de serviço de arquitetura e engenharia visando à construção da Nova Sede  
do Instituto de Ciências do Mar - LABOMAR/Centro Tecnológico De Ciências Naturais  
- *Campus Iracema* - UFC

# **ANEXO II**

# **PARECER TÉCNICO ESTRUTURAL**

AGOSTO/2024

agosto de 2024.



**WETTER L. T.**  
PROJETOS ESTRUTURAIS



## PARECER TÉCNICO

**ASSUNTO: ACQUÁRIO CEARÁ**

**REVISÃO: 00**

**DATA: 5 de setembro de 2024**

WETTER L.T.



---

Responsáveis Técnicos: **Wetter Lino Tavares – Eng. Civil – CREA 2921/D**

**Pedro Soares Júnior – Eng. Civil – CREA 40257/D**



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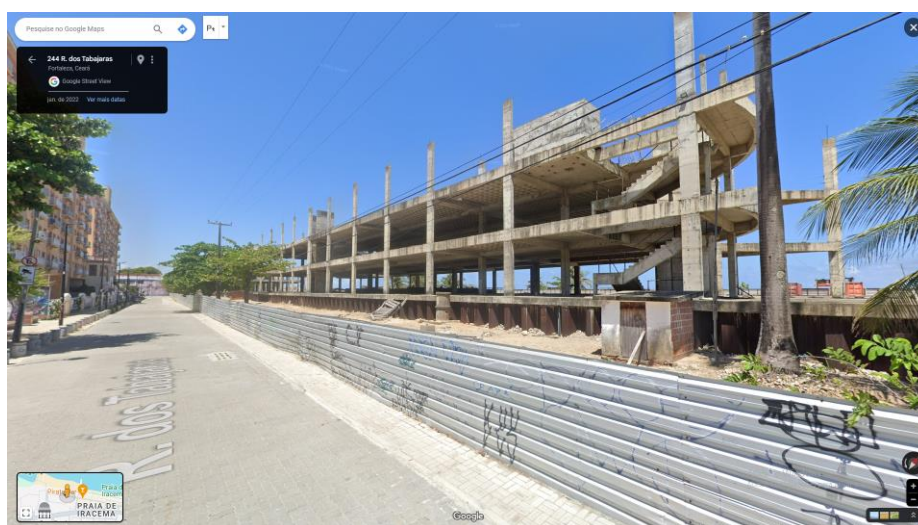


## 1. INTRODUÇÃO

O objetivo do presente Laudo Técnico é analisar os resultados dos ensaios constantes no **Relatório Técnico (1056-B\_23 - ACQUÁRIO CEARÁ FINA.pdf – UFC/LMCC/GPMATE/ASTEF)**, datado de fevereiro de 2024, referente à estrutura de concreto – armado e protendido – do Acquário Ceará, onde também serão abordadas as intervenções estruturais devido às ampliações e demolições, que atenderá a nova arquitetura para o uso do **Labomar – UFC (Instituto de Ciências do Mar)**.

## 2. DESCRIÇÃO

A estrutura foi concebida em concreto armado e protendido, com 4 (quatro) lajes executadas; a 1ª. laje (teto do pavimento técnico) é em laje maciça protendida e as três lajes – teto do subsolo, teto do pavimento térreo e teto do 1º. pavimento, são nervuradas. Algumas vigas destes pavimentos são protendidas. **Vide fotos 01 a 57 e imagem 01.**



**IMAGEM 01 – VISTA LATERAL DO LABOMAR - UFC (Fonte: Google Maps)**



A cortina de contenção foi executada com pranchas metálicas e a laje de fundação dos pilares é uma laje de subpressão atirantada com 40 cm de espessura.

### **3. DOCUMENTOS UTILIZADOS**

- **Visita técnica realizada em 22/04/2024;**
- **Visita técnica realizada em 23/05/2024;**
- **Relatório de esclerometria – LATEC – Eng. Eduardo Cabral;**
- **Projeto estrutural – forma do subsolo;**
- **Projeto executivo final – pdf;**



- GERAL
- TRECHO-1
- TRECHO-2
- TRECHO-3
- TRECHO-4
- TRECHO-5
- 0001 - 061111-Locação dos Pilares
- 0002 - 061113-Formas das Sapatas
- 0003 - 062111-Formas dos Subsolo
- 0004 - 063111-Formas dos Térreos
- 0005 - 065111-Formas dos 1º Pavimentos
- 0006 - 065211-Formas dos 2º Pavimentos
- 0007 - 067111-Formas das Cobertas
- 0008 - 061190-Detalhes Construtivos
- 1001 - 061111-Locação dos Pilares
- 1002 - 061113-Formas das Sapatas
- 1003 - 062111-Formas das Lajes e Vigas
- 1004 - 062311-Subsolo Formas das Bases -Locação de Ralos e Dreno
- 1006 - 062411-Radier - Formas e Armaduras dos Suportes
- 1007 - 067211-Coberta Locação Formas e Armaduras das Bases
- 1008 - 061201-Armadura de Pilares - 001
- 1009 - 061202-Armadura de Pilares 002
- 1010 - 061203-Armaduras de Pilares 003
- 1011 - 061204-Armadura de Pilares 004
- 1012 - 061205-Armaduras de Pilares 005
- 1013 - 061206-Armadura de Pilares 006
- 1014 - 063111-Térreo Formas das Lajes e Vigas
- 1015 - 065111-1º Pavimento Forma das Lajes e Vigas
- 1016 - 065211-2º Pavimento Forma das Lajes e Vigas
- 1017 - 067111-Coberta Formas das Lajes e Vigas
- 1018 - 068111- Nível + 20.10m Forma Lajes e Vigas
- 1019 - 062112-Subsolo Arm.Positiva das Lajes -sentido Horizontal Púnção
- 1020 - 062113-Subsolo Armadura Positiva das Lajes -Sentido Vertical
- 1021 - 062114-Subsolo Armadura Negativa das Lajes - Sentido Horizontal



- 1022 - 062115-Subsolo Armadura Negativa das Lajes - sentido Vertical
- 1023 - 062116-Subsolo Armadura de Proteção das Lajes - Sentido Horizontal
- 1024 - 062117-Subsolo Armadura de Proteção das Lajes - Sentido Vertical
- 1025 - 062101-Subsolo Armadura de Vigas - 001
- 1026 - 063101-Térreo Armadura de Vigas - 001
- 1027 - 063102-Térreo Armadura de Vigas - 002
- 1028 - 063103-Térreo Armadura de Vigas - 003
- 1029 - 063104-Térreo Armadura de Vigas - 004
- 1030 - 063105-Térreo Armadura de Vigas Protensão - 005
- 1031 - 063112-Térreo Arm Positiva das Lajes
- 1032 - 063113-Térreo Armadura Negativa das Lajes
- 1033 - 065101-1º Pavimento Armadura de Vigas - 001
- 1034 - 065102-1º Pavimento Armadura de Vigas - 002
- 1035 - 065103-1º Pavimento Armadura de Vigas - 003
- 1036 - 065105-1º Pavimentação Armadura de Vigas -Protensão - 004
- 1037 - 065112-1º Pavimento Tipo Arma Positiva das Lajes
- 1038 - 065113-1º Pavimento Tipo Arm Negativa das Lajes
- 1039 - 065201-2º Pavimento Armadura de Vigas - 001
- 1040 - 065202-2º Pavimento Armadura de Vigas - 002
- 1041 - 065203-2º Pavimento Armadura de Vigas - 003
- 1042 - 065204-2º Pavimento Armadura de Protensão das Vigas - 001
- 1043 - 065205-2º Pavimento Armadura de Protensão das Vigas - 002
- 1044 - 065212-2º Pavimento Tipo Armadura Positiva das Lajes
- 1045 - 065213-2º Pavimento Tipo Armadura Negativa das Lajes
- 1046 - 067101-Coberta Armadura de Vigas - 001
- 1047 - 067102-Coberta Armadura de Vigas - 002
- 1048 - 067103-Coberta Armadura de Vigas - 003
- 1049 - 067104-Coberta Armadura de Protensão das Vigas - 001
- 1050 - 067105-Coberta Armadura de Protensão das Vigas - 002
- 1051 - 067112-Coberta Armadura Positiva das Lajes
- 1052 - 067113-Coberta Armadura Negativa das Lajes
- 1054 - 063192-Subsolo - Base 09 á 12 Forma e Armadura
- 1055 - 062190-Subsolo - reservatórios 2 Formas





- 1056 - 062191- Subsolo - Reservatórios 2 Armadura
- 1057 - 062192-Subsolo - reservatórios 2 armadura das redes
- 1058 - 062193-Subsolo - Reservatórios 3 Formas
- 1059 - 062194-Subsolo - Reservatórios 3 Armaduras das Lajes
- 1060 - 062195-Subsolo - Reservatórios 3 Armaduras das Paredes
- 1061 - 062196-Subsolo - Reservatórios 4 e 5
- 1062 - 062197-Subsolo - Reservatório Armaduras das Lajes
- 1063 - 062198-Subsolo - Reservatório 4 Armadura das Paredes
- 1064 - 062199-Subsolo - Tanque de Quarentena Forma e armadura
- 1065 - 063193-Térreo -Resevatórios 02 AO 07 Forma e Armaduras
- 1066 - 065311-Aquário dos Tubarões Forma das Lajes e Virgas
- 1067 - 065301-Aquarios dos Tubarões Armadura de Uniões Paredes - 001
- 1068 - 065302-1º Pavimentação - Aquario dos Tubarões Armadura das Vigas Paredes - 002
- 1069 - 065303-1º Pavimento - Aquario dos Tubarões Arm. Dreno Tunel
- 1070 - 065312-1º Pavimento -Aquario dos Tubartões Arm Positiva Hor e Ver
- 1071 - 065313-1º Pavimento - Aquario dos Tubarões Arm Negativa Sent Hor e Ver
- 1073 - 065291-2º Pavimento tipo - Torres de Desgaseificação 1 Forma
- 1074 - 065292-2º Pavimento tipo -Torre de Desgaseificação 1 Armadura
- 1075 - 068112-Nível +20. 10m Armadura das
- 1076 - 068101-Nível + 20,10m Armadura de Vigas - 001
- 1077 - 068102-Nível +20,10m Armadura de Vigas - 002
- 1078 - 068103-Nível +20.10m Armadura de Protensão das Vigas - 001
- 2001 - 061111-Locação dos Pilares Trecho 2
- 2002 - 061113-FORMAS DAS SAPATAS\_TRECHO 02
- 2003 - 062111-FORMAS DAS LAJES E VIGAS\_TRECHO 02
- 2004 - 062211-CORTES AA, BB\_TRECHO 02
- 2005 - 062311-SUBSOLO\_LOCAÇÕES DE RALOS E DRENOS\_LOCAÇÃO,FORMAS E ARMADURAS DAS BASES
- 2006 - 062212-CORTES CC e DD\_TRECHO 02
- 2007 - 061201-ARMADURA DOS PILARES\_001
- 2008 - 061202-ARMADURA DOS PILARES\_002
- 2009 - 061203-ARMADURA DOS PILARES\_003
- 2010 - 061204-ARMADURA DOS PILARES\_004
- 2011 - 061205-ARMADURA DOS PILARES\_005
- 2012 - 063111-FORMAS DAS LAJES E VIGAS\_TÉRREO\_TRECHO 02



- 2013 - 065111-FORMAS DAS LAJES E VIGAS\_1º PAVIMENTO
- 2014 - 065211-FORMAS DAS LAJES E VIGAS\_2º PAVIMENTO\_TRECHO 02
- 2015-067111-FORMAS DAS LAJES E VIGAS\_COBERTA\_NIVEL 20.62\_TRECHO 02
- 2016-062112-ARMADURA POSITIVA DAS LAJES\_SUBSOLO\_TRECHO 02
- 2017-062101-ARMADURA DE VIGAS\_001\_SUBSOLO\_TRECHO 02
- 2018-062102-ARMADURA DE VIGAS\_002\_SUBSOLO\_TRECHO 02
- 2019-063101-ARMADURA DE VIGAS\_001\_TÉRREO
- 2020-063102-ARMADURA DE VIGAS\_002\_TÉRREO
- 2021-063112-ARMADURA POSITIVA DAS LAJES\_TÉRREO\_TRECHO 02
- 2022-063113-ARMADURA NEGATIVA DAS LAJES\_TÉRREO\_TRECHO 02
- 2023-065101-ARMADURA DE VIGAS\_001\_1º PAVIMENTO\_TRECHO 02
- 2024-065102-ARMADURA DE VIGAS\_002\_1º PAVIMENTO\_TRECHO 02
- 2025-065112-ARMADURA POSITIVA DAS LAJES\_1º PAVIMENTO\_TRECHO 02
- 2026-065113-ARMADURA NEGATIVA DAS LAJES\_1º PAVIMENTO\_TRECHO 02
- 2027-065201-ARMADURA DE VIGAS\_2º PAVIMENTO\_TRECHO 02
- 2028-065202-ARMADURA DE VIGAS\_002\_2º PAVIMENTO\_TRECHO 02
- 2029-065212-ARMADURA POSITIVA DAS LAJES\_2º PAVIMENTO\_TRECHO 02
- 2030-065213-ARMADURA NEGATIVA DAS LAJES\_2º PAVIMENTO\_TRECHO 02
- 2031-067101-ARMADURA DE VIGAS\_001\_COBERTA\_TRECHO 02
- 2032-067102-ARMADURA DE VIGAS\_002\_COBERTA\_TRECHO 02
- 2033-067103-ARMADURA DE VIGAS\_003\_COBERTA\_TRECHO 02
- 2034-067104-ARMADURA DE PROTENSÃO DAS VIGAS\_004\_COBERTA\_TRECHO 02
- 2035-067112-ARMADURA POSITIVA DAS LAJES\_COBERTA\_TRECHO 02
- 2036-067113-ARMADURA NEGATIVA DAS LAJES\_COBERTA\_TRECHO 02
- 2037-068101-ARMADURA DE VIGAS, PILARES E LAJES\_N\_20.62\_TRECHO 02
- 2038-061191-FORMAS\_SUBSOLO\_RESERVATÓRIO A\_TRECHO 02
- 2039 - 061291-ARMADURAS\_SUBSOLO\_RESERVATORIO A\_TRECHO 02
- 2040 - 061192-FORMAS\_SUBSOLO\_RESERVATÓRIO B\_TRECHO 02
- 2041 - 061292-ARMADURAS\_SUBSOLO\_RESERVATÓRIO B\_TRECHO 02
- 2042-061193-FORMAS\_SUBSOLO\_RESERVATÓRIO C\_D\_TRECHO 02
- 2043 - 061293-ARMADURAS\_SUBSOLO\_RESERVATÓRIO C\_D\_TRECHO 02
- 2044-061194-FORMAS\_SUBSOLO\_RESERVATÓRIOS\_E\_G\_J\_TRECHO 02
- 2045 - 061294-ARMADURA\_SUBSOLO\_RESERVATÓRIOS\_E\_G\_J\_TRECHO 02
- 2046-061195-FORMAS\_SUBSOLO\_RESERVATÓRIO F\_TRECHO 02



- 2047 - 061295-ARMADURAS\_SUBSOLO\_RESERVATORIO F\_TRECHO 02
- 2048 - 062511-FORMAS DAS LAJES E VIGAS\_AQUAIO MASTER\_SUBSOLO\_TRECHO 02
- 2049 - 063211-FORMAS DAS LAJES E VIGAS\_AQUARIO MASTER\_TÉRREO\_TRECHO 02
- 2050 - 065311-FORMAS DAS LAJES E VIGAS\_AQUARIO MASTER\_1º PAVIMENTO\_TRECHO 02
- 2051 - 065411-FORMAS DAS LAJES E VIGAS\_AQUARIO MASTER\_2º PAVIMENTO\_TRECHO 02
- 2052 - 065511-CORTE 1\_1 AO CORTE 4\_4\_AQUARIO MASTER\_NAVIO NAUFRAGADO\_TRECHO 02
- 2053 - 065611-CORTE 5\_5 AO CORTE 10\_10\_AQUARIO MASTER\_SEAWALK\_DOMO DO MAR\_TRECHO 02
- 2054-065291-FORMAS\_2º PAVIMENTO TIPO\_TORRE DE DESGASEIFICAÇÃO 2\_TRECHO 02
- 2055-065292-ARMADURAS\_2º PAVIMENTO TIPO\_TORRE DE DESGASEIFICAÇÃO 2\_TRECHO 02
- 2056 - 062411-LOCAÇÃO DOS SUPORTES\_RADIER\_TRECHO 02
- 2057 - 062412-FORMAS E ARMADURAS DOS SUPORTES\_001\_RADIER\_TRECHO 02
- 2058 - 062413-FORMAS E ARMADURAS DOS SUPORTES\_002\_RADIER\_TRECHO 02
- 2059-067211-LOCAÇÃO, FORMAS E ARMADURAS DAS BASES\_COBERTA\_TRECHO 02
- 2060 - 061114-FORMAS DAS LAJES E PAREDES\_RESERVATÓRIO DE COLETA 01\_TRECHO 02
- 2061 - 061115-ARMADURAS DAS LAJES E PAREDES\_RESERVATÓRIO DE COLETAS 01\_TRECHO 02
- 3001-061111-Locação dos Pilares
- 3002 - 061113-Formas das Sapatas
- 3003-062111-Formas de Lajes e Vigas
- 3004-062311-Formas da Base - Locação de Ralos e Drenos
- 3005-062192-Subsolo 1 a 13 - Formas e Armaduras
- 3007-061201- Armadura de Pilares - 001
- 3008-061202 - Armadura de Pilares - 002
- 3009-061203 - Armadura de Pilares - 003
- 3010-063111- Térreo - Formas das Lajes e Vigas
- 3011-065111- Primeiro Pavimento - Formas das Lajes e Vigas
- 3012-065211- Segundo Pavimento - Formas das Lajes e Vigas
- 3013-067111- Coberturas - Formas Lajes e Vigas
- 3014 - 068111 - Nível +20.10 - Formas e Armaduras
- 3015 - 062112- Subsolo - Armadura Positiva das Lajes
- 3016 - 062113- Armadura Positiva das Lajes - Sentido Vertical
- 3017 - 062114-Armadura Negativa das Lajes - Sentido Horizontal
- 3018 - 062115- Armadura Negativa das Lajes - Sentido Vertical
- 3019 - 062116 - Armadura de Protensão das Lajes - Sentido Horizontal
- 3020 - 062117- Armadura de Protensão das Lajes - Sentido Vertical





- 3021-062101- Subsolo - Armaduras das Vigas - 001
- 3022-063101-Térreo - Armadura de Vigas - 001
- 3023-063102 - Térreo - Armadura de Vigas - 002
- 3024-063103 -Térreo - Armadura de Vigas - 003
- 3025-063104 -Térreo - Armadura de Vigas - 004
- 3026-063105 - Térreo - Armadura de Vigas-Protensão
- 3027-063112 - Térreo - Armadura Positiva das lajes
- 3028 - 063113 - Térreo - Armadura Negativa das lajes
- 3029-063114 - Térreo - Armadura de Protensão das lajes - Sentido Horizontal
- 3030-063115 -Térreo - Armadura de Protensão das lajes - Sentido Vertical
- 3031-065101- 1º Pavimento - Armadura de Vigas - 001
- 3032-065102 - 1º Pavimento - Armadura de Vigas - 002
- 3033-065103- 1º Pavimento - Armadura de Vigas - 003
- 3034-065104 - 1º Pavimento - Armadura de Vigas - 004
- 3035-065105 - 1º Pavimento - Armadura de Vigas - Protensão - 005
- 3037 - 065113 - 1º Pavimento Tipo- Armadura Negativa das Lajes
- 3038-065201 - 2º Pavimento - Armadura de Vigas 001
- 3039-065202 - 2º Pavimento - Armadura de Vigas 002
- 3040-065203 - 2º Pavimento - Armadura de Vigas 003
- 3041-065204 - 2º Pavimento - Armadura de Vigas-Protensão 004
- 3042-065205 - 2º Pavimento - Armadura de Vigas-Protensão 005
- 3043-065212 - 2º Pavimento Tipo- Armadura Positiva das Lajes
- 3044 - 065213 - 2º Pavimento Tipo- Armadura Negativa das Lajes
- 3045-067101 - Coberta - Armadura de Vigas - 001
- 3046-067102 - Coberta - Armadura de Vigas - 002
- 3047-067103 - Coberta - Armadura de Vigas - 003
- 3048-067105 - Coberta - Armadura de Vigas - Protensão - 004
- 3049-067112 - Coberta - Armadura Positiva das Lajes
- 3050-067113 - Coberta - Armadura Negativa das Lajes
- 3051-068101-Nível +20.10m - Armadura de Vigas - 001
- 3052-062411-Radier - Localização dos Suportes
- 3053-062412- Radier - Formas e Armaduras dos Suportes
- 3059-065191- 1º Pavimento - Torre de Desgaseificação 1 - Formas e Armaduras
- 3060-065293- 2º Pavimento - Torre de Desgaseificação 2 - Formas e Armaduras



- 3061-06529 - 2º Pavimento - Torre de Desgaseificação 3 - Formas e Armaduras
- 3062 - 061114 - Reservatório de Coleta 01 - Formas e Armaduras
- 4001 - 061111-LOCAÇÃO DOS PILARES\_TRECHO 04
- 4002 - 061113-FORMAS DAS SAPATAS\_TRECHO 04
- 4003 - 062111-FORMAS DAS LAJES E VIGAS\_SUBSOLO\_TRECHO 04
- 4004 - 062211-CORTES AA, BB, CC e DD\_SUBSOLO\_TRECHO 04
- 4005 - 062311-FORMAS DAS BASES\_LOCAÇÕES DE RALOS E DRENOS\_SUBSOLO\_TRECHO 04
- 4006 - 063111-FORMAS DAS LAJES E VIGAS\_TÉRREO\_NIVEL 2.95\_TRECHO 04
- 4007 - 061201-ARMADURA DOS PILARES\_001
- 4008 - 061202-ARMADURA DOS PILARES\_002
- 4009 - 061203-ARMADURA DOS PILARES\_003
- 4010 - 061204-ARMADURA DOS PILARES\_004
- 4011 - 061205-ARMADURA DOS PILARES\_005
- 4012 - 061206-ARMADURA DOS PILARES\_006
- 4013 - 065111-FORMAS DAS LAJES E VIGAS\_1º PAVIMENTO\_TRECHO 04
- 4014 - 065211-FORMAS DAS LAJES E VIGAS\_2º PAVIMENTO\_TRECHO 04
- 4015 - 067111-FORMAS DAS LAJES E VIGAS\_COBERTA\_TRECHO 04
- 4016 - 068111-FORMAS E ARMADURAS DAS LAJES E VIGAS\_NIVEL 20.62\_TRECHO 04
- 4017 - 062112-ARM. POSITIVA DAS LAJES-SENTIDO HORIZONTAL\_PUNCAO\_SUBSOLO\_TRECHO 04
- 4018 - 062113-ARMADURA POSITIVA DAS LAJES\_SENTIDO VERTICAL\_SUBSOLO\_TRECHO 04
- 4019 - 062114-ARMADURA NEGATIVA DAS LAJES\_SENTIDO HORIZONTAL\_SUBSOLO\_TRECHO 04
- 4020 - 062115-ARMADURA NEGATIVA DAS LAJES\_SENTIDO VERTICAL\_SUBSOLO\_TRECHO 04
- 4021 - 062116-ARMADURA DE PROTENSÃO DAS LAJES\_SENTIDO HORIZONTAL\_SUBSOLO\_TRECHO 04
- 4022 - 062117-ARMADURA DE PROTENSÃO DAS LAJES\_SENTIDO VERTICAL\_SUBSOLO\_TRECHO 04
- 4023 - 062101-ARMADURA DE VIGAS\_SUBSOLO\_TRECHO 04
- 4024 - 061226-FORMAS E ARMADURAS\_ESCADAS TIPO 01 e 02\_TRECHO 04
- 4025 - 063101-ARMADURA DE VIGAS - 001\_TÉRREO\_TRECHO 04
- 4026 - 063102-ARMADURA DE VIGAS - 002\_TÉRREO\_TRECHO 04
- 4027 - 063103-ARMADURA DE VIGAS - 003\_TÉRREO\_TRECHO 04
- 4028 - 063104-ARMADURA DE VIGAS - 004\_TÉRREO\_TRECHO 04
- 4029 - 063105-ARMADURA DE VIGAS\_PROTENSÃO-005\_TÉRREO\_TRECHO 04
- 4030 - 063112-ARMADURA POSITIVA DAS LAJES\_TÉRREO\_TRECHO 04
- 4031 - 063113-ARMADURA NEGATIVA DAS LAJES\_TÉRREO\_TRECHO 04
- 4032 - 063114-ARMADURA DE PROTENSÃO DAS LAJES - SENTIDO HORIZONTAL\_TÉRREO\_TRECHO 04



























- 4033 - 063115-ARMADURA DE PROTENSAO DAS LAJES - SENTIDO VERTICAL\_TÉRREO\_TRECHO 04
- 4034 - 065101-ARMADURA DE VIGAS - 001\_1º PAVIMENTO\_TRECHO 04
- 4035 - 065102-ARMADURA DE VIGAS - 002\_1º PAVIMENTO\_TRECHO 04
- 4036 - 065103-ARMADURA DE VIGAS-003\_1º PAVIMENTO\_TRECHO 04
- 4037 - 065104-ARMADURA DE VIGAS - 004\_1º PAVIMENTO\_TRECHO 04
- 4038 - 065105-ARMADURA DE VIGAS\_1º PAVIMENTO\_TRECHO 04
- 4039 - 065106-ARMADURA DE VIGAS - PROTENSAO - 006\_1º PAVIMENTO\_TRECHO 04
- 4040 - 065112-ARMADURA POSITIVA DAS LAJES\_1º PAVIMENTO\_TRECHO 04
- 4041 - 065113-ARMADURA NEGATIVA DAS LAJES\_1º PAVIMENTO\_TRECHO 04
- 4042 - 065201-ARMADURA DE VIGAS - 001\_2º PAVIMENTO\_TRECHO 04
- 4043 - 065202-ARMADURA DE VIGAS - 002\_2º PAVIMENTO\_TRECHO 04
- 4044 - 065203-ARMADURA DE VIGAS - 003\_2º PAVIMENTO\_TRECHO 04
- 4045 - 065204-ARMADURA DE VIGAS - PROTENSAO-004\_2º PAVIMENTO TIPO\_TRECHO 04
- 4046 - 065205-ARMADURA DE PROTENSAO DAS VIGAS - 005\_2º PAVIMENTO TIPO\_TRECHO 04
- 4047 - 065206-ARMADURA DE PROTENSA DAS VIGAS - 006\_2º PAVIMENTO TIPO\_TRECHO 04
- 4048 - 065212-ARMADURA POSITIVA DAS LAJES\_2º PAVIMENTO\_TRECHO 04
- 4049 - 065213-ARMADURA NEGATIVA DAS LAJES\_2º PAVIMENTO\_TRECHO 04
- 4050 - 067101-ARMADURA DE VIGAS - 002\_COBERTA\_TRECHO 04
- 4051 - 067102-ARMADURA DE VIGAS - 002\_COBERTA\_TRECHO 04
- 4052 - 067103-ARMADURA DE VIGAS - 003\_COBERTA\_TRECHO 04
- 4053 - 067104-ARMADURA DE VIGAS - 004\_COBERTA\_TRECHO 04
- 4054 - 067105-Coberta Armadura de Vigas -Protensão 005
- 4055 - 067106-Coberta Armadura de Vigas- Protensão -006
- 4056 - 067112-Coberta Armadura Positiva das Lajes
- 4057 - 067113-Coberta Armadura Negativa das Lajes
- 4058 - 068101-Nível + 20.62m) Armadura das Lajes e Vigas - 001
- 4059 - 062192-Subsolo -Base 01 Á 04 Forma e Armaduras
- 4060 - 062193-Subsolo - Base 05 á 07 Forma e Armadura
- 4061 - 062194-Subsolo - Base 08 á 11 Forma e Armaduras
- 4062 - 062195-Subsolo - Base 12 á 13 Forma e Armaduras
- 4063 - 062411-Radier Locação,Formas e Armaduras dos Suportes
- 4064 - 062196-Reservatório 1 e 2 Armadura
- 4065 - 062197-Reservatório 03,04,05 e 06 Armadura das Lajes
- 4066 - 062198-Reservatório 03,04,05 e 06 Armaduras dos Encontros e Paredes







-  4067 - 062201-Reservatório 07,08 Armadura das Lajes
-  4068 - 062202-Reservatório 07,08 Armadura das Paredes
-  4072 - 065292-2º Pavimento - Aquíario 17 Formas e Armaduras
-  4073 - 065293-2º Pavimento - Torre de Desgaseificação 1 Form e Arm
-  4074 - 065294-2º Pavimento - Torre de Desgaseificação 2
-  4077 - 063211-Térreo -Nível + 2.95m Locação das Estacas e Bloco
-  5001 - 061250\_R01-Praça das Águas - Forma das Fundações
-  5002 - 061251\_R01-Praça das Á gua - Térreo Forma
-  5003 - 061252\_R01-Praça das água Armaduras
-  5004 - 061253\_R01-Coberta Armaduras Laje L1
-  5005 - 061254\_R01-Coberta Armadura Lajes L3 e L4
-  5006 - 061255\_R02-Coberta Armadura Positiva Laje L2
-  5007 - 061256\_R01-Coberta Armadura Negativa Laje L2
-  5008 - 061257\_R00-Quiosque Posto de Informação Armadura Sapatas,Pilar,Vigas e Lages
-  5009 - 061258\_R00-Praça das Águas - Coberta Fontr Forma
-  5010 - 061249\_R00-Praça das Águas - Locação dos Pilares e Est. Arm. das Est.
-  5011 - 061259\_R00-Praça das Águas - Bermas
-  ARQ 001\_Setores & Índice\_V05
-  ARQ 002\_Situação\_V08-Layout1
-  ARQ 002\_Situação\_V08-Layout2
-  ARQ 003\_Praça das Águas\_V05
-  ARQ 004\_Planta Baixa Pavimento Técnico\_V05
-  ARQ 005\_Planta Baixa Subsolo\_Geral\_V05
-  ARQ 006\_Planta Baixa Subsolo\_Trecho 1\_V05
-  ARQ 007\_Planta Baixa Subsolo\_Trecho 2\_V05
-  ARQ 008\_Planta Baixa Subsolo\_Trecho 3\_V05
-  ARQ 009\_Planta Baixa Subsolo\_Trecho 4\_V05
-  ARQ 010\_Planta Pavimento Terreo\_Geral\_V05
-  ARQ 011\_Planta Pavimento Terreo\_Trecho 1\_V05
-  ARQ 012\_Planta Pavimento Terreo\_Trecho 2\_V05
-  ARQ 013\_Planta Pavimento Terreo\_Trecho 3\_V05
-  ARQ 014\_Planta Pavimento Terreo\_Trecho 4\_V05
-  ARQ 015\_Planta Primeiro Pavimento\_Geral\_V05
-  ARQ 016\_Planta Primeiro Pavimento\_Trecho 1\_V05





-  ARQ 017\_Planta Primeiro Pavimento\_Trecho 2\_V05
-  ARQ 018\_Planta Primeiro Pavimento\_Trecho 3\_V05
-  ARQ 019\_Planta Primeiro Pavimento\_Trecho 4\_V05
-  ARQ 020\_Planta Segundo Pavimento\_Geral\_V05
-  ARQ 021\_Planta Segundo Pavimento\_Trecho 1\_V05
-  ARQ 022\_Planta Segundo Pavimento\_Trecho 2\_V05
-  ARQ 023\_Planta Segundo Pavimento\_Trecho 3\_V05
-  ARQ 024\_Planta Segundo Pavimento\_Trecho 4\_V05
-  ARQ 025\_Planta de Coberta\_V05
-  ARQ 026\_Casca\_V05
-  ARQ 027\_Corte Longitudinal A\_Geral\_V05
-  ARQ 028\_Corte Longitudinal A\_Trecho 1\_V05
-  ARQ 029\_Corte Longitudinal A\_Trecho 2\_V05
-  ARQ 030\_Corte Longitudinal A\_Trecho 3\_V05
-  ARQ 031\_Corte Longitudinal A\_Trecho 4\_V05
-  ARQ 032\_Corte Transversal B\_V05
-  ARQ 033\_Corte Transversal C\_V05
-  ARQ 034\_Corte Transversal D\_V05
-  ARQ 035\_Corte Transversal E\_V05
-  ARQ 036\_Corte Transversal F\_V05
-  ARQ 037\_Fachadas\_V05
-  EXECUTIVO FINAL - PDF-20240605T171831Z-001
-  PROJETO EXECUTIVO.pdf24\_merged-1
-  RELAÇÃO PROJETO EXECUTIVO acquário ceará



- **Projeto de Arquitetura**
  - > versão 02
  - > 2024\_07\_29\_EST
  - > ARQ
  - > LBM\_EP\_ARQ\_003\_R00\_PLANTAS;
  
- **Projeto de Arquitetura**
  - > versão 02
  - > 2024\_07\_29\_EST
  - > EST\_DEMOL\_CONST
    -  CON\_1º PAVTO
    -  CON\_2º PAV
    -  CON\_PAV TEC E SUBSOLO
    -  CON\_TERREO
  
- **Registro fotográfico.**



## 4. METODOLOGIA

O documento apresentará através de fotos atuais e comentários explicativos, as tratativas a serem realizadas para que a estrutura de concreto existente venha a ser utilizada em sua nova função: implantação do **Labomar-UFC**, além de informações quanto à recuperação estrutural e das medidas preventivas para evitar a degradação da estrutura no futuro, pois a edificação passou alguns anos paralisada, sofrendo a ação das intempéries ao longo do tempo.

Apresentaremos em **anexo** um projeto orientativo, sem detalhamento, apenas com a estimativa do volume de concreto e peso da armadura. Esses valores deverão ser confirmados através do projeto executivo de intervenção estrutural da ampliação e das demolições que serão realizadas.

## 5. DESENVOLVIMENTO

Para um melhor entendimento dividiremos por itens o presente documento.

### 5.1 Recuperação da estrutura de concreto e das pranchas metálicas;

### 5.2 Demolições;

### 5.3 Ampliações / alterações na estrutura;

### 5.4 Novas estruturas adjacentes à estrutura existente.



## **5.1 RECUPERAÇÃO DA ESTRUTURA DE CONCRETO E DAS PRANCHAS METÁLICAS**

A execução da estrutura de concreto do **Acquário Ceará** foi paralisada há aproximadamente sete anos. Durante este tempo a edificação ficou exposta às intempéries. Diante da presente situação a estrutura foi investigada através de ensaios para a verificação do grau de deterioração e quais ações deverão ser realizadas para tornar viável a estrutura e assim receber a sua nova função exigida pelo **Instituto de Ciências do Mar – Labomar** – função educacional atrelada à UFC – Universidade Federal do Ceará.

### **ENSAIOS REALIZADOS NA ESTRUTURA:**

- **Resistência à compressão do concreto;**
- **Cobrimentos;**
- **Corrosão de armaduras;**
- **Ação de cloretos e sulfetos;**
- **Etringita tardia em fundações;**
- **Juntas de dilatação e “bicheiras”;**
- **Cortinas metálicas de contenção;**
- **Fissuras, deformações, prumos verticais e eflorescências.**

A partir dos resultados dos ensaios, comentaremos cada anomalia com a sua devida correção e medidas preventivas.





Fissuras em lajes, sapatas ou vigas devem ser tratadas através dos seguintes procedimentos:

- Em fissuras com abertura menor que 0,5 mm, deve ser aplicado **penetron impermeabilizante de cristalização integral por pintura** ou produto similar, segundo indicações do fabricante;

- Em fissuras iguais ou maiores que 0,5 mm, aplicar **resina epóxi tipo Sikadur 31** ou similar, preenchendo toda a fissura para manter a monoliticidade da peça. Manchas de umidade, bolor ou mofo, bem como toda a estrutura de concreto aparente e concreto totalmente exposto às intempéries deverão ser lavadas com hidrojateamento a uma pressão de 2500 psi, para remover impurezas e cloretos, preparando a edificação para o seu novo uso.

A corrosão incidente nas armaduras é pontual, não apresentando destacamento de concreto ou fissuras acentuadas; os pontos de corrosão deverão ser tratados e recuperados de acordo com os **procedimentos básicos de recuperação estrutural contidos no final deste capítulo.**

As armaduras de espera das escadas deverão ser retiradas e executadas novamente, pois o dispositivo de “mangueira” não protegeu a armadura corretamente neste intervalo de tempo; os corrimãos metálicos também deverão ser substituídos por corrimãos/guarda-corpos em aço inox linha 304.

A corrosão nas contenções metálicas são pontuais e deverão ser lixadas, pintadas e recuperadas. Por se tratar de uma estrutura metálica recomendamos a análise, apenas para recuperar, de um especialista em estrutura metálica, pois em



nosso escopo somos responsáveis apenas pela estrutura de concreto – armado e protendido.

As falhas de concretagem – que foram verificadas no ensaio de ultrassom - os nichos de brita e as juntas de concretagem mal executadas devem ser bem apicoadas, utilizando um marteleto de pequeno porte, em torno de 3 kg, para retirar britas e o concreto desagregado, recompondo posteriormente com graute tipo **Sikagrout** ou similar, sem utilizar brita zero.

Em relação ao  $F_{ck}$  (resistência característica à compressão do concreto), podemos concluir, através dos ensaios realizados de corpo testemunho e esclerometria, que a estrutura apresentou valores inferiores a **40 MPa**, porém, os valores apresentaram média de **35 MPa**, que para esse tipo de edificação e nesses sete anos com as condições de exposição da estrutura, não apresentam fissuras de indícios ou evidências de instabilidade, deformação ou fissuração acentuadas. **Portanto, atende aos critérios vigentes para o ELU (Estado Limite Último – ruína e instabilidade) e ELS (Estado Limite de Serviço – flecha, vibração, fissura excessiva e outros).**

Outro aspecto importante da resistência do concreto de **40 MPa** para **30,7 MPa** (menor valor encontrado), é que a extração de corpo testemunho apresenta um resultado mais realista que a esclerometria. Tal resultado leva a uma redução aproximada de **30 %**, que está dentro dos parâmetros do coeficiente de segurança adotados na concepção do projeto estrutural. **Portanto, como já descrito, não tiveram consequências na estrutura, pois caso contrário, já deveriam ter ocorrido.**



Os ensaios de resistividade elétrica superficial do concreto, potencial de corrosão, profundidade de carbonatação, determinação da espessura do cobrimento, determinação do teor de cloretos e sulfatos, microscopia eletrônica de varredura (MEV) e análise química por energia dispersiva (EDS), apresentaram resultados que indicam uma estrutura de concreto suscetível a manifestações patológicas de carbonatação no concreto e corrosão na armadura. Durante estes sete anos não se verificou no local a incidência de corrosão acentuada, porém, se a estrutura continuar sem tratamento protetivo, corre-se um sério risco de corrosão a médio prazo. Como essa suscetibilidade não é imediata, é necessário analisar os prazos de execução da nova edificação, e em caso de **peças de concreto armado aparente**, mesmo com um Fck de **40 MPa** e cobrimento satisfatório (maior que 4 cm), é necessário a aplicação de **penetron impermeabilizante de cristalização integral por pintura** ou produto similar para a proteção do concreto.

No caso da análise da laje de subpressão e algumas fundações, principalmente devido ao grande volume de concreto e preocupação com o risco de formação de etringita tardia e da reação de alcáli agregado (RAA), verificamos que existem indícios que atestam as manifestações patológicas citadas. **Portanto, é necessário fechar as fissuras como descrito anteriormente e impermeabilizar toda a face superior e o tronco da pirâmide (cuscuz) da fundação, podendo ser utilizado material betuminoso ou similar que garanta que não existirá umidade excessiva nesses elementos estruturais.**

**A redução da espessura da chapa das contenções metálicas deverá ser analisada pelo fabricante para verificar se a inércia e as propriedades**



**mecânicas foram reduzidas a ponto de haver a necessidade de um novo dimensionamento da contenção metálica.**

Quanto à questão da resistência do concreto, mesmo com valores reduzidos, não há indício ou evidências no local que determinem reforço, escoramento ou interdição; o valor médio de **35 MPa**, o bom cobrimento e a boa execução foram determinantes para atender à segurança e utilização da estrutura da edificação.

## **5.2 DEMOLIÇÃO DA ESTRUTURA**

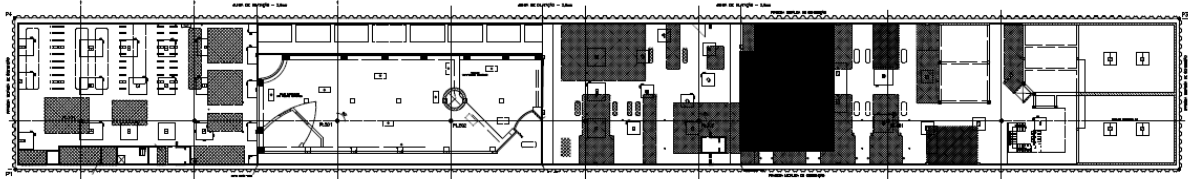
As demolições a serem realizadas para adaptação da nova arquitetura deverão seguir com rigor as seguintes premissas:

- 1) Escorar a estrutura utilizando pontaletes metálicos ou torres, dependendo do pé-direito, para a proteção dos operários, nos locais das demolições. Recomendamos pois, a elaboração de um projeto de escoramento;**
- 2) No caso da laje de teto do pavimento técnico ou piso do térreo, a demolição da laje deverá ocorrer com cuidado, pois existem cabos de protensão na laje. **Vide figura 01. Os referidos cabos deverão ser reprotendidos - “afrouxados”- antes da demolição, com a laje devidamente escorada;****
- 3) Aberturas em lajes só poderão ser executadas somente após a colocação de vigas de reforço e com o trecho da estrutura no local devidamente escorado;**
- 4) É extremamente proibido o acúmulo de entulho sobre as lajes existentes: teto do pavimento técnico, teto do pavimento térreo, teto do 1º. e 2º. Pavimentos;**
- 5) É proibido o uso de máquinas (tratores ou equipamento similares) sobre as**

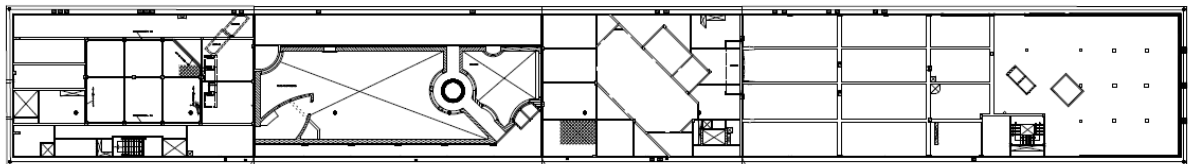


lajes, podendo ser permitido, desde que seja avaliado e consentido por um engenheiro civil especialista em estrutura através de autorização comprovada por documentos e a devida ART (Anotação de Responsabilidade Técnica), perante o CREA-CE.

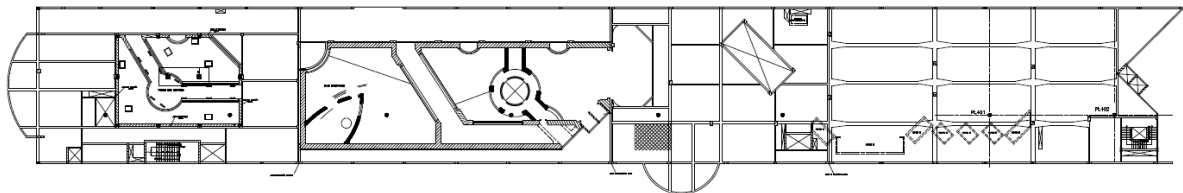
**SUBSOLO - LAJE A DEMOLIR**



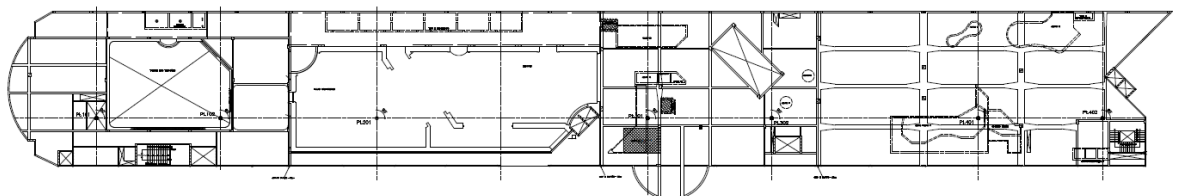
**TÉRREO - LAJE A DEMOLIR**



**1° PAVTO - LAJE A DEMOLIR**



**2° PAVTO - LAJE A DEMOLIR**



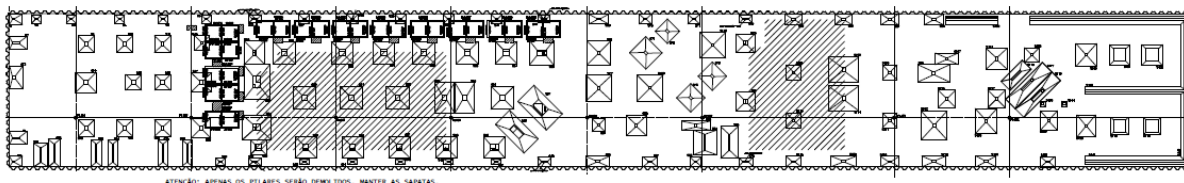


### 5.3 AMPLIAÇÃO E ALTERAÇÃO NA ESTRUTURA

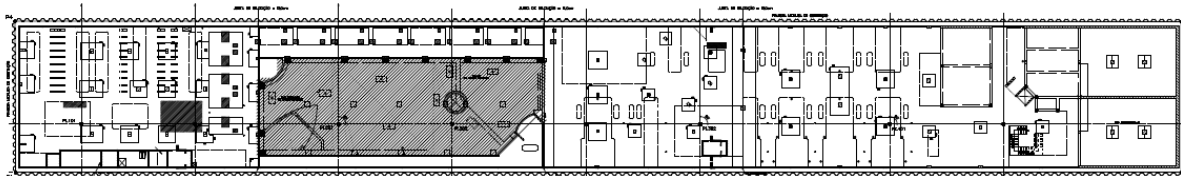
Devido às adequações/modificações na arquitetura, muitos trechos da estrutura de concreto serão alterados, com a inclusão de fundações, pilares, vigas e lajes. Portanto, apresentaremos apenas um projeto orientativo com a estimativa das intervenções estruturais que deverão ser realizadas.

De modo geral as intervenções consistem em inclusão de elementos estruturais, não será realizado a priori, reforço estrutural com perfis metálicos ou fibra de carbono.

#### PAV. TÉCNICO - LAJE A CONSTRUIR



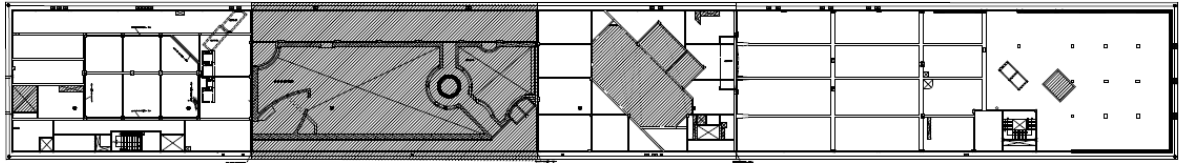
#### SUBSOLO - LAJE A CONSTRUIR





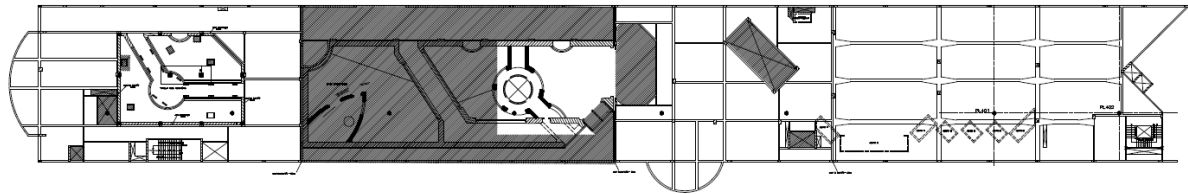


## TÉRREO - LAJE A CONSTRUIR

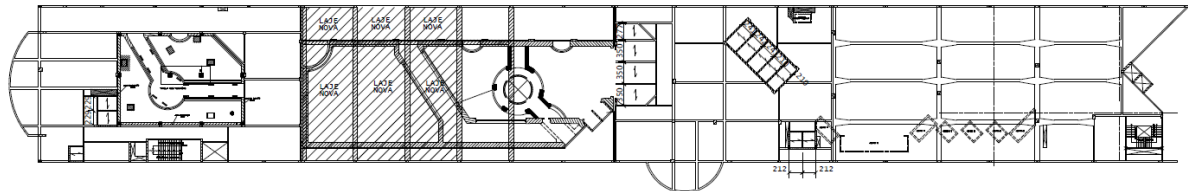


ATENÇÃO: TODAS AS MEDIDAS DEVERÃO SER CONFERIDAS NO PROJETO EXECUTIVO ANTES DA EXECUÇÃO

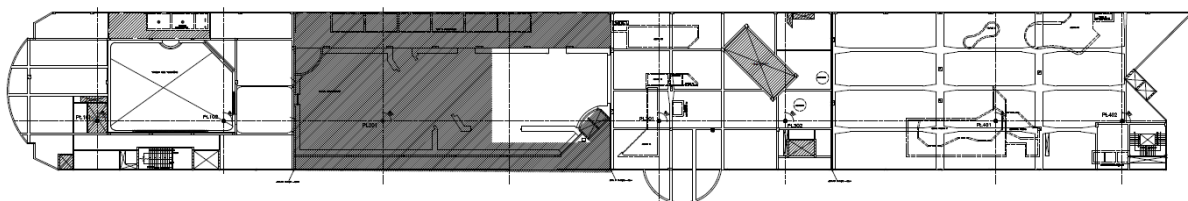
## 1° PAVTO - LAJE A CONSTRUIR



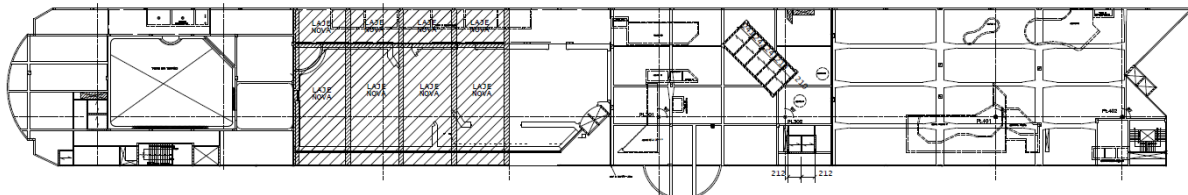
ATENÇÃO: TODAS AS MEDIDAS DEVERÃO SER CONFERIDAS NO PROJETO EXECUTIVO ANTES DA EXECUÇÃO



## 2° PAVTO - LAJE A CONSTRUIR



ATENÇÃO: TODAS AS MEDIDAS DEVERÃO SER CONFERIDAS NO PROJETO EXECUTIVO ANTES DA EXECUÇÃO





## **TRATAMENTO E PROCEDIMENTOS BÁSICOS PARA RECUPERAÇÃO ESTRUTURAL DEVIDO À CORROSÃO NA ARMADURA DAS PEÇAS EM CONCRETO ARMADO:**

Antes de realizar a recuperação das peças de concreto armado (pilares, vigas e lajes), devem ser corrigidas todas as causas que geram as manifestações patológicas, tais como: vazamentos em tubulações danificadas (ralos, caixas sifonadas, canos e conexões em PVC), impermeabilização, rejunte dos revestimentos, dentre outros.

**NOTA 1:** As fissuras no concreto que não apresentam a armadura oxidada devem ser apenas fechadas (“colmatadas”) com resina à base de epóxi;

**NOTA 2:** Cada correção deverá ser realizada por **empresa especializada** em instalações prediais, em impermeabilização e em reparos estruturais.

O trabalho de **recuperação estrutural** deverá ser realizado por empresa especializada e devidamente registrada no CREA-CE.

**OBSERVAÇÃO IMPORTANTE:** Os serviços de recuperação estrutural em pilares deverão ser realizados de forma alternada. Nunca deverá ser realizado o reparo em todos os pilares de uma só vez para evitar o enfraquecimento global da estrutura.

No caso em que a corrosão afetou a armadura da peça e seu cobrimento já estiver se destacando, deve-se proceder como descrito a seguir:





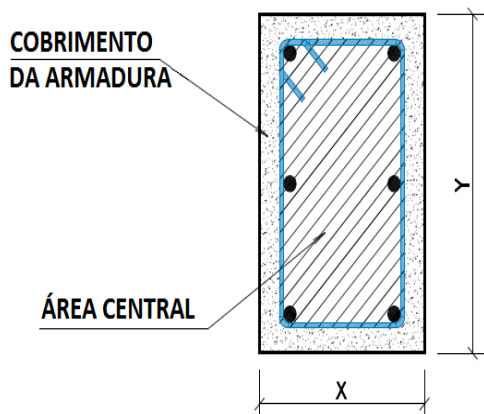
**Passo 01:** Retirar o concreto e/ou revestimento (reboco) já destacado da estrutura devido à corrosão na armadura, tomando o devido cuidado para não ocasionar vibração excessiva na estrutura. Utilizar instrumentos adequados para evitar impactos excessivos na estrutura;

**Passo 02:** Aplicar através de um borrifador, a substância **FENOLFTALEÍNA**, para que se tenha a certeza de que o concreto carbonatado será retirado. A substância citada ao encontrar o concreto com boa alcalinidade resulta na cor violeta; **caso contrário, teremos o incolor, o qual caracteriza o concreto carbonatado que deverá ser retirado.**



### **APLICAÇÃO DE FENOLFTALEÍNA (CONCRETO ACEITÁVEL NA COR VIOLETA)**

**Passo 03:** Caso a seção do pilar seja reduzida a menos que a área central, o autor do presente Parecer Técnico deverá ser comunicado imediatamente.

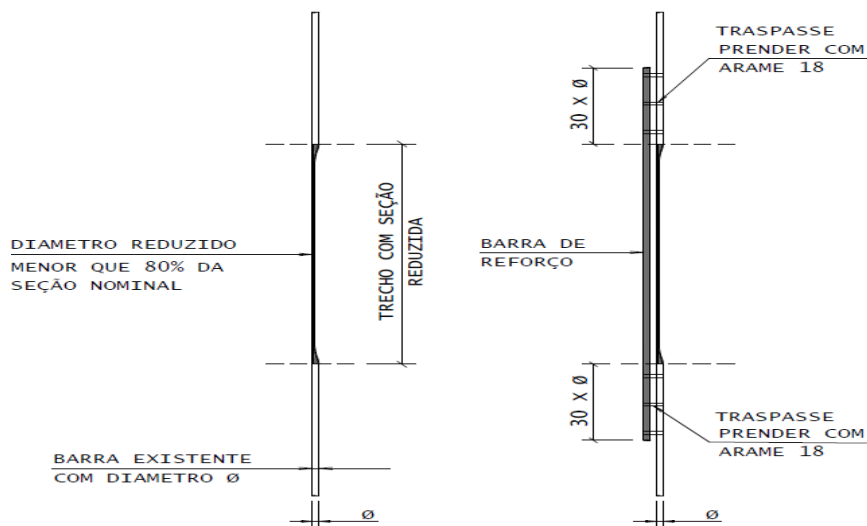


#### OBSERVAÇÃO

EM HIPÓTESE ALGUMA A SEÇÃO DO PILAR DEVE SER REDUZIDA A UMA SEÇÃO MENOR QUE A ÁREA HACHURADA (ÁREA CENTRAL).

CASO ISSO SEJA NECESSÁRIO O AUTOR DESSE PARECER TÉCNICO DEVERÁ SER INFORMADO IMEDIATAMENTE ANTES DA REDUÇÃO DA SEÇÃO

**Passo 04:** Limpar a armadura com escova de aço ou esmerilhadeira. Caso a barra, após a limpeza, apresente uma seção menor que 80% da sua seção nominal, ou seja, sua seção seja reduzida mais de 20%, esta deverá ser reforçada com outra de mesmo diâmetro, deixando um traspasse 30 vezes o diâmetro nominal. Esse procedimento deve ser realizado tanto para armaduras longitudinais (pilares e vigas), quanto para as armaduras transversais - estribos dos pilares. **Utilizar estribos # 6.3 C/20. Vide detalhe do traspasse abaixo:**



#### COMPLEMENTO DA BARRA DANIFICADA



**Passo 05:** Aplicar uma pintura polimérica na armadura como um inibidor de corrosão (**Armatec 108 ou similar**). Este produto deverá ser aplicado na armadura seca e concreto secos, sem nenhuma umidade.



#### **APLICAÇÃO DE PINTURA POLIMÉRICA INIBIDORA DE CORROSÃO**

**Passo 06:** Em seguida, reconstituir a seção original utilizando uma **argamassa cimentícia tixotrópica de alta resistência**. O local de aplicação deverá estar limpo, isento de poeira ou partículas soltas e deve ser bem lavado antes da aplicação, ficando úmido, mas não saturado. Utilizar argamassa com aditivos inibidores de corrosão. **No caso de pilares, a seção deverá ser reconstituída com graute pre-dosado fluido de alta resistência inicial (sikagrout 250 ou similar)**



#### **APLICAÇÃO DA ARGAMASSA CIMENTÍCIA TIXOTRÓPICA**

##### **Características:**

Consistência: Tixotrópica  
Resistência: 20 MPa em 24 horas  
Sikatop 122 PLUS ou Similar



**Passo 07:** Após o período de cura da argamassa, a superfície recuperada deverá receber uma barreira protetiva para reduzir a ação de intempéries na estrutura, utilizar sikatop 107 ou similar, em caso de concreto aparente (sem reboco ou revestimentos cerâmicos ou outros) nós deveremos ser comunicados.

Todo o serviço de recuperação estrutural deverá ser realizado por empresa especializada, mediante a apresentação de uma ART (Anotação de Responsabilidade Técnica). **Antes da execução do serviço a empresa contratada deverá se apresentar à Wetter LT para as devidas orientações técnicas.**

As peças estruturais que apresentam **manifestações patológicas** de corrosão devem ser prontamente corrigidas de acordo com o presente Laudo Técnico.



## 6. PARECER CONCLUSIVO

Diante das investigações visuais, sensoriais e ensaios de engenharia em relação às condições de conservação e durabilidade das peças estruturais, podemos afirmar que é necessária a realização da recuperação estrutural e as medidas preventivas para evitar o risco de futuras manifestações patológicas.

Quanto às intervenções estruturais com a inclusão de fundações, pilares, vigas e lajes para adequação da nova arquitetura, estamos apresentando em anexo um projeto orientativo com estimativas de volume de concreto e peso de armadura passiva e ativa.

Portanto, para a estrutura existente, por mais que tenha passado sete anos sem proteção adequada do concreto, o estado de conservação se apresenta razoável, podendo ser reutilizada, após as tratativas e as intervenções estruturais descritas no presente documento.

Sem mais para o momento, pomo-nos à sua inteira disposição para esclarecer eventuais dúvidas referentes aos detalhes do presente Laudo Técnico.

Atenciosamente,

**Wetter Lino Tavares**  
Engenheiro Civil CREA - 2921/D

**Pedro Soares Júnior**  
Engenheiro Civil CREA-CE-40275/D





## 7. REGISTRO FOTOGRÁFICO



**FOTO 01 – FECHAMENTO DA LAJE COM PISO FLUTUANTE PAV. TÉRREO**





**FOTO 02 – NECESSIDADE DE LAVAGEM DO CONCRETO EXTERNO**



**FOTO 03 – LAJE MACIÇA TETO SUBSOLO APOIO DA AMPLIAÇÃO**





**FOTO 04 – CONTENÇÃO METÁLICA AFASTADA DA ESTRUTURA E TRECHOS PONTUAIS DE CORROSÃO NO SUBSOLO**



**FOTO 05 – FISSURAS NO TETO DO SUBSOLO A SEREM COLMATADAS**





**FOTO 06 – FISSURAS NO TETO DO SUBSOLO A SEREM COLMATADAS**





**FOTO 07 – BASES APOIADAS SOBRE O TETO DO PAV.TÉCNICO QUE SERÃO DEMOLIDAS**





**FOTO 08 – TUBULAÇÕES NO TETO DO PAV. TÉCNICO QUE SERÃO  
RETIRADAS E ABERTURAS FECHADAS COM LAJE MACIÇA: H=14**





**FOTO 09 – TUBULAÇÕES NO TETO DO PAV. TÉCNICO QUE SERÃO  
RETIRADAS E ABERTURAS FECHADAS COM LAJE MACIÇA: H=14**





**FOTO 10 – TUBULAÇÕES NO TETO DO PAV. TÉCNICO QUE SERÃO  
RETIRADAS E ABERTURAS FECHADAS COM LAJE MACIÇA: H=14**



**FOTO 11 – DORMENTES E PILARES QUE SERÃO RETIRADOS E NOVAS LAJES SOBRE ESSE TRECHO - AUDITÓRIO**





**FOTO 12 – REALIZAR LIMPEZA E ACABAMENTO NAS JUNTAS DE DILATAÇÃO**





**FOTO 13 – JUNTAS ENTRE PILARES QUE TERÃO A FUNÇÃO DE APOIO DOS PISOS ACIMA DO AUDITÓRIO**





**FOTO 14 – CAIXAS DE CONCRETO E BASES QUE SERÃO RETIRADAS E APOIADAS SOBRE LAJE DE TETO DO PAV. TÉCNICO**





**FOTO 15 – JUNTA DE ELEMENTOS DIVIDIDOS NO TRECHO 1 AQUÁRIO COM TÚNEL A SER DEMOLIDO**





**FOTO 16 – VERIFICAR A PROTEÇÃO CATÓDICA DA CONTENÇÃO**



**FOTO 17 – CONTENÇÃO COM ALGUNS PONTOS DE CORROSÃO**





**FOTO 18 – CONTENÇÃO COM ALGUNS PONTOS DE CORROSÃO**





**FOTO 19 – CORROSÃO DE ARMADURAS NA BASE DO PILAR - TRECHOS PONTUAIS**





**FOTO 20 – CORROSÃO DE ARMADURAS NA BASE DO PILAR - TRECHOS PONTUAIS**





**FOTO 21 – CORROSÃO DE ARMADURAS NA BASE DO PILAR - TRECHOS PONTUAIS**





**FOTO 22 – VERIFICAR REDUÇÃO DE VIGA E COLOCAR LAJE FLUTUANTE  
PARA FECHAMENTO DO AQUÁRIO**





**FOTO 23 – VERIFICAR REDUÇÃO DE VIGA E COLOCAR LAJE FLUTUANTE  
PARA FECHAMENTO DO AQUÁRIO**





**FOTO 24 – ABERTURA EM LAJE DE TETO DO PAV. TÉRREO - INCLUSÃO DE VIGAS EM CONCRETO**





**FOTO 25 – FECHAMENTO DAS LAJES DE TETO DO PAV. TÉRREO – 1º.  
PAVIMENTO E 2º. PAVIMENTO**





**FOTO 26 – CONTENÇÃO COM CORROSÕES PONTUAIS**



**FOTO 27 – CONTENÇÃO COM CORROSÕES PONTUAIS**





**FOTO 28 – CONTENÇÃO COM CORROSÕES PONTUAIS**





**FOTO 29 – FECHAMENTO COM LAJE FLUTUANTE NO TETO DO PAV.  
TÉRREO**





**FOTO 30 – FECHAMENTO COM LAJE FLUTUANTE NO TETO DO SUBSOLO**





**FOTO 31 – FECHAMENTO DAS LAJES DE TETO DO PAV. TÉRREO – 1º.  
PAVIMENTO E 2º. PAVIMENTO**





**FOTO 32 – FECHAMENTO COM VIGA NOVA E LAJE NERVURADA NO TETO DO PAV. TÉRREO**





**FOTO 33 – ABERTURA NA LAJE PARA PASSAGEM DE UM ELEVADOR NO TETO DO 1º. PAVIMENTO**





**FOTO 34 – EXECUÇÃO DE NOVAS LAJES NO TETO DO PAV. TÉRREO, 1º. PAVIMENTO, 2º. PAVIMENTO E 3º. PAVIMENTO**





**FOTO 35 – EXECUÇÃO NOVA DO TETO DO 3º. PAVIMENTO**





**FOTO 36 – ARMADURA DE ESPERA DA ESCADA PARA O ACESSO DO NOVO TETO DO 3º. PAVIMENTO**





**FOTO 37 – ARMADURA DE ESPERA DE UMA LAJE**



**FOTO 38 – ARMADURA DE ESPERA DE UMA LAJE**





**FOTO 39 – EXECUÇÃO NOVA LAJE TETO DO 3º. PAVIMENTO E DEMOLIÇÃO DAS CAIXAS DE CONCRETO**





**FOTO 40 – DEMOLIÇÃO DE PAREDES DE CONCRETO DO TÚNEL DO AQUÁRIO**





**FOTO 41 – DEMOLIÇÃO DE PAREDES DE CONCRETO DO TÚNEL DO AQUÁRIO**





**FOTO 42 – DEMOLIÇÃO DE PAREDES DE CONCRETO DO TÚNEL DO  
AQUÁRIO**





**FOTO 43 – DEMOLIÇÃO DE PAREDES DE CONCRETO DO TÚNEL DO AQUÁRIO**





**FOTO 44 – DEMOLIÇÃO DE PAREDES DE CONCRETO DO TÚNEL DO AQUÁRIO**





**FOTO 45 – DEMOLIÇÃO DE PAREDES DE CONCRETO DO TÚNEL DO AQUÁRIO**





**FOTO 46 – DEMOLIÇÃO DE PAREDES DE CONCRETO DO TÚNEL DO AQUÁRIO**





**FOTO 47 – DEMOLIÇÃO DE PAREDES DE CONCRETO DO TÚNEL DO AQUÁRIO**





**FOTO 48 – DEMOLIÇÃO DE PAREDES DE CONCRETO DO TÚNEL DO AQUÁRIO**





**FOTO 49 – FECHAMENTO COM LAJE FLUTUANTE DO TETO DO 2º.  
PAVIMENTO**





**FOTO 50 – FECHAMENTO COM LAJE FLUTUANTE DO TETO DO 2º.  
PAVIMENTO**





**FOTO 51 – FECHAMENTO COM LAJE MACIÇA NO TETO DO 2º. PAVIMENTO**





**FOTO 52 – ARMADURA DE ESPERA DA ESCADA DE ACESSO AO TETO DO 3º. PAVIMENTO**





**FOTO 53 – PROLONGAMENTO DOS PILARES DO TÚNEL DO AQUÁRIO PARA A NOVA LAJE DE TETO DO 2º. PAVIMENTO**





**FOTO 54 – PROLONGAMENTO DOS PILARES DO TÚNEL DO AQUÁRIO PARA A NOVA LAJE DE TETO DO 2º. PAVIMENTO**





**FOTO 55 – VERIFICAÇÃO DA LAJE DE FUNDO DO TÚNEL DO AQUÁRIO - VIDE VIGAS FAIXAS NAS BORDAS OU PROTENSÃO DA LAJE**





**FOTO 56 – CONTINUIDADE DA VIGA DE COROAMENTO DAS CONTENÇÕES**





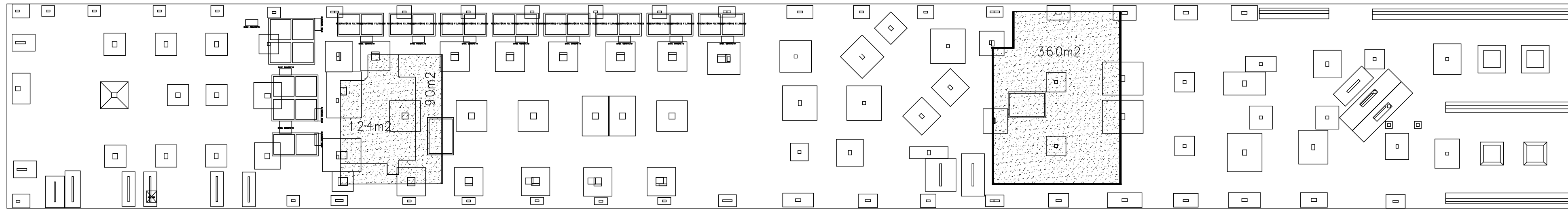
**FOTO 57 – CONTINUIDADE DA VIGA DE COROAMENTO DAS CONTENÇÕES;  
VERIFICAR PINTURA PROTETIVA NOS TRECHOS EXTERNOS DA  
CONTENÇÃO METÁLICA**



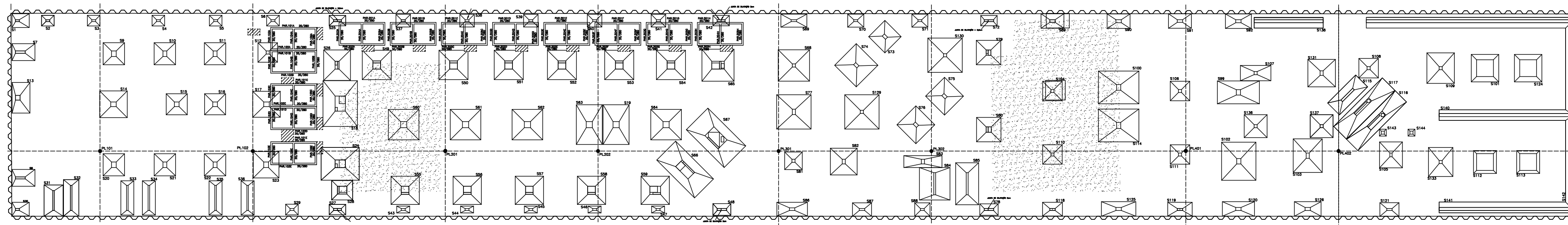
## 8. ANEXO

<b>QUANTITATIVOS ACQUARIO LABOMAR</b>			
<b>PAVIMENTOS</b>	<b>VOLUME DE CONCRETO (45MPa) (m³)</b>	<b>PESO DE CORDOALHA (CP-190 RB MONOCORDOALHA 12.7mm) (Kg)</b>	<b>JUNTA DE DILATAÇÃO (m)</b>
ANEXO	651	0	0
TETO DO TÉCNICO	15	0	92
TETO DO SUBSOLO	525	5000	0
TETO DO TÉRREO	500	5000	110
TETO DO 1º PAVIMENTO	563	5000	102
TETO DO 2º PAVIMENTO	1175	2000	102
COBERTA ROOFTOP	580	3000	102
<b>TOTAL</b>	<b>4009</b>	<b>20000</b>	<b>508</b>
<b>ÁREA DE LAJE PRÉ-MOLDADA - Pretendida (m²)</b>		<b>468</b>	
<b>PESO DE AÇO - Taxa média de armadura (CA-50) (Kg)</b>		<b>150</b>	
<b>OPÇÃO 1: VOLUME DE CONCRETO CELULAR PARA ENCHIMENTO DO PAV. TÉCNICO - Auditório e sala de imersão (m³)</b>		<b>548</b>	
<b>OPÇÃO 2: ÁREA DE LAJE PRÉ-MOLDADA (Pretendida) - Auditório e sala de imersão (m²)</b>		<b>574</b>	
<b>OPÇÃO 2: ÁREA DE ALVENARIA EM BLOCO ESTRUTURAL - Auditório e sala de imersão (m²)</b>		<b>390</b>	

# INTERVENÇÕES PAVIMENTO TÉCNICO



PAV. TÉCNICO - ENCHIMENTO NO PISO (SOBRE A FACE SUPERIOR DA LAJE SUBPRESSÃO)



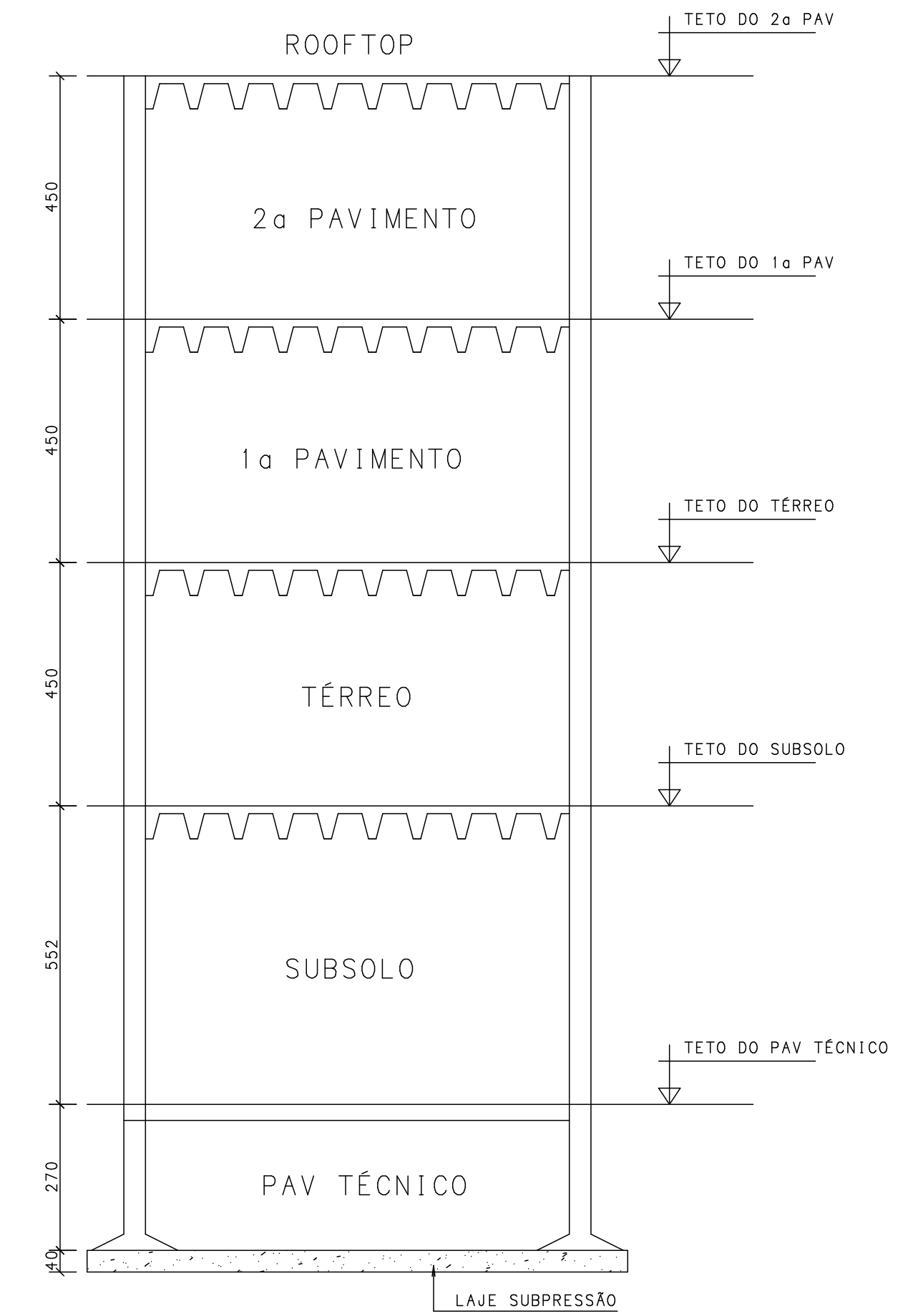
ATENÇÃO: APENAS OS PILARES SERÃO DEMOLIDOS, MANTER AS SAPATAS.

**LEGENDA**

ENCHIMENTO NO PISO (CONCRETO LEVE COM PESO ESPECÍFICO 700kg/m³)  
 VOLUME DE CONCRETO CELULAR (ENCHIMENTO) = 548m³

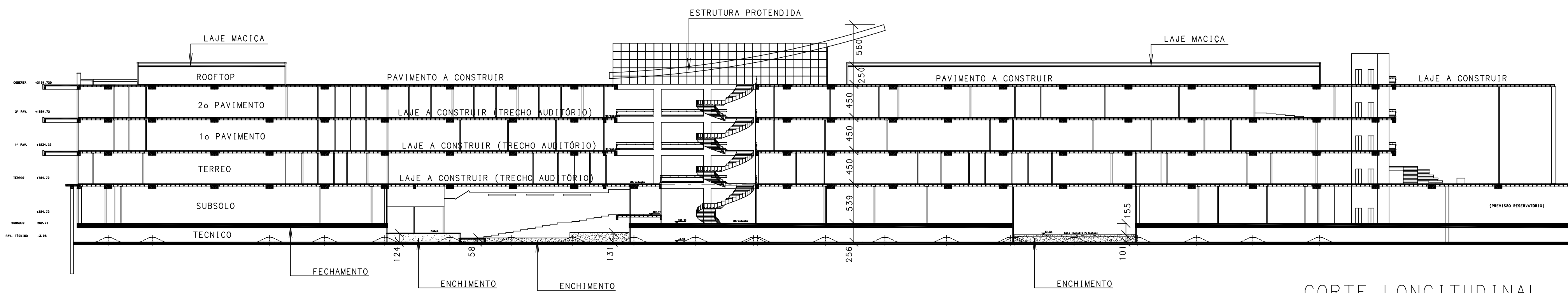
FORMA DO PAVIMENTO TÉCNICO

ESCALA 1:400



ESQUEMA VERTICAL

ESCALA 1:100



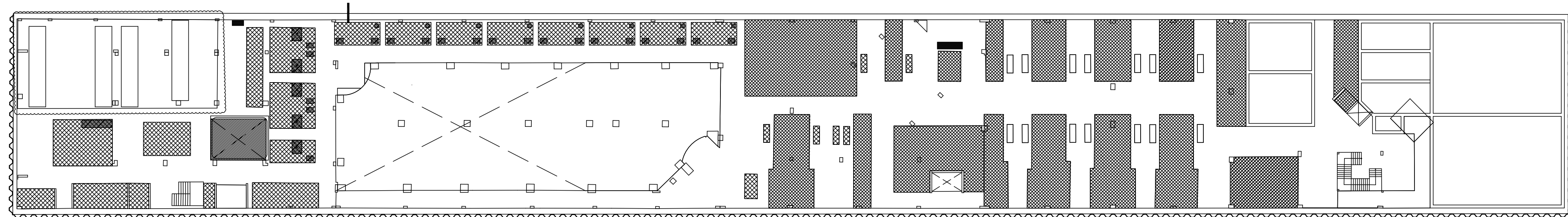
CORTE LONGITUDINAL

RO	VERSÃO ORIGINAL	04/09/2024	
NÚMERO	MODIFICAÇÃO	DATA	
<p>ASSOCIAÇÃO CEARENSE DE ENGENHARIA ESTRUTURAL</p> <p>(SÓCIO/FUNDADOR)</p>	Fck =	30MPa	
	Econcreto =	26000MPa	
	Eaco =	210GPa	
	CLASSE DE AGRESSIVIDADE:	CLASSE II (MODERADA)	
	COBRIMENTO =	3,0cm	
<p>WETTER L.T. PROJETOS ESTRUTURAIS</p> <p>(85) 3234-4545 / 98733-8549</p> <p>www.wetterit.com.br - estrutura@wetterit.com.br</p> <p>FORTALEZA - CEARÁ</p>			
PROPRIETÁRIO:	LABOMAR ACQUARIO CEARÁ	DATA:	04/09/2024
OBRA:	PROJETO ESTRUTURAL DE INTERVENÇÃO		
PEÇAS DETALHADAS:		PRANCHA:	
ESQUEMA VERTICAL		001/R0	
ESQUEMA DE PAVIMENTO TÉCNICO		TOTAL DE PRANCHAS:	
		0006	

ESTA PRANCHA NÃO PODERÁ SER EXECUTADA SEM ASSINATURA DO AUTOR DO PROJETO ESTRUTURAL ATRAVÉS DO REGISTRO DE UMA ANOTAÇÃO DE RESPONSABILIDADE TÉCNICA (ART) PERANTE O CONSELHO REGIONAL DE ENGENHARIA DO CEARÁ (CREA-CE)



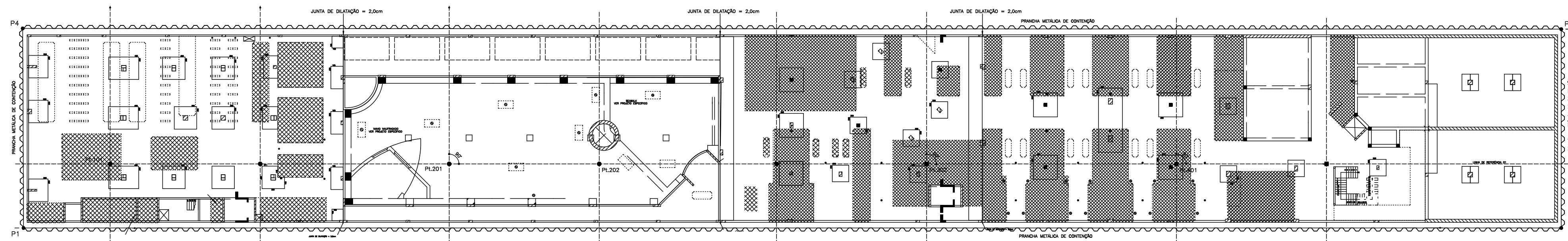
# INTERVENÇÕES SUBSOLO



FORMA DO SUBSOLO (TETO DO PAV TÉCNICO)

ESCALA 1:400

## SUBSOLO - LAJE A DEMOLIR

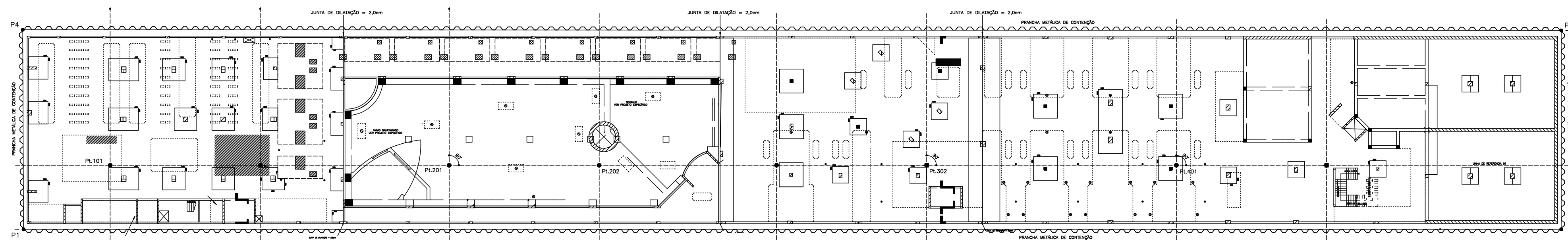


OBSERVAÇÃO: CUIDADO NA DEMOLIÇÃO DAS LAJES DESSE PAVIMENTO, POIS SÃO LAJES MACIÇAS PROTENDIDAS.

FORMA DO SUBSOLO (TETO DO PAV TÉCNICO)

ESCALA 1:400

## SUBSOLO - LAJE A CONSTRUIR



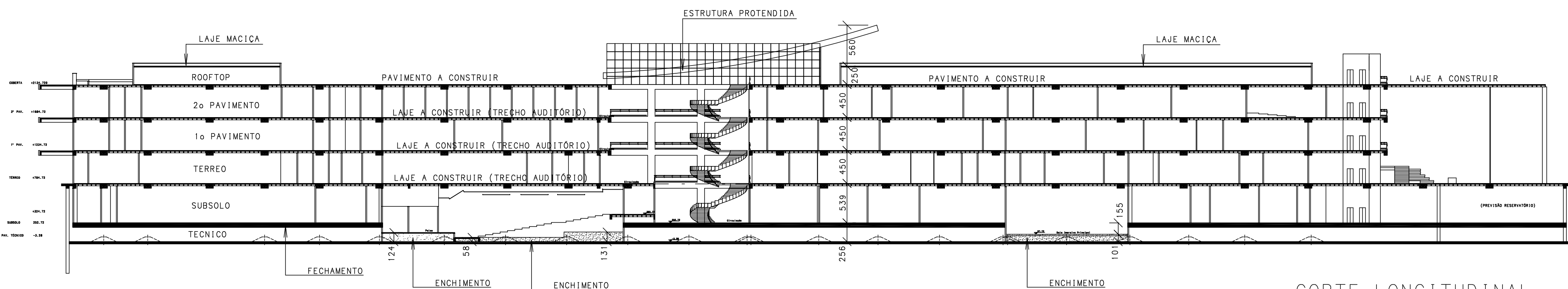
OBSERVAÇÃO: AS ESTRUTURAS A CONSTRUIR SÃO FECHAMENTOS DE VAZIOS

EXECUTAR LAJE h=14 cm

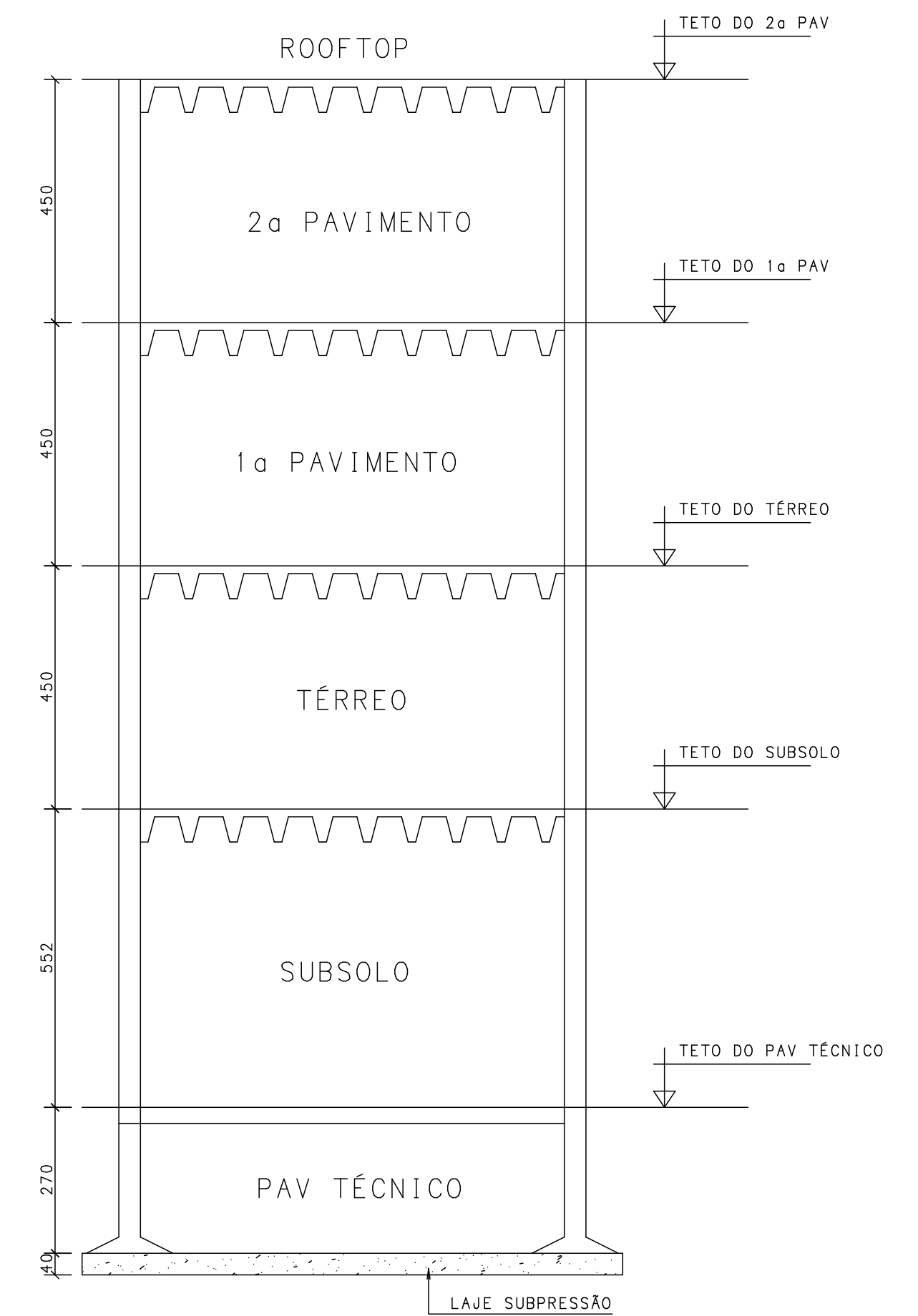
FORMA DO SUBSOLO (TETO DO PAV TÉCNICO)

ESCALA 1:400

LEGENDA	
	LAJE A CONSTRUIR
	LAJE A DEMOLIR
	BASE A DEMOLIR



CORTE LONGITUDINAL



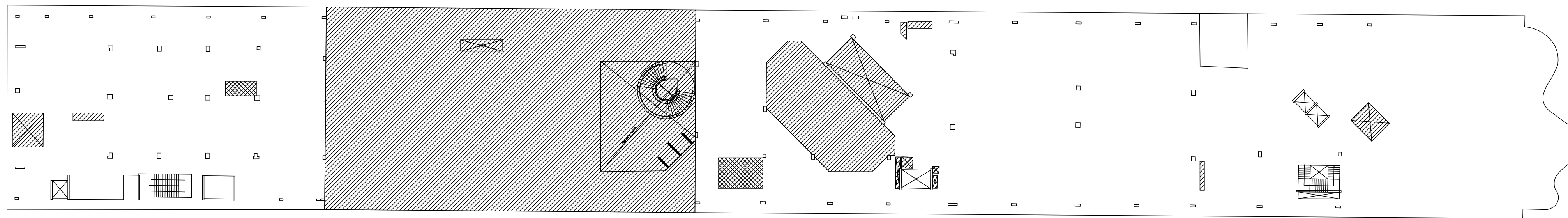
ESQUEMA VERTICAL

ESCALA 1:100

RO	VERSÃO ORIGINAL	04/09/2024
NÚMERO	MODIFICAÇÃO	DATA
<p>ASSOCIAÇÃO BRASILEIRA DE ENGENHARIA E CONSULTORIA ESTRUTURAL <b>ABECE</b> (SÓCIO/FUNDADOR) (ASSOCIADO)</p>	Fck =	30MPa
	Econcreto =	26000MPa
	Eaço =	210GPa
	CLASSE DE AGRESSIVIDADE:	CLASSE II (MODERADA)
	COBRIMENTO =	3,0cm
<p><b>WETTER L.T.</b> PROJETOS ESTRUTURAIS</p> <p>(85) 3234-4545 / 98733-8549</p> <p>www.wetterit.com.br - estrutura@wetterit.com.br</p> <p>FORTALEZA - CEARÁ</p>		
PROPRIETÁRIO: LABOMAR ACQUARIO CEARÁ	DATA: 04/09/2024	PORTFOLIO:
OBRA: PROJETO ESTRUTURAL DE INTERVENÇÃO		
PEÇAS DETALHADAS: ESQUEMA VERTICAL ESQUEMA VERTICAL		PRANCHA: 002/R0
		TOTAL DE PRANCHAS: 0006

ESTA PRANCHA NÃO PODERÁ SER EXECUTADA SEM ASSINATURA DO AUTOR DO PROJETO ESTRUTURAL ATRAVÉS DO REGISTRO DE UMA ANOTAÇÃO DE RESPONSABILIDADE TÉCNICA (ART) PERANTE O CONSELHO REGIONAL DE ENGENHARIA DO CEARÁ (CREA-CE)  
 KOPRER @PTDFCS@RUC 9067111F5-C 67 @B5-D5 7-FREG@RUC@157E1 5F-C @50CA@RFP 9F5-C@RUC@B5-9A53-D@B1 3F5-7@RUC@

INTERVENÇÕES DO PAVIMENTO TÉRREO

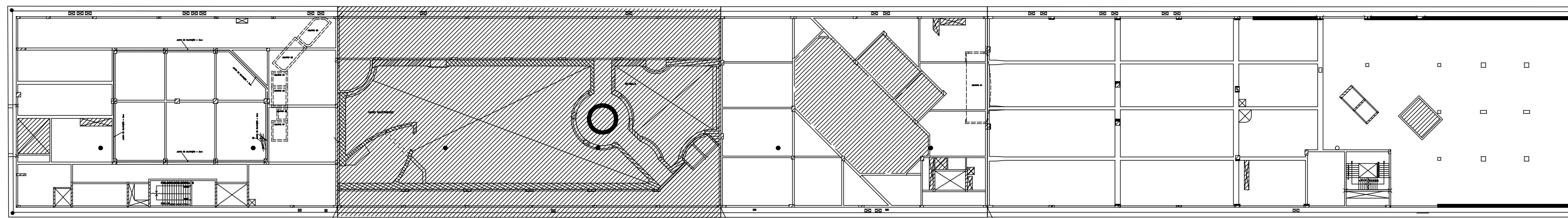


LEGENDA

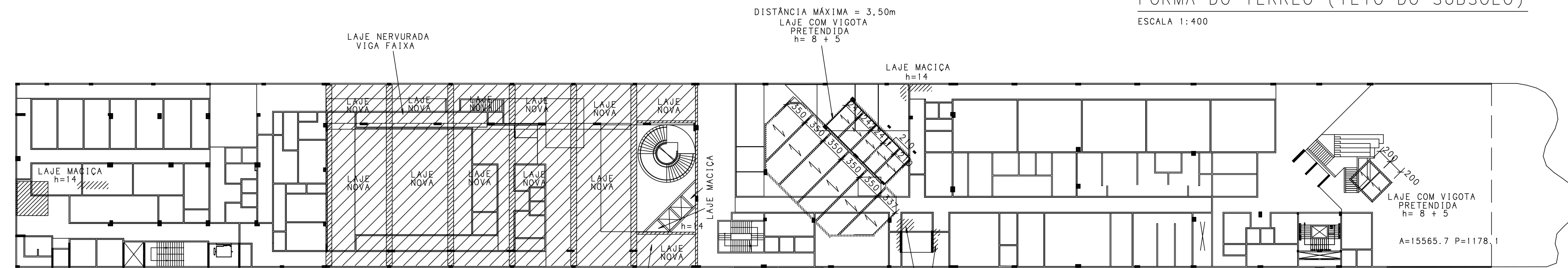
	LAJE A CONSTRUIR
	LAJE A DEMOLIR

FORMA DO TÉRREO (TETO DO SUBSOLO)  
ESCALA 1:400

TÉRREO - LAJE A CONSTRUIR



FORMA DO TÉRREO (TETO DO SUBSOLO)  
ESCALA 1:400

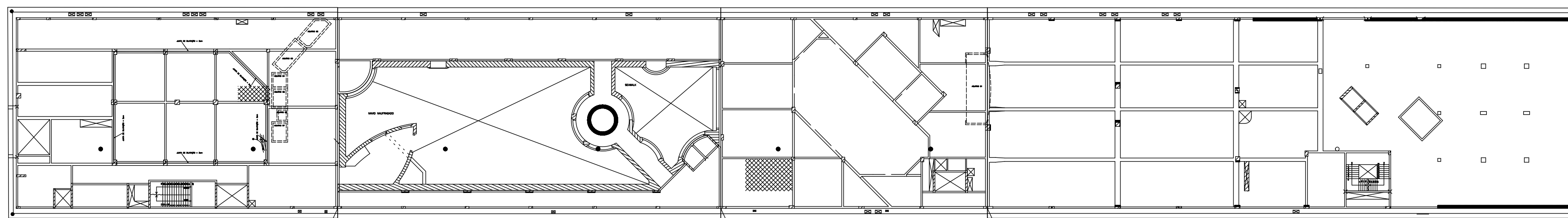


ÁREA LAJE PREMOLDADA PRETENDIDA: 272,0m<sup>2</sup>  
ALVENARIA: 30,0m

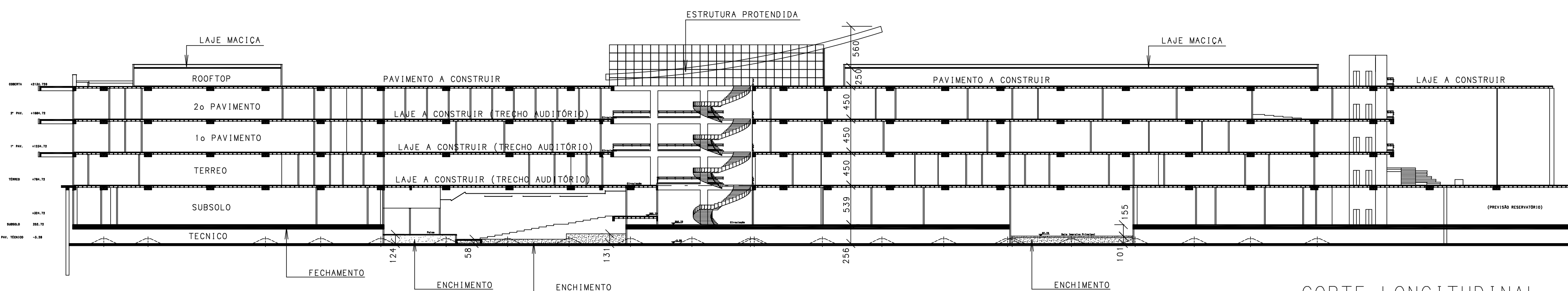
ATENÇÃO: TODAS AS MEDIDAS DEVERÃO SER CONFERIDAS NO PROJETO EXECUTIVO ANTES DA EXECUÇÃO

FORMA DO TÉRREO (TETO DO SUBSOLO)  
ESCALA 1:400

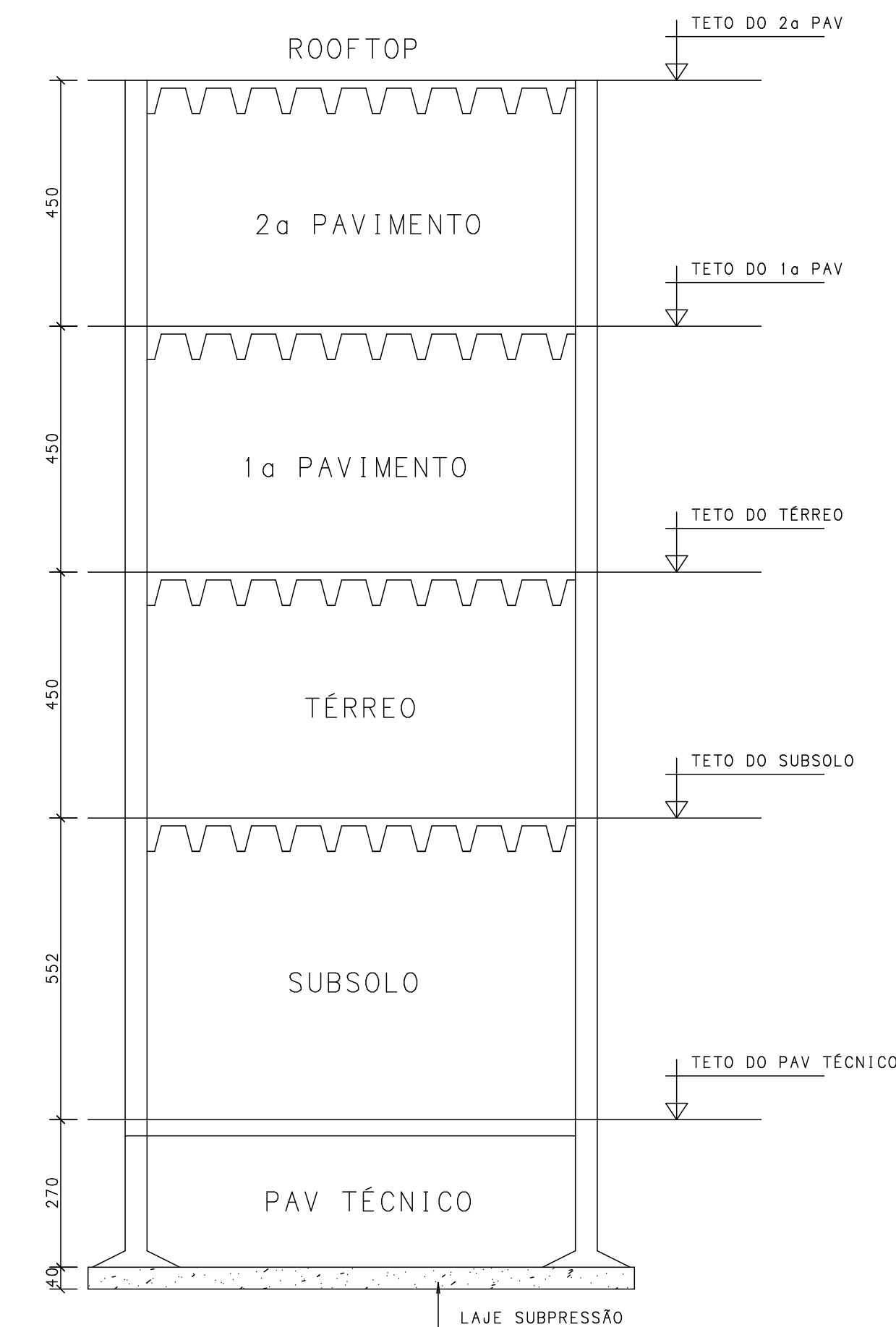
TÉRREO - LAJE A DEMOLIR



FORMA DO TÉRREO (TETO DO SUBSOLO)  
ESCALA 1:400



CORTE LONGITUDINAL

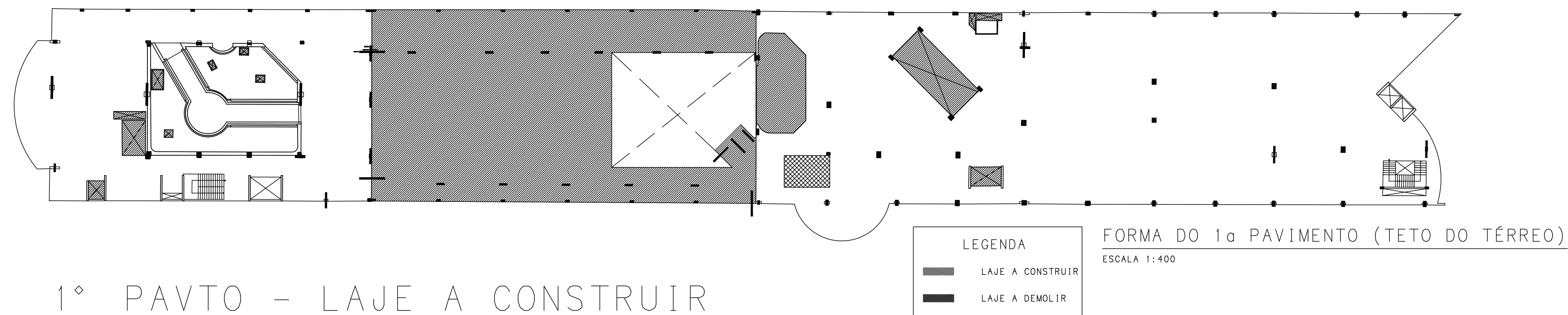


ESQUEMA VERTICAL  
ESCALA 1:100

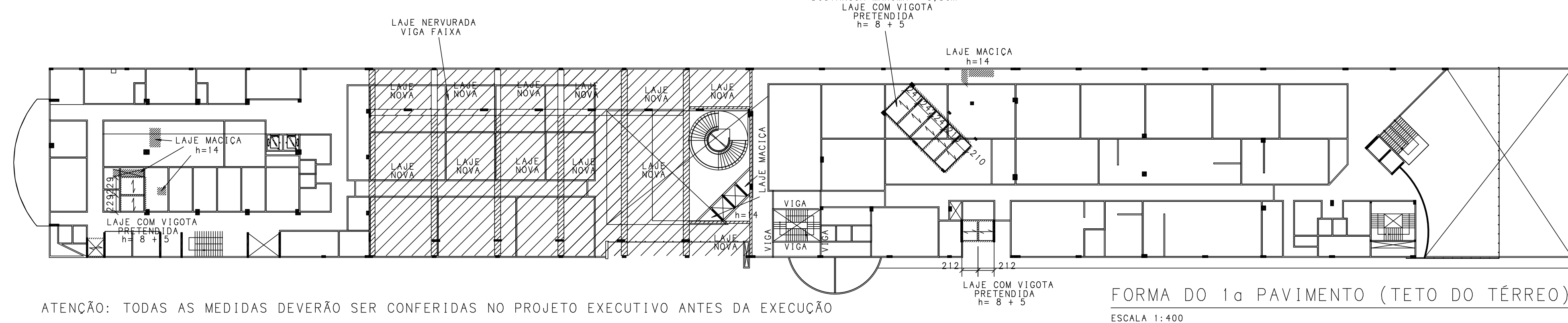
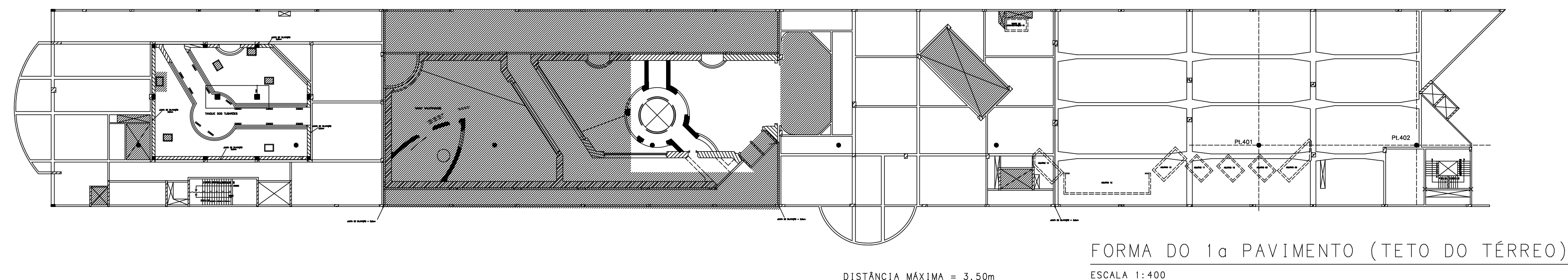
RO	VERSÃO ORIGINAL	04/09/2024
NÚMERO	MODIFICAÇÃO	DATA
 ASSOCIAÇÃO BRASILEIRA DE ENGENHARIA E CONSULTORIA ESTRUTURAL (SÓCIO/FUNDADOR)	Fck =	30MPa
	Econcreto =	26000MPa
	Eaco =	210GPa
	CLASSE DE AGRESSIVIDADE:	CLASSE II (MODERADA)
	COBRIMENTO =	3,0cm
 WETTER L.T. PROJETOS ESTRUTURAIS (85) 3234-4545 / 98733-8549 www.wetterit.com.br - estrutura@wetterit.com.br FORTALEZA - CEARÁ		
PROPRIETÁRIO: LABOMAR ACQUARIO CEARÁ	DATA: 04/09/2024	PORTFOLIO: 
OBRA: PROJETO ESTRUTURAL DE INTERVENÇÃO		PRANCHA: 003/R0
PEÇAS DETALHADAS: ESQUEMA VERTICAL ESQUEMA VERTICAL		TOTAL DE PRANCHAS: 0006

ESTA PRANCHA NÃO PODERÁ SER EXECUTADA SEM ASSINATURA DO AUTOR DO PROJETO ESTRUTURAL ATRAVÉS DO REGISTRO DE UMA ANOTAÇÃO DE RESPONSABILIDADE TÉCNICA (ART) PERANTE O CONSELHO REGIONAL DE ENGENHARIA DO CEARÁ (CREA-CE)

INTERVENÇÕES DO 1º PAVIMENTO



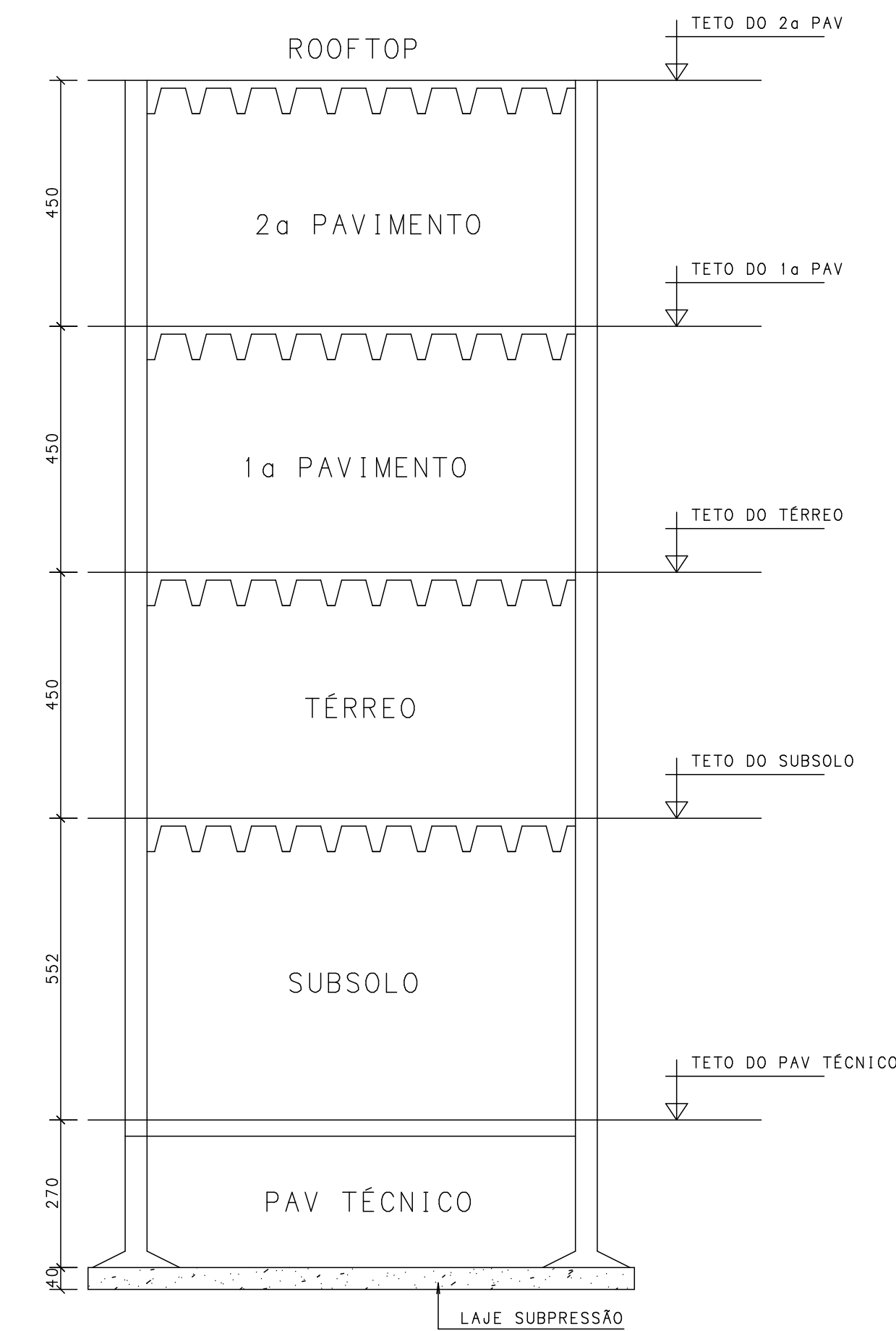
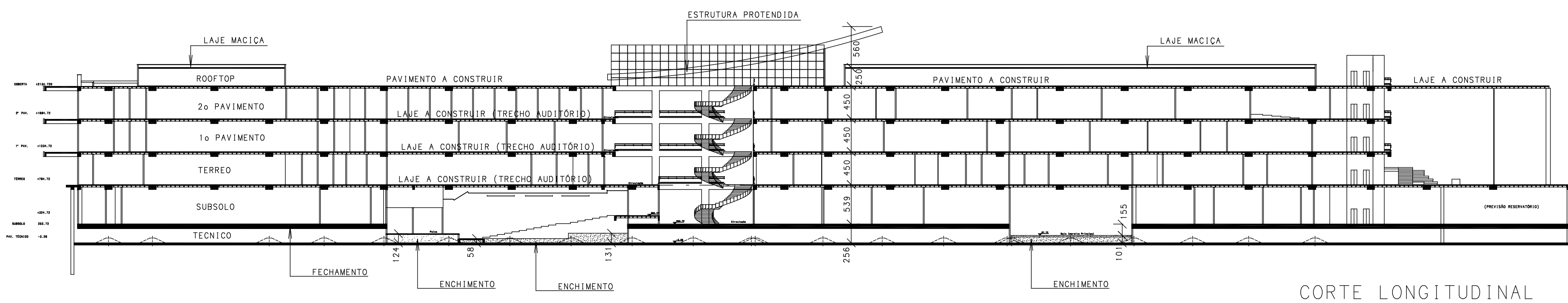
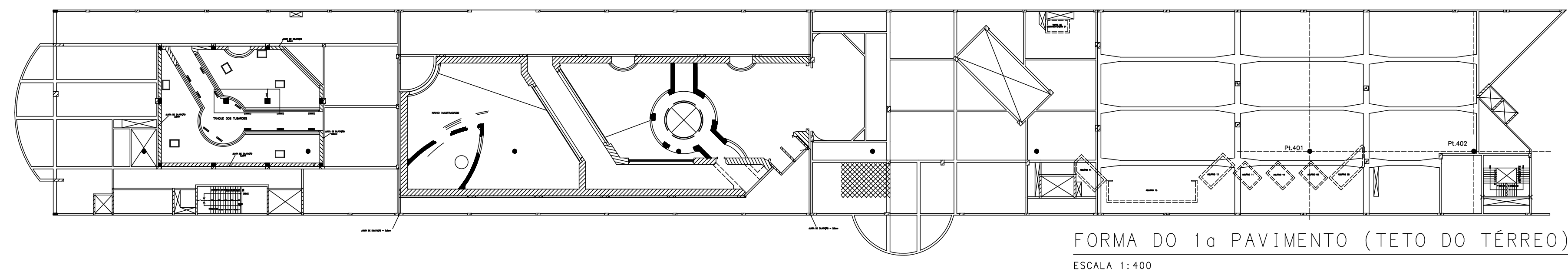
1º PAVTO - LAJE A CONSTRUIR



ATENÇÃO: TODAS AS MEDIDAS DEVERÃO SER CONFERIDAS NO PROJETO EXECUTIVO ANTES DA EXECUÇÃO

1º PAVTO - LAJE A DEMOLIR

ÁREA LAJE PREMOLDADA PRETENDIDA: 97,5m<sup>2</sup>  
 ALVENARIA: 18,0m



RO	VERSÃO ORIGINAL	04/09/2024
NÚMERO	MODIFICAÇÃO	DATA
ASSOCIAÇÃO GEARSENSE DE ENGENHARIA ESTRUTURAL  (SÓCIO/FUNDADOR)	Fck =	30MPa
	Econcreto =	26000MPa
	Eaco =	210GPa
	CLASSE DE AGRESSIVIDADE:	CLASSE II (MODERADA)
	COBRIMENTO =	3,0cm

**WETTER L.T.**  
 PROJETOS ESTRUTURAIS

(85) 3234-4545 / 98733-8549

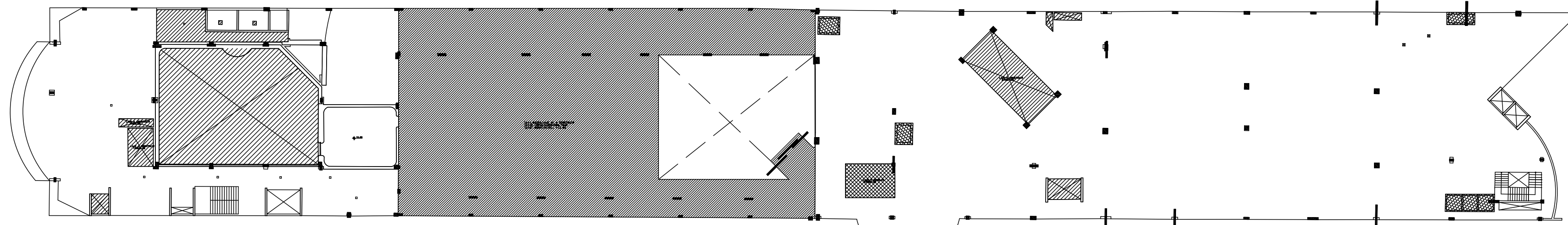
www.wetterit.com.br - estrutura@wetterit.com.br

FORTALEZA - CEARÁ

PROPRIETÁRIO: LABOMAR ACQUARIO CEARÁ	DATA: 04/09/2024	PORTFOLIO:
OBRA: PROJETO ESTRUTURAL DE INTERVENÇÃO		
PEÇAS DETALHADAS: ESQUEMA VERTICAL ESQUEMA VERTICAL		
PRANCHA: 004/R0		TOTAL DE PRANCHAS: 0006



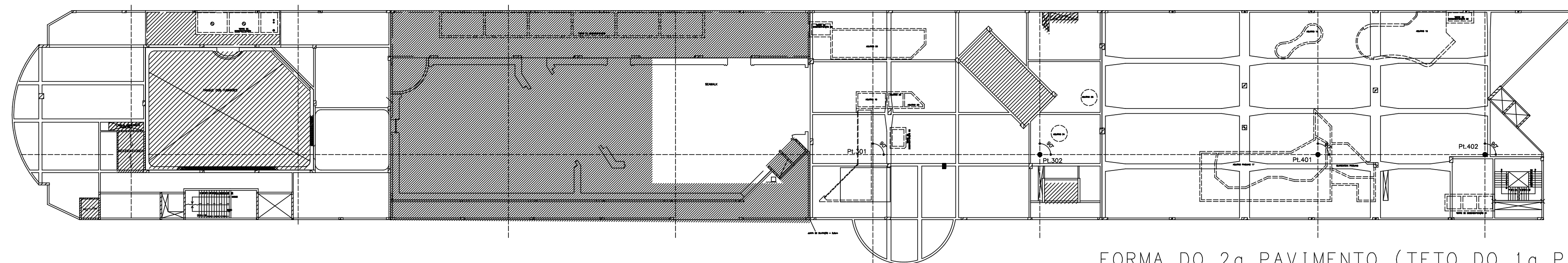
# INTERVENÇÃO ESTRUTURAL 2º PAVTO



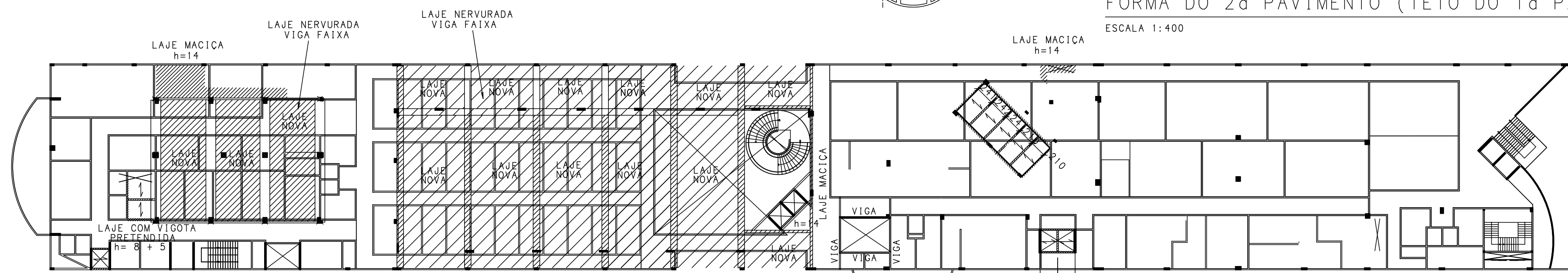
LEGENDA  
 ■ LAJE A CONSTRUIR  
 ■ LAJE A DEMOLIR

FORMA DO 2ª PAVIMENTO (TETO DO 1ª PAV)  
 ESCALA 1:400

## 2º PAVTO - LAJE A CONSTRUIR



FORMA DO 2ª PAVIMENTO (TETO DO 1ª PAV)  
 ESCALA 1:400

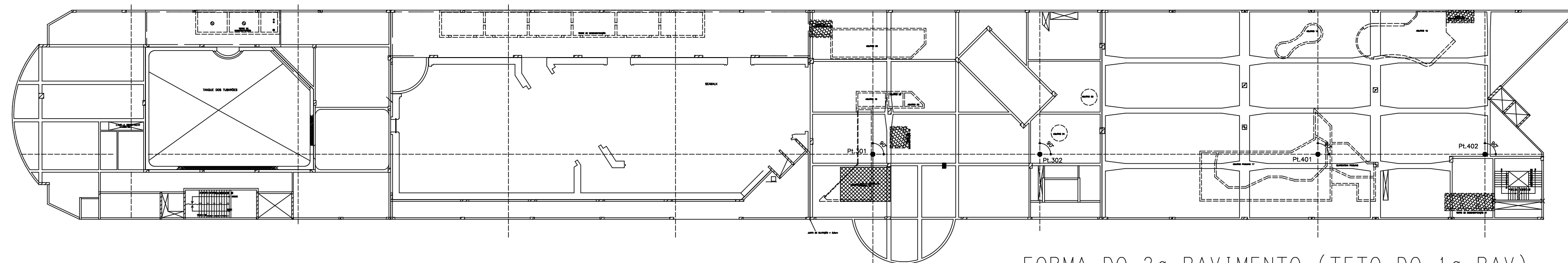


FORMA DO 2ª PAVIMENTO (TETO DO 1ª PAV)  
 ESCALA 1:400

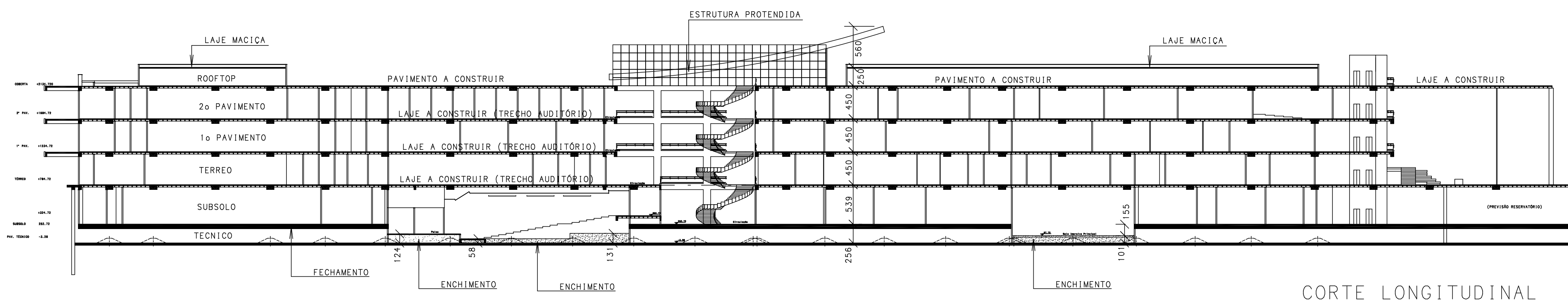
ATENÇÃO: TODAS AS MEDIDAS DEVERÃO SER CONFERIDAS NO PROJETO EXECUTIVO ANTES DA EXECUÇÃO

## 2º PAVTO - LAJE A DEMOLIR

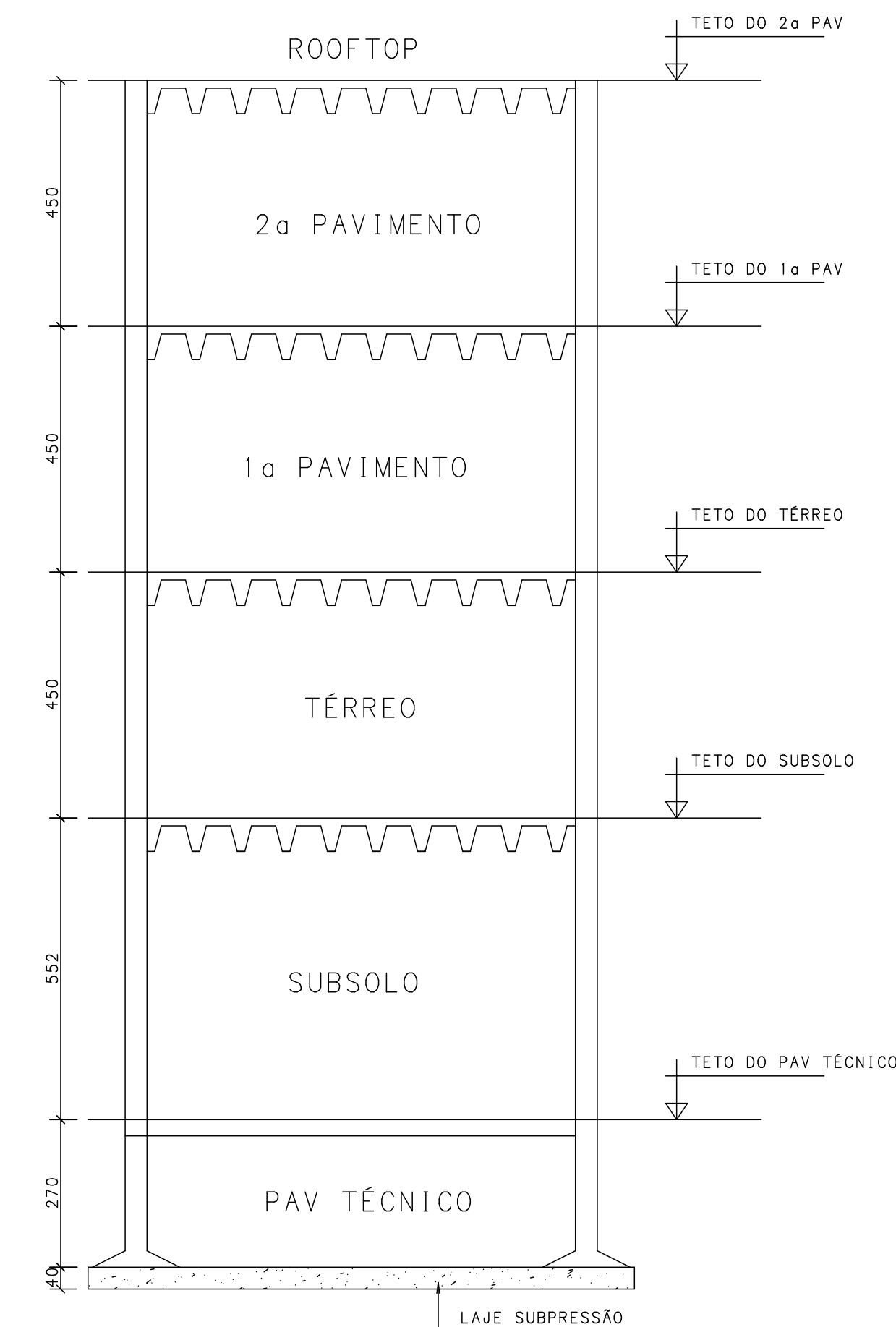
ÁREA LAJE PRETENDIDA: 97,5m<sup>2</sup>  
 ALVENARIA: 18,0m



FORMA DO 2ª PAVIMENTO (TETO DO 1ª PAV)  
 ESCALA 1:400



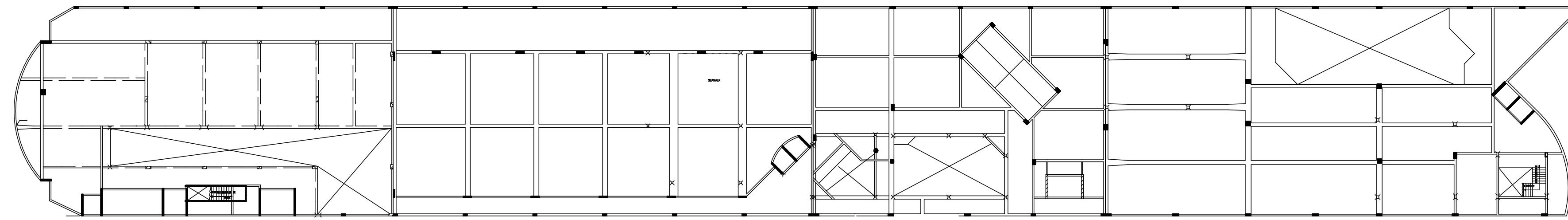
CORTE LONGITUDINAL



ESQUEMA VERTICAL  
 ESCALA 1:100

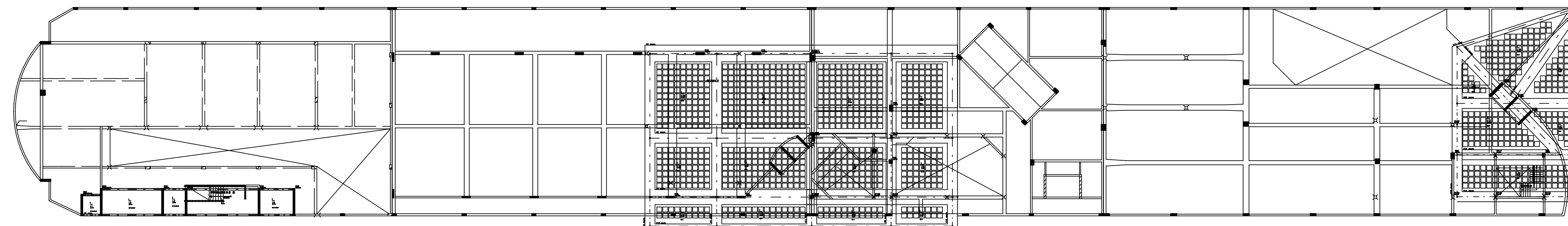
RO	VERSÃO ORIGINAL	04/09/2024
NÚMERO	MODIFICAÇÃO	DATA
<p>ASSOCIAÇÃO BRASILEIRA DE ENGENHARIA E CONSULTORIA ESTRUTURAL                  (ASSOCIADO)</p>	Fck =	30MPa
	Econcreto =	26000MPa
	Eaco =	210GPa
	CLASSE DE AGRESSIVIDADE:	CLASSE II (MODERADA)
COBRIMENTO =		3,0cm
<p><b>WETTER L.T.</b>                  PROJETOS ESTRUTURAIS</p> <p>(85) 3234-4545 / 98733-8549                  www.wetterit.com.br - estrutura@wetterit.com.br                  FORTALEZA - CEARÁ</p>		PROPRIETÁRIO: LABOMAR ACQUARIO CEARÁ DATA: 04/09/2024 PORTFOLIO: 
PEÇAS DETALHADAS: ESQUEMA VERTICAL ESQUEMA VERTICAL		PRANCHA: 005/R0 TOTAL DE PRANCHAS: 0006

ESTA PRANCHA NÃO PODERÁ SER EXECUTADA SEM ASSINATURA DO AUTOR DO PROJETO ESTRUTURAL ATRAVÉS DO REGISTRO DE UMA ANOTAÇÃO DE RESPONSABILIDADE TÉCNICA (ART) PERANTE O CONSELHO REGIONAL DE ENGENHARIA DO CEARÁ (CREA-CE)  
 K9989F @ F11DFCS-9800 9087F11F35-C 67 @B5- D05 7- PREGO33X(05)E1 9F-C @50A38FP-9F5-CPAC0B5-9A5) D0F1 3(05-7A5X) % - \$1-



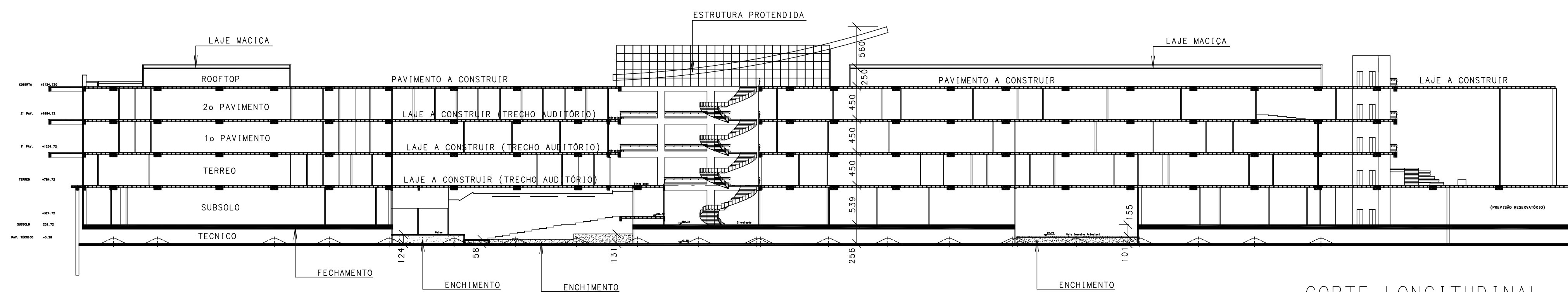
OBSERVAÇÃO: EXECUTAR PROJETO ESTRUTURAL DA ULTIMA LAJE

FORMA DO 3ª PAVIMENTO (TETO DO 2ª PAV)  
ESCALA 1:400

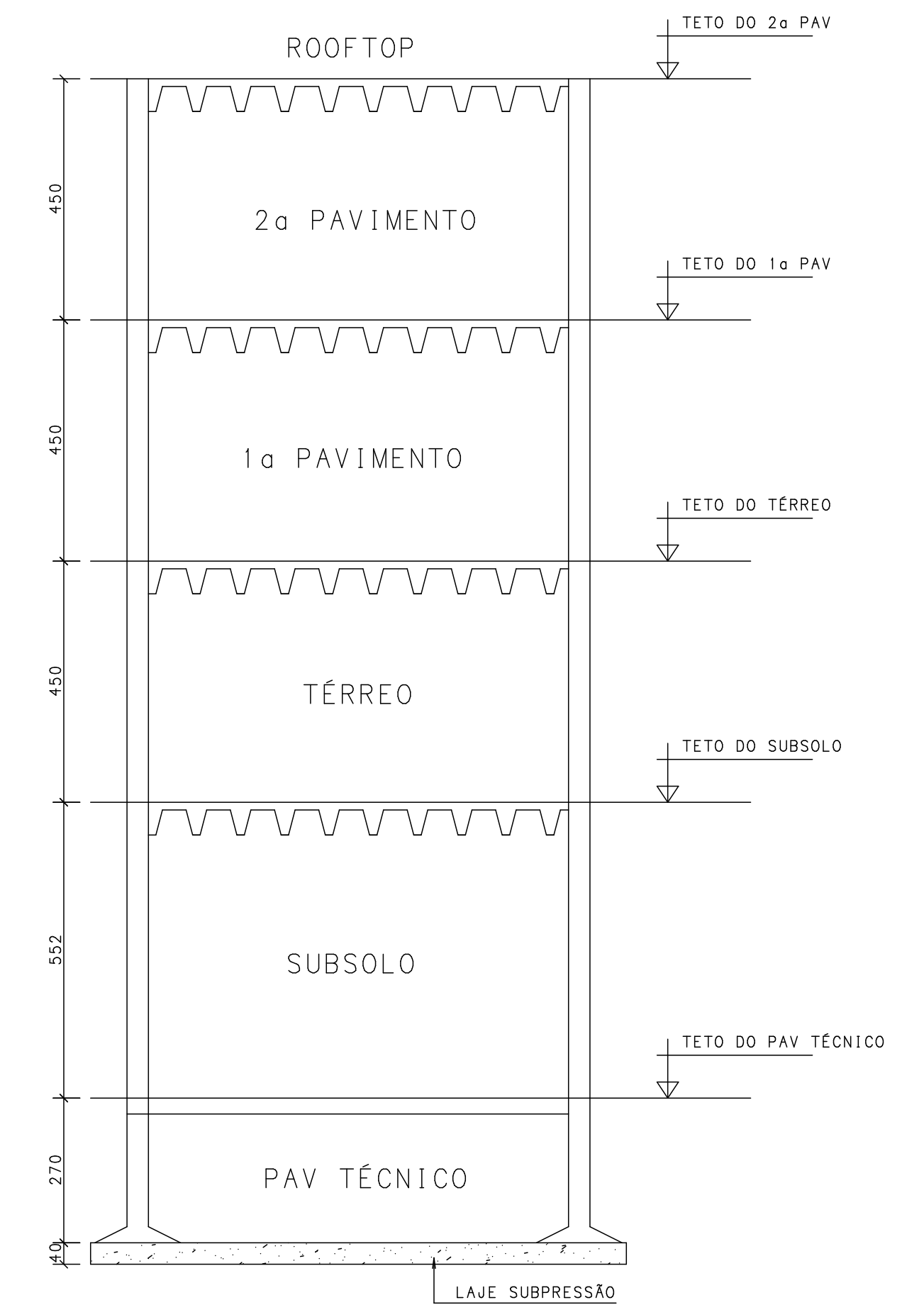


OBSERVAÇÃO: EXECUTAR PROJETO ESTRUTURAL DA ULTIMA LAJE

FORMA COBERTA DO ROOFTOP  
ESCALA 1:400



CORTE LONGITUDINAL



ESQUEMA VERTICAL  
ESCALA 1:100

RO	VERSÃO ORIGINAL	04/09/2024
NÚMERO	MODIFICAÇÃO	DATA
<p>ASSOCIAÇÃO CEARENSE DE ENGENHARIA ESTRUTURAL</p> <p>(SÓCIO/FUNDADOR)</p>	<p>ASSOCIAÇÃO BRASILEIRA DE ENGENHARIA E CONSULTORIA ESTRUTURAL</p> <p>(ASSOCIADO)</p>	Fck = 30MPa
		Econcreto = 26000MPa
		Eaco = 210GPa
		CLASSE DE AGRESSIVIDADE: CLASSE II (MODERADA)
		COBRIMENTO = 3,0cm
<p><b>WETTER L.T.</b> PROJETOS ESTRUTURAIS</p> <p>(85) 3234-4545 / 98733-8549</p> <p>www.wetterit.com.br - estrutura@wetterit.com.br</p> <p>FORTALEZA - CEARÁ</p>		PROPRIETÁRIO: LABOMAR ACQUARIO CEARÁ
DATA: 04/09/2024		PORTFOLIO: 
OBRA: PROJETO ESTRUTURAL DE INTERVENÇÃO		PRANCHA: 006/R0
PEÇAS DETALHADAS: ESQUEMA VERTICAL ESQUEMA VERTICAL		TOTAL DE PRANCHAS: EXTRA 601

ESTA PRANCHA NÃO PODERÁ SER EXECUTADA SEM ASSINATURA DO AUTOR DO PROJETO ESTRUTURAL ATRAVÉS DO REGISTRO DE UMA ANOTAÇÃO DE RESPONSABILIDADE TÉCNICA (ART) PERANTE O CONSELHO REGIONAL DE ENGENHARIA DO CEARÁ (CREA-CE)