



Ministério da Saúde

FIOCRUZ
Fundação Oswaldo Cruz



CONTRATAÇÃO DE OBRA DE REFORMA DE EDIFICAÇÃO
EXISTENTE VISANDO A IMPLANTAÇÃO DO BLOCO DE ENSINO
E PESQUISA DA FIOCRUZ RONDÔNIA EM PORTO VELHO/RO.

MEMORIAL DE CÁLCULO E DESCRITIVO


PROJETO EXECUTIVO

HVAC


OUTUBRO/2020

CONTRATO RDC ELETRÔNICO N.º 31/2019-COGIC
PROCESSO: 25389.000189/2017-19

MEMORIAL: 30000393-03-OS8-C00-HVA-MC-1001-R02


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CONTROLE DE REVISÃO					
REV.	DESCRIÇÃO	ELABORADO		APROVADO	
R00	EMIÇÃO INICIAL	RAYMOND	SETEMBRO 2020	SALIM	SETEMBRO 2020
R01	ATENDENDO A COMENTÁRIOS	RAYMOND	OUTUBRO 2020	SALIM	OUTUBRO 2020
R02	REVISÃO	RAYMOND	NOVEMBRO 2020	SALIM	NOVEMBRO 2020

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APRESENTAÇÃO

A ARCHITECTUS vem por meio deste documento apresentar o memorial descritivo da fase de Projeto Executivo de HVAC.


É importante que este documento seja visto em conjunto com os projetos apresentados para o perfeito entendimento de ambos.

Elementos Contratuais

Contrato de Serviços de Arquitetura e Engenharia nº 31/2019
 Processo nº 25389.000189/2017-19
 RDC Eletrônico nº 08/2019-COGIC
 Data de Assinatura do Contrato 12.08.2019
 Data da Ordem de Serviço 16.09.2019
 Prazo de Execução dos Serviços 540 (quinhentos e quarenta) dias
 Endereço do Empreendimento BR-364, Km 5,5 – Porto Velho - RO

Equipe Técnica

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1 INTRODUÇÃO

O Campus da Fiocruz localizado em Porto Velho – RO é composto por três empreendimentos (A, B e C) e uma previsão de expansão (D), conforme tabela abaixo:


CAMPUS FIOCRUZ RONDÔNIA		
EMPREENDIMENTO	Nº DO PRÉDIO	NOME DO PRÉDIO
A	-	Gestão e Ensino
	-	Eventos
	-	Auditório
	-	Subestação 3/Central Técnica
	-	Guarita 1
	-	Guarita 2
B	B01	Bloco de Laboratórios Fase A
	B02	Bloco de Laboratórios Fase B
	B03	Biotério
	B04	Apoio Técnico e Logístico
	B05	Central de Resíduos
	B06	Central de Água Gelada
	B07	Central de Gases
	B08	Subestação 1
	B09	ETE
	B10	ETA/Castelo d'água
	B11	Galinheiro
	B12	Cabine de Entrada
	B13	Depósito de Inflamáveis
	B14	Cisterna
	B15	Compostagem
C	C00	Ensino e Pesquisa
D (Expansão)	-	Laboratórios
	-	Curral de Lhamas

Tabela 1 - Empreendimentos do Campus Fiocruz-RO

1.1 EDIFICAÇÃO


O objeto desse relatório é o prédio C00 - Ensino e Pesquisa. Por ser executado na Fase 01, que é a primeira fase de execução do campus, o bloco concentrará, inicialmente, todas as atividades do Campus.

O prédio possui pavimento térreo, superior e técnico, contendo ambientes para pesquisa, laboratórios, biotério, copas, salas de aula e administrativas, banheiros e vestiários.

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1.2 OBJETIVO


Este documento tem por objetivo descrever e especificar os materiais e equipamentos dos sistemas de ar condicionado e ventilação mecânica da fase de Projeto Executivo e complementar as informações constantes nos desenhos do Empreendimento C, prédio Ensino e Pesquisa.

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2 HVAC


2.1 DOCUMENTOS DE REFERÊNCIA

30000393-03-OS5-G00-GRL-CE-0001	CADERNO DE ENCARGOS E ESPECIFICAÇÕES
30000393-03-OS8-C00-HVA-DE-1001	PL. BAIXA PAV. TÉRREO - SETOR A
30000393-03-OS8-C00-HVA-DE-1002	PL. BAIXA PAV. TÉRREO - SETOR B
30000393-03-OS8-C00-HVA-DE-1003	PL. BAIXA PAV. SUPERIOR - SETOR A
30000393-03-OS8-C00-HVA-DE-1004	PL. BAIXA PAV. SUPERIOR - SETOR B
30000393-03-OS8-C00-HVA-DE-1005	PL. BAIXA PAV. TÉCNICO - SETOR A
30000393-03-OS8-C00-HVA-DE-1006	PL. BAIXA PAV. TÉCNICO - SETOR B
30000393-03-OS8-C00-HVA-DE-1007	PL. DE ZONEAMENTO PAV. TÉRREO - SETOR A
30000393-03-OS8-C00-HVA-DE-1008	PL. DE ZONEAMENTO PAV. TÉRREO - SETOR B
30000393-03-OS8-C00-HVA-DE-1009	PL. DE ZONEAMENTO PAV. SUPERIOR - SETOR A
30000393-03-OS8-C00-HVA-DE-1010	PL. DE ZONEAMENTO PAV. SUPERIOR - SETOR B
30000393-03-OS8-C00-HVA-DE-1011	PL. DE CASCATA DE PRESSÕES PAV. TÉRREO - SETOR A
30000393-03-OS8-C00-HVA-DE-1012	PL. DE CASCATA DE PRESSÕES PAV. TÉRREO - SETOR B
30000393-03-OS8-C00-HVA-DE-1013	PL. DE CASCATA DE PRESSÕES PAV. SUPERIOR - SETOR A
30000393-03-OS8-C00-HVA-DE-1014	PL. DE CASCATA DE PRESSÕES PAV. SUPERIOR - SETOR B
30000393-03-OS8-C00-HVA-DE-1015	CORTES AA BB
30000393-03-OS8-C00-HVA-DE-1016	DETALHES EXECUTIVOS 1
30000393-03-OS8-C00-HVA-DE-1017	DETALHES EXECUTIVOS 2
30000393-03-OS8-C00-HVA-DE-1018	FLUXOGRAMA DE AR
30000393-03-OS8-C00-HVA-DE-1019	FLUXOGRAMA DE ÁGUA GELADA
30000393-03-OS8-C00-HVA-DE-1020	CORTES CC DD EE FF
30000393-03-OS8-C00-HVA-LM-1001	LISTA DE EQUIPAMENTOS

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2.2 NORMAS TÉCNICAS APLICÁVEIS

- NBR 16101 – Filtros para partículas em suspensão no ar – Determinação da eficiência para filtros grossos, médios e finos;
- NBR 16401 – Instalações centrais de ar condicionado para conforto, Parte 1, 2 e 3;
- ASHRAE – American Society of Heating, Refrigeration and Air Conditioning Engineers;
- SMACNA – Sheet Metal and Air Conditioning Contractors National Association;
- SMACNA – Manuais HVAC duct system design e HVAC duct construction standards a serem utilizados no projeto e fabricação das redes de dutos.
- SMACNA – Manual distribution system - as recomendações contidas neste manual deverão ser seguidas por ocasião do “start up”, balanceamento e regulação das instalações.
- ASTM – American Society for Testing and Materials;
- AMCA – Air Movement & Control Association International;
- DW 143 - Ductwork Leakage Testing
- ANSI – American National Standards Institute;
- Organização Mundial da Saúde – OMS - Manual de Segurança Biológica em Laboratório – Terceira edição - 2004
- Ministério da Saúde – Portaria 3523/GM (28/08/1998) - Qualidade do ar de interiores e prevenção de riscos à saúde dos ocupantes de ambientes climatizados;
- ANVISA – Agência Nacional de Vigilância Sanitária – Resolução 09 (16/01/2003) - Revisão e atualização da RE 176 padrões referenciais de qualidade de ar interior em ambientes climatizados artificialmente de uso público e coletivo;

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3 PARÂMETROS DO PROJETO

3.1 LOCAL / ESTADO

O empreendimento estará localizado na cidade de Porto Velho, Rondônia.

3.2 CONDIÇÕES EXTERNAS

Valores retirados da NBR 16401-1, Tabela A.


	VERÃO – Para desumidificação – Ar externo total (*)	VERÃO – Para resfriamento	INVERNO – Para aquecimento
Temperatura de bulbo seco	35,5°C	35,5°C	17,6°C
Temperatura de bulbo úmido	27,7°C	25,7°C	

(*) O Termo de referência solicita TPO = 26,8 °C e W = 22,7 g/Kg. Os valores indicados no projeto são mais rígidos que o do TR;

3.3 CONDIÇÕES INTERNAS

AMBIENTE	TEMPERATURA DE BULBO SECO (°C)	UMIDADE RELATIVA (%)	AQUECI- MENTO	CLASSE DE FILTRAGEM
ADMINISTRATIVO	23+/-1	Max 65	Não	G3/F5 (*)
BIOTÉRIO	21 +/- 1	60% +/- 10	Sim	G4/F5/F9
FREEZERS	22 +/- 1	Max 65	Sim	G3/F5/F7
Demais laboratórios	22 +/- 1	50 +/- 10	Sim	G3/F5/F7

(*) Áreas atendidas por fancoletes terão classe de filtragem G3 e ar externo tratado (DOAS) com filtragem G3/M5

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3.4 DISSIPACÕES

O projeto deverá indicar os valores de dissipação térmica considerados na iluminação, pessoas e equipamentos, por ambiente, utilizando no mínimo:

▪ Iluminação

- Ambientes comuns 10 W/m².

▪ Pessoas

- Ambientes ocupação conforme layout;
- Dissipação ambientes em geral 75 W_{sensível}/pessoa; 55 W_{latente}/pessoa;

3.5 TAXA DE AR EXTERNO

- Ambientes comuns: 27 m³/h por pessoa – conforme Portaria nº 3523 da ANVISA;
- Salas de reunião e auditórios: 17 m³/h por pessoa – conforme Resolução nº 09 da ANVISA;


3.6 VENTILAÇÃO MECÂNICA

- Vestiários.....10 T/h;
- Sanitários.....25l/h bacia (ou mictório);

3.7 CERTIFICAÇÕES

O sistema de climatização atenderá aos seguintes itens:

- Ashrae 62.1-2010 - Taxas de renovação de ar
- Ashrae 62.1-2010 - Taxas de exaustão
- Ashrae 90.1-2019 – Eficiência de equipamentos
- Chillers com refrigerantes livres de CFC
- Variadores de frequência nas bombas de água gelada dos circuitos secundários e em todos os condicionadores de ar e ventiladores com filtragem acima da classe G3.

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Todas as soluções foram conduzidas com intuito de atendimento integral à Legislação do PROCEL - PBE Edifica para a obtenção da etiquetagem da edificação, Nível A, de modo a atender a IN-01/2010 do Ministério do Planejamento.

3.8 FILTRAGEM DO AR

A filtragem mínima associada a condicionadores de áreas laboratoriais que operem em regime de 100% de ar exterior será composta por:

- Pré-filtragem: classe G4 + M5 (MERV 8 + 10);
- Filtragem final: classe F9 (MERV 15);
- A filtragem mínima associada aos demais condicionadores de áreas laboratoriais será composta por:
- Pré-filtragem: classe G4 + M5 (MERV 8 + 10);
- Filtragem final: classe F7 (MERV 12);
- A exaustão dos Biotérios será dotada de filtragem terminal com carvão ativado com pré-filtragem classe G4 + M5 (MERV 8 + 10), para prevenção de odores.


3.9 DESCARGA DE AR DOS LABORATÓRIOS

A descarga de exaustão proveniente destes ambientes será realizada na cobertura de edificação, através de ejetor de alta indução, que promova jatos verticais de alta velocidade (>10m/s), e proteção contra intempéries.

3.10 CABINES/CAPELAS CONSIDERADAS NO PROJETO

PLANTA TÉRREO - DISTRIBUIÇÃO DE CABINES/CAPELAS				
Descrição		Largura (m)	Vazão de exaustão para fora do prédio	Tipo de cabine/Capela
BIOTÉRIO				
CÓD. 232 - FLUXO LAMINAR PACHANE	Sala de Procedimento	0,8	0	Classe I, de bancada, com descarga no próprio ambiente
Fluxo laminar	Teste Comportamental	1,0	400	Classe II-A2, de piso, com descarga de ar para fora do prédio
LABORATÓRIO ENTOMOLOGIA				
CÓD. 2072 - Fluxo Laminar PACHANE		0,8	0	Classe I, de bancada, com descarga no próprio ambiente
Capela de exaustão de gases - GRANDE		1,5	3600	Capela de piso, com descarga de ar para fora do prédio
PREPARO DE SOLUÇÕES				
Capela de exaustão de gases - PEQUENA		0,8	600	Capela de bancada, com descarga de ar para fora do prédio
BIOLOGIA MOLECULAR				
CÓD. 2669 - CSB Pachane	Sala de Extração Pesquisa	1,15	0	Classe II-A1, de piso, com descarga de ar no próprio ambiente
2 CSB	Sala de Extração Pesquisa	1,35	0	Classe II-A1, de piso, com descarga de ar no próprio ambiente
CÓD. 510 - Fluxo Laminar TROX	Sala Pré- Mix Pesquisa	0,8	0	Classe I, de bancada, com descarga no próprio ambiente
2 CSB	Sala Pré- Mix Pesquisa	1,35	0	Classe II-A1, de piso, com descarga de ar no próprio ambiente
EXPRESSÃO RECOMBINANTE				
CÓD. 321 - Fluxo Laminar		0,8	0	Classe I de bancada, com descarga de ar para fora do prédio
CÓD. 261 - CSB PACHANE		1,5	0	Classe II-A1, de piso, com descarga de ar no próprio ambiente
CÓD. 2126 - Fluxo Laminar		0,8	0	Classe I de bancada, com descarga de ar para fora do prédio

PLANTA SUPERIOR - DISTRIBUIÇÃO DE CABINES/CAPELAS				
Descrição		Largura (m)	Vazão de exaustão para fora do prédio	Tipo de cabine/Capela
CULTURA DE VÍRUS				
CÓD. 2177 - CSB B2 PACHANE		1,15	1360	Classe II-B2, de piso, com descarga de ar para fora do prédio
CULTURA CELULAR				
CÓD. 2792 - CSB Filterlux		0,8	0	Classe II-A1, de bancada, com descarga de ar no próprio ambiente
CÓD. 959 - CSB PACHANE		1,0	0	Classe II-A1, de piso, com descarga de ar no próprio ambiente
CULTURA PARASITO				
CÓD. 1768 - CSB PACHANE		1,0	0	Classe II-A1, de piso, com descarga de ar no próprio ambiente
CÓD. 1941 - Fluxo Laminar		0,8	0	Classe I de bancada, com descarga de ar para fora do prédio
CÓD. 960 - Fluxo Laminar TROX		1,5	0	Classe I de piso, com descarga de ar para fora do prédio
LABORATÓRIO IMUNOLOGIA/ PBML/ NIMFAR				
CÓD. 686 - CSB PACHANE		1,0	0	Classe II-A1, de piso, com descarga de ar no próprio ambiente
CÓD. 601 - Fluxo Laminar		1,3	0	Classe I de piso, com descarga de ar para fora do prédio
		0,8	600	Capela de bancada, com descarga de ar para fora do prédio
CÓD. 3023 - Capela de exaustão de gases		1,1	900	Capela de piso, com descarga de ar para fora do prédio
CULTURA DE BACTÉRIAS				
CÓD. 469 - CSB VECO		1,3	1360	Classe II-B2, de piso, com descarga de ar para fora do prédio
CSB Classe II - A2 - Modelo BIOSAFE A2-12- AT INOX 304		1,3	560	Classe II-A2, de piso, com descarga de ar para fora do prédio
LABORATÓRIO MICROBIOLOGIA/ VIROLOGIA E EPIDEMIOLOGIA				
CÓD. 421 - Fluxo Laminar AMERSHAM		0,8	600	Capela de bancada, com descarga de ar para fora do prédio.
CÓD. 2334 - Fluxo Laminar PACHANE		0,8	0	Classe I de piso, com descarga de ar no próprio ambiente
1 Fluxo Laminar		1,3	0	Classe I, de piso, com descarga no próprio ambiente
BIOLOGIA MOLECULAR				
CÓD. 1432 CSB PACHANE	Sala Extração Rotina	1,2	0	Classe II-A1, de piso, com descarga de ar no próprio ambiente
CÓD. 511 - CSB VECO	Sala Extração Rotina	1,35	560	Classe II-A2, de piso, com descarga de ar para fora do prédio
1 CSB	Sala Extração Rotina	1,5	0	Classe II-A1, de piso, com descarga de ar no próprio ambiente
CÓD. 1869 - Fluxo Laminar LOCCUS	Sala Pré Mix Rotina	0,8	0	Classe I, de bancada, com descarga no próprio ambiente
2 Fluxo Laminar	Sala Pré Mix Rotina	1,35	0	Classe I, de piso, com descarga no próprio ambiente

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3.11 CONTROLE DE PRESSÃO DOS AMBIENTES

A vazão de insuflação e exaustão em cada ambiente será constante e garantido através de registros mecânicos de vazão constante. O controle de pressão dos ambientes será feito mediante o balanceamento do sistema – para pressão positiva, vazão de insuflação maior que a de retorno/exaustão; Para pressão negativa, vazão de insuflação inferior a de retorno/exaustão.

3.12 RENOVAÇÃO DE AR DOS AMBIENTES

- Biotério – 15 ren/h
- Laboratório de Entomologia, Preparo de Soluções, Laboratório de imunologia e Laboratório de Microbiologia, dotados de capelas de exaustão, terão a taxa mínima de renovação de ar interno com ar exterior de, no mínimo 4 ren/h (renovações por hora)


3.13 AMBIENTES COM 100% DE AR EXTERNO

- Biotério (Térreo)
- Pesquisa Extração DNA e Pesquisa Premix DNA (Térreo)
- Pesquisa DNA PCR e Pesquisa DNA Pos PCR (Térreo)
- Rotina Extração RNA e Rotina Premix RNA (Superior)
- Rotina PCR RNA e Rotina Pos PCR RNA (Superior)
- Circulação limpa (Térreo e Superior)
- Cultura de Vírus (Térreo)
- Cultura Bactérias (Superior)
- Preparo Esterilização (Térreo)
- Lavagem (Térreo)
- Preparo Soluções Reagentes (Térreo)
- Lavagem Expurgo (Superior)

3.14 EQUIPAMENTOS RESERVAS

As seguintes áreas terão condicionadores de ar reserva:

- Biotério (Térreo) – Condicionador de ar e ventilador de exaustão
- Freezers (térreo e Superior)
- Sala de Nobreak (Técnico)
- CPD/TI (Térreo)

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4 DESCRIÇÃO DOS SISTEMAS

4.1 DESCRIÇÃO GERAL

4.1.1 SISTEMA DE RESFRIAMENTO

A carga térmica máxima é em 200 TR. O resfriamento do edifício será feito na Central de Água Gelada (B06) com chillers com condensação a ar com circuito primário e secundário de água gelada. A CAG atenderá também aos prédios de Laboratório e Biotério, que não estão contemplados no presente documento. Cada prédio terá um circuito secundário com vazão variável conforme a operação do prédio.

Um sistema de controle de corrosão e tratamento biocida será fornecido para o sistema de água gelada.

Distribuição de água gelada será feita com tubulação de aço carbono isolada termicamente + cavaletes de interligação de todos os equipamentos e válvulas de balanceamento tipo dinâmicas (uma para cada condicionador de ar);

4.1.2 SISTEMA DE AQUECIMENTO

O sistema de aquecimento será feito com bateria de resistências elétricas:

- Nos condicionadores de ar – Para reaquecimento em modo de desumidificação. O sensor de umidade no duto de retorno/exaustão aciona a válvula de controle de água gelada. Se a temperatura estiver adequada, mas a umidade não, o aquecimento deverá operar para não permitir que a temperatura desça abaixo do set point;
- Nos ambientes laboratoriais – Nos condicionadores de ar que atendem vários ambientes, os sensores no duto de retorno/exaustão controlam somente a mistura do ar que vem dos diversos ambientes. Para permitir o ajuste fino da temperatura de cada ambiente, haverá resistências elétricas comandadas por termostato de ambiente;


4.2 DESCRIÇÕES ESPECÍFICAS DE CADA AMBIENTE CLIMATIZADO

4.2.1 SISTEMA DE DISTRIBUIÇÃO DE AR DOS LABORATÓRIOS

Os laboratórios e todos os escritórios associados serão atendidos por condicionadores de ar, conforme a planta de zoneamento.

A distribuição de ar nos laboratórios (insuflação e retorno/exaustão) terá vazão de ar constante a ser garantida por caixas de vazão constante (VAC) dotadas de resistências elétricas que serão controladas por termostatos de ambiente.

A pressão de cada ambiente laboratorial será balanceada conforme a planta de cascata de pressões.

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Nos laboratórios, haverá um manômetro diferencial para indicar a pressão (negativa) do laboratório em relação ao corredor público.

Os laboratórios terão controle de umidade relativa de acordo com a **tabela de condições internas**.

Além dos laboratórios, um conjunto de condicionadores de ar atenderá também salas de aula e áreas administrativas da parte 1. A distribuição de ar nessas áreas será feita por fancoletes individuais para cada ambiente.

4.2.2 SISTEMA DE EXAUSTÃO DOS LABORATÓRIOS

Os laboratórios poderão ter três tipos de sistemas de ventilação:

1. Exaustão de cabines/capelas
 - Atendem as cabines/capelas indicadas no projeto.
2. Exaustão do ambiente
 - Atendem às necessidades do ambiente para eliminação de cheiro ou contaminantes.
3. Extrapurgação
 - Atendem às necessidades de exaustão para viabilizar o controle de pressões indicadas na planta de cascata de pressão.

Os laboratórios (exceto os de pesquisa e rotina extração e pre mix DNA e RNA) terão pressão negativa em relação à circulação.

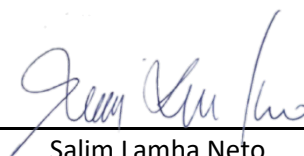
As CSB classe II-A2 terão sistema de exaustão de ar com duto terminando em coifa instalada 10 cm acima do colarinho de descarga de ar na parte superior da CSB. Dessa forma se a CSB não estiver em operação, a exaustão continuará em operação, succionando o ar do ambiente.


As CSB classe II-B2 e capelas químicas terão sistema de exaustão de ar com desvio para uma grelha de exaustão no ambiente. Quando a CSB/capela não estiver operante, dampers motorizados desviarão a vazão para a grelha de ambiente.

4.2.3 SISTEMA DE EXAUSTÃO DOS SANITÁRIOS

Os banheiros e outras áreas que necessitam de exaustão geral serão servidos por dois ventiladores de exaustão, sendo um operante e outro reserva e rede de dutos e grelhas de exaustão.

Fortaleza, 09 de outubro de 2020.


 Salim Lamha Neto
 Responsável Técnico

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ANEXO A **MEMÓRIA DE CÁLCULO** **ENSINO E PESQUISA**

Air System Sizing Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-01**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **13**
Floor Area **90,5** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **26,4** kW
Sensible coil load **17,9** kW
Coil L/s at Jun 1400 **1214** L/s
Max block L/s **1214** L/s
Sum of peak zone L/s **1214** L/s
Sensible heat ratio **0,678**
L/(s kW) **46,0**
m²/kW **3,4**
W/m² **291,6**
Water flow @ 7,5 K rise **0,84** L/s

Load occurs at **Jun 1400**
OA DB / WB **34,6 / 25,6** °C
Entering DB / WB **23,5 / 17,6** °C
Leaving DB / WB **11,2 / 10,7** °C
Coil ADP **9,8** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **14,0** °C
Zone T-stat Check **13 of 13** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **11,2** kW
Coil L/s at Des Htg **1214** L/s
Max coil L/s **1214** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **123,6**
Ent. DB / Lvg DB **12,7 / 20,4** °C

Supply Fan Sizing Data

Actual max L/s **1214** L/s
Standard L/s **1201** L/s
Actual max L/(s·m²) **13,41** L/(s·m²)

Fan motor BHP **1,91** BHP
Fan motor kW **1,52** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **287** L/s
L/(s·m²) **3,17** L/(s·m²)

L/s/person **20,49** L/s/person

Zone Sizing Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-01**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **13**
Floor Area **90,5** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	108	108	14,21	0,0	0,00	0,0	0,00	0
Zone 2	56	56	25,23	1,4	0,03	0,0	0,00	0
Zone 3	64	64	11,64	0,0	0,00	0,0	0,00	0
Zone 4	108	108	14,03	0,0	0,00	0,0	0,00	0
Zone 5	111	111	17,63	2,8	0,06	0,0	0,00	0
Zone 6	21	21	2,46	0,0	0,00	0,0	0,00	0
Zone 7	47	47	5,95	0,0	0,00	0,0	0,00	0
Zone 8	72	72	9,11	0,0	0,00	0,0	0,00	0
Zone 9	167	167	34,69	4,2	0,08	0,0	0,00	0
Zone 10	67	67	8,07	0,0	0,00	0,0	0,00	0
Zone 11	72	72	7,91	0,0	0,00	0,0	0,00	0
Zone 12	222	222	105,71	5,6	0,11	0,0	0,00	0
Zone 13	100	100	7,87	0,0	0,00	0,0	0,00	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 ²)
Zone 1	0,7	Jul 2000	0,1	7,6
Zone 2	0,1	Jun 2000	0,0	2,2
Zone 3	0,4	Jun 2000	0,0	5,5
Zone 4	0,7	Nov 1900	0,0	7,7
Zone 5	0,1	Jan 2300	0,0	6,3
Zone 6	0,2	Jan 2300	0,0	8,4
Zone 7	0,4	Nov 1900	0,0	7,9
Zone 8	0,5	Jan 2300	0,0	7,9
Zone 9	0,1	Jan 2300	0,0	4,8
Zone 10	0,5	Jan 2300	0,0	8,3
Zone 11	0,6	Jan 2300	0,0	9,1
Zone 12	0,0	Jan 2300	0,0	2,1
Zone 13	0,8	Jan 2300	0,0	12,7

Zone Sizing Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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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 (m²)	Space L/(s·m²)
Zone 1							
100 - Anopheles Infec.	1	0,7	Jul 2000	108	0,1	7,6	14,21
Zone 2							
101 - A.C.	1	0,1	Jun 2000	56	0,0	2,2	25,23
Zone 3							
102 - Anopheles Adulto	1	0,4	Jun 2000	64	0,0	5,5	11,64
Zone 4							
103 - Anopheles Exper.	1	0,7	Nov 1900	108	0,0	7,7	14,03
Zone 5							
104 - Circ.	1	0,1	Jan 2300	111	0,0	6,3	17,63
Zone 6							
105 - Aedes Criação	1	0,2	Jan 2300	21	0,0	8,4	2,46
Zone 7							
106 - Anopheles Larvário	1	0,4	Nov 1900	47	0,0	7,9	5,95
Zone 8							
107 - Carrapatos/Flebo.	1	0,5	Jan 2300	72	0,0	7,9	9,11
Zone 9							
108 - Circ.	1	0,1	Jan 2300	167	0,0	4,8	34,69
Zone 10							
109 - Aedes Exp./Infec.	1	0,5	Jan 2300	67	0,0	8,3	8,07
Zone 11							
110 - Triatomíneos	1	0,6	Jan 2300	72	0,0	9,1	7,91
Zone 12							
111 - Circ.	1	0,0	Jan 2300	222	0,0	2,1	105,71
Zone 13							
112 - Mosquitos Campo	1	0,8	Jan 2300	100	0,0	12,7	7,87

Ventilation Sizing Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method **Sum of Space OA Airflows**
Design Ventilation Airflow Rate **287 L/s**

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
100 - Anopheles Infec.	1	7,6	1,0	108,0	0,00	0,00	0,0	25,0	27,0
Zone 2									
101 - A.C.	1	2,2	0,0	55,5	0,00	0,00	0,0	25,0	13,9
Zone 3									
102 - Anopheles Adulto	1	5,5	1,0	64,0	0,00	0,00	0,0	25,0	16,0
Zone 4									
103 - Anopheles Exper.	1	7,7	2,0	108,0	0,00	0,00	0,0	25,0	27,0
Zone 5									
104 - Circ.	1	6,3	0,0	111,1	0,00	0,00	0,0	25,0	27,8
Zone 6									
105 - Aedes Criação	1	8,4	1,0	20,7	0,00	0,00	0,0	25,0	5,2
Zone 7									
106 - Anopheles Larvário	1	7,9	1,0	47,0	0,00	0,00	0,0	25,0	11,8
Zone 8									
107 - Carrapatos/Flebo.	1	7,9	1,0	72,0	0,00	0,00	0,0	25,0	18,0
Zone 9									
108 - Circ.	1	4,8	0,0	166,5	0,00	0,00	25,0	0,0	25,0
Zone 10									
109 - Aedes Exp./Infec.	1	8,3	2,0	67,0	0,00	0,00	0,0	25,0	16,8
Zone 11									
110 - Triatomíneos	1	9,1	2,0	72,0	0,00	0,00	0,0	25,0	18,0
Zone 12									
111 - Circ.	1	2,1	0,0	222,0	0,00	0,00	0,0	25,0	55,5
Zone 13									
112 - Mosquitos Campo	1	12,7	3,0	100,0	0,00	0,00	0,0	25,0	25,0
Totals (incl. Space Multipliers)				1213,8					286,8

Air System Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1400 COOLING OA DB / WB 34,6 °C / 25,6 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	38 m²	658	-	38 m²	137	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1358 W	1357	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	1450 W	1450	-	0	0	-
People	14	1005	841	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4471	841	-	137	0
Zone Conditioning	-	4733	841	-	217	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	1214 L/s	0	-	1214 L/s	0	-
Ventilation Load	287 L/s	4996	7660	287 L/s	1271	-1329
Supply Fan Load	1214 L/s	1517	-	1214 L/s	-1517	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	11247	8502	-	-29	-1329
Central Cooling Coil	-	17884	8502	-	-11213	-1329
Central Heating Coil	-	-3527	-	-	11185	-
Terminal Reheat Coils	-	-3110	-	-	0	-
>> Total Conditioning	-	11247	8502	-	-29	-1329
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 30,6 °C / 24,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	16 m²	551	-	16 m²	58	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	114 W	114	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	737	60	-	58	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 30,1 °C / 24,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	3 m²	108	-	3 m²	10	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	33 W	33	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	141	0	-	10	0

Zone Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 30,1 °C / 24,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	8 m²	289	-	8 m²	27	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	83 W	82	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	443	60	-	27	0

Zone 4	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Nov 1900			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 28,1 °C / 23,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	260	-	7 m²	25	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	116 W	115	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	231 W	231	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	750	120	-	25	0

Zone Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 5	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	95 W	94	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	94	0	-	0	0

Zone 6	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	126 W	126	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	198	60	-	0	0

Zone Design Load Summary for AH-TER-01

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Zone 7	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Nov 1900			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 28,1 °C / 23,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	5 m²	169	-	5 m²	16	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	119 W	118	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	360	60	-	16	0

Zone 8	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	119 W	118	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	316 W	316	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	506	60	-	0	0

Zone Design Load Summary for AH-TER-01

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Zone 9	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	72 W	72	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	72	0	-	0	0

Zone 10	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	125 W	124	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	249 W	249	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	517	120	-	0	0

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Zone 11	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	273 W	273	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	553	120	-	0	0

Zone 12	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	32 W	31	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	31	0	-	0	0

Zone Design Load Summary for AH-TER-01

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Zone 13	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	191 W	190	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	381 W	381	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	787	180	-	0	0

Space Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
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TABLE 1.1.A. Component Loads For Space "100 - Anopheles Infec." In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000 COOLING OA DB / WB 30,6 °C / 24,5 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	16 m²	551	-	16 m²	58	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	114 W	114	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	737	60	-	58	0

TABLE 1.1.B. Envelope Loads For Space "100 - Anopheles Infec." In Zone "Zone 1"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
NW EXPOSURE						
WALL	10	1,513	-	390	-	37
SW EXPOSURE						
WALL	6	1,513	-	161	-	21

Space Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
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TABLE 2.1.A. Component Loads For Space "101 - A.C." In Zone "Zone 2"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 2000 COOLING OA DB / WB 30,1 °C / 24,5 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	3 m²	108	-	3 m²	10	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	33 W	33	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	141	0	-	10	0

TABLE 2.1.B. Envelope Loads For Space "101 - A.C." In Zone "Zone 2"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NW EXPOSURE						
WALL	3	1,513	-	108	-	10

Space Design Load Summary for AH-TER-01

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TABLE 3.1.A. Component Loads For Space "102 - Anopheles Adulto" In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 2000 COOLING OA DB / WB 30,1 °C / 24,5 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	8 m²	289	-	8 m²	27	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	83 W	82	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	443	60	-	27	0

TABLE 3.1.B. Envelope Loads For Space "102 - Anopheles Adulto" In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NW EXPOSURE						
WALL	8	1,513	-	289	-	27

Space Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
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TABLE 4.1.A. Component Loads For Space "103 - Anopheles Exper." In Zone "Zone 4"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Nov 1900 COOLING OA DB / WB 28,1 °C / 23,1 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	260	-	7 m²	25	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	116 W	115	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	231 W	231	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	750	120	-	25	0

TABLE 4.1.B. Envelope Loads For Space "103 - Anopheles Exper." In Zone "Zone 4"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SW EXPOSURE						
WALL	7	1,513	-	260	-	25

Space Design Load Summary for AH-TER-01

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TABLE 5.1.A. Component Loads For Space "104 - Circ." In Zone "Zone 5"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	95 W	94	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	94	0	-	0	0

TABLE 5.1.B. Envelope Loads For Space "104 - Circ." In Zone "Zone 5"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

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TABLE 6.1.A. Component Loads For Space "105 - Aedes Criação" In Zone "Zone 6"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	126 W	126	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	198	60	-	0	0

TABLE 6.1.B. Envelope Loads For Space "105 - Aedes Criação" In Zone "Zone 6"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

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TABLE 7.1.A. Component Loads For Space "106 - Anopheles Larvário" In Zone "Zone 7"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Nov 1900 COOLING OA DB / WB 28,1 °C / 23,1 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	5 m²	169	-	5 m²	16	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	119 W	118	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	360	60	-	16	0

TABLE 7.1.B. Envelope Loads For Space "106 - Anopheles Larvário" In Zone "Zone 7"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
SW EXPOSURE				(W)	(W)	(W)
WALL	5	1,513	-	169	-	16

Space Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 8.1.A. Component Loads For Space "107 - Carrapatos/Flebo." In Zone "Zone 8"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	119 W	118	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	316 W	316	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	506	60	-	0	0

TABLE 8.1.B. Envelope Loads For Space "107 - Carrapatos/Flebo." In Zone "Zone 8"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 9.1.A. Component Loads For Space "108 - Circ." In Zone "Zone 9"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	72 W	72	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	72	0	-	0	0

TABLE 9.1.B. Envelope Loads For Space "108 - Circ." In Zone "Zone 9"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 10.1.A. Component Loads For Space "109 - Aedes Exp./Infec." In Zone "Zone 10"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	125 W	124	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	249 W	249	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	517	120	-	0	0

TABLE 10.1.B. Envelope Loads For Space "109 - Aedes Exp./Infec." In Zone "Zone 10"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 11.1.A. Component Loads For Space "110 - Triatomíneos" In Zone "Zone 11"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	273 W	273	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	553	120	-	0	0

TABLE 11.1.B. Envelope Loads For Space "110 - Triatomíneos" In Zone "Zone 11"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 12.1.A. Component Loads For Space "111 - Circ." In Zone "Zone 12"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	32 W	31	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	31	0	-	0	0

TABLE 12.1.B. Envelope Loads For Space "111 - Circ." In Zone "Zone 12"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 13.1.A. Component Loads For Space "112 - Mosquitos Campo" In Zone "Zone 13"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	191 W	190	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	381 W	381	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	787	180	-	0	0

TABLE 13.1.B. Envelope Loads For Space "112 - Mosquitos Campo" In Zone "Zone 13"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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June DESIGN COOLING DAY, 1400

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,6	0,01726	287	400	4996	7660
Vent - Return Mixing	Outlet	23,5	0,01027	1214	640	-	-
Central Cooling Coil	Outlet	11,2	0,00787	1214	640	17884	8502
Central Heating Coil	Outlet	13,6	0,00787	1214	640	3527	-
Supply Fan	Outlet	14,6	0,00787	1214	640	1517	-
Cold Supply Duct	Outlet	14,6	0,00787	1214	640	-	-
Zone Air	-	20,1	0,00810	1214	714	4733	841
Return Plenum	Outlet	20,1	0,00810	1214	714	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	470	Deadband	561	19,0	108	701	0	0
Zone 2	86	Heating	95	19,8	56	649	248	0
Zone 3	296	Deadband	343	19,1	64	737	0	0
Zone 4	599	Deadband	636	19,6	108	753	0	0
Zone 5	94	Heating	95	19,8	111	649	588	0
Zone 6	198	Cooling	203	22,8	21	922	0	0
Zone 7	261	Deadband	286	19,7	47	769	0	0
Zone 8	506	Deadband	517	20,6	72	727	0	0
Zone 9	72	Heating	73	19,8	167	649	948	0
Zone 10	517	Deadband	527	21,2	67	818	0	0
Zone 11	553	Deadband	564	21,2	72	806	0	0
Zone 12	31	Heating	32	19,8	222	649	1326	0
Zone 13	787	Deadband	802	21,4	100	818	0	0

System Psychrometrics for AH-TER-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	287	400	-1271	1329
Vent - Return Mixing	Outlet	20,4	0,00914	1214	427	-	-
Central Cooling Coil	Outlet	12,7	0,00877	1214	427	11213	1329
Central Heating Coil	Outlet	20,4	0,00877	1214	427	11185	-
Supply Fan	Outlet	21,5	0,00877	1214	427	1517	-
Cold Supply Duct	Outlet	21,5	0,00877	1214	427	-	-
Zone Air	-	21,3	0,00877	1214	435	-217	0
Return Plenum	Outlet	21,3	0,00877	1214	435	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-58	Deadband	-80	20,8	108	435	0	0
Zone 2	-10	Deadband	-16	21,2	56	435	0	0
Zone 3	-27	Deadband	-39	20,9	64	435	0	0
Zone 4	-25	Deadband	-39	21,2	108	435	0	0
Zone 5	0	Deadband	-1	21,4	111	435	0	0
Zone 6	0	Deadband	-5	21,3	21	435	0	0
Zone 7	-16	Deadband	-25	21,0	47	435	0	0
Zone 8	0	Deadband	-2	21,4	72	435	0	0
Zone 9	0	Deadband	-1	21,5	167	435	0	0
Zone 10	0	Deadband	-2	21,4	67	435	0	0
Zone 11	0	Deadband	-3	21,4	72	435	0	0
Zone 12	0	Deadband	0	21,5	222	435	0	0
Zone 13	0	Deadband	-4	21,4	100	435	0	0

Air System Sizing Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-02**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **7**
Floor Area **131,6** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **68,8** kW
Sensible coil load **35,3** kW
Coil L/s at Jun 1500 **1260** L/s
Max block L/s **1260** L/s
Sum of peak zone L/s **1260** L/s
Sensible heat ratio **0,514**
L/(s kW) **18,3**
m²/kW **1,9**
W/m² **522,8**
Water flow @ 7,5 K rise **2,20** L/s

Load occurs at **Jun 1500**
OA DB / WB **34,9 / 25,7** °C
Entering DB / WB **34,9 / 25,7** °C
Leaving DB / WB **11,5 / 11,1** °C
Coil ADP **8,9** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **14,0** °C
Zone T-stat Check **7 of 7** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **10,9** kW
Coil L/s at Des Htg **1260** L/s
Max coil L/s **1260** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **82,8**
Ent. DB / Lvg DB **10,4 / 17,6** °C

Supply Fan Sizing Data

Actual max L/s **1260** L/s
Standard L/s **1247** L/s
Actual max L/(s·m²) **9,57** L/(s·m²)

Fan motor BHP **1,99** BHP
Fan motor kW **1,57** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **1260** L/s
L/(s·m²) **9,57** L/(s·m²)

L/s/person **179,98** L/s/person

Zone Sizing Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-02**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **7**
Floor Area **131,6** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	180	180	11,39	0,0	0,00	0,0	0,00	0
Zone 2	119	119	11,12	0,0	0,00	0,0	0,00	0
Zone 3	56	56	9,42	1,4	0,03	0,0	0,00	0
Zone 4	667	667	9,38	16,7	0,33	0,0	0,00	0
Zone 5	78	78	7,57	0,0	0,00	0,0	0,00	0
Zone 6	105	105	8,54	0,0	0,00	0,0	0,00	0
Zone 7	56	56	10,11	0,0	0,00	0,0	0,00	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 ²)
Zone 1	1,3	Jul 2000	0,0	15,8
Zone 2	0,8	Jun 2000	0,0	10,7
Zone 3	0,1	Jan 2300	0,0	5,9
Zone 4	1,1	Jan 2300	0,0	71,1
Zone 5	0,6	Jan 2300	0,0	10,3
Zone 6	0,6	Jan 2300	0,0	12,3
Zone 7	0,1	Jan 2300	0,0	5,5

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 ²)	Space L/(s·m ²)
Zone 1							
113 - Preparo Ester.	1	1,3	Jul 2000	180	0,0	15,8	11,39
Zone 2							
114 - Lavagem	1	0,8	Jun 2000	119	0,0	10,7	11,12
Zone 3							
115 - A.C.	1	0,1	Jan 2300	56	0,0	5,9	9,42
Zone 4							
116 - Circ.	1	1,1	Jan 2300	667	0,0	71,1	9,38
Zone 5							
117 - Imagem Sist. Ótico	1	0,6	Jan 2300	78	0,0	10,3	7,57
Zone 6							
118 - Preparo	1	0,6	Jan 2300	105	0,0	12,3	8,54
Zone 7							
120 - A.C.	1	0,1	Jan 2300	56	0,0	5,5	10,11

Ventilation Sizing Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 1260 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
113 - Preparo Ester.	1	15,8	3,0	180,0	0,00	0,00	0,0	100,0	180,0
Zone 2									
114 - Lavagem	1	10,7	1,0	119,0	0,00	0,00	0,0	100,0	119,0
Zone 3									
115 - A.C.	1	5,9	0,0	55,6	0,00	0,00	0,0	100,0	55,6
Zone 4									
116 - Circ.	1	71,1	0,0	666,7	0,00	0,00	0,0	100,0	666,7
Zone 5									
117 - Imagem Sist. Ótico	1	10,3	2,0	78,0	0,00	0,00	0,0	100,0	78,0
Zone 6									
118 - Preparo	1	12,3	1,0	105,0	0,00	0,00	0,0	100,0	105,0
Zone 7									
120 - A.C.	1	5,5	0,0	55,6	0,00	0,00	0,0	100,0	55,6
Totals (incl. Space Multipliers)				1259,9					1259,9

Air System Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	18 m²	370	-	18 m²	65	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1974 W	1974	-	0	0	-
Task Lighting	20 W	20	-	0	0	-
Electric Equipment	1473 W	1473	-	0	0	-
People	7	503	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4340	421	-	65	0
Zone Conditioning	-	4394	421	-	24	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	1260 L/s	0	-	1260 L/s	0	-
Ventilation Load	1260 L/s	21960	33045	1260 L/s	2666	-9517
Supply Fan Load	1260 L/s	1575	-	1260 L/s	-1575	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	27929	33465	-	1115	-9517
Central Cooling Coil	-	35329	33465	-	-10899	-9517
Central Heating Coil	-	-5175	-	-	10899	-
Terminal Reheat Coils	-	-2224	-	-	1115	-
>> Total Conditioning	-	27929	33465	-	1115	-9517
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 30,6 °C / 24,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	11 m²	373	-	11 m²	39	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	237 W	237	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	474 W	474	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1300	180	-	39	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 2000			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 30,1 °C / 24,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	269	-	7 m²	25	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	161 W	160	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	321 W	321	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	823	60	-	25	0

Zone Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	89 W	88	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	88	0	-	0	0

Zone 4	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1067 W	1066	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1066	0	-	0	0

Zone Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 5	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	155 W	154	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	309 W	309	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	617	120	-	0	0

Zone 6	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	185 W	184	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	369 W	369	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	635	60	-	0	0

Zone Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
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Zone 7	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	83 W	82	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	82	0	-	0	0

Space Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "113 - Preparo Ester." In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 2000 COOLING OA DB / WB 30,6 °C / 24,5 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	11 m²	373	-	11 m²	39	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	237 W	237	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	474 W	474	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1300	180	-	39	0

TABLE 1.1.B. Envelope Loads For Space "113 - Preparo Ester." In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NW EXPOSURE						
WALL	7	1,513	-	267	-	25
SW EXPOSURE						
WALL	4	1,513	-	106	-	14

Space Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
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TABLE 2.1.A. Component Loads For Space "114 - Lavagem" In Zone "Zone 2"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 2000 COOLING OA DB / WB 30,1 °C / 24,5 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	269	-	7 m²	25	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	161 W	160	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	321 W	321	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	823	60	-	25	0

TABLE 2.1.B. Envelope Loads For Space "114 - Lavagem" In Zone "Zone 2"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NW EXPOSURE						
WALL	7	1,513	-	269	-	25

Space Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 3.1.A. Component Loads For Space "115 - A.C." In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	89 W	88	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	88	0	-	0	0

TABLE 3.1.B. Envelope Loads For Space "115 - A.C." In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 4.1.A. Component Loads For Space "116 - Circ." In Zone "Zone 4"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1067 W	1066	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1066	0	-	0	0

TABLE 4.1.B. Envelope Loads For Space "116 - Circ." In Zone "Zone 4"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 5.1.A. Component Loads For Space "117 - Imagem Sist. Ótico" In Zone "Zone 5"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	155 W	154	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	309 W	309	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	617	120	-	0	0

TABLE 5.1.B. Envelope Loads For Space "117 - Imagem Sist. Ótico" In Zone "Zone 5"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 6.1.A. Component Loads For Space "118 - Preparo" In Zone "Zone 6"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	185 W	184	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	369 W	369	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	635	60	-	0	0

TABLE 6.1.B. Envelope Loads For Space "118 - Preparo" In Zone "Zone 6"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

TABLE 7.1.A. Component Loads For Space "120 - A.C." In Zone "Zone 7"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	83 W	82	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	82	0	-	0	0

TABLE 7.1.B. Envelope Loads For Space "120 - A.C." In Zone "Zone 7"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

June DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,9	0,01725	1260	400	21960	33045
Vent - Return Mixing	Outlet	34,9	0,01725	1260	400	-	-
Central Cooling Coil	Outlet	11,5	0,00814	1260	400	35329	33465
Central Heating Coil	Outlet	14,9	0,00814	1260	400	5175	-
Supply Fan	Outlet	16,0	0,00814	1260	400	1575	-
Cold Supply Duct	Outlet	16,0	0,00814	1260	400	-	-
Zone Air	-	20,4	0,00826	1260	431	4394	421
Return Plenum	Outlet	20,4	0,00826	1260	431	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	1144	Deadband	1162	21,4	180	494	0	0
Zone 2	706	Deadband	721	21,0	119	448	0	0
Zone 3	88	Heating	89	19,9	56	400	172	0
Zone 4	1066	Heating	1070	19,9	667	400	2053	0
Zone 5	617	Cooling	623	22,6	78	545	0	0
Zone 6	635	Deadband	643	21,1	105	454	0	0
Zone 7	82	Deadband	86	17,3	56	400	0	0

System Psychrometrics for AH-TER-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	1260	400	-2666	9517
Vent - Return Mixing	Outlet	17,6	0,01035	1260	400	-	-
Central Cooling Coil	Outlet	10,4	0,00776	1260	400	10899	9517
Central Heating Coil	Outlet	17,6	0,00776	1260	400	10899	-
Supply Fan	Outlet	18,6	0,00776	1260	400	1575	-
Cold Supply Duct	Outlet	18,6	0,00776	1260	400	-	-
Zone Air	-	19,4	0,00776	1260	400	-24	0
Return Plenum	Outlet	19,4	0,00776	1260	400	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-39	Deadband	-16	18,6	180	400	0	0
Zone 2	-25	Deadband	-10	18,6	119	400	0	0
Zone 3	0	Heating	0	19,9	56	400	86	0
Zone 4	0	Heating	0	19,9	667	400	1029	0
Zone 5	0	Deadband	1	18,7	78	400	0	0
Zone 6	0	Deadband	1	18,7	105	400	0	0
Zone 7	0	Deadband	0	18,6	56	400	0	0

Air System Sizing Summary for AH-TER-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

Air System Information

Air System Name **AH-TER-03**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **22,7** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **5,0** kW
Coil L/s at Jan 1800 **657** L/s
Max block L/s **657** L/s
Sum of peak zone L/s **657** L/s
Sensible heat ratio **1,000**
L/(s kW) **131,7**
m²/kW **4,5**
W/m² **219,8**
Water flow @ 7,5 K rise **0,16** L/s

Load occurs at **Jan 1800**
OA DB / WB **27,8 / 21,7** °C
Entering DB / WB **22,2 / 15,8** °C
Leaving DB / WB **15,8 / 13,4** °C
Coil ADP **15,1** °C
Bypass Factor **0,100**
Resulting RH **52** %
Design supply temp. **13,0** °C
Zone T-stat Check **1 of 1** OK
Max zone temperature deviation **0,0** K

Humidifier Sizing Data

Max steam flow at Des Htg **0,00** kg/hr
Airflow Rate **0** L/s

Air mass flow **0,00** kg/hr
Moisture gain **,00000** kg/kg

Supply Fan Sizing Data

Actual max L/s **657** L/s
Standard L/s **650** L/s
Actual max L/(s·m²) **28,94** L/(s·m²)

Fan motor BHP **1,04** BHP
Fan motor kW **0,82** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **0** L/s
L/(s·m²) **0,00** L/(s·m²)

L/s/person **0,00** L/s/person

Zone Sizing Summary for AH-TER-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

Air System Information

Air System Name **AH-TER-03**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **22,7** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	657	657	28,94	0,0	0,00	0,0	0,00	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 ²)
Zone 1	4,1	Jan 2300	0,0	22,7

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 ²)	Space L/(s·m ²)
Zone 1							
119 - Freezers	1	4,1	Jan 2300	657	0,0	22,7	28,94

Ventilation Sizing Summary for AH-TER-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

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 (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
119 - Freezers	1	22,7	0,0	657,0	0,00	0,00	0,0	0,0	0,0
Totals (incl. Space Multipliers)				657,0					0,0

Air System Design Load Summary for AH-TER-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 1800 COOLING OA DB / WB 27,8 °C / 21,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	341 W	340	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3750 W	3750	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4090	0	-	0	0
Zone Conditioning	-	4168	0	-	0	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	657 L/s	0	-	657 L/s	0	-
Ventilation Load	0 L/s	0	0	0 L/s	0	0
Supply Fan Load	657 L/s	821	-	657 L/s	-821	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	4990	0	-	-821	0
Central Cooling Coil	-	4990	0	-	-821	0
Humidification Load	-	-	0	-	-	0
>> Total Conditioning	-	4990	0	-	-821	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TER-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	341 W	340	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3750 W	3750	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4090	0	-	0	0

Space Design Load Summary for AH-TER-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

TABLE 1.1.A. Component Loads For Space "119 - Freezers" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	341 W	340	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3750 W	3750	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4090	0	-	0	0

TABLE 1.1.B. Envelope Loads For Space "119 - Freezers" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-TER-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

January DESIGN COOLING DAY, 1800

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	27,8	0,01404	0	400	0	0
Vent - Return Mixing	Outlet	22,2	0,00873	657	800	-	-
Central Cooling Coil	Outlet	15,8	0,00873	657	800	4990	0
Supply Fan	Outlet	16,8	0,00873	657	800	821	-
Humidifier	Outlet	16,8	0,00873	657	800	-	0
Cold Supply Duct	Outlet	16,8	0,00873	657	800	-	-
Zone Air	-	22,2	0,00873	657	800	4168	0
Return Plenum	Outlet	22,2	0,00873	657	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	4090	Cooling	4168	22,2	657	800	0	0

System Psychrometrics for AH-TER-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	0	400	0	0
Vent - Return Mixing	Outlet	22,0	0,00873	657	800	-	-
Central Cooling Coil	Outlet	21,0	0,00873	657	800	821	0
Supply Fan	Outlet	22,0	0,00873	657	800	821	-
Humidifier	Outlet	22,0	0,00873	657	800	-	0
Cold Supply Duct	Outlet	22,0	0,00873	657	800	-	-
Zone Air	-	22,0	0,00873	657	800	0	0
Return Plenum	Outlet	22,0	0,00873	657	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	0	Deadband	0	22,0	657	800	0	0

Air System Sizing Summary for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

Air System Information

Air System Name **AH-TER-04**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **103,5** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **53,0** kW
Sensible coil load **29,4** kW
Coil L/s at Aug 1500 **1251** L/s
Max block L/s **1251** L/s
Sum of peak zone L/s **1251** L/s
Sensible heat ratio **0,556**
L/(s kW) **23,6**
m²/kW **2,0**
W/m² **512,2**
Water flow @ 7,5 K rise **1,69** L/s

Load occurs at **Aug 1500**
OA DB / WB **35,5 / 25,7** °C
Entering DB / WB **31,2 / 23,1** °C
Leaving DB / WB **11,5 / 11,1** °C
Coil ADP **9,3** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **14,0** °C
Zone T-stat Check **3 of 3** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **11,6** kW
Coil L/s at Des Htg **1251** L/s
Max coil L/s **1251** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **111,8**
Ent. DB / Lvg DB **10,3 / 18,0** °C

Supply Fan Sizing Data

Actual max L/s **1251** L/s
Standard L/s **1238** L/s
Actual max L/(s·m²) **12,09** L/(s·m²)

Fan motor BHP **1,97** BHP
Fan motor kW **1,56** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **888** L/s
L/(s·m²) **8,58** L/(s·m²)

L/s/person **35,53** L/s/person

Zone Sizing Summary for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
05:37

Air System Information

Air System Name **AH-TER-04**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **103,5** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	1102	1102	13,09	0,0	0,00	0,0	0,00	0
Zone 2	38	38	2,73	0,0	0,00	0,0	0,00	0
Zone 3	111	111	20,57	2,8	0,06	0,0	0,00	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 ²)
Zone 1	8,9	Jun 1700	0,2	84,2
Zone 2	0,4	Jan 2300	0,0	13,9
Zone 3	0,1	Jan 2300	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 ²)	Space L/(s·m ²)
Zone 1							
121 - A. Lab. Entomo.	1	8,9	Jun 1700	1102	0,2	84,2	13,09
Zone 2							
122 - Coleções	1	0,4	Jan 2300	38	0,0	13,9	2,73
Zone 3							
123 - A.C.	1	0,1	Jan 2300	111	0,0	5,4	20,57

Ventilation Sizing Summary for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 888 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
121 - A. Lab. Entomo.	1	84,2	23,0	1102,0	0,00	0,00	0,0	71,0	782,4
Zone 2									
122 - Coleções	1	13,9	2,0	37,9	0,00	0,00	0,0	71,0	26,9
Zone 3									
123 - A.C.	1	5,4	0,0	111,1	0,00	0,00	0,0	71,0	78,9
Totals (incl. Space Multipliers)				1251,0					888,2

Air System Design Load Summary for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1500 COOLING OA DB / WB 35,5 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	11 m²	929	-	11 m²	-	-
Wall Transmission	19 m²	382	-	19 m²	68	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	11 m²	640	-	11 m²	132	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1553 W	1552	-	0	0	-
Task Lighting	30 W	30	-	0	0	-
Electric Equipment	3368 W	3368	-	0	0	-
People	25	1795	1502	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	8697	1502	-	200	0
Zone Conditioning	-	8745	1502	-	108	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	1251 L/s	0	-	1251 L/s	0	-
Ventilation Load	888 L/s	15579	22060	888 L/s	1556	-7092
Supply Fan Load	1251 L/s	1564	-	1251 L/s	-1564	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	25888	23562	-	100	-7092
Central Cooling Coil	-	29448	23562	-	-11596	-7092
Central Heating Coil	-	-2959	-	-	11576	-
Terminal Reheat Coils	-	-601	-	-	119	-
>> Total Conditioning	-	25888	23562	-	100	-7092
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,9 °C / 25,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	11 m²	1497	-	11 m²	-	-
Wall Transmission	19 m²	556	-	19 m²	68	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	11 m²	583	-	11 m²	132	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1263 W	1263	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	3368 W	3368	-	0	0	-
People	23	1651	1382	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	8928	1382	-	200	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	209 W	208	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	362	120	-	0	0

Zone Design Load Summary for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	81 W	81	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	91	0	-	0	0

Space Design Load Summary for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "121 - A. Lab. Entomo." In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700 COOLING OA DB / WB 33,9 °C / 25,4 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	11 m²	1497	-	11 m²	-	-
Wall Transmission	19 m²	556	-	19 m²	68	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	11 m²	583	-	11 m²	132	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1263 W	1263	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	3368 W	3368	-	0	0	-
People	23	1651	1382	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	8928	1382	-	200	0

TABLE 1.1.B. Envelope Loads For Space "121 - A. Lab. Entomo." In Zone "Zone 1"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
NW EXPOSURE						
WALL	19	1,513	-	556	-	68
WINDOW 1	11	5,000	0,500	583	1497	132

Space Design Load Summary for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 2.1.A. Component Loads For Space "122 - Coleções" In Zone "Zone 2"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	209 W	208	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	362	120	-	0	0

TABLE 2.1.B. Envelope Loads For Space "122 - Coleções" In Zone "Zone 2"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 3.1.A. Component Loads For Space "123 - A.C." In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	81 W	81	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	91	0	-	0	0

TABLE 3.1.B. Envelope Loads For Space "123 - A.C." In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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August DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	35,5	0,01702	888	400	15579	22060
Vent - Return Mixing	Outlet	31,2	0,01455	1251	449	-	-
Central Cooling Coil	Outlet	11,5	0,00809	1251	449	29448	23562
Central Heating Coil	Outlet	13,5	0,00809	1251	449	2959	-
Supply Fan	Outlet	14,6	0,00809	1251	449	1564	-
Cold Supply Duct	Outlet	14,6	0,00809	1251	449	-	-
Zone Air	-	20,8	0,00850	1251	568	8745	1502
Return Plenum	Outlet	20,8	0,00850	1251	568	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	8244	Deadband	8279	20,9	1102	573	0	0
Zone 2	362	Cooling	374	22,8	38	754	0	0
Zone 3	91	Heating	92	19,8	111	455	601	0

System Psychrometrics for AH-TER-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	888	400	-1556	7092
Vent - Return Mixing	Outlet	18,0	0,00956	1251	403	-	-
Central Cooling Coil	Outlet	10,3	0,00762	1251	403	11596	7092
Central Heating Coil	Outlet	18,0	0,00762	1251	403	11576	-
Supply Fan	Outlet	19,1	0,00762	1251	403	1564	-
Cold Supply Duct	Outlet	19,1	0,00762	1251	403	-	-
Zone Air	-	19,1	0,00762	1251	410	-108	0
Return Plenum	Outlet	19,1	0,00762	1251	410	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-200	Deadband	-111	19,0	1102	410	0	0
Zone 2	0	Deadband	4	19,1	38	410	0	0
Zone 3	0	Heating	0	20,0	111	410	119	0

Air System Sizing Summary for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
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Air System Information

Air System Name **AH-TER-05**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **141,9** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **44,7** kW
Sensible coil load **30,4** kW
Coil L/s at Aug 1500 **2000** L/s
Max block L/s **2000** L/s
Sum of peak zone L/s **2000** L/s
Sensible heat ratio **0,679**
L/(s kW) **44,7**
m²/kW **3,2**
W/m² **315,0**
Water flow @ 7,5 K rise **1,43** L/s

Load occurs at **Aug 1500**
OA DB / WB **35,5 / 25,7** °C
Entering DB / WB **25,3 / 18,8** °C
Leaving DB / WB **12,6 / 12,0** °C
Coil ADP **11,2** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **13,0** °C
Zone T-stat Check **3 of 3** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **18,6** kW
Coil L/s at Des Htg **2000** L/s
Max coil L/s **2000** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **130,7**
Ent. DB / Lvg DB **12,2 / 20,0** °C

Supply Fan Sizing Data

Actual max L/s **2000** L/s
Standard L/s **1979** L/s
Actual max L/(s·m²) **14,09** L/(s·m²)

Fan motor BHP **3,15** BHP
Fan motor kW **2,50** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **500** L/s
L/(s·m²) **3,52** L/(s·m²)

L/s/person **10,87** L/s/person

Zone Sizing Summary for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
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Air System Information

Air System Name **AH-TER-05**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **141,9** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	56	56	9,42	1,5	0,03	0,0	0,00	0
Zone 2	1180	1180	12,58	0,0	0,00	0,0	0,00	0
Zone 3	764	764	18,10	0,0	0,00	0,0	0,00	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 ²)
Zone 1	0,1	Jan 2300	0,0	5,9
Zone 2	8,5	Jun 1700	0,2	93,8
Zone 3	6,9	Jun 1700	0,2	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 ²)	Space L/(s·m ²)
Zone 1							
124 - A.C.	1	0,1	Jan 2300	56	0,0	5,9	9,42
Zone 2							
125 - Antic./BioProt.	1	8,5	Jun 1700	1180	0,2	93,8	12,58
Zone 3							
126 - Expressão Recombin	1	6,9	Jun 1700	764	0,2	42,2	18,10

Ventilation Sizing Summary for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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05:38

1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 500 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
124 - A.C.	1	5,9	0,0	55,6	0,00	0,00	0,0	25,0	13,9
Zone 2									
125 - Antic./BioProt.	1	93,8	23,0	1180,0	0,00	0,00	0,0	25,0	295,0
Zone 3									
126 - Expressão Recombin	1	42,2	23,0	764,0	0,00	0,00	0,0	25,0	191,0
Totals (incl. Space Multipliers)				1999,6					499,9

Air System Design Load Summary for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1500 COOLING OA DB / WB 35,5 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	22 m²	1858	-	22 m²	-	-
Wall Transmission	30 m²	606	-	30 m²	107	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	22 m²	1280	-	22 m²	264	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	24 m²	528	-	24 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	2129 W	2128	-	0	0	-
Task Lighting	20 W	20	-	0	0	-
Electric Equipment	4502 W	4502	-	0	0	-
People	46	3303	2764	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	14225	2764	-	371	0
Zone Conditioning	-	14401	2764	-	539	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	2000 L/s	0	-	2000 L/s	0	-
Ventilation Load	500 L/s	8133	11569	500 L/s	1905	-2715
Supply Fan Load	2000 L/s	2500	-	2000 L/s	-2500	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	25034	14333	-	-56	-2715
Central Cooling Coil	-	30366	14333	-	-18608	-2744
Central Heating Coil	-	-5151	-	-	18553	-
Terminal Reheat Coils	-	-182	-	-	0	-
>> Total Conditioning	-	25034	14333	-	-56	-2744
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	89 W	88	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	88	0	-	0	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,9 °C / 25,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	11 m²	1497	-	11 m²	-	-
Wall Transmission	19 m²	562	-	19 m²	68	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	11 m²	583	-	11 m²	132	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1407 W	1407	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2814 W	2814	-	0	0	-
People	23	1651	1382	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	8524	1382	-	200	0

Zone Design Load Summary for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,9 °C / 25,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	11 m²	1497	-	11 m²	-	-
Wall Transmission	11 m²	320	-	11 m²	39	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	11 m²	583	-	11 m²	132	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	24 m²	512	-	24 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	633 W	633	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1688 W	1688	-	0	0	-
People	23	1651	1382	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	6895	1382	-	171	0

Space Design Load Summary for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

TABLE 1.1.A. Component Loads For Space "124 - A.C." In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	89 W	88	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	88	0	-	0	0

TABLE 1.1.B. Envelope Loads For Space "124 - A.C." In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

TABLE 2.1.A. Component Loads For Space "125 - Antic./BioProt." In Zone "Zone 2"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,9 °C / 25,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	11 m²	1497	-	11 m²	-	-
Wall Transmission	19 m²	562	-	19 m²	68	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	11 m²	583	-	11 m²	132	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1407 W	1407	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2814 W	2814	-	0	0	-
People	23	1651	1382	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	8524	1382	-	200	0

TABLE 2.1.B. Envelope Loads For Space "125 - Antic./BioProt." In Zone "Zone 2"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NW EXPOSURE						
WALL	19	1,513	-	562	-	68
WINDOW 1	11	5,000	0,500	583	1497	132

Space Design Load Summary for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

TABLE 3.1.A. Component Loads For Space "126 - Expressão Recombin" In Zone "Zone 3"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700 COOLING OA DB / WB 33,9 °C / 25,4 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	11 m²	1497	-	11 m²	-	-
Wall Transmission	11 m²	320	-	11 m²	39	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	11 m²	583	-	11 m²	132	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	24 m²	512	-	24 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	633 W	633	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1688 W	1688	-	0	0	-
People	23	1651	1382	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	6895	1382	-	171	0

TABLE 3.1.B. Envelope Loads For Space "126 - Expressão Recombin" In Zone "Zone 3"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
NW EXPOSURE						
WALL	11	1,513	-	320	-	39
WINDOW 1	11	5,000	0,500	583	1497	132

System Psychrometrics for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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August DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	35,5	0,01702	500	400	8133	11569
Vent - Return Mixing	Outlet	25,3	0,01107	2000	798	-	-
Central Cooling Coil	Outlet	12,6	0,00861	2000	798	30366	14333
Central Heating Coil	Outlet	14,7	0,00861	2000	798	5151	-
Supply Fan	Outlet	15,8	0,00861	2000	798	2500	-
Cold Supply Duct	Outlet	15,8	0,00861	2000	798	-	-
Zone Air	-	21,9	0,00908	2000	930	14401	2764
Return Plenum	Outlet	21,9	0,00908	2000	930	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	88	Heating	91	19,9	56	800	182	0
Zone 2	7838	Deadband	8077	21,5	1180	910	0	0
Zone 3	6299	Cooling	6233	22,6	764	970	0	0

System Psychrometrics for AH-TER-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	500	400	-1905	2715
Vent - Return Mixing	Outlet	20,0	0,00896	2000	423	-	-
Central Cooling Coil	Outlet	12,2	0,00849	2000	423	18608	2744
Central Heating Coil	Outlet	20,0	0,00849	2000	423	18553	-
Supply Fan	Outlet	21,0	0,00849	2000	423	2500	-
Cold Supply Duct	Outlet	21,0	0,00849	2000	423	-	-
Zone Air	-	20,8	0,00849	2000	430	-539	0
Return Plenum	Outlet	20,8	0,00849	2000	430	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	0	Deadband	-1	21,0	56	430	0	0
Zone 2	-200	Deadband	-274	20,8	1180	430	0	0
Zone 3	-171	Deadband	-265	20,7	764	430	0	0

Air System Sizing Summary for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-06**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **40,0** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **35,4** kW
Sensible coil load **18,3** kW
Coil L/s at Jun 1500 **669** L/s
Max block L/s **669** L/s
Sum of peak zone L/s **669** L/s
Sensible heat ratio **0,516**
L/(s kW) **18,9**
m²/kW **1,1**
W/m² **885,0**
Water flow @ 7,5 K rise **1,13** L/s

Load occurs at **Jun 1500**
OA DB / WB **34,9 / 25,7** °C
Entering DB / WB **34,9 / 25,7** °C
Leaving DB / WB **12,1 / 11,7** °C
Coil ADP **9,6** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **13,0** °C
Zone T-stat Check **3 of 3** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **5,9** kW
Coil L/s at Des Htg **669** L/s
Max coil L/s **669** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **146,3**
Ent. DB / Lvg DB **10,3 / 17,6** °C

Supply Fan Sizing Data

Actual max L/s **669** L/s
Standard L/s **662** L/s
Actual max L/(s·m²) **16,73** L/(s·m²)

Fan motor BHP **1,05** BHP
Fan motor kW **0,84** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **669** L/s
L/(s·m²) **16,73** L/(s·m²)

L/s/person **83,67** L/s/person

Zone Sizing Summary for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-06**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **40,0** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	333	333	83,33	8,8	0,17	0,0	0,00	0
Zone 2	162	162	9,00	0,0	0,00	0,0	0,00	0
Zone 3	174	174	9,67	0,0	0,00	0,0	0,00	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 ²)
Zone 1	0,1	Jan 2300	0,0	4,0
Zone 2	1,2	Jan 2300	0,0	18,0
Zone 3	1,4	Jan 2300	0,0	18,0

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 ²)	Space L/(s·m ²)
Zone 1							
127 - A.C.	1	0,1	Jan 2300	333	0,0	4,0	83,33
Zone 2							
128 - P. Extração DNA	1	1,2	Jan 2300	162	0,0	18,0	9,00
Zone 3							
129 - P. Premix DNA	1	1,4	Jan 2300	174	0,0	18,0	9,67

Ventilation Sizing Summary for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 669 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
127 - A.C.	1	4,0	0,0	333,3	0,00	0,00	0,0	100,0	333,3
Zone 2									
128 - P. Extração DNA	1	18,0	3,0	162,0	0,00	0,00	0,0	100,0	162,0
Zone 3									
129 - P. Premix DNA	1	18,0	5,0	174,0	0,00	0,00	0,0	100,0	174,0
Totals (incl. Space Multipliers)				669,3					669,3

Air System Design Load Summary for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	600 W	600	-	0	0	-
Task Lighting	20 W	20	-	0	0	-
Electric Equipment	1440 W	1440	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2634	481	-	0	0
Zone Conditioning	-	2624	481	-	-2	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	669 L/s	0	-	669 L/s	0	-
Ventilation Load	669 L/s	10981	16669	669 L/s	1354	-5131
Supply Fan Load	669 L/s	837	-	669 L/s	-837	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	14441	17150	-	516	-5131
Central Cooling Coil	-	18252	17150	-	-5850	-5131
Central Heating Coil	-	-2415	-	-	5850	-
Terminal Reheat Coils	-	-1396	-	-	516	-
>> Total Conditioning	-	14441	17150	-	516	-5131
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	60 W	60	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	60	0	-	0	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	720 W	720	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1215	180	-	0	0

Zone Design Load Summary for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	720 W	720	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1359	300	-	0	0

Space Design Load Summary for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "127 - A.C." In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	60 W	60	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	60	0	-	0	0

TABLE 1.1.B. Envelope Loads For Space "127 - A.C." In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 2.1.A. Component Loads For Space "128 - P. Extração DNA" In Zone "Zone 2"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	720 W	720	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1215	180	-	0	0

TABLE 2.1.B. Envelope Loads For Space "128 - P. Extração DNA" In Zone "Zone 2"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 3.1.A. Component Loads For Space "129 - P. Premix DNA" In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	720 W	720	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1359	300	-	0	0

TABLE 3.1.B. Envelope Loads For Space "129 - P. Premix DNA" In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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June DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,9	0,01725	669	400	10981	16669
Vent - Return Mixing	Outlet	34,9	0,01725	669	400	-	-
Central Cooling Coil	Outlet	12,1	0,00847	669	400	18252	17150
Central Heating Coil	Outlet	15,1	0,00847	669	400	2415	-
Supply Fan	Outlet	16,2	0,00847	669	400	837	-
Cold Supply Duct	Outlet	16,2	0,00847	669	400	-	-
Zone Air	-	21,2	0,00871	669	468	2624	481
Return Plenum	Outlet	21,2	0,00871	669	468	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	60	Heating	60	19,8	333	400	1396	0
Zone 2	1215	Cooling	1210	22,4	162	505	0	0
Zone 3	1359	Cooling	1354	22,7	174	563	0	0

System Psychrometrics for AH-TER-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	669	400	-1354	5131
Vent - Return Mixing	Outlet	17,6	0,01035	669	400	-	-
Central Cooling Coil	Outlet	10,3	0,00773	669	400	5850	5131
Central Heating Coil	Outlet	17,6	0,00773	669	400	5850	-
Supply Fan	Outlet	18,6	0,00773	669	400	837	-
Cold Supply Duct	Outlet	18,6	0,00773	669	400	-	-
Zone Air	-	19,3	0,00773	669	400	2	0
Return Plenum	Outlet	19,3	0,00773	669	400	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	0	Heating	0	19,9	333	400	516	0
Zone 2	0	Deadband	1	18,7	162	400	0	0
Zone 3	0	Deadband	1	18,6	174	400	0	0

Air System Sizing Summary for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-07**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **37,3** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **20,9** kW
Sensible coil load **10,8** kW
Coil L/s at Jun 1500 **407** L/s
Max block L/s **407** L/s
Sum of peak zone L/s **407** L/s
Sensible heat ratio **0,518**
L/(s kW) **19,5**
m²/kW **1,8**
W/m² **560,7**
Water flow @ 7,5 K rise **0,67** L/s

Load occurs at **Jun 1500**
OA DB / WB **34,9 / 25,7** °C
Entering DB / WB **34,9 / 25,7** °C
Leaving DB / WB **12,7 / 12,2** °C
Coil ADP **10,2** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **13,0** °C
Zone T-stat Check **3 of 3** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **3,7** kW
Coil L/s at Des Htg **407** L/s
Max coil L/s **407** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **99,0**
Ent. DB / Lvg DB **10,0 / 17,6** °C

Supply Fan Sizing Data

Actual max L/s **407** L/s
Standard L/s **403** L/s
Actual max L/(s·m²) **10,91** L/(s·m²)

Fan motor BHP **0,64** BHP
Fan motor kW **0,51** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **407** L/s
L/(s·m²) **10,91** L/(s·m²)

L/s/person **81,42** L/s/person

Zone Sizing Summary for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-07**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **37,3** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	111	111	27,78	2,9	0,06	0,0	0,00	0
Zone 2	140	140	9,15	0,0	0,00	0,0	0,00	0
Zone 3	156	156	8,67	0,0	0,00	0,0	0,00	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 ²)
Zone 1	0,1	Jan 2300	0,0	4,0
Zone 2	1,1	Jan 2300	0,0	15,3
Zone 3	1,1	Jan 2300	0,0	18,0

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 ²)	Space L/(s·m ²)
Zone 1							
130 - A.C.	1	0,1	Jan 2300	111	0,0	4,0	27,78
Zone 2							
131 - P. PCR DNA	1	1,1	Jan 2300	140	0,0	15,3	9,15
Zone 3							
132 - P. Pos-PCR DNA	1	1,1	Jan 2300	156	0,0	18,0	8,67

Ventilation Sizing Summary for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 407 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
130 - A.C.	1	4,0	0,0	111,1	0,00	0,00	0,0	100,0	111,1
Zone 2									
131 - P. PCR DNA	1	15,3	3,0	140,0	0,00	0,00	0,0	100,0	140,0
Zone 3									
132 - P. Pos-PCR DNA	1	18,0	2,0	156,0	0,00	0,00	0,0	100,0	156,0
Totals (incl. Space Multipliers)				407,1					407,1

Air System Design Load Summary for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	560 W	559	-	0	0	-
Task Lighting	20 W	20	-	0	0	-
Electric Equipment	1332 W	1332	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2270	300	-	0	0
Zone Conditioning	-	2280	300	-	-2	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	407 L/s	0	-	407 L/s	0	-
Ventilation Load	407 L/s	6416	9786	407 L/s	682	-3287
Supply Fan Load	407 L/s	509	-	407 L/s	-509	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	9205	10086	-	172	-3287
Central Cooling Coil	-	10830	10086	-	-3694	-3287
Central Heating Coil	-	-1198	-	-	3694	-
Terminal Reheat Coils	-	-427	-	-	172	-
>> Total Conditioning	-	9205	10086	-	172	-3287
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	60 W	60	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	60	0	-	0	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	230 W	229	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	612 W	612	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1067	180	-	0	0

Zone Design Load Summary for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	720 W	720	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1144	120	-	0	0

Space Design Load Summary for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "130 - A.C." In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	60 W	60	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	60	0	-	0	0

TABLE 1.1.B. Envelope Loads For Space "130 - A.C." In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 2.1.A. Component Loads For Space "131 - P. PCR DNA" In Zone "Zone 2"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	230 W	229	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	612 W	612	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1067	180	-	0	0

TABLE 2.1.B. Envelope Loads For Space "131 - P. PCR DNA" In Zone "Zone 2"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 3.1.A. Component Loads For Space "132 - P. Pos-PCR DNA" In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	720 W	720	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1144	120	-	0	0

TABLE 3.1.B. Envelope Loads For Space "132 - P. Pos-PCR DNA" In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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June DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,9	0,01725	407	400	6416	9786
Vent - Return Mixing	Outlet	34,9	0,01725	407	400	-	-
Central Cooling Coil	Outlet	12,7	0,00876	407	400	10830	10086
Central Heating Coil	Outlet	15,1	0,00876	407	400	1198	-
Supply Fan	Outlet	16,2	0,00876	407	400	509	-
Cold Supply Duct	Outlet	16,2	0,00876	407	400	-	-
Zone Air	-	21,8	0,00901	407	470	2280	300
Return Plenum	Outlet	21,8	0,00901	407	470	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	60	Heating	60	19,9	111	400	427	0
Zone 2	1067	Cooling	1071	22,6	140	521	0	0
Zone 3	1144	Cooling	1149	22,3	156	473	0	0

System Psychrometrics for AH-TER-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	407	400	-682	3287
Vent - Return Mixing	Outlet	17,6	0,01035	407	400	-	-
Central Cooling Coil	Outlet	10,0	0,00759	407	400	3694	3287
Central Heating Coil	Outlet	17,6	0,00759	407	400	3694	-
Supply Fan	Outlet	18,6	0,00759	407	400	509	-
Cold Supply Duct	Outlet	18,6	0,00759	407	400	-	-
Zone Air	-	19,0	0,00759	407	400	2	0
Return Plenum	Outlet	19,0	0,00759	407	400	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	0	Heating	0	19,9	111	400	172	0
Zone 2	0	Deadband	1	18,7	140	400	0	0
Zone 3	0	Deadband	1	18,7	156	400	0	0

Air System Sizing Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-08**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **13**
Floor Area **163,4** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **103,6** kW
Sensible coil load **53,4** kW
Coil L/s at Jun 1500 **1939** L/s
Max block L/s **1939** L/s
Sum of peak zone L/s **1939** L/s
Sensible heat ratio **0,515**
L/(s kW) **18,7**
m²/kW **1,6**
W/m² **634,2**
Water flow @ 7,5 K rise **3,31** L/s

Load occurs at **Jun 1500**
OA DB / WB **34,9 / 25,7** °C
Entering DB / WB **34,9 / 25,7** °C
Leaving DB / WB **11,9 / 11,5** °C
Coil ADP **9,4** °C
Bypass Factor **0,100**
Resulting RH **60** %
Design supply temp. **13,0** °C
Zone T-stat Check **13 of 13** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **14,5** kW
Coil L/s at Des Htg **1939** L/s
Max coil L/s **1939** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **89,0**
Ent. DB / Lvg DB **11,3 / 17,6** °C

Supply Fan Sizing Data

Actual max L/s **1939** L/s
Standard L/s **1919** L/s
Actual max L/(s·m²) **11,87** L/(s·m²)

Fan motor BHP **3,06** BHP
Fan motor kW **2,42** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **1939** L/s
L/(s·m²) **11,87** L/(s·m²)

L/s/person **215,47** L/s/person

Zone Sizing Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-08**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **13**
Floor Area **163,4** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	274	274	13,98	7,2	0,14	0,0	0,00	0
Zone 2	222	222	69,44	5,8	0,12	0,0	0,00	0
Zone 3	56	56	8,05	1,5	0,03	0,0	0,00	0
Zone 4	56	56	7,42	1,5	0,03	0,0	0,00	0
Zone 5	278	278	22,58	7,3	0,15	0,0	0,00	0
Zone 6	57	57	5,94	1,5	0,03	0,0	0,00	0
Zone 7	54	54	5,93	1,4	0,03	0,0	0,00	0
Zone 8	113	113	6,28	3,0	0,06	0,0	0,00	0
Zone 9	104	104	7,59	2,7	0,05	0,0	0,00	0
Zone 10	14	14	1,57	0,4	0,01	0,0	0,00	0
Zone 11	603	603	14,99	15,8	0,32	0,0	0,00	0
Zone 12	11	11	1,57	0,3	0,01	0,0	0,00	0
Zone 13	96	96	14,33	2,5	0,05	0,0	0,00	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 ²)
Zone 1	1,5	Nov 1900	0,1	19,6
Zone 2	0,4	Nov 1900	0,0	3,2
Zone 3	0,2	Jan 2300	0,0	7,0
Zone 4	0,2	Jan 2300	0,0	7,6
Zone 5	0,2	Jul 1600	0,0	12,3
Zone 6	0,2	Jan 2300	0,0	9,6
Zone 7	0,5	Jan 2300	0,0	9,1
Zone 8	0,9	Jan 2300	0,0	18,0
Zone 9	0,8	Jul 1600	0,0	13,7
Zone 10	0,1	Jan 2300	0,0	9,1
Zone 11	4,8	Dec 1300	0,1	40,2
Zone 12	0,1	Jan 2300	0,0	7,3
Zone 13	0,9	Dec 1200	0,0	6,7

Zone Sizing Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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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 (m²)	Space L/(s·m²)
Zone 1							
133 - Circ. Suja	1	1,5	Nov 1900	274	0,1	19,6	13,98
Zone 2							
134 - Air Lock	1	0,4	Nov 1900	222	0,0	3,2	69,44
Zone 3							
135 - Vest. Saída	1	0,2	Jan 2300	56	0,0	7,0	8,05
Zone 4							
136 - Vest. Entrada	1	0,2	Jan 2300	56	0,0	7,6	7,42
Zone 5							
137 - Circ. Limpa	1	0,2	Jul 1600	278	0,0	12,3	22,58
Zone 6							
138 - Ciclo Invertido	1	0,2	Jan 2300	57	0,0	9,6	5,94
Zone 7							
139 - Análise e Teste C.	1	0,5	Jan 2300	54	0,0	9,1	5,93
Zone 8							
140 - Procedimento	1	0,9	Jan 2300	113	0,0	18,0	6,28
Zone 9							
141 - Manutenção	1	0,8	Jul 1600	104	0,0	13,7	7,59
Zone 10							
142 - Dep. Caixas	1	0,1	Jan 2300	14	0,0	9,1	1,57
Zone 11							
143 - Lavagem	1	4,8	Dec 1300	603	0,1	40,2	14,99
Zone 12							
144 - Dep. Marvalha	1	0,1	Jan 2300	11	0,0	7,3	1,57
Zone 13							
145 - Dep. Ração	1	0,9	Dec 1200	96	0,0	6,7	14,33

Ventilation Sizing Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 1939 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
133 - Circ. Suja	1	19,6	0,0	274,0	0,00	0,00	0,0	100,0	274,0
Zone 2									
134 - Air Lock	1	3,2	0,0	222,2	0,00	0,00	0,0	100,0	222,2
Zone 3									
135 - Vest. Saída	1	7,0	1,0	56,4	0,00	0,00	0,0	100,0	56,4
Zone 4									
136 - Vest. Entrada	1	7,6	1,0	56,4	0,00	0,00	0,0	100,0	56,4
Zone 5									
137 - Circ. Limpa	1	12,3	0,0	277,8	0,00	0,00	0,0	100,0	277,8
Zone 6									
138 - Ciclo Invertido	1	9,6	1,0	57,0	0,00	0,00	0,0	100,0	57,0
Zone 7									
139 - Análise e Teste C.	1	9,1	1,0	54,0	0,00	0,00	0,0	100,0	54,0
Zone 8									
140 - Procedimento	1	18,0	3,0	113,0	0,00	0,00	0,0	100,0	113,0
Zone 9									
141 - Manutenção	1	13,7	1,0	104,0	0,00	0,00	0,0	100,0	104,0
Zone 10									
142 - Dep. Caixas	1	9,1	0,0	14,3	0,00	0,00	0,0	100,0	14,3
Zone 11									
143 - Lavagem	1	40,2	1,0	602,8	0,00	0,00	0,0	100,0	602,8
Zone 12									
144 - Dep. Marvalha	1	7,3	0,0	11,5	0,00	0,00	0,0	100,0	11,5
Zone 13									
145 - Dep. Ração	1	6,7	0,0	96,0	0,00	0,00	0,0	100,0	96,0
Totals (incl. Space Multipliers)				1939,2					1939,2

Air System Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	18 m²	819	-	18 m²	-	-
Wall Transmission	64 m²	1310	-	64 m²	136	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	18 m²	1072	-	18 m²	124	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	36 m²	894	-	36 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	2451 W	2451	-	0	0	-
Task Lighting	50 W	50	-	0	0	-
Electric Equipment	1711 W	1711	-	0	0	-
People	9	646	541	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	8953	541	-	260	0
Zone Conditioning	-	9281	541	-	254	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	1939 L/s	0	-	1939 L/s	0	-
Ventilation Load	1939 L/s	36172	49734	1939 L/s	3197	-11732
Supply Fan Load	1939 L/s	2424	-	1939 L/s	-2424	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	47877	50275	-	1027	-11732
Central Cooling Coil	-	53357	50275	-	-14535	-11773
Central Heating Coil	-	-1915	-	-	14535	-
Terminal Reheat Coils	-	-3565	-	-	1027	-
>> Total Conditioning	-	47877	50275	-	1027	-11773
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Nov 1900			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 28,1 °C / 23,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	32 m²	1249	-	32 m²	68	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	294 W	294	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1543	0	-	68	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Nov 1900			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 28,1 °C / 23,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	11 m²	377	-	11 m²	23	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	48 W	48	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	425	0	-	23	0

Zone Design Load Summary for AH-TER-08

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	105 W	105	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	177	60	-	0	0

Zone 4	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	114 W	114	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	186	60	-	0	0

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Zone 5	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	3 m²	65	-	3 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	185 W	184	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	249	0	-	0	0

Zone 6	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	144 W	144	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	226	60	-	0	0

Zone Design Load Summary for AH-TER-08

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Zone 7	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	273 W	273	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	491	60	-	0	0

Zone 8	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	360 W	360	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	855	180	-	0	0

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Zone 9	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	11 m²	278	-	11 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	206 W	205	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	274 W	274	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	840	60	-	0	0

Zone 10	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	136	0	-	0	0

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Zone 11	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 29,4 °C / 22,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	14 m²	1886	-	14 m²	-	-
Wall Transmission	18 m²	543	-	18 m²	39	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	14 m²	455	-	14 m²	96	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	23 m²	451	-	23 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	603 W	603	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	804 W	804	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4824	60	-	135	0

Zone 12	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	110 W	109	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	109	0	-	0	0

Zone Design Load Summary for AH-TER-08

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Zone 13	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1200			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 28,1 °C / 22,3 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	4 m²	593	-	4 m²	-	-
Wall Transmission	3 m²	75	-	3 m²	6	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	4 m²	114	-	4 m²	28	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	101 W	100	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	882	0	-	34	0

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "133 - Circ. Suja" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Nov 1900			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 28,1 °C / 23,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	32 m²	1249	-	32 m²	68	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	294 W	294	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1543	0	-	68	0

TABLE 1.1.B. Envelope Loads For Space "133 - Circ. Suja" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SW EXPOSURE						
WALL	32	1,513	-	1249	-	68

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 2.1.A. Component Loads For Space "134 - Air Lock" In Zone "Zone 2"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Nov 1900 COOLING OA DB / WB 28,1 °C / 23,1 °C OCCUPIED T-STAT 21,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	11 m²	377	-	11 m²	23	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	48 W	48	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	425	0	-	23	0

TABLE 2.1.B. Envelope Loads For Space "134 - Air Lock" In Zone "Zone 2"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SW EXPOSURE						
WALL	6	1,513	-	215	-	12
SE EXPOSURE						
WALL	5	1,513	-	162	-	11

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
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TABLE 3.1.A. Component Loads For Space "135 - Vest. Saída" In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	105 W	105	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	177	60	-	0	0

TABLE 3.1.B. Envelope Loads For Space "135 - Vest. Saída" In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 4.1.A. Component Loads For Space "136 - Vest. Entrada" In Zone "Zone 4"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 21,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	114 W	114	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	186	60	-	0	0

TABLE 4.1.B. Envelope Loads For Space "136 - Vest. Entrada" In Zone "Zone 4"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 5.1.A. Component Loads For Space "137 - Circ. Limpa" In Zone "Zone 5"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	3 m²	65	-	3 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	185 W	184	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	249	0	-	0	0

TABLE 5.1.B. Envelope Loads For Space "137 - Circ. Limpa" In Zone "Zone 5"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 6.1.A. Component Loads For Space "138 - Ciclo Invertido" In Zone "Zone 6"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 21,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	144 W	144	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	226	60	-	0	0

TABLE 6.1.B. Envelope Loads For Space "138 - Ciclo Invertido" In Zone "Zone 6"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 7.1.A. Component Loads For Space "139 - Análise e Teste C." In Zone "Zone 7"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 21,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	273 W	273	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	491	60	-	0	0

TABLE 7.1.B. Envelope Loads For Space "139 - Análise e Teste C." In Zone "Zone 7"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 8.1.A. Component Loads For Space "140 - Procedimento" In Zone "Zone 8"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	360 W	360	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	855	180	-	0	0

TABLE 8.1.B. Envelope Loads For Space "140 - Procedimento" In Zone "Zone 8"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 9.1.A. Component Loads For Space "141 - Manutenção" In Zone "Zone 9"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	11 m²	278	-	11 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	206 W	205	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	274 W	274	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	840	60	-	0	0

TABLE 9.1.B. Envelope Loads For Space "141 - Manutenção" In Zone "Zone 9"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 10.1.A. Component Loads For Space "142 - Dep. Caixas" In Zone "Zone 10"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	136	0	-	0	0

TABLE 10.1.B. Envelope Loads For Space "142 - Dep. Caixas" In Zone "Zone 10"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 11.1.A. Component Loads For Space "143 - Lavagem" In Zone "Zone 11"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 29,4 °C / 22,6 °C OCCUPIED T-STAT 21,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	14 m²	1886	-	14 m²	-	-
Wall Transmission	18 m²	543	-	18 m²	39	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	14 m²	455	-	14 m²	96	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	23 m²	451	-	23 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	603 W	603	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	804 W	804	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4824	60	-	135	0

TABLE 11.1.B. Envelope Loads For Space "143 - Lavagem" In Zone "Zone 11"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	18	1,513	-	543	-	39
WINDOW 1	14	5,000	0,500	455	1886	96

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 12.1.A. Component Loads For Space "144 - Dep. Marvalha" In Zone "Zone 12"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	110 W	109	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	109	0	-	0	0

TABLE 12.1.B. Envelope Loads For Space "144 - Dep. Marvalha" In Zone "Zone 12"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 13.1.A. Component Loads For Space "145 - Dep. Ração" In Zone "Zone 13"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1200			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 28,1 °C / 22,3 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 21,0 °C			OCCUPIED T-STAT 19,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	4 m²	593	-	4 m²	-	-
Wall Transmission	3 m²	75	-	3 m²	6	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	4 m²	114	-	4 m²	28	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	101 W	100	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	882	0	-	34	0

TABLE 13.1.B. Envelope Loads For Space "145 - Dep. Ração" In Zone "Zone 13"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	3	1,513	-	75	-	6
WINDOW 1	4	5,000	0,500	114	593	28

System Psychrometrics for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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June DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,9	0,01725	1939	400	36172	49734
Vent - Return Mixing	Outlet	34,9	0,01725	1939	400	-	-
Central Cooling Coil	Outlet	11,9	0,00836	1939	400	53357	50275
Central Heating Coil	Outlet	12,7	0,00836	1939	400	1915	-
Supply Fan	Outlet	13,8	0,00836	1939	400	2424	-
Cold Supply Duct	Outlet	13,8	0,00836	1939	400	-	-
Zone Air	-	19,3	0,00846	1939	426	9281	541
Return Plenum	Outlet	19,3	0,00846	1939	426	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	891	Heating	992	18,9	274	400	684	0
Zone 2	272	Heating	307	18,8	222	400	1030	0
Zone 3	177	Heating	177	18,9	56	500	166	0
Zone 4	186	Heating	186	18,9	56	500	158	0
Zone 5	248	Heating	263	18,8	278	400	1404	0
Zone 6	226	Heating	226	18,9	57	499	123	0
Zone 7	491	Cooling	496	21,5	54	505	0	0
Zone 8	855	Deadband	865	20,2	113	550	0	0
Zone 9	836	Deadband	836	20,5	104	454	0	0
Zone 10	136	Cooling	138	21,9	14	400	0	0
Zone 11	3929	Deadband	4060	19,4	603	409	0	0
Zone 12	109	Cooling	111	21,9	11	400	0	0
Zone 13	595	Deadband	625	19,2	96	400	0	0

System Psychrometrics for AH-TER-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	1939	400	-3197	11732
Vent - Return Mixing	Outlet	17,6	0,01035	1939	400	-	-
Central Cooling Coil	Outlet	11,3	0,00827	1939	400	14535	11773
Central Heating Coil	Outlet	17,6	0,00827	1939	400	14535	-
Supply Fan	Outlet	18,6	0,00827	1939	400	2424	-
Cold Supply Duct	Outlet	18,6	0,00827	1939	400	-	-
Zone Air	-	19,0	0,00827	1939	400	-254	0
Return Plenum	Outlet	19,0	0,00827	1939	400	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-68	Heating	-66	19,0	274	400	174	0
Zone 2	-23	Heating	-23	19,0	222	400	111	0
Zone 3	0	Heating	0	19,0	56	400	23	0
Zone 4	0	Heating	0	19,0	56	400	23	0
Zone 5	0	Heating	0	19,0	278	400	112	0
Zone 6	0	Heating	0	19,0	57	400	23	0
Zone 7	0	Heating	0	19,0	54	400	22	0
Zone 8	0	Heating	0	19,0	113	400	46	0
Zone 9	0	Heating	0	19,0	104	400	42	0
Zone 10	0	Heating	0	19,0	14	400	6	0
Zone 11	-135	Heating	-132	19,0	603	400	370	0
Zone 12	0	Heating	0	19,0	11	400	5	0
Zone 13	-34	Heating	-34	19,0	96	400	71	0

Air System Sizing Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-09**
Equipment Class **SPLT AHU**
Air System Type **CAV/RH**

Number of zones **14**
Floor Area **334,7** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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

No central cooling coil loads occurred during this calculation.

Precool Coil Sizing Data

Total coil load **83,9** kW
Sensible coil load **54,2** kW
Coil L/s at Aug 1500 **3285** L/s
Max coil L/s **3285** L/s
Sensible heat ratio **0,646**
Water flow @ 7,5 K rise **N/A**

Load occurs at **Aug 1500**
OA DB / WB **35,5 / 25,7** °C
Entering DB / WB **26,8 / 20,0** °C
Leaving DB / WB **13,0 / 12,4** °C
Bypass Factor **0,100**

Humidifier Sizing Data

Max steam flow at Oct 1500 **1,25** kg/hr
Airflow Rate **3285** L/s

Air mass flow **14061,71** kg/hr
Moisture gain **,00009** kg/kg

Supply Fan Sizing Data

Actual max L/s **3285** L/s
Standard L/s **3251** L/s
Actual max L/(s·m²) **9,82** L/(s·m²)

Fan motor BHP **5,18** BHP
Fan motor kW **4,11** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **1135** L/s
L/(s·m²) **3,39** L/(s·m²)

L/s/person **17,47** L/s/person

Zone Sizing Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-TER-09**
Equipment Class **SPLT AHU**
Air System Type **CAV/RH**

Number of zones **14**
Floor Area **334,7** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	375	375	9,17	0,0	-	0,0	-	0
Zone 2	173	173	10,00	0,0	-	0,0	-	0
Zone 3	219	219	11,41	0,0	-	0,0	-	0
Zone 4	241	241	12,55	0,0	-	0,0	-	0
Zone 5	264	264	13,75	0,0	-	0,0	-	0
Zone 6	173	173	9,01	0,0	-	0,0	-	0
Zone 7	105	105	2,36	0,0	-	0,0	-	0
Zone 8	70	70	9,21	0,0	-	0,0	-	0
Zone 9	82	82	10,25	0,0	-	0,0	-	0
Zone 10	82	82	10,25	0,0	-	0,0	-	0
Zone 11	158	158	20,52	0,0	-	0,0	-	0
Zone 12	397	397	26,12	0,0	-	0,0	-	0
Zone 13	238	238	14,54	0,0	-	0,0	-	0
Zone 14	708	708	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 ²)
Zone 1	3,8	Dec 1300	0,1	40,9
Zone 2	1,8	Dec 1300	0,1	17,3
Zone 3	2,2	Dec 1300	0,1	19,2
Zone 4	2,5	Dec 1300	0,1	19,2
Zone 5	2,7	Dec 1300	0,1	19,2
Zone 6	1,7	Dec 1300	0,1	19,2
Zone 7	1,1	Dec 1300	0,0	44,6
Zone 8	0,7	Jun 1500	0,0	7,6
Zone 9	0,8	Jun 1500	0,0	8,0
Zone 10	0,8	Jun 1500	0,0	8,0
Zone 11	1,4	Oct 1500	0,1	7,7
Zone 12	4,1	Jan 2300	0,0	15,2
Zone 13	2,6	Jan 2300	0,0	16,4
Zone 14	7,6	Dec 1200	0,3	92,2

Zone Sizing Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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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 (m²)	Space L/(s·m²)
Zone 1							
146 - Equipe Adm.	1	3,8	Dec 1300	375	0,1	40,9	9,17
Zone 2							
147 - Diretoria	1	1,8	Dec 1300	173	0,1	17,3	10,00
Zone 3							
148 - Assist. Diretoria	1	2,2	Dec 1300	219	0,1	19,2	11,41
Zone 4							
149 - Eq. Acadêmica	1	2,5	Dec 1300	241	0,1	19,2	12,55
Zone 5							
150 - Lab. Inf	1	2,7	Dec 1300	264	0,1	19,2	13,75
Zone 6							
151 - Equipe Infra.	1	1,7	Dec 1300	173	0,1	19,2	9,01
Zone 7							
152 - Circ.	1	1,1	Dec 1300	105	0,0	44,6	2,36
Zone 8							
153 - Coord. Adm.	1	0,7	Jun 1500	70	0,0	7,6	9,21
Zone 9							
154 - Coord. Infra.	1	0,8	Jun 1500	82	0,0	8,0	10,25
Zone 10							
155 - Coord. Pesquisa	1	0,8	Jun 1500	82	0,0	8,0	10,25
Zone 11							
156 - Coord. Ensino	1	1,4	Oct 1500	158	0,1	7,7	20,52
Zone 12							
157 - CPD/TI	1	4,1	Jan 2300	397	0,0	15,2	26,12
Zone 13							
158 - Reunião	1	2,6	Jan 2300	238	0,0	16,4	14,54
Zone 14							
159 - Recp./Hall/Café	1	7,6	Dec 1200	708	0,3	92,2	7,68

Ventilation Sizing Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 1135 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
146 - Equipe Adm.	1	40,9	8,0	375,0	7,50	0,00	0,0	0,0	60,0
Zone 2									
147 - Diretoria	1	17,3	7,0	173,0	7,50	0,00	0,0	0,0	52,5
Zone 3									
148 - Assist. Diretoria	1	19,2	5,0	219,0	7,50	0,00	0,0	0,0	37,5
Zone 4									
149 - Eq. Acadêmica	1	19,2	6,0	241,0	7,50	0,00	0,0	0,0	45,0
Zone 5									
150 - Lab. Inf	1	19,2	7,0	264,0	7,50	0,00	0,0	0,0	52,5
Zone 6									
151 - Equipe Infra.	1	19,2	3,0	173,0	7,50	0,00	0,0	0,0	22,5
Zone 7									
152 - Circ.	1	44,6	1,0	105,1	7,50	0,00	0,0	0,0	7,5
Zone 8									
153 - Coord. Adm.	1	7,6	3,0	70,0	7,50	0,00	0,0	0,0	22,5
Zone 9									
154 - Coord. Infra.	1	8,0	3,0	82,0	7,50	0,00	0,0	0,0	22,5
Zone 10									
155 - Coord. Pesquisa	1	8,0	3,0	82,0	7,50	0,00	0,0	0,0	22,5
Zone 11									
156 - Coord. Ensino	1	7,7	3,0	158,0	7,50	0,00	0,0	0,0	22,5
Zone 12									
157 - CPD/TI	1	15,2	0,0	397,0	7,50	0,00	0,0	0,0	0,0
Zone 13									
158 - Reunião	1	16,4	8,0	238,4	7,50	0,00	0,0	0,0	60,0
Zone 14									
159 - Recp./Hall/Café	1	92,2	8,0	707,9	0,00	0,00	0,0	100,0	707,9
Totals (incl. Space Multipliers)				3285,4					1135,4

Air System Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	NO COOLING DATA NO COOLING OA DB / WB			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	37 m²	-	-	37 m²	-	-
Wall Transmission	97 m²	-	-	97 m²	497	-
Roof Transmission	0 m²	-	-	0 m²	0	-
Window Transmission	37 m²	-	-	37 m²	629	-
Skylight Transmission	0 m²	-	-	0 m²	0	-
Door Loads	0 m²	-	-	0 m²	0	-
Floor Transmission	0 m²	-	-	0 m²	0	-
Partitions	63 m²	-	-	63 m²	0	-
Ceiling	0 m²	-	-	0 m²	0	-
Overhead Lighting	-	-	-	0	0	-
Task Lighting	-	-	-	0	0	-
Electric Equipment	-	-	-	0	0	-
People	-	-	-	0	0	0
Infiltration	-	-	-	-	0	0
Miscellaneous	-	-	-	-	0	0
Safety Factor	10% / 0%	-	-	0%	0	0
>> Total Zone Loads	-	-	-	-	1126	0
Zone Conditioning	-	-	-	-	-1931	0
Plenum Wall Load	0%	-	-	0	0	-
Plenum Roof Load	0%	-	-	0	0	-
Plenum Lighting Load	0%	-	-	0	0	-
Return Fan Load	-	-	-	3285 L/s	0	-
Ventilation Load	-	-	-	1135 L/s	-4153	-3555
Supply Fan Load	-	-	-	3285 L/s	-4107	-
Space Fan Coil Fans	-	-	-	-	0	-
Duct Heat Gain / Loss	0%	-	-	0%	0	-
>> Total System Loads	-	-	-	-	-10191	-3555
Central Cooling Coil	-	-	-	-	0	0
Precool Coil	-	-	-	-	-10191	-3495
Humidification Load	-	-	-	-	-	0
>> Total Conditioning	-	-	-	-	-10191	-3495
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 29,4 °C / 22,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	6 m²	622	-	6 m²	-	-
Wall Transmission	8 m²	222	-	8 m²	43	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	6 m²	127	-	6 m²	94	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	614 W	613	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1280 W	1280	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	345	0	0%	0	0
>> Total Zone Loads	-	3794	481	-	137	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 29,4 °C / 22,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	5 m²	141	-	5 m²	28	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	64	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	260 W	259	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	320 W	320	-	0	0	-
People	7	503	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	161	0	0%	0	0
>> Total Zone Loads	-	1769	421	-	74	0

Zone Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 29,4 °C / 22,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	173	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	64	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	800 W	800	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	200	0	0%	0	0
>> Total Zone Loads	-	2205	300	-	80	0

Zone 4	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 29,4 °C / 22,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	173	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	64	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	960 W	960	-	0	0	-
People	6	431	360	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	224	0	0%	0	0
>> Total Zone Loads	-	2460	360	-	80	0

Zone Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 5	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 29,4 °C / 22,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	173	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	64	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1120 W	1120	-	0	0	-
People	7	503	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	247	0	0%	0	0
>> Total Zone Loads	-	2715	421	-	80	0

Zone 6	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 29,4 °C / 22,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	173	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	64	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	480 W	480	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	154	0	0%	0	0
>> Total Zone Loads	-	1695	180	-	80	0

Zone Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 7	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 29,4 °C / 22,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	2 m²	170	-	2 m²	-	-
Wall Transmission	3 m²	82	-	3 m²	16	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	2 m²	35	-	2 m²	26	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	669 W	669	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	103	0	0%	0	0
>> Total Zone Loads	-	1130	60	-	41	0

Zone 8	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	5 m²	153	-	5 m²	25	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	114 W	114	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	160 W	160	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	65	0	0%	0	0
>> Total Zone Loads	-	718	180	-	25	0

Zone Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 9	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	220	-	7 m²	36	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	120 W	120	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	160 W	160	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	73	0	0%	0	0
>> Total Zone Loads	-	798	180	-	36	0

Zone 10	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	220	-	7 m²	36	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	120 W	120	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	160 W	160	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	73	0	0%	0	0
>> Total Zone Loads	-	798	180	-	36	0

Zone Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 11	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,3 °C / 24,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	4 m²	302	-	4 m²	-	-
Wall Transmission	14 m²	323	-	14 m²	69	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	4 m²	168	-	4 m²	68	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	116 W	115	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	160 W	160	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	129	0	0%	0	0
>> Total Zone Loads	-	1423	180	-	137	0

Zone 12	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	228 W	228	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3500 W	3500	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	373	0	0%	0	0
>> Total Zone Loads	-	4101	0	-	0	0

Zone Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 13	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	246 W	246	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1500 W	1500	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	233	0	0%	0	0
>> Total Zone Loads	-	2563	481	-	0	0

Zone 14	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1200			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 28,1 °C / 22,3 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	12 m²	3072	-	12 m²	-	-
Wall Transmission	21 m²	159	-	21 m²	110	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	12 m²	225	-	12 m²	208	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	63 m²	896	-	63 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1383 W	1383	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	600 W	600	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	692	0	0%	0	0
>> Total Zone Loads	-	7611	481	-	318	0

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "146 - Equipe Adm." In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 29,4 °C / 22,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	6 m²	622	-	6 m²	-	-
Wall Transmission	8 m²	222	-	8 m²	43	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	6 m²	127	-	6 m²	94	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	614 W	613	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1280 W	1280	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	345	0	0%	0	0
>> Total Zone Loads	-	3794	481	-	137	0

TABLE 1.1.B. Envelope Loads For Space "146 - Equipe Adm." In Zone "Zone 1"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
SE EXPOSURE				(W)	(W)	(W)
WALL	8	1,513	-	222	-	43
WINDOW 1	6	5,000	0,412	127	622	94

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 2.1.A. Component Loads For Space "147 - Diretoria" In Zone "Zone 2"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 29,4 °C / 22,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	5 m²	141	-	5 m²	28	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	64	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	260 W	259	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	320 W	320	-	0	0	-
People	7	503	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	161	0	0%	0	0
>> Total Zone Loads	-	1769	421	-	74	0

TABLE 2.1.B. Envelope Loads For Space "147 - Diretoria" In Zone "Zone 2"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	5	1,513	-	141	-	28
WINDOW 1	3	5,000	0,412	64	311	47

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 3.1.A. Component Loads For Space "148 - Assist. Diretoria" In Zone "Zone 3"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 29,4 °C / 22,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	173	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	64	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	800 W	800	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	200	0	0%	0	0
>> Total Zone Loads	-	2205	300	-	80	0

TABLE 3.1.B. Envelope Loads For Space "148 - Assist. Diretoria" In Zone "Zone 3"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
SE EXPOSURE				(W)	(W)	(W)
WALL	7	1,513	-	173	-	34
WINDOW 1	3	5,000	0,412	64	311	47

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 4.1.A. Component Loads For Space "149 - Eq. Acadêmica" In Zone "Zone 4"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 29,4 °C / 22,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	173	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	64	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	960 W	960	-	0	0	-
People	6	431	360	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	224	0	0%	0	0
>> Total Zone Loads	-	2460	360	-	80	0

TABLE 4.1.B. Envelope Loads For Space "149 - Eq. Acadêmica" In Zone "Zone 4"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	7	1,513	-	173	-	34
WINDOW 1	3	5,000	0,412	64	311	47

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 5.1.A. Component Loads For Space "150 - Lab. Inf" In Zone "Zone 5"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 29,4 °C / 22,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	173	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	64	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1120 W	1120	-	0	0	-
People	7	503	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	247	0	0%	0	0
>> Total Zone Loads	-	2715	421	-	80	0

TABLE 5.1.B. Envelope Loads For Space "150 - Lab. Inf" In Zone "Zone 5"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	7	1,513	-	173	-	34
WINDOW 1	3	5,000	0,412	64	311	47

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 6.1.A. Component Loads For Space "151 - Equipe Infra." In Zone "Zone 6"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 29,4 °C / 22,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	173	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	64	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	480 W	480	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	154	0	0%	0	0
>> Total Zone Loads	-	1695	180	-	80	0

TABLE 6.1.B. Envelope Loads For Space "151 - Equipe Infra." In Zone "Zone 6"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
SE EXPOSURE				(W)	(W)	(W)
WALL	7	1,513	-	173	-	34
WINDOW 1	3	5,000	0,412	64	311	47

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 7.1.A. Component Loads For Space "152 - Circ." In Zone "Zone 7"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 29,4 °C / 22,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	2 m²	170	-	2 m²	-	-
Wall Transmission	3 m²	82	-	3 m²	16	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	2 m²	35	-	2 m²	26	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	669 W	669	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	103	0	0%	0	0
>> Total Zone Loads	-	1130	60	-	41	0

TABLE 7.1.B. Envelope Loads For Space "152 - Circ." In Zone "Zone 7"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	3	1,513	-	82	-	16
WINDOW 1	2	5,000	0,412	35	170	26

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 8.1.A. Component Loads For Space "153 - Coord. Adm." In Zone "Zone 8"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 34,9 °C / 25,7 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	5 m²	153	-	5 m²	25	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	114 W	114	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	160 W	160	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	65	0	0%	0	0
>> Total Zone Loads	-	718	180	-	25	0

TABLE 8.1.B. Envelope Loads For Space "153 - Coord. Adm." In Zone "Zone 8"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NE EXPOSURE						
WALL	5	1,513	-	153	-	25

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 9.1.A. Component Loads For Space "154 - Coord. Infra." In Zone "Zone 9"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 34,9 °C / 25,7 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	220	-	7 m²	36	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	120 W	120	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	160 W	160	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	73	0	0%	0	0
>> Total Zone Loads	-	798	180	-	36	0

TABLE 9.1.B. Envelope Loads For Space "154 - Coord. Infra." In Zone "Zone 9"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NE EXPOSURE						
WALL	7	1,513	-	220	-	36

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 10.1.A. Component Loads For Space "155 - Coord. Pesquisa" In Zone "Zone 10"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 34,9 °C / 25,7 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	220	-	7 m²	36	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	120 W	120	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	160 W	160	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	73	0	0%	0	0
>> Total Zone Loads	-	798	180	-	36	0

TABLE 10.1.B. Envelope Loads For Space "155 - Coord. Pesquisa" In Zone "Zone 10"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NE EXPOSURE						
WALL	7	1,513	-	220	-	36

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 11.1.A. Component Loads For Space "156 - Coord. Ensino" In Zone "Zone 11"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500 COOLING OA DB / WB 33,3 °C / 24,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	4 m²	302	-	4 m²	-	-
Wall Transmission	14 m²	323	-	14 m²	69	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	4 m²	168	-	4 m²	68	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	116 W	115	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	160 W	160	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	129	0	0%	0	0
>> Total Zone Loads	-	1423	180	-	137	0

TABLE 11.1.B. Envelope Loads For Space "156 - Coord. Ensino" In Zone "Zone 11"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NE EXPOSURE						
WALL	7	1,513	-	123	-	36
SE EXPOSURE						
WALL	7	1,513	-	200	-	33
WINDOW 1	4	5,000	0,412	168	302	68

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 12.1.A. Component Loads For Space "157 - CPD/TI" In Zone "Zone 12"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	228 W	228	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3500 W	3500	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	373	0	0%	0	0
>> Total Zone Loads	-	4101	0	-	0	0

TABLE 12.1.B. Envelope Loads For Space "157 - CPD/TI" In Zone "Zone 12"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 13.1.A. Component Loads For Space "158 - Reunião" In Zone "Zone 13"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	246 W	246	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1500 W	1500	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	233	0	0%	0	0
>> Total Zone Loads	-	2563	481	-	0	0

TABLE 13.1.B. Envelope Loads For Space "158 - Reunião" In Zone "Zone 13"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 14.1.A. Component Loads For Space "159 - Recp./Hall/Café" In Zone "Zone 14"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1200 COOLING OA DB / WB 28,1 °C / 22,3 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	12 m²	3072	-	12 m²	-	-
Wall Transmission	21 m²	159	-	21 m²	110	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	12 m²	225	-	12 m²	208	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	63 m²	896	-	63 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1383 W	1383	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	600 W	600	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	692	0	0%	0	0
>> Total Zone Loads	-	7611	481	-	318	0

TABLE 14.1.B. Envelope Loads For Space "159 - Recp./Hall/Café" In Zone "Zone 14"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
SE EXPOSURE						
WALL	2	1,513	-	41	-	10
WINDOW 1	12	5,000	0,845	225	3072	208
NE EXPOSURE						
WALL	20	1,513	-	118	-	100

System Psychrometrics for AH-TER-09

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	1135	400	4153	3555
Vent - Return Mixing	Outlet	15,6	0,00965	3285	413	-	-
Precool Coil	Outlet	13,0	0,00929	3285	413	10191	3495
Central Cooling Coil	Outlet	13,0	0,00929	3285	413	0	0
Supply Fan	Outlet	14,0	0,00929	3285	413	4107	-
Humidifier	Outlet	14,0	0,00929	3285	413	-	0
Cold Supply Duct	Outlet	14,0	0,00929	3285	413	-	-
Zone Air	-	14,5	0,00929	3285	421	1931	0
Return Plenum	Outlet	14,5	0,00929	3285	421	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-137	Deadband	138	14,4	375	421	0	0
Zone 2	-74	Deadband	73	14,4	173	421	0	0
Zone 3	-80	Deadband	79	14,3	219	421	0	0
Zone 4	-80	Deadband	79	14,3	241	421	0	0
Zone 5	-80	Deadband	80	14,3	264	421	0	0
Zone 6	-80	Deadband	79	14,4	173	421	0	0
Zone 7	-41	Deadband	107	14,9	105	421	0	0
Zone 8	-25	Deadband	25	14,3	70	421	0	0
Zone 9	-36	Deadband	35	14,4	82	421	0	0
Zone 10	-36	Deadband	35	14,4	82	421	0	0
Zone 11	-137	Deadband	119	14,7	158	421	0	0
Zone 12	0	Deadband	0	14,0	397	421	0	0
Zone 13	0	Deadband	2	14,1	238	421	0	0
Zone 14	-318	Deadband	1082	15,3	708	421	0	0

Air System Sizing Summary for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-1PV-01**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **65,6** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **47,2** kW
Sensible coil load **24,5** kW
Coil L/s at Jun 1500 **924** L/s
Max block L/s **924** L/s
Sum of peak zone L/s **924** L/s
Sensible heat ratio **0,518**
L/(s kW) **19,6**
m²/kW **1,4**
W/m² **720,3**
Water flow @ 7,5 K rise **1,51** L/s

Load occurs at **Jun 1500**
OA DB / WB **34,9 / 25,7** °C
Entering DB / WB **34,9 / 25,7** °C
Leaving DB / WB **12,8 / 12,3** °C
Coil ADP **10,3** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **13,0** °C
Zone T-stat Check **3 of 3** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **8,7** kW
Coil L/s at Des Htg **924** L/s
Max coil L/s **924** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **132,4**
Ent. DB / Lvg DB **9,7 / 17,6** °C

Supply Fan Sizing Data

Actual max L/s **924** L/s
Standard L/s **915** L/s
Actual max L/(s·m²) **14,09** L/(s·m²)

Fan motor BHP **1,46** BHP
Fan motor kW **1,16** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **924** L/s
L/(s·m²) **14,09** L/(s·m²)

L/s/person **102,68** L/s/person

Zone Sizing Summary for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-1PV-01**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **65,6** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	447	447	15,74	0,0	0,00	0,0	0,00	0
Zone 2	366	366	12,71	0,0	0,00	0,0	0,00	0
Zone 3	111	111	13,23	0,0	0,00	0,0	0,00	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 ²)
Zone 1	3,4	Jul 1800	0,1	28,4
Zone 2	2,9	Jun 1700	0,1	28,8
Zone 3	0,2	Jan 2300	0,0	8,4

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 ²)	Space L/(s·m ²)
Zone 1							
200 - Cultura de Vírus	1	3,4	Jul 1800	447	0,1	28,4	15,74
Zone 2							
201 - Cultura Celular	1	2,9	Jun 1700	366	0,1	28,8	12,71
Zone 3							
203 - A.C.	1	0,2	Jan 2300	111	0,0	8,4	13,23

Ventilation Sizing Summary for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method **Sum of Space OA Airflows**
Design Ventilation Airflow Rate **924 L/s**

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
200 - Cultura de Vírus	1	28,4	5,0	447,0	0,00	0,00	0,0	100,0	447,0
Zone 2									
201 - Cultura Celular	1	28,8	4,0	366,0	0,00	0,00	0,0	100,0	366,0
Zone 3									
203 - A.C.	1	8,4	0,0	111,1	0,00	0,00	0,0	100,0	111,1
Totals (incl. Space Multipliers)				924,1					924,1

Air System Design Load Summary for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	8 m²	836	-	8 m²	-	-
Wall Transmission	30 m²	564	-	30 m²	107	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	8 m²	443	-	8 m²	96	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	66 m²	260	-	66 m²	0	-
Overhead Lighting	984 W	984	-	0	0	-
Task Lighting	20 W	20	-	0	0	-
Electric Equipment	2288 W	2288	-	0	0	-
People	9	646	541	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	6041	541	-	203	0
Zone Conditioning	-	6179	541	-	-83	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	924 L/s	0	-	924 L/s	0	-
Ventilation Load	924 L/s	14573	22225	924 L/s	1238	-7822
Supply Fan Load	924 L/s	1155	-	924 L/s	-1155	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	21907	22766	-	0	-7822
Central Cooling Coil	-	24483	22766	-	-8686	-7822
Central Heating Coil	-	-2576	-	-	8686	-
>> Total Conditioning	-	21907	22766	-	0	-7822
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,3 °C / 25,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	4 m²	504	-	4 m²	-	-
Wall Transmission	23 m²	642	-	23 m²	85	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	4 m²	209	-	4 m²	48	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	28 m²	113	-	28 m²	0	-
Overhead Lighting	426 W	426	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1136 W	1136	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	3399	300	-	133	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,9 °C / 25,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	4 m²	544	-	4 m²	-	-
Wall Transmission	6 m²	182	-	6 m²	22	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	4 m²	212	-	4 m²	48	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	29 m²	114	-	29 m²	0	-
Overhead Lighting	432 W	432	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1152 W	1152	-	0	0	-
People	4	287	240	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2934	240	-	70	0

Zone Design Load Summary for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	8 m²	33	-	8 m²	0	-
Overhead Lighting	126 W	126	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	159	0	-	0	0

Space Design Load Summary for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "200 - Cultura de Vírus" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,3 °C / 25,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	4 m²	504	-	4 m²	-	-
Wall Transmission	23 m²	642	-	23 m²	85	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	4 m²	209	-	4 m²	48	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	28 m²	113	-	28 m²	0	-
Overhead Lighting	426 W	426	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1136 W	1136	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	3399	300	-	133	0

TABLE 1.1.B. Envelope Loads For Space "200 - Cultura de Vírus" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SW EXPOSURE						
WALL	17	1,513	-	436	-	63
NW EXPOSURE						
WALL	6	1,513	-	206	-	22
WINDOW 1	4	5,000	0,500	209	504	48

Space Design Load Summary for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 2.1.A. Component Loads For Space "201 - Cultura Celular" In Zone "Zone 2"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,9 °C / 25,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	4 m²	544	-	4 m²	-	-
Wall Transmission	6 m²	182	-	6 m²	22	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	4 m²	212	-	4 m²	48	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	29 m²	114	-	29 m²	0	-
Overhead Lighting	432 W	432	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1152 W	1152	-	0	0	-
People	4	287	240	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2934	240	-	70	0

TABLE 2.1.B. Envelope Loads For Space "201 - Cultura Celular" In Zone "Zone 2"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NW EXPOSURE						
WALL	6	1,513	-	182	-	22
WINDOW 1	4	5,000	0,500	212	544	48

Space Design Load Summary for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 3.1.A. Component Loads For Space "203 - A.C." In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	8 m²	33	-	8 m²	0	-
Overhead Lighting	126 W	126	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	159	0	-	0	0

TABLE 3.1.B. Envelope Loads For Space "203 - A.C." In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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June DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,9	0,01725	924	400	14573	22225
Vent - Return Mixing	Outlet	34,9	0,01725	924	400	-	-
Central Cooling Coil	Outlet	12,8	0,00880	924	400	24483	22766
Central Heating Coil	Outlet	15,1	0,00880	924	400	2576	-
Supply Fan	Outlet	16,1	0,00880	924	400	1155	-
Cold Supply Duct	Outlet	16,1	0,00880	924	400	-	-
Zone Air	-	21,7	0,00901	924	455	6179	541
Return Plenum	Outlet	21,7	0,00901	924	455	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	3114	Cooling	3153	22,1	447	463	0	0
Zone 2	2768	Cooling	2760	22,5	366	462	0	0
Zone 3	159	Deadband	266	18,2	111	400	0	0

System Psychrometrics for AH-1PV-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	924	400	-1238	7822
Vent - Return Mixing	Outlet	17,6	0,01035	924	400	-	-
Central Cooling Coil	Outlet	9,7	0,00745	924	400	8686	7822
Central Heating Coil	Outlet	17,6	0,00745	924	400	8686	-
Supply Fan	Outlet	18,6	0,00745	924	400	1155	-
Cold Supply Duct	Outlet	18,6	0,00745	924	400	-	-
Zone Air	-	18,7	0,00745	924	400	83	0
Return Plenum	Outlet	18,7	0,00745	924	400	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-133	Deadband	19	18,7	447	400	0	0
Zone 2	-70	Deadband	43	18,7	366	400	0	0
Zone 3	0	Deadband	21	18,8	111	400	0	0

Air System Sizing Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-1PV-02**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **5**
Floor Area **91,0** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **56,3** kW
Sensible coil load **28,8** kW
Coil L/s at Jun 1500 **972** L/s
Max block L/s **972** L/s
Sum of peak zone L/s **972** L/s
Sensible heat ratio **0,511**
L/(s kW) **17,3**
m²/kW **1,6**
W/m² **618,5**
Water flow @ 7,5 K rise **1,80** L/s

Load occurs at **Jun 1500**
OA DB / WB **34,9 / 25,7** °C
Entering DB / WB **34,9 / 25,7** °C
Leaving DB / WB **10,2 / 9,9** °C
Coil ADP **7,4** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **14,0** °C
Zone T-stat Check **5 of 5** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **8,9** kW
Coil L/s at Des Htg **972** L/s
Max coil L/s **972** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **97,3**
Ent. DB / Lvg DB **10,0 / 17,6** °C

Supply Fan Sizing Data

Actual max L/s **972** L/s
Standard L/s **962** L/s
Actual max L/(s·m²) **10,68** L/(s·m²)

Fan motor BHP **1,53** BHP
Fan motor kW **1,21** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **972** L/s
L/(s·m²) **10,68** L/(s·m²)

L/s/person **242,92** L/s/person

Zone Sizing Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-1PV-02**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **5**
Floor Area **91,0** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	56	56	12,92	1,4	0,03	0,0	0,00	0
Zone 2	63	63	5,24	0,0	0,00	0,0	0,00	0
Zone 3	131	131	7,71	0,0	0,00	0,0	0,00	0
Zone 4	667	667	12,67	0,0	0,00	0,0	0,00	0
Zone 5	56	56	10,90	1,4	0,03	0,0	0,00	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 ²)
Zone 1	0,2	Jul 1600	0,0	4,3
Zone 2	0,6	Aug 1600	0,0	12,0
Zone 3	1,1	Jan 2300	0,0	17,0
Zone 4	1,2	Jul 1600	0,0	52,6
Zone 5	0,1	Jan 2300	0,0	5,1

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 ²)	Space L/(s·m ²)
Zone 1							
204 - A.C.	1	0,2	Jul 1600	56	0,0	4,3	12,92
Zone 2							
205 - Lavagem/Expurgo	1	0,6	Aug 1600	63	0,0	12,0	5,24
Zone 3							
206 - Plat. Microscopia	1	1,1	Jan 2300	131	0,0	17,0	7,71
Zone 4							
208 - Circ.	1	1,2	Jul 1600	667	0,0	52,6	12,67
Zone 5							
209 - A.C.	1	0,1	Jan 2300	56	0,0	5,1	10,90

Ventilation Sizing Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method **Sum of Space OA Airflows**
Design Ventilation Airflow Rate **972 L/s**

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
204 - A.C.	1	4,3	0,0	55,6	0,00	0,00	0,0	100,0	55,6
Zone 2									
205 - Lavagem/Expurgo	1	12,0	1,0	62,8	0,00	0,00	0,0	100,0	62,8
Zone 3									
206 - Plat. Microscopia	1	17,0	3,0	131,0	0,00	0,00	0,0	100,0	131,0
Zone 4									
208 - Circ.	1	52,6	0,0	666,7	0,00	0,00	0,0	100,0	666,7
Zone 5									
209 - A.C.	1	5,1	0,0	55,6	0,00	0,00	0,0	100,0	55,6
Totals (incl. Space Multipliers)				971,7					971,7

Air System Design Load Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	4 m²	166	-	4 m²	12	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	6 m²	135	-	6 m²	0	-
Ceiling	94 m²	657	-	94 m²	0	-
Overhead Lighting	1365 W	1365	-	0	0	-
Task Lighting	20 W	20	-	0	0	-
Electric Equipment	510 W	510	-	0	0	-
People	4	287	240	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	3141	240	-	12	0
Zone Conditioning	-	3801	240	-	-209	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	972 L/s	0	-	972 L/s	0	-
Ventilation Load	972 L/s	18417	27289	972 L/s	1593	-7887
Supply Fan Load	972 L/s	1215	-	972 L/s	-1215	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	23433	27529	-	170	-7887
Central Cooling Coil	-	28756	27529	-	-8851	-7887
Central Heating Coil	-	-5139	-	-	8851	-
Terminal Reheat Coils	-	-184	-	-	170	-
>> Total Conditioning	-	23433	27529	-	170	-7887
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	6 m²	137	-	6 m²	0	-
Ceiling	4 m²	17	-	4 m²	0	-
Overhead Lighting	65 W	64	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	219	0	-	0	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	4 m²	181	-	4 m²	12	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	8 m²	157	-	8 m²	0	-
Overhead Lighting	180 W	180	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	600	60	-	12	0

Zone Design Load Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	17 m²	67	-	17 m²	0	-
Overhead Lighting	255 W	255	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	510 W	510	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1058	180	-	0	0

Zone 4	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	60 m²	400	-	60 m²	0	-
Overhead Lighting	789 W	789	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1189	0	-	0	0

Zone Design Load Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 5	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	5 m²	20	-	5 m²	0	-
Overhead Lighting	77 W	76	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	97	0	-	0	0

Space Design Load Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "204 - A.C." In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	6 m²	137	-	6 m²	0	-
Ceiling	4 m²	17	-	4 m²	0	-
Overhead Lighting	65 W	64	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	219	0	-	0	0

TABLE 1.1.B. Envelope Loads For Space "204 - A.C." In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 2.1.A. Component Loads For Space "205 - Lavagem/Expurgo" In Zone "Zone 2"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	4 m²	181	-	4 m²	12	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	8 m²	157	-	8 m²	0	-
Overhead Lighting	180 W	180	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	600	60	-	12	0

TABLE 2.1.B. Envelope Loads For Space "205 - Lavagem/Expurgo" In Zone "Zone 2"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
H EXPOSURE				(W)	(W)	(W)
ROOF	4	1,199	-	181	-	12

Space Design Load Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 3.1.A. Component Loads For Space "206 - Plat. Microscopia" In Zone "Zone 3"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	17 m²	67	-	17 m²	0	-
Overhead Lighting	255 W	255	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	510 W	510	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1058	180	-	0	0

TABLE 3.1.B. Envelope Loads For Space "206 - Plat. Microscopia" In Zone "Zone 3"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 4.1.A. Component Loads For Space "208 - Circ." In Zone "Zone 4"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	60 m²	400	-	60 m²	0	-
Overhead Lighting	789 W	789	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1189	0	-	0	0

TABLE 4.1.B. Envelope Loads For Space "208 - Circ." In Zone "Zone 4"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 5.1.A. Component Loads For Space "209 - A.C." In Zone "Zone 5"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	5 m²	20	-	5 m²	0	-
Overhead Lighting	77 W	76	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	97	0	-	0	0

TABLE 5.1.B. Envelope Loads For Space "209 - A.C." In Zone "Zone 5"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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June DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,9	0,01725	972	400	18417	27289
Vent - Return Mixing	Outlet	34,9	0,01725	972	400	-	-
Central Cooling Coil	Outlet	10,2	0,00754	972	400	28756	27529
Central Heating Coil	Outlet	14,6	0,00754	972	400	5139	-
Supply Fan	Outlet	15,6	0,00754	972	400	1215	-
Cold Supply Duct	Outlet	15,6	0,00754	972	400	-	-
Zone Air	-	19,1	0,00762	972	423	3801	240
Return Plenum	Outlet	19,1	0,00762	972	423	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	217	Heating	265	20,0	56	400	23	0
Zone 2	583	Cooling	526	22,7	63	490	0	0
Zone 3	1058	Cooling	1070	22,5	131	530	0	0
Zone 4	1186	Deadband	1820	17,9	667	400	0	0
Zone 5	97	Heating	120	19,9	56	400	161	0

System Psychrometrics for AH-1PV-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	972	400	-1593	7887
Vent - Return Mixing	Outlet	17,6	0,01035	972	400	-	-
Central Cooling Coil	Outlet	10,0	0,00757	972	400	8851	7887
Central Heating Coil	Outlet	17,6	0,00757	972	400	8851	-
Supply Fan	Outlet	18,6	0,00757	972	400	1215	-
Cold Supply Duct	Outlet	18,6	0,00757	972	400	-	-
Zone Air	-	19,0	0,00757	972	400	209	0
Return Plenum	Outlet	19,0	0,00757	972	400	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	0	Heating	1	19,9	56	400	84	0
Zone 2	-12	Deadband	14	18,8	63	400	0	0
Zone 3	0	Deadband	40	18,9	131	400	0	0
Zone 4	0	Deadband	153	18,8	667	400	0	0
Zone 5	0	Heating	1	19,9	56	400	85	0

Air System Sizing Summary for AH-1PV-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-1PV-03**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **22,8** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **5,1** kW
Sensible coil load **5,1** kW
Coil L/s at Jan 0000 **657** L/s
Max block L/s **657** L/s
Sum of peak zone L/s **657** L/s
Sensible heat ratio **1,000**
L/(s kW) **130,0**
m²/kW **4,5**
W/m² **221,6**
Water flow @ 7,5 K rise **0,16** L/s

Load occurs at **Jan 0000**
OA DB / WB **21,4 / 19,8** °C
Entering DB / WB **22,3 / 16,4** °C
Leaving DB / WB **15,8 / 14,0** °C
Coil ADP **15,1** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **14,0** °C
Zone T-stat Check **1 of 1** OK
Max zone temperature deviation **0,0** K

Humidifier Sizing Data

Max steam flow at Des Htg **0,00** kg/hr
Airflow Rate **0** L/s

Air mass flow **0,00** kg/hr
Moisture gain **,00000** kg/kg

Supply Fan Sizing Data

Actual max L/s **657** L/s
Standard L/s **650** L/s
Actual max L/(s·m²) **28,82** L/(s·m²)

Fan motor BHP **1,04** BHP
Fan motor kW **0,82** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **0** L/s
L/(s·m²) **0,00** L/(s·m²)

L/s/person **0,00** L/s/person

Zone Sizing Summary for AH-1PV-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-1PV-03**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **22,8** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	657	657	28,82	16,5	0,33	0,0	0,00	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 ²)
Zone 1	4,2	Jan 2300	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 ²)	Space L/(s·m ²)
Zone 1							
207 - Freezers	1	4,2	Jan 2300	657	0,0	22,8	28,82

Ventilation Sizing Summary for AH-1PV-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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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 (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
207 - Freezers	1	22,8	0,0	657,0	0,00	0,00	0,0	0,0	0,0
Totals (incl. Space Multipliers)				657,0					0,0

Air System Design Load Summary for AH-1PV-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 0000 COOLING OA DB / WB 21,4 °C / 19,8 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	23 m²	90	-	23 m²	0	-
Overhead Lighting	342 W	342	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3750 W	3750	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4182	0	-	0	0
Zone Conditioning	-	4231	0	-	90	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	657 L/s	0	-	657 L/s	0	-
Ventilation Load	0 L/s	0	0	0 L/s	0	0
Supply Fan Load	657 L/s	821	-	657 L/s	-821	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	5052	0	-	-731	0
Central Cooling Coil	-	5052	0	-	-731	0
Humidification Load	-	-	0	-	-	0
Terminal Reheat Coils	-	0	-	-	0	-
>> Total Conditioning	-	5052	0	-	-731	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-1PV-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	23 m²	90	-	23 m²	0	-
Overhead Lighting	342 W	342	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3750 W	3750	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4182	0	-	0	0

Space Design Load Summary for AH-1PV-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "207 - Freezers" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	23 m²	90	-	23 m²	0	-
Overhead Lighting	342 W	342	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	3750 W	3750	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4182	0	-	0	0

TABLE 1.1.B. Envelope Loads For Space "207 - Freezers" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-1PV-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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January DESIGN COOLING DAY, 0000

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	21,4	0,01404	0	400	0	0
Vent - Return Mixing	Outlet	22,3	0,00930	657	800	-	-
Central Cooling Coil	Outlet	15,8	0,00930	657	800	5052	0
Supply Fan	Outlet	16,9	0,00930	657	800	821	-
Humidifier	Outlet	16,9	0,00930	657	800	-	0
Cold Supply Duct	Outlet	16,9	0,00930	657	800	-	-
Zone Air	-	22,3	0,00930	657	800	4231	0
Return Plenum	Outlet	22,3	0,00930	657	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	4182	Cooling	4231	22,3	657	800	0	0

System Psychrometrics for AH-1PV-03

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	0	400	0	0
Vent - Return Mixing	Outlet	21,9	0,00960	657	800	-	-
Central Cooling Coil	Outlet	21,0	0,00960	657	800	731	0
Supply Fan	Outlet	22,0	0,00960	657	800	821	-
Humidifier	Outlet	22,0	0,00960	657	800	-	0
Cold Supply Duct	Outlet	22,0	0,00960	657	800	-	-
Zone Air	-	21,9	0,00960	657	800	-90	0
Return Plenum	Outlet	21,9	0,00960	657	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	0	Deadband	-90	21,9	657	800	0	0

Air System Sizing Summary for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-1PV-04**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **178,3** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **63,9** kW
Sensible coil load **40,4** kW
Coil L/s at Jun 1500 **2444** L/s
Max block L/s **2444** L/s
Sum of peak zone L/s **2444** L/s
Sensible heat ratio **0,632**
L/(s kW) **38,3**
m²/kW **2,8**
W/m² **358,4**
Water flow @ 7,5 K rise **2,04** L/s

Load occurs at **Jun 1500**
OA DB / WB **34,9 / 25,7** °C
Entering DB / WB **26,9 / 20,2** °C
Leaving DB / WB **13,1 / 12,5** °C
Coil ADP **11,5** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **14,0** °C
Zone T-stat Check **3 of 3** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **22,5** kW
Coil L/s at Des Htg **2444** L/s
Max coil L/s **2444** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **126,1**
Ent. DB / Lvg DB **11,4 / 19,1** °C

Supply Fan Sizing Data

Actual max L/s **2444** L/s
Standard L/s **2419** L/s
Actual max L/(s·m²) **13,71** L/(s·m²)

Fan motor BHP **3,85** BHP
Fan motor kW **3,06** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **928** L/s
L/(s·m²) **5,20** L/(s·m²)

L/s/person **35,68** L/s/person

Zone Sizing Summary for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-1PV-04**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **178,3** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	111	111	19,47	0,0	0,00	0,0	0,00	0
Zone 2	422	422	19,37	0,0	0,00	0,0	0,00	0
Zone 3	1911	1911	12,67	0,0	0,00	0,0	0,00	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 ²)
Zone 1	0,1	Jan 2300	0,0	5,7
Zone 2	1,7	Jul 1600	0,0	21,8
Zone 3	15,3	Jun 1700	0,4	150,8

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 ²)	Space L/(s·m ²)
Zone 1							
210 - A.C.	1	0,1	Jan 2300	111	0,0	5,7	19,47
Zone 2							
211 - Cultura Bactérias	1	1,7	Jul 1600	422	0,0	21,8	19,37
Zone 3							
212 - Lab. Mic./Vir./Ep.	1	15,3	Jun 1700	1911	0,4	150,8	12,67

Ventilation Sizing Summary for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 928 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
210 - A.C.	1	5,7	0,0	111,0	0,00	0,00	0,0	25,0	27,8
Zone 2									
211 - Cultura Bactérias	1	21,8	2,0	422,2	0,00	0,00	0,0	100,0	422,2
Zone 3									
212 - Lab. Mic./Vir./Ep.	1	150,8	24,0	1911,0	0,00	0,00	0,0	25,0	477,8
Totals (incl. Space Multipliers)				2444,2					927,7

Air System Design Load Summary for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	19 m²	2012	-	19 m²	-	-
Wall Transmission	33 m²	718	-	33 m²	120	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	19 m²	1067	-	19 m²	231	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	10 m²	222	-	10 m²	0	-
Ceiling	178 m²	707	-	178 m²	0	-
Overhead Lighting	2675 W	2674	-	0	0	-
Task Lighting	20 W	20	-	0	0	-
Electric Equipment	6904 W	6904	-	0	0	-
People	26	1867	1562	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	16190	1562	-	351	0
Zone Conditioning	-	16088	1562	-	362	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	2444 L/s	0	-	2444 L/s	0	-
Ventilation Load	928 L/s	14379	21967	928 L/s	2665	-6154
Supply Fan Load	2444 L/s	3055	-	2444 L/s	-3055	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	33522	23529	-	-29	-6154
Central Cooling Coil	-	40366	23529	-	-22521	-6154
Central Heating Coil	-	-6844	-	-	22492	-
>> Total Conditioning	-	33522	23529	-	-29	-6154
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	6 m²	23	-	6 m²	0	-
Overhead Lighting	86 W	85	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	108	0	-	0	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	10 m²	225	-	10 m²	0	-
Ceiling	22 m²	86	-	22 m²	0	-
Overhead Lighting	327 W	327	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	872 W	872	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1664	120	-	0	0

Zone Design Load Summary for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,9 °C / 25,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	19 m²	2619	-	19 m²	-	-
Wall Transmission	33 m²	986	-	33 m²	120	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	19 m²	1021	-	19 m²	231	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	151 m²	598	-	151 m²	0	-
Overhead Lighting	2262 W	2262	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	6032 W	6032	-	0	0	-
People	24	1723	1442	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	15250	1442	-	351	0

Space Design Load Summary for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "210 - A.C." In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	6 m²	23	-	6 m²	0	-
Overhead Lighting	86 W	85	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	108	0	-	0	0

TABLE 1.1.B. Envelope Loads For Space "210 - A.C." In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 2.1.A. Component Loads For Space "211 - Cultura Bactérias" In Zone "Zone 2"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	10 m²	225	-	10 m²	0	-
Ceiling	22 m²	86	-	22 m²	0	-
Overhead Lighting	327 W	327	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	872 W	872	-	0	0	-
People	2	144	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1664	120	-	0	0

TABLE 2.1.B. Envelope Loads For Space "211 - Cultura Bactérias" In Zone "Zone 2"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 3.1.A. Component Loads For Space "212 - Lab. Mic./Vir./Ep." In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,9 °C / 25,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	19 m²	2619	-	19 m²	-	-
Wall Transmission	33 m²	986	-	33 m²	120	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	19 m²	1021	-	19 m²	231	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	151 m²	598	-	151 m²	0	-
Overhead Lighting	2262 W	2262	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	6032 W	6032	-	0	0	-
People	24	1723	1442	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	15250	1442	-	351	0

TABLE 3.1.B. Envelope Loads For Space "212 - Lab. Mic./Vir./Ep." In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NW EXPOSURE						
WALL	33	1,513	-	986	-	120
WINDOW 1	19	5,000	0,500	1021	2619	231

System Psychrometrics for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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June DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,9	0,01725	928	400	14379	21967
Vent - Return Mixing	Outlet	26,9	0,01221	2444	509	-	-
Central Cooling Coil	Outlet	13,1	0,00891	2444	509	40366	23529
Central Heating Coil	Outlet	15,4	0,00891	2444	509	6844	-
Supply Fan	Outlet	16,5	0,00891	2444	509	3055	-
Cold Supply Duct	Outlet	16,5	0,00891	2444	509	-	-
Zone Air	-	22,0	0,00913	2444	576	16088	1562
Return Plenum	Outlet	22,0	0,00913	2444	576	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	108	Deadband	176	17,8	111	516	0	0
Zone 2	1661	Deadband	1847	20,1	422	542	0	0
Zone 3	14421	Cooling	14065	22,6	1911	587	0	0

System Psychrometrics for AH-1PV-04

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	928	400	-2665	6154
Vent - Return Mixing	Outlet	19,1	0,00894	2444	414	-	-
Central Cooling Coil	Outlet	11,4	0,00808	2444	414	22521	6154
Central Heating Coil	Outlet	19,1	0,00808	2444	414	22492	-
Supply Fan	Outlet	20,1	0,00808	2444	414	3055	-
Cold Supply Duct	Outlet	20,1	0,00808	2444	414	-	-
Zone Air	-	20,0	0,00808	2444	423	-362	0
Return Plenum	Outlet	20,0	0,00808	2444	423	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	0	Deadband	-2	20,1	111	423	0	0
Zone 2	0	Deadband	-10	20,1	422	423	0	0
Zone 3	-351	Deadband	-350	20,0	1911	423	0	0

Air System Sizing Summary for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-1PV-05**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **40,0** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **37,2** kW
Sensible coil load **19,2** kW
Coil L/s at Jun 1500 **706** L/s
Max block L/s **706** L/s
Sum of peak zone L/s **706** L/s
Sensible heat ratio **0,516**
L/(s kW) **19,0**
m²/kW **1,1**
W/m² **930,9**
Water flow @ 7,5 K rise **1,19** L/s

Load occurs at **Jun 1500**
OA DB / WB **34,9 / 25,7** °C
Entering DB / WB **34,9 / 25,7** °C
Leaving DB / WB **12,2 / 11,8** °C
Coil ADP **9,7** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **13,0** °C
Zone T-stat Check **3 of 3** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **6,1** kW
Coil L/s at Des Htg **706** L/s
Max coil L/s **706** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **152,3**
Ent. DB / Lvg DB **10,4 / 17,6** °C

Supply Fan Sizing Data

Actual max L/s **706** L/s
Standard L/s **699** L/s
Actual max L/(s·m²) **17,66** L/(s·m²)

Fan motor BHP **1,11** BHP
Fan motor kW **0,88** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **706** L/s
L/(s·m²) **17,66** L/(s·m²)

L/s/person **88,29** L/s/person

Zone Sizing Summary for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Air System Information

Air System Name **AH-1PV-05**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **40,0** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	333	333	83,33	8,8	0,17	0,0	0,00	0
Zone 2	193	193	10,72	0,0	0,00	0,0	0,00	0
Zone 3	180	180	10,00	0,0	0,00	0,0	0,00	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 ²)
Zone 1	0,1	Jan 2300	0,0	4,0
Zone 2	1,6	Jul 1600	0,0	18,0
Zone 3	1,4	Jan 2300	0,0	18,0

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 ²)	Space L/(s·m ²)
Zone 1							
213 - A.C.	1	0,1	Jan 2300	333	0,0	4,0	83,33
Zone 2							
214 - R. Extração DNA	1	1,6	Jul 1600	193	0,0	18,0	10,72
Zone 3							
215 - R. Premix DNA	1	1,4	Jan 2300	180	0,0	18,0	10,00

Ventilation Sizing Summary for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 706 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
213 - A.C.	1	4,0	0,0	333,3	0,00	0,00	0,0	100,0	333,3
Zone 2									
214 - R. Extração DNA	1	18,0	3,0	193,0	0,00	0,00	0,0	100,0	193,0
Zone 3									
215 - R. Premix DNA	1	18,0	5,0	180,0	0,00	0,00	0,0	100,0	180,0
Totals (incl. Space Multipliers)				706,3					706,3

Air System Design Load Summary for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 34,9 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	14 m²	299	-	14 m²	0	-
Ceiling	40 m²	159	-	40 m²	0	-
Overhead Lighting	600 W	600	-	0	0	-
Task Lighting	20 W	20	-	0	0	-
Electric Equipment	1440 W	1440	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	3092	481	-	0	0
Zone Conditioning	-	3102	481	-	-117	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	706 L/s	0	-	706 L/s	0	-
Ventilation Load	706 L/s	11557	17550	706 L/s	1515	-5311
Supply Fan Load	706 L/s	883	-	706 L/s	-883	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	15542	18030	-	515	-5311
Central Cooling Coil	-	19207	18030	-	-6090	-5311
Central Heating Coil	-	-2144	-	-	6090	-
Terminal Reheat Coils	-	-1521	-	-	515	-
>> Total Conditioning	-	15542	18030	-	515	-5311
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	4 m²	16	-	4 m²	0	-
Overhead Lighting	60 W	60	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	76	0	-	0	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	14 m²	303	-	14 m²	0	-
Ceiling	18 m²	71	-	18 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	720 W	720	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1590	180	-	0	0

Zone Design Load Summary for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	18 m²	71	-	18 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	720 W	720	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1430	300	-	0	0

Space Design Load Summary for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

TABLE 1.1.A. Component Loads For Space "213 - A.C." In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	4 m²	16	-	4 m²	0	-
Overhead Lighting	60 W	60	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	76	0	-	0	0

TABLE 1.1.B. Envelope Loads For Space "213 - A.C." In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

TABLE 2.1.A. Component Loads For Space "214 - R. Extração DNA" In Zone "Zone 2"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	14 m²	303	-	14 m²	0	-
Ceiling	18 m²	71	-	18 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	720 W	720	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1590	180	-	0	0

TABLE 2.1.B. Envelope Loads For Space "214 - R. Extração DNA" In Zone "Zone 2"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

TABLE 3.1.A. Component Loads For Space "215 - R. Premix DNA" In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	18 m²	71	-	18 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	720 W	720	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1430	300	-	0	0

TABLE 3.1.B. Envelope Loads For Space "215 - R. Premix DNA" In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

June DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,9	0,01725	706	400	11557	17550
Vent - Return Mixing	Outlet	34,9	0,01725	706	400	-	-
Central Cooling Coil	Outlet	12,2	0,00850	706	400	19207	18030
Central Heating Coil	Outlet	14,7	0,00850	706	400	2144	-
Supply Fan	Outlet	15,8	0,00850	706	400	883	-
Cold Supply Duct	Outlet	15,8	0,00850	706	400	-	-
Zone Air	-	21,2	0,00873	706	464	3102	481
Return Plenum	Outlet	21,2	0,00873	706	464	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	76	Heating	95	19,8	333	400	1521	0
Zone 2	1586	Cooling	1562	22,5	193	488	0	0
Zone 3	1430	Cooling	1446	22,5	180	557	0	0

System Psychrometrics for AH-1PV-05

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	706	400	-1515	5311
Vent - Return Mixing	Outlet	17,6	0,01035	706	400	-	-
Central Cooling Coil	Outlet	10,4	0,00778	706	400	6090	5311
Central Heating Coil	Outlet	17,6	0,00778	706	400	6090	-
Supply Fan	Outlet	18,6	0,00778	706	400	883	-
Cold Supply Duct	Outlet	18,6	0,00778	706	400	-	-
Zone Air	-	19,4	0,00778	706	400	117	0
Return Plenum	Outlet	19,4	0,00778	706	400	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	0	Heating	0	19,9	333	400	515	0
Zone 2	0	Deadband	73	19,0	193	400	0	0
Zone 3	0	Deadband	44	18,9	180	400	0	0

Air System Sizing Summary for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

Air System Information

Air System Name **AH-1PV-06**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **37,3** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **23,1** kW
Sensible coil load **12,2** kW
Coil L/s at Jul 1600 **460** L/s
Max block L/s **460** L/s
Sum of peak zone L/s **460** L/s
Sensible heat ratio **0,528**
L/(s kW) **19,9**
m²/kW **1,6**
W/m² **620,3**
Water flow @ 7,5 K rise **0,74** L/s

Load occurs at **Jul 1600**
OA DB / WB **35,2 / 25,6** °C
Entering DB / WB **35,2 / 25,6** °C
Leaving DB / WB **12,9 / 12,4** °C
Coil ADP **10,5** °C
Bypass Factor **0,100**
Resulting RH **54** %
Design supply temp. **13,0** °C
Zone T-stat Check **3 of 3** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **4,1** kW
Coil L/s at Des Htg **460** L/s
Max coil L/s **460** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **110,3**
Ent. DB / Lvg DB **10,1 / 17,6** °C

Supply Fan Sizing Data

Actual max L/s **460** L/s
Standard L/s **455** L/s
Actual max L/(s·m²) **12,32** L/(s·m²)

Fan motor BHP **0,72** BHP
Fan motor kW **0,57** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **460** L/s
L/(s·m²) **12,32** L/(s·m²)

L/s/person **76,59** L/s/person

Zone Sizing Summary for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

Air System Information

Air System Name **AH-1PV-06**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **3**
Floor Area **37,3** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	111	111	27,78	2,9	0,06	0,0	0,00	0
Zone 2	175	175	11,45	0,0	0,00	0,0	0,00	0
Zone 3	173	173	9,63	0,0	0,00	0,0	0,00	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 ²)
Zone 1	0,1	Jan 2300	0,0	4,0
Zone 2	1,9	Jan 2300	0,0	15,3
Zone 3	1,9	Jan 2300	0,0	18,0

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 ²)	Space L/(s·m ²)
Zone 1							
216 - A.C.	1	0,1	Jan 2300	111	0,0	4,0	27,78
Zone 2							
217 - R. PCR DNA	1	1,9	Jan 2300	175	0,0	15,3	11,45
Zone 3							
218 - R. Pos-PCR DNA	1	1,9	Jan 2300	173	0,0	18,0	9,63

Ventilation Sizing Summary for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 460 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
216 - A.C.	1	4,0	0,0	111,1	0,00	0,00	0,0	100,0	111,1
Zone 2									
217 - R. PCR DNA	1	15,3	5,0	175,1	0,00	0,00	0,0	100,0	175,1
Zone 3									
218 - R. Pos-PCR DNA	1	18,0	1,0	173,3	0,00	0,00	0,0	100,0	173,3
Totals (incl. Space Multipliers)				459,5					459,5

Air System Design Load Summary for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	37 m²	148	-	37 m²	0	-
Overhead Lighting	560 W	559	-	0	0	-
Task Lighting	20 W	20	-	0	0	-
Electric Equipment	2664 W	2664	-	0	0	-
People	6	431	360	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	3822	360	-	0	0
Zone Conditioning	-	3801	360	-	-82	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	460 L/s	0	-	460 L/s	0	-
Ventilation Load	460 L/s	7162	10566	460 L/s	828	-3643
Supply Fan Load	460 L/s	574	-	460 L/s	-574	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	11538	10926	-	171	-3643
Central Cooling Coil	-	12209	10926	-	-4114	-3643
Central Heating Coil	-	0	-	-	4114	-
Terminal Reheat Coils	-	-672	-	-	171	-
>> Total Conditioning	-	11538	10926	-	171	-3643
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	4 m²	16	-	4 m²	0	-
Overhead Lighting	60 W	60	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	76	0	-	0	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	15 m²	61	-	15 m²	0	-
Overhead Lighting	230 W	229	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1224 W	1224	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1883	300	-	0	0

Zone Design Load Summary for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	18 m²	71	-	18 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1440 W	1440	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1863	60	-	0	0

Space Design Load Summary for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 1.1.A. Component Loads For Space "216 - A.C." In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	4 m²	16	-	4 m²	0	-
Overhead Lighting	60 W	60	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	76	0	-	0	0

TABLE 1.1.B. Envelope Loads For Space "216 - A.C." In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 2.1.A. Component Loads For Space "217 - R. PCR DNA" In Zone "Zone 2"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	15 m²	61	-	15 m²	0	-
Overhead Lighting	230 W	229	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1224 W	1224	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1883	300	-	0	0

TABLE 2.1.B. Envelope Loads For Space "217 - R. PCR DNA" In Zone "Zone 2"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 3.1.A. Component Loads For Space "218 - R. Pos-PCR DNA" In Zone "Zone 3"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	18 m²	71	-	18 m²	0	-
Overhead Lighting	270 W	270	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1440 W	1440	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1863	60	-	0	0

TABLE 3.1.B. Envelope Loads For Space "218 - R. Pos-PCR DNA" In Zone "Zone 3"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

System Psychrometrics for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

July DESIGN COOLING DAY, 1600

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	35,2	0,01702	460	400	7162	10566
Vent - Return Mixing	Outlet	35,2	0,01702	460	400	-	-
Central Cooling Coil	Outlet	12,9	0,00886	460	400	12209	10926
Central Heating Coil	Outlet	12,9	0,00886	460	400	0	-
Supply Fan	Outlet	14,0	0,00886	460	400	574	-
Cold Supply Duct	Outlet	14,0	0,00886	460	400	-	-
Zone Air	-	22,1	0,00913	460	474	3801	360
Return Plenum	Outlet	22,1	0,00913	460	474	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	76	Heating	95	19,8	111	400	672	0
Zone 2	1883	Cooling	1865	22,9	175	562	0	0
Zone 3	1863	Cooling	1842	22,9	173	433	0	0

System Psychrometrics for AH-1PV-06

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	460	400	-828	3643
Vent - Return Mixing	Outlet	17,6	0,01035	460	400	-	-
Central Cooling Coil	Outlet	10,1	0,00764	460	400	4114	3643
Central Heating Coil	Outlet	17,6	0,00764	460	400	4114	-
Supply Fan	Outlet	18,6	0,00764	460	400	574	-
Cold Supply Duct	Outlet	18,6	0,00764	460	400	-	-
Zone Air	-	19,1	0,00764	460	400	82	0
Return Plenum	Outlet	19,1	0,00764	460	400	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	0	Heating	0	19,9	111	400	171	0
Zone 2	0	Deadband	38	18,8	175	400	0	0
Zone 3	0	Deadband	44	18,9	173	400	0	0

Air System Sizing Summary for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

Air System Information

Air System Name **AH-1PV-07**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **4**
Floor Area **236,6** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **83,0** kW
Sensible coil load **54,1** kW
Coil L/s at Aug 1600 **3379** L/s
Max block L/s **3379** L/s
Sum of peak zone L/s **3379** L/s
Sensible heat ratio **0,653**
L/(s kW) **40,7**
m²/kW **2,9**
W/m² **350,7**
Water flow @ 7,5 K rise **2,65** L/s

Load occurs at **Aug 1600**
OA DB / WB **35,2 / 25,6** °C
Entering DB / WB **26,8 / 20,0** °C
Leaving DB / WB **13,4 / 12,8** °C
Coil ADP **11,9** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **14,0** °C
Zone T-stat Check **4 of 4** OK
Max zone temperature deviation **0,0** K

Central Heating Coil Sizing Data

Max coil load **31,5** kW
Coil L/s at Des Htg **3379** L/s
Max coil L/s **3379** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Des Htg**
W/m² **133,3**
Ent. DB / Lvg DB **11,2 / 19,0** °C

Supply Fan Sizing Data

Actual max L/s **3379** L/s
Standard L/s **3344** L/s
Actual max L/(s·m²) **14,28** L/(s·m²)

Fan motor BHP **5,32** BHP
Fan motor kW **4,22** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **1167** L/s
L/(s·m²) **4,93** L/(s·m²)

L/s/person **25,94** L/s/person

Zone Sizing Summary for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

Air System Information

Air System Name **AH-1PV-07**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **4**
Floor Area **236,6** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	296	296	14,87	0,0	0,00	0,0	0,00	0
Zone 2	222	222	19,30	0,0	0,00	0,0	0,00	0
Zone 3	430	430	11,41	0,0	0,00	0,0	0,00	0
Zone 4	2431	2431	14,51	0,0	0,00	0,0	0,00	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 ²)
Zone 1	2,8	Sep 1800	0,1	19,9
Zone 2	0,7	Aug 1600	0,0	11,5
Zone 3	4,1	Nov 1800	0,2	37,7
Zone 4	23,2	Sep 1600	0,9	167,5

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 ²)	Space L/(s·m ²)
Zone 1							
219 - P. Citometria	1	2,8	Sep 1800	296	0,1	19,9	14,87
Zone 2							
220 - A.C.	1	0,7	Aug 1600	222	0,0	11,5	19,30
Zone 3							
221 - Cultura Parasitos	1	4,1	Nov 1800	430	0,2	37,7	11,41
Zone 4							
222 - Lab. Imun./PBLM	1	23,2	Sep 1600	2431	0,9	167,5	14,51

Ventilation Sizing Summary for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 1167 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
219 - P. Citometria	1	19,9	4,0	295,9	0,00	0,00	0,0	25,0	74,0
Zone 2									
220 - A.C.	1	11,5	0,0	222,0	0,00	0,00	0,0	25,0	55,5
Zone 3									
221 - Cultura Parasitos	1	37,7	5,0	430,2	0,00	0,00	0,0	100,0	430,2
Zone 4									
222 - Lab. Imun./PBLM	1	167,5	36,0	2430,9	0,00	0,00	0,0	25,0	607,7
Totals (incl. Space Multipliers)				3379,1					1167,4

Air System Design Load Summary for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	28 m²	1582	-	28 m²	-	-
Wall Transmission	84 m²	2031	-	84 m²	304	-
Roof Transmission	192 m²	8710	-	192 m²	553	-
Window Transmission	28 m²	1588	-	28 m²	330	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	22 m²	503	-	22 m²	0	-
Ceiling	7 m²	27	-	7 m²	0	-
Overhead Lighting	3549 W	3549	-	0	0	-
Task Lighting	30 W	30	-	0	0	-
Electric Equipment	9004 W	9004	-	0	0	-
People	45	3231	2704	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	30255	2704	-	1186	0
Zone Conditioning	-	29808	2704	-	1088	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	3379 L/s	0	-	3379 L/s	0	-
Ventilation Load	1167 L/s	17916	26123	1167 L/s	3094	-8065
Supply Fan Load	3379 L/s	4224	-	3379 L/s	-4224	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	51948	28827	-	-42	-8065
Central Cooling Coil	-	54143	28827	-	-31591	-8065
Central Heating Coil	-	-2195	-	-	31549	-
>> Total Conditioning	-	51948	28827	-	-42	-8065
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 32,2 °C / 24,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	17 m²	525	-	17 m²	61	-
Roof Transmission	20 m²	813	-	20 m²	57	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	5 m²	99	-	5 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	299 W	298	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	796 W	796	-	0	0	-
People	4	287	240	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2828	240	-	118	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	5 m²	213	-	5 m²	14	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	12 m²	265	-	12 m²	0	-
Ceiling	7 m²	27	-	7 m²	0	-
Overhead Lighting	173 W	172	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	678	0	-	14	0

Zone Design Load Summary for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Nov 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 29,4 °C / 23,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	6 m²	453	-	6 m²	-	-
Wall Transmission	31 m²	1036	-	31 m²	111	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	6 m²	181	-	6 m²	66	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	566 W	565	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1508 W	1508	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4112	300	-	177	0

Zone 4	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,1 °C / 25,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	22 m²	1601	-	22 m²	-	-
Wall Transmission	36 m²	1072	-	36 m²	132	-
Roof Transmission	168 m²	7479	-	168 m²	482	-
Window Transmission	22 m²	1148	-	22 m²	264	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	6 m²	125	-	6 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	2513 W	2512	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	6700 W	6700	-	0	0	-
People	36	2585	2163	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	23233	2163	-	878	0

Space Design Load Summary for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 1.1.A. Component Loads For Space "219 - P. Citometria" In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1800 COOLING OA DB / WB 32,2 °C / 24,6 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	17 m²	525	-	17 m²	61	-
Roof Transmission	20 m²	813	-	20 m²	57	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	5 m²	99	-	5 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	299 W	298	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	796 W	796	-	0	0	-
People	4	287	240	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2828	240	-	118	0

TABLE 1.1.B. Envelope Loads For Space "219 - P. Citometria" In Zone "Zone 1"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
SW EXPOSURE						
WALL	17	1,513	-	525	-	61
H EXPOSURE						
ROOF	20	1,199	-	813	-	57

Space Design Load Summary for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 2.1.A. Component Loads For Space "220 - A.C." In Zone "Zone 2"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 22,0 °C			OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	5 m²	213	-	5 m²	14	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	12 m²	265	-	12 m²	0	-
Ceiling	7 m²	27	-	7 m²	0	-
Overhead Lighting	173 W	172	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	678	0	-	14	0

TABLE 2.1.B. Envelope Loads For Space "220 - A.C." In Zone "Zone 2"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	5	1,199	-	213	-	14

Space Design Load Summary for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 3.1.A. Component Loads For Space "221 - Cultura Parasitos" In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Nov 1800 COOLING OA DB / WB 29,4 °C / 23,5 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	6 m²	453	-	6 m²	-	-
Wall Transmission	31 m²	1036	-	31 m²	111	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	6 m²	181	-	6 m²	66	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	566 W	565	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1508 W	1508	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4112	300	-	177	0

TABLE 3.1.B. Envelope Loads For Space "221 - Cultura Parasitos" In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SW EXPOSURE						
WALL	22	1,513	-	776	-	80
SE EXPOSURE						
WALL	9	1,513	-	260	-	31
WINDOW 1	6	5,000	0,500	181	453	66

Space Design Load Summary for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 4.1.A. Component Loads For Space "222 - Lab. Imun./PBLM" In Zone "Zone 4"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600 COOLING OA DB / WB 34,1 °C / 25,1 °C OCCUPIED T-STAT 22,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 20,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	22 m²	1601	-	22 m²	-	-
Wall Transmission	36 m²	1072	-	36 m²	132	-
Roof Transmission	168 m²	7479	-	168 m²	482	-
Window Transmission	22 m²	1148	-	22 m²	264	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	6 m²	125	-	6 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	2513 W	2512	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	6700 W	6700	-	0	0	-
People	36	2585	2163	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	23233	2163	-	878	0

TABLE 4.1.B. Envelope Loads For Space "222 - Lab. Imun./PBLM" In Zone "Zone 4"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
SE EXPOSURE						
WALL	36	1,513	-	1072	-	132
WINDOW 1	22	5,000	0,500	1148	1601	264
H EXPOSURE						
ROOF	168	1,199	-	7479	-	482

System Psychrometrics for AH-1PV-07

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

August DESIGN COOLING DAY, 1600

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	35,2	0,01702	1167	400	17916	26123
Vent - Return Mixing	Outlet	26,8	0,01200	3379	556	-	-
Central Cooling Coil	Outlet	13,4	0,00907	3379	556	54143	28827
Central Heating Coil	Outlet	13,9	0,00907	3379	556	2195	-
Supply Fan	Outlet	15,0	0,00907	3379	556	4224	-
Cold Supply Duct	Outlet	15,0	0,00907	3379	556	-	-
Zone Air	-	22,3	0,00935	3379	638	29808	2704
Return Plenum	Outlet	22,3	0,00935	3379	638	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	2763	Cooling	2692	22,6	296	640	0	0
Zone 2	678	Deadband	893	18,3	222	563	0	0
Zone 3	3779	Cooling	3854	22,5	430	629	0	0
Zone 4	23035	Cooling	22369	22,7	2431	647	0	0

System Psychrometrics for AH-1PV-07

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09/05/2020
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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	1167	400	-3094	8065
Vent - Return Mixing	Outlet	19,1	0,00880	3379	413	-	-
Central Cooling Coil	Outlet	11,2	0,00799	3379	413	31591	8065
Central Heating Coil	Outlet	19,0	0,00799	3379	413	31549	-
Supply Fan	Outlet	20,1	0,00799	3379	413	4224	-
Cold Supply Duct	Outlet	20,1	0,00799	3379	413	-	-
Zone Air	-	19,8	0,00799	3379	421	-1088	0
Return Plenum	Outlet	19,8	0,00799	3379	421	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-118	Deadband	-105	19,8	296	421	0	0
Zone 2	-14	Deadband	-15	20,0	222	421	0	0
Zone 3	-177	Deadband	-160	19,8	430	421	0	0
Zone 4	-878	Deadband	-807	19,8	2431	421	0	0

Air System Sizing Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

Air System Information

Air System Name **AH-1PV-08**
Equipment Class **SPLT AHU**
Air System Type **CAV/RH**

Number of zones **19**
Floor Area **345,2** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **91,1** kW
Sensible coil load **63,9** kW
Coil L/s at Aug 1500 **4534** L/s
Max block L/s **4534** L/s
Sum of peak zone L/s **4534** L/s
Sensible heat ratio **0,701**
L/(s kW) **49,7**
m²/kW **3,8**
W/m² **264,0**
Water flow @ 7,5 K rise **N/A**

Load occurs at **Aug 1500**
OA DB / WB **35,5 / 25,7** °C
Entering DB / WB **25,8 / 19,3** °C
Leaving DB / WB **14,0 / 13,4** °C
Coil ADP **12,6** °C
Bypass Factor **0,100**
Resulting RH **56** %
Design supply temp. **14,0** °C
Zone T-stat Check **18 of 19** OK
Max zone temperature deviation **0,0** K

Humidifier Sizing Data

Max steam flow at Des Htg **0,00** kg/hr
Airflow Rate **0** L/s

Air mass flow **0,00** kg/hr
Moisture gain **,00000** kg/kg

Supply Fan Sizing Data

Actual max L/s **4534** L/s
Standard L/s **4487** L/s
Actual max L/(s·m²) **13,13** L/(s·m²)

Fan motor BHP **7,14** BHP
Fan motor kW **5,67** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **960** L/s
L/(s·m²) **2,78** L/(s·m²)

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

Zone Sizing Summary for AH-1PV-08

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Air System Name **AH-1PV-08**
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Number of zones **19**
Floor Area **345,2** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	500	500	16,35	0,0	-	0,0	-	0
Zone 2	531	531	17,66	0,0	-	0,0	-	0
Zone 3	275	275	4,86	0,0	-	0,0	-	0
Zone 4	152	152	6,82	0,0	-	0,0	-	0
Zone 5	42	42	4,00	0,0	-	0,0	-	0
Zone 6	59	59	6,62	0,0	-	0,0	-	0
Zone 7	66	66	7,44	0,0	-	0,0	-	0
Zone 8	105	105	11,80	0,0	-	0,0	-	0
Zone 9	105	105	11,80	0,0	-	0,0	-	0
Zone 10	173	173	19,89	0,0	-	0,0	-	0
Zone 11	59	59	6,51	0,0	-	0,0	-	0
Zone 12	67	67	7,32	0,0	-	0,0	-	0
Zone 13	106	106	11,65	0,0	-	0,0	-	0
Zone 14	106	106	11,65	0,0	-	0,0	-	0
Zone 15	188	188	21,12	0,0	-	0,0	-	0
Zone 16	290	290	17,66	0,0	-	0,0	-	0
Zone 17	334	334	17,67	0,0	-	0,0	-	0
Zone 18	897	897	23,06	0,0	-	0,0	-	0
Zone 19	479	479	15,25	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 ²)
Zone 1	5,4	Jun 1800	0,1	30,6
Zone 2	5,7	Jul 1800	0,1	30,1
Zone 3	3,0	Jul 1600	0,0	56,5
Zone 4	1,4	Sep 1600	0,1	22,3
Zone 5	0,4	Aug 1600	0,0	10,5
Zone 6	0,6	Jan 2300	0,0	8,9
Zone 7	0,7	Aug 1600	0,0	8,9
Zone 8	1,0	Aug 1600	0,0	8,9
Zone 9	1,0	Aug 1600	0,0	8,9
Zone 10	1,6	Oct 1500	0,1	8,7
Zone 11	0,6	Jan 2300	0,0	9,1
Zone 12	0,7	Aug 1600	0,0	9,1
Zone 13	1,1	Aug 1600	0,0	9,1
Zone 14	1,1	Aug 1600	0,0	9,1
Zone 15	1,8	Oct 1500	0,1	8,9
Zone 16	3,1	Jan 2300	0,0	16,4
Zone 17	3,5	Jul 1600	0,1	18,9
Zone 18	9,1	Aug 1600	0,4	38,9
Zone 19	5,1	Dec 1200	0,3	31,4

Zone Sizing Summary for AH-1PV-08

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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 (m²)	Space L/(s·m²)
Zone 1							
223 - Sala de Aula	1	5,4	Jun 1800	500	0,1	30,6	16,35
Zone 2							
224 - Sala de Aula	1	5,7	Jul 1800	531	0,1	30,1	17,66
Zone 3							
225 - Circ.	1	3,0	Jul 1600	275	0,0	56,5	4,86
Zone 4							
226 - Circ.	1	1,4	Sep 1600	152	0,1	22,3	6,82
Zone 5							
227 - Circ.	1	0,4	Aug 1600	42	0,0	10,5	4,00
Zone 6							
228 - Esc. Pesquisador	1	0,6	Jan 2300	59	0,0	8,9	6,62
Zone 7							
229 - Esc. Pesquisador	1	0,7	Aug 1600	66	0,0	8,9	7,44
Zone 8							
230 - Esc. Pesquisador	1	1,0	Aug 1600	105	0,0	8,9	11,80
Zone 9							
231 - Esc. Pesquisador	1	1,0	Aug 1600	105	0,0	8,9	11,80
Zone 10							
232 - Esc. Pesquisador	1	1,6	Oct 1500	173	0,1	8,7	19,89
Zone 11							
233 - Esc. Pesquisador	1	0,6	Jan 2300	59	0,0	9,1	6,51
Zone 12							
234 - Esc. Pesquisador	1	0,7	Aug 1600	67	0,0	9,1	7,32
Zone 13							
235 - Esc. Pesquisador	1	1,1	Aug 1600	106	0,0	9,1	11,65
Zone 14							
236 - Esc. Pesquisador	1	1,1	Aug 1600	106	0,0	9,1	11,65
Zone 15							
237 - Esc. Pesquisador	1	1,8	Oct 1500	188	0,1	8,9	21,12
Zone 16							
238 - Reunião	1	3,1	Jan 2300	290	0,0	16,4	17,66
Zone 17							
239 - Pesq. Visitantes	1	3,5	Jul 1600	334	0,1	18,9	17,67
Zone 18							
240 - Est. Biblioteca	1	9,1	Aug 1600	897	0,4	38,9	23,06
Zone 19							
241 - Convívio	1	5,1	Dec 1200	479	0,3	31,4	15,25

Ventilation Sizing Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 960 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
223 - Sala de Aula	1	30,6	24,0	500,4	7,50	0,00	0,0	0,0	180,0
Zone 2									
224 - Sala de Aula	1	30,1	24,0	531,4	7,50	0,00	0,0	0,0	180,0
Zone 3									
225 - Circ.	1	56,5	1,0	274,6	7,50	0,00	0,0	0,0	7,5
Zone 4									
226 - Circ.	1	22,3	1,0	152,0	7,50	0,00	0,0	0,0	7,5
Zone 5									
227 - Circ.	1	10,5	1,0	42,0	7,50	0,00	0,0	0,0	7,5
Zone 6									
228 - Esc. Pesquisador	1	8,9	3,0	58,9	7,50	0,00	0,0	0,0	22,5
Zone 7									
229 - Esc. Pesquisador	1	8,9	3,0	66,3	7,50	0,00	0,0	0,0	22,5
Zone 8									
230 - Esc. Pesquisador	1	8,9	3,0	105,0	7,50	0,00	0,0	0,0	22,5
Zone 9									
231 - Esc. Pesquisador	1	8,9	3,0	105,0	7,50	0,00	0,0	0,0	22,5
Zone 10									
232 - Esc. Pesquisador	1	8,7	3,0	173,0	7,50	0,00	0,0	0,0	22,5
Zone 11									
233 - Esc. Pesquisador	1	9,1	3,0	59,2	7,50	0,00	0,0	0,0	22,5
Zone 12									
234 - Esc. Pesquisador	1	9,1	3,0	66,6	7,50	0,00	0,0	0,0	22,5
Zone 13									
235 - Esc. Pesquisador	1	9,1	3,0	106,0	7,50	0,00	0,0	0,0	22,5
Zone 14									
236 - Esc. Pesquisador	1	9,1	3,0	106,0	7,50	0,00	0,0	0,0	22,5
Zone 15									
237 - Esc. Pesquisador	1	8,9	3,0	188,0	7,50	0,00	0,0	0,0	22,5
Zone 16									
238 - Reunião	1	16,4	8,0	289,6	7,50	0,00	0,0	0,0	60,0
Zone 17									
239 - Pesq. Visitantes	1	18,9	8,0	334,0	7,50	0,00	0,0	0,0	60,0
Zone 18									

Ventilation Sizing Summary for AH-1PV-08

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240 - Est. Biblioteca	1	38,9	16,0	897,0	7,50	0,00	0,0	0,0	120,0
Zone 19									
241 - Convívio	1	31,4	15,0	478,7	7,50	0,00	0,0	0,0	112,5
Totals (incl. Space Multipliers)				4533,6					960,0

Air System Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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06:00

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1500 COOLING OA DB / WB 35,5 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	26 m²	1978	-	26 m²	-	-
Wall Transmission	98 m²	2500	-	98 m²	507	-
Roof Transmission	124 m²	5219	-	124 m²	504	-
Window Transmission	26 m²	1396	-	26 m²	446	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	112 m²	2227	-	112 m²	0	-
Ceiling	174 m²	324	-	174 m²	0	-
Overhead Lighting	5178 W	5178	-	0	0	-
Task Lighting	190 W	190	-	0	0	-
Electric Equipment	13400 W	13399	-	0	0	-
People	128	9191	7690	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	4160	0	0%	0	0
>> Total Zone Loads	-	45762	7690	-	1457	0
Zone Conditioning	-	44005	7690	-	1565	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	4534 L/s	0	-	4534 L/s	0	-
Ventilation Load	960 L/s	14186	19592	960 L/s	3987	0
Supply Fan Load	4534 L/s	5667	-	4534 L/s	-5667	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	63858	27282	-	-116	0
Central Cooling Coil	-	63858	27291	-	0	0
Humidification Load	-	-	0	-	-	0
>> Total Conditioning	-	63858	27291	-	0	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
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06:00

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 32,8 °C / 25,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	1 m²	162	-	1 m²	-	-
Wall Transmission	9 m²	303	-	9 m²	48	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	1 m²	56	-	1 m²	21	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	7 m²	121	-	7 m²	0	-
Ceiling	31 m²	57	-	31 m²	0	-
Overhead Lighting	459 W	459	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	24	1723	1442	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	489	0	0%	0	0
>> Total Zone Loads	-	5380	1442	-	69	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,3 °C / 25,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	1 m²	157	-	1 m²	-	-
Wall Transmission	9 m²	299	-	9 m²	48	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	1 m²	59	-	1 m²	21	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	23 m²	438	-	23 m²	0	-
Ceiling	30 m²	56	-	30 m²	0	-
Overhead Lighting	452 W	451	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	24	1723	1442	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	519	0	0%	0	0
>> Total Zone Loads	-	5714	1442	-	69	0

Zone Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	82 m²	1649	-	82 m²	0	-
Ceiling	57 m²	105	-	57 m²	0	-
Overhead Lighting	848 W	847	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	268	0	0%	0	0
>> Total Zone Loads	-	2952	60	-	0	0

Zone 4	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,1 °C / 25,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	2 m²	109	-	2 m²	-	-
Wall Transmission	4 m²	98	-	4 m²	18	-
Roof Transmission	13 m²	574	-	13 m²	54	-
Window Transmission	2 m²	71	-	2 m²	26	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	335 W	334	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	128	0	0%	0	0
>> Total Zone Loads	-	1413	60	-	97	0

Zone Design Load Summary for AH-1PV-08

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06:00

Zone 5	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	3 m²	137	-	3 m²	13	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	158 W	157	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	39	0	0%	0	0
>> Total Zone Loads	-	429	60	-	13	0

Zone 6	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	58	0	0%	0	0
>> Total Zone Loads	-	633	180	-	0	0

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Zone 7	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	2 m²	75	-	2 m²	7	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	65	0	0%	0	0
>> Total Zone Loads	-	712	180	-	7	0

Zone 8	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	393	-	9 m²	36	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	95	0	0%	0	0
>> Total Zone Loads	-	1047	180	-	36	0

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Zone 9	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	393	-	9 m²	36	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	95	0	0%	0	0
>> Total Zone Loads	-	1047	180	-	36	0

Zone 10	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,3 °C / 24,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	252	-	3 m²	-	-
Wall Transmission	7 m²	220	-	7 m²	37	-
Roof Transmission	9 m²	347	-	9 m²	35	-
Window Transmission	3 m²	116	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	131 W	130	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	149	0	0%	0	0
>> Total Zone Loads	-	1638	180	-	119	0

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Zone 11	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	58	0	0%	0	0
>> Total Zone Loads	-	637	180	-	0	0

Zone 12	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	2 m²	75	-	2 m²	7	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	65	0	0%	0	0
>> Total Zone Loads	-	716	180	-	7	0

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Zone 13	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	402	-	9 m²	37	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	96	0	0%	0	0
>> Total Zone Loads	-	1060	180	-	37	0

Zone 14	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	402	-	9 m²	37	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	96	0	0%	0	0
>> Total Zone Loads	-	1060	180	-	37	0

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Zone 15	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 33,3 °C / 24,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	4 m²	366	-	4 m²	-	-
Wall Transmission	7 m²	200	-	7 m²	33	-
Roof Transmission	9 m²	355	-	9 m²	36	-
Window Transmission	4 m²	168	-	4 m²	68	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	165	0	0%	0	0
>> Total Zone Loads	-	1812	180	-	138	0

Zone 16	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 22,0 °C / 20,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	246 W	246	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	283	0	0%	0	0
>> Total Zone Loads	-	3113	481	-	0	0

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Zone 17	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	8 m²	241	-	8 m²	39	-
Roof Transmission	12 m²	495	-	12 m²	47	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	284 W	283	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1600 W	1600	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	322	0	0%	0	0
>> Total Zone Loads	-	3539	481	-	86	0

Zone 18	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	7 m²	403	-	7 m²	-	-
Wall Transmission	30 m²	819	-	30 m²	155	-
Roof Transmission	39 m²	1717	-	39 m²	159	-
Window Transmission	7 m²	369	-	7 m²	119	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	584 W	583	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	3200 W	3200	-	0	0	-
People	16	1149	961	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	825	0	0%	0	0
>> Total Zone Loads	-	9075	961	-	432	0

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Zone 19	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1200			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 28,1 °C / 22,3 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	9 m²	2131	-	9 m²	-	-
Wall Transmission	25 m²	233	-	25 m²	129	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	9 m²	156	-	9 m²	145	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	471 W	471	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	600 W	600	-	0	0	-
People	15	1077	901	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	468	0	0%	0	0
>> Total Zone Loads	-	5147	901	-	274	0

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
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TABLE 1.1.A. Component Loads For Space "223 - Sala de Aula" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1800 COOLING OA DB / WB 32,8 °C / 25,2 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	1 m²	162	-	1 m²	-	-
Wall Transmission	9 m²	303	-	9 m²	48	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	1 m²	56	-	1 m²	21	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	7 m²	121	-	7 m²	0	-
Ceiling	31 m²	57	-	31 m²	0	-
Overhead Lighting	459 W	459	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	24	1723	1442	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	489	0	0%	0	0
>> Total Zone Loads	-	5380	1442	-	69	0

TABLE 1.1.B. Envelope Loads For Space "223 - Sala de Aula" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NW EXPOSURE						
WALL	9	1,513	-	303	-	48
WINDOW 1	1	5,000	0,500	56	162	21

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 2.1.A. Component Loads For Space "224 - Sala de Aula" In Zone "Zone 2"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1800 COOLING OA DB / WB 33,3 °C / 25,2 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	1 m²	157	-	1 m²	-	-
Wall Transmission	9 m²	299	-	9 m²	48	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	1 m²	59	-	1 m²	21	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	23 m²	438	-	23 m²	0	-
Ceiling	30 m²	56	-	30 m²	0	-
Overhead Lighting	452 W	451	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	24	1723	1442	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	519	0	0%	0	0
>> Total Zone Loads	-	5714	1442	-	69	0

TABLE 2.1.B. Envelope Loads For Space "224 - Sala de Aula" In Zone "Zone 2"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
NW EXPOSURE						
WALL	9	1,513	-	299	-	48
WINDOW 1	1	5,000	0,500	59	157	21

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 3.1.A. Component Loads For Space "225 - Circ." In Zone "Zone 3"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	82 m²	1649	-	82 m²	0	-
Ceiling	57 m²	105	-	57 m²	0	-
Overhead Lighting	848 W	847	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	268	0	0%	0	0
>> Total Zone Loads	-	2952	60	-	0	0

TABLE 3.1.B. Envelope Loads For Space "225 - Circ." In Zone "Zone 3"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 4.1.A. Component Loads For Space "226 - Circ." In Zone "Zone 4"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600 COOLING OA DB / WB 34,1 °C / 25,1 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	2 m²	109	-	2 m²	-	-
Wall Transmission	4 m²	98	-	4 m²	18	-
Roof Transmission	13 m²	574	-	13 m²	54	-
Window Transmission	2 m²	71	-	2 m²	26	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	335 W	334	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	128	0	0%	0	0
>> Total Zone Loads	-	1413	60	-	97	0

TABLE 4.1.B. Envelope Loads For Space "226 - Circ." In Zone "Zone 4"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	4	1,513	-	98	-	18
WINDOW 1	2	5,000	0,500	71	109	26
H EXPOSURE						
ROOF	13	1,199	-	574	-	54

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 5.1.A. Component Loads For Space "227 - Circ." In Zone "Zone 5"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	3 m²	137	-	3 m²	13	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	158 W	157	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	39	0	0%	0	0
>> Total Zone Loads	-	429	60	-	13	0

TABLE 5.1.B. Envelope Loads For Space "227 - Circ." In Zone "Zone 5"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	3	1,199	-	137	-	13

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 6.1.A. Component Loads For Space "228 - Esc. Pesquisador" In Zone "Zone 6"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	58	0	0%	0	0
>> Total Zone Loads	-	633	180	-	0	0

TABLE 6.1.B. Envelope Loads For Space "228 - Esc. Pesquisador" In Zone "Zone 6"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 7.1.A. Component Loads For Space "229 - Esc. Pesquisador" In Zone "Zone 7"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	2 m²	75	-	2 m²	7	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	65	0	0%	0	0
>> Total Zone Loads	-	712	180	-	7	0

TABLE 7.1.B. Envelope Loads For Space "229 - Esc. Pesquisador" In Zone "Zone 7"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	2	1,199	-	75	-	7

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 8.1.A. Component Loads For Space "230 - Esc. Pesquisador" In Zone "Zone 8"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	393	-	9 m²	36	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	95	0	0%	0	0
>> Total Zone Loads	-	1047	180	-	36	0

TABLE 8.1.B. Envelope Loads For Space "230 - Esc. Pesquisador" In Zone "Zone 8"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	9	1,199	-	393	-	36

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 9.1.A. Component Loads For Space "231 - Esc. Pesquisador" In Zone "Zone 9"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	393	-	9 m²	36	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	95	0	0%	0	0
>> Total Zone Loads	-	1047	180	-	36	0

TABLE 9.1.B. Envelope Loads For Space "231 - Esc. Pesquisador" In Zone "Zone 9"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	9	1,199	-	393	-	36

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 10.1.A. Component Loads For Space "232 - Esc. Pesquisador" In Zone "Zone 10"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500 COOLING OA DB / WB 33,3 °C / 24,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	252	-	3 m²	-	-
Wall Transmission	7 m²	220	-	7 m²	37	-
Roof Transmission	9 m²	347	-	9 m²	35	-
Window Transmission	3 m²	116	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	131 W	130	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	149	0	0%	0	0
>> Total Zone Loads	-	1638	180	-	119	0

TABLE 10.1.B. Envelope Loads For Space "232 - Esc. Pesquisador" In Zone "Zone 10"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
SE EXPOSURE						
WALL	7	1,513	-	220	-	37
WINDOW 1	3	5,000	0,500	116	252	47
H EXPOSURE						
ROOF	9	1,199	-	347	-	35

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 11.1.A. Component Loads For Space "233 - Esc. Pesquisador" In Zone "Zone 11"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	58	0	0%	0	0
>> Total Zone Loads	-	637	180	-	0	0

TABLE 11.1.B. Envelope Loads For Space "233 - Esc. Pesquisador" In Zone "Zone 11"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 12.1.A. Component Loads For Space "234 - Esc. Pesquisador" In Zone "Zone 12"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	2 m²	75	-	2 m²	7	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	65	0	0%	0	0
>> Total Zone Loads	-	716	180	-	7	0

TABLE 12.1.B. Envelope Loads For Space "234 - Esc. Pesquisador" In Zone "Zone 12"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	2	1,199	-	75	-	7

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

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TABLE 13.1.A. Component Loads For Space "235 - Esc. Pesquisador" In Zone "Zone 13"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	402	-	9 m²	37	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	96	0	0%	0	0
>> Total Zone Loads	-	1060	180	-	37	0

TABLE 13.1.B. Envelope Loads For Space "235 - Esc. Pesquisador" In Zone "Zone 13"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	9	1,199	-	402	-	37

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 14.1.A. Component Loads For Space "236 - Esc. Pesquisador" In Zone "Zone 14"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	402	-	9 m²	37	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	96	0	0%	0	0
>> Total Zone Loads	-	1060	180	-	37	0

TABLE 14.1.B. Envelope Loads For Space "236 - Esc. Pesquisador" In Zone "Zone 14"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	9	1,199	-	402	-	37

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 15.1.A. Component Loads For Space "237 - Esc. Pesquisador" In Zone "Zone 15"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500 COOLING OA DB / WB 33,3 °C / 24,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	4 m²	366	-	4 m²	-	-
Wall Transmission	7 m²	200	-	7 m²	33	-
Roof Transmission	9 m²	355	-	9 m²	36	-
Window Transmission	4 m²	168	-	4 m²	68	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	165	0	0%	0	0
>> Total Zone Loads	-	1812	180	-	138	0

TABLE 15.1.B. Envelope Loads For Space "237 - Esc. Pesquisador" In Zone "Zone 15"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
SE EXPOSURE						
WALL	7	1,513	-	200	-	33
WINDOW 1	4	5,000	0,500	168	366	68
H EXPOSURE						
ROOF	9	1,199	-	355	-	36

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 16.1.A. Component Loads For Space "238 - Reunião" In Zone "Zone 16"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 22,0 °C / 20,0 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	246 W	246	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	283	0	0%	0	0
>> Total Zone Loads	-	3113	481	-	0	0

TABLE 16.1.B. Envelope Loads For Space "238 - Reunião" In Zone "Zone 16"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 17.1.A. Component Loads For Space "239 - Pesq. Visitantes" In Zone "Zone 17"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	8 m²	241	-	8 m²	39	-
Roof Transmission	12 m²	495	-	12 m²	47	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	284 W	283	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1600 W	1600	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	322	0	0%	0	0
>> Total Zone Loads	-	3539	481	-	86	0

TABLE 17.1.B. Envelope Loads For Space "239 - Pesq. Visitantes" In Zone "Zone 17"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
NE EXPOSURE						
WALL	8	1,513	-	241	-	39
H EXPOSURE						
ROOF	12	1,199	-	495	-	47

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 18.1.A. Component Loads For Space "240 - Est. Biblioteca" In Zone "Zone 18"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	7 m²	403	-	7 m²	-	-
Wall Transmission	30 m²	819	-	30 m²	155	-
Roof Transmission	39 m²	1717	-	39 m²	159	-
Window Transmission	7 m²	369	-	7 m²	119	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	584 W	583	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	3200 W	3200	-	0	0	-
People	16	1149	961	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	825	0	0%	0	0
>> Total Zone Loads	-	9075	961	-	432	0

TABLE 18.1.B. Envelope Loads For Space "240 - Est. Biblioteca" In Zone "Zone 18"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NE EXPOSURE						
WALL	17	1,513	-	500	-	90
SE EXPOSURE						
WALL	13	1,513	-	318	-	65
WINDOW 1	7	5,000	0,500	369	403	119
H EXPOSURE						
ROOF	39	1,199	-	1717	-	159

Space Design Load Summary for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:00

TABLE 19.1.A. Component Loads For Space "241 - Convívio" In Zone "Zone 19"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1200 COOLING OA DB / WB 28,1 °C / 22,3 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	9 m²	2131	-	9 m²	-	-
Wall Transmission	25 m²	233	-	25 m²	129	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	9 m²	156	-	9 m²	145	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	471 W	471	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	600 W	600	-	0	0	-
People	15	1077	901	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 0%	468	0	0%	0	0
>> Total Zone Loads	-	5147	901	-	274	0

TABLE 19.1.B. Envelope Loads For Space "241 - Convívio" In Zone "Zone 19"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NE EXPOSURE						
WALL	20	1,513	-	121	-	103
SE EXPOSURE						
WALL	5	1,513	-	112	-	26
WINDOW 1	9	5,000	0,845	156	2131	145

System Psychrometrics for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:01

August DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	35,5	0,01702	960	400	14186	19592
Vent - Return Mixing	Outlet	25,8	0,01150	4534	958	-	-
Central Cooling Coil	Outlet	14,0	0,00944	4534	958	63858	27291
Supply Fan	Outlet	15,0	0,00944	4534	958	5667	-
Humidifier	Outlet	15,0	0,00944	4534	958	-	0
Cold Supply Duct	Outlet	15,0	0,00944	4534	958	-	-
Zone Air	-	23,1	0,01002	4534	1108	44005	7690
Return Plenum	Outlet	23,1	0,01002	4534	1108	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	5200	Cooling	5112	23,6	500	1220	0	0
Zone 2	5551	Cooling	5426	23,6	531	1204	0	0
Zone 3	2943	Cooling	2709	23,3	275	969	0	0
Zone 4	1370	Deadband	1240	21,8	152	986	0	0
Zone 5	422	Deadband	386	22,7	42	1083	0	0
Zone 6	633	Cooling	618	23,8	59	1237	0	0
Zone 7	709	Cooling	680	23,6	66	1205	0	0
Zone 8	1028	Deadband	952	22,6	105	1110	0	0
Zone 9	1028	Deadband	952	22,6	105	1110	0	0
Zone 10	1550	Deadband	1489	22,2	173	1046	0	0
Zone 11	637	Cooling	622	23,8	59	1235	0	0
Zone 12	712	Cooling	683	23,6	67	1203	0	0
Zone 13	1040	Deadband	962	22,6	106	1109	0	0
Zone 14	1040	Deadband	962	22,6	106	1109	0	0
Zone 15	1700	Deadband	1635	22,3	188	1039	0	0
Zone 16	3113	Cooling	3113	24,0	290	1105	0	0
Zone 17	3503	Cooling	3384	23,5	334	1084	0	0
Zone 18	9002	Cooling	8660	23,1	897	1049	0	0
Zone 19	4582	Deadband	4423	22,7	479	1126	0	0

System Psychrometrics for AH-1PV-08

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:01

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	960	400	-3987	0
Vent - Return Mixing	Outlet	20,3	0,01035	4534	437	-	-
Central Cooling Coil	Outlet	20,3	0,01035	4534	437	0	0
Supply Fan	Outlet	21,4	0,01035	4534	437	5667	-
Humidifier	Outlet	21,4	0,01035	4534	437	-	0
Cold Supply Duct	Outlet	21,4	0,01035	4534	437	-	-
Zone Air	-	21,1	0,01035	4534	447	-1565	0
Return Plenum	Outlet	21,1	0,01035	4534	447	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-69	Deadband	-91	21,2	500	447	0	0
Zone 2	-69	Deadband	-98	21,2	531	447	0	0
Zone 3	0	Deadband	-59	21,2	275	447	0	0
Zone 4	-97	Deadband	-91	20,9	152	447	0	0
Zone 5	-13	Deadband	-14	21,1	42	447	0	0
Zone 6	0	Deadband	-6	21,3	59	447	0	0
Zone 7	-7	Deadband	-11	21,2	66	447	0	0
Zone 8	-36	Deadband	-37	21,1	105	447	0	0
Zone 9	-36	Deadband	-37	21,1	105	447	0	0
Zone 10	-119	Deadband	-113	20,8	173	447	0	0
Zone 11	0	Deadband	-6	21,3	59	447	0	0
Zone 12	-7	Deadband	-11	21,2	67	447	0	0
Zone 13	-37	Deadband	-38	21,1	106	447	0	0
Zone 14	-37	Deadband	-38	21,1	106	447	0	0
Zone 15	-138	Deadband	-129	20,8	188	447	0	0
Zone 16	0	Deadband	0	21,4	290	447	0	0
Zone 17	-86	Deadband	-92	21,1	334	447	0	0
Zone 18	-432	Deadband	-428	21,0	897	447	0	0
Zone 19	-274	Deadband	-266	20,9	479	447	0	0

Air System Sizing Summary for AH-TEC-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

Air System Information

Air System Name **AH-TEC-01**
Equipment Class **SPLT AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **19,2** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **27,7** kW
Sensible coil load **27,3** kW
Coil L/s at Aug 1500 **1958** L/s
Max block L/s **1958** L/s
Sum of peak zone L/s **1958** L/s
Sensible heat ratio **0,984**
L/(s kW) **70,6**
m²/kW **0,7**
W/m² **1445,1**
Water flow @ 7,5 K rise **N/A**

Load occurs at **Aug 1500**
OA DB / WB **35,5 / 25,7** °C
Entering DB / WB **25,6 / 17,5** °C
Leaving DB / WB **14,0 / 13,2** °C
Coil ADP **12,7** °C
Bypass Factor **0,100**
Resulting RH **45** %
Design supply temp. **14,3** °C
Zone T-stat Check **1 of 1** OK
Max zone temperature deviation **0,0** K

Supply Fan Sizing Data

Actual max L/s **1958** L/s
Standard L/s **1938** L/s
Actual max L/(s·m²) **102,00** L/(s·m²)

Fan motor BHP **2,69** BHP
Fan motor kW **2,14** kW
Fan static **600** Pa

Outdoor Ventilation Air Data

Design airflow L/s **19** L/s
L/(s·m²) **1,00** L/(s·m²)

L/s/person **0,00** L/s/person

Zone Sizing Summary for AH-TEC-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

Air System Information

Air System Name **AH-TEC-01**
Equipment Class **SPLT AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **19,2** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	1958	1958	102,00	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 ²)
Zone 1	25,0	Sep 1600	0,3	19,2

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 ²)	Space L/(s·m ²)
Zone 1							
300 - Sala No-Breaks	1	25,0	Sep 1600	1958	0,3	19,2	102,00

Ventilation Sizing Summary for AH-TEC-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

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 (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
300 - Sala No-Breaks	1	19,2	0,0	1958,5	0,00	1,00	0,0	0,0	19,2
Totals (incl. Space Multipliers)				1958,5					19,2

Air System Design Load Summary for AH-TEC-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1500 COOLING OA DB / WB 35,5 °C / 25,7 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	14 m²	300	-	14 m²	135	-
Roof Transmission	19 m²	764	-	19 m²	147	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	37 m²	-99	-	37 m²	10	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	24000 W	23999	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	24964	0	-	292	0
Zone Conditioning	-	24940	0	-	402	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	1958 L/s	0	-	1958 L/s	0	-
Ventilation Load	19 L/s	229	436	19 L/s	166	-5
Supply Fan Load	1958 L/s	2137	-	1958 L/s	-2137	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	27305	436	-	-1569	-5
Central Cooling Coil	-	27305	440	-	-1569	0
>> Total Conditioning	-	27305	440	-	-1569	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TEC-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,1 °C / 25,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 25,0 °C			OCCUPIED T-STAT 24,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	14 m²	346	-	14 m²	135	-
Roof Transmission	19 m²	788	-	19 m²	147	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	37 m²	-99	-	37 m²	10	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	24000 W	23999	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	25035	0	-	292	0

Space Design Load Summary for AH-TEC-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

TABLE 1.1.A. Component Loads For Space "300 - Sala No-Breaks" In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600 COOLING OA DB / WB 34,1 °C / 25,1 °C OCCUPIED T-STAT 25,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 24,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	14 m²	346	-	14 m²	135	-
Roof Transmission	19 m²	788	-	19 m²	147	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	37 m²	-99	-	37 m²	10	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	24000 W	23999	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	25035	0	-	292	0

TABLE 1.1.B. Envelope Loads For Space "300 - Sala No-Breaks" In Zone "Zone 1"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	14	1,513	-	346	-	135
H EXPOSURE						
ROOF	19	1,199	-	788	-	147

System Psychrometrics for AH-TEC-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

August DESIGN COOLING DAY, 1500

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	35,5	0,01702	19	400	229	436
Vent - Return Mixing	Outlet	25,6	0,00930	1958	796	-	-
Central Cooling Coil	Outlet	14,0	0,00922	1958	796	27305	440
Supply Fan	Outlet	14,9	0,00922	1958	796	2137	-
Cold Supply Duct	Outlet	14,9	0,00922	1958	796	-	-
Zone Air	-	25,5	0,00922	1958	800	24940	0
Return Plenum	Outlet	25,5	0,00922	1958	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	24964	Cooling	24940	25,5	1958	800	0	0

System Psychrometrics for AH-TEC-01

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	19	400	-166	5
Vent - Return Mixing	Outlet	24,8	0,01027	1958	796	-	-
Central Cooling Coil	Outlet	24,1	0,01027	1958	796	1569	0
Supply Fan	Outlet	25,0	0,01027	1958	796	2137	-
Cold Supply Duct	Outlet	25,0	0,01027	1958	796	-	-
Zone Air	-	24,8	0,01027	1958	800	-402	0
Return Plenum	Outlet	24,8	0,01027	1958	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-292	Deadband	-402	24,8	1958	800	0	0

Air System Sizing Summary for AH-TEC-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

Air System Information

Air System Name **AH-TEC-02**
Equipment Class **SPLT AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **9,3** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **7,1** kW
Coil L/s at Jul 1600 **506** L/s
Max block L/s **506** L/s
Sum of peak zone L/s **506** L/s
Sensible heat ratio **0,971**
L/(s kW) **69,6**
m²/kW **1,3**
W/m² **782,1**
Water flow @ 7,5 K rise **N/A**

Load occurs at **Jul 1600**
OA DB / WB **35,2 / 25,6** °C
Entering DB / WB **25,7 / 17,7** °C
Leaving DB / WB **14,1 / 13,3** °C
Coil ADP **12,8** °C
Bypass Factor **0,100**
Resulting RH **45** %
Design supply temp. **14,3** °C
Zone T-stat Check **1 of 1** OK
Max zone temperature deviation **0,0** K

Supply Fan Sizing Data

Actual max L/s **506** L/s
Standard L/s **501** L/s
Actual max L/(s·m²) **54,46** L/(s·m²)

Fan motor BHP **0,70** BHP
Fan motor kW **0,55** kW
Fan static **600** Pa

Outdoor Ventilation Air Data

Design airflow L/s **9** L/s
L/(s·m²) **1,00** L/(s·m²)

L/s/person **0,00** L/s/person

Zone Sizing Summary for AH-TEC-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

Air System Information

Air System Name **AH-TEC-02**
Equipment Class **SPLT AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **9,3 m²**
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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·m²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	506	506	54,46	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 (m²)
Zone 1	6,5	Sep 1600	0,1	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 (m²)	Space L/(s·m²)
Zone 1							
301 - Sala Quadros	1	6,5	Sep 1600	506	0,1	9,3	54,46

Ventilation Sizing Summary for AH-TEC-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

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 (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
301 - Sala Quadros	1	9,3	0,0	506,5	0,00	1,00	0,0	0,0	9,3
Totals (incl. Space Multipliers)				506,5					9,3

Air System Design Load Summary for AH-TEC-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	132	-	7 m²	67	-
Roof Transmission	9 m²	378	-	9 m²	71	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	30 m²	-79	-	30 m²	8	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	6000 W	6000	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	6431	0	-	146	0
Zone Conditioning	-	6405	0	-	207	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	506 L/s	0	-	506 L/s	0	-
Ventilation Load	9 L/s	107	209	9 L/s	78	0
Supply Fan Load	506 L/s	553	-	506 L/s	-553	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	7064	209	-	-267	0
Central Cooling Coil	-	7064	210	-	-267	0
>> Total Conditioning	-	7064	210	-	-267	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TEC-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,1 °C / 25,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 25,0 °C			OCCUPIED T-STAT 24,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	172	-	7 m²	67	-
Roof Transmission	9 m²	382	-	9 m²	71	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	30 m²	-79	-	30 m²	8	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	6000 W	6000	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	6474	0	-	146	0

Space Design Load Summary for AH-TEC-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

TABLE 1.1.A. Component Loads For Space "301 - Sala Quadros" In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600 COOLING OA DB / WB 34,1 °C / 25,1 °C OCCUPIED T-STAT 25,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 24,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	172	-	7 m²	67	-
Roof Transmission	9 m²	382	-	9 m²	71	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	30 m²	-79	-	30 m²	8	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	6000 W	6000	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	6474	0	-	146	0

TABLE 1.1.B. Envelope Loads For Space "301 - Sala Quadros" In Zone "Zone 1"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
SE EXPOSURE						
WALL	7	1,513	-	172	-	67
H EXPOSURE						
ROOF	9	1,199	-	382	-	71

System Psychrometrics for AH-TEC-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

July DESIGN COOLING DAY, 1600

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	35,2	0,01702	9	400	107	209
Vent - Return Mixing	Outlet	25,7	0,00944	506	793	-	-
Central Cooling Coil	Outlet	14,1	0,00930	506	793	7064	210
Supply Fan	Outlet	15,0	0,00930	506	793	553	-
Cold Supply Duct	Outlet	15,0	0,00930	506	793	-	-
Zone Air	-	25,6	0,00930	506	800	6405	0
Return Plenum	Outlet	25,6	0,00930	506	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	6431	Cooling	6405	25,6	506	800	0	0

System Psychrometrics for AH-TEC-02

Project Name: FIOCRUZ RONDÔNIA
Prepared by: MHA Engenharia Ltda

09/05/2020
06:02

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	9	400	-78	0
Vent - Return Mixing	Outlet	24,5	0,01035	506	793	-	-
Central Cooling Coil	Outlet	24,1	0,01035	506	793	267	0
Supply Fan	Outlet	25,0	0,01035	506	793	553	-
Cold Supply Duct	Outlet	25,0	0,01035	506	793	-	-
Zone Air	-	24,7	0,01035	506	800	-207	0
Return Plenum	Outlet	24,7	0,01035	506	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-146	Deadband	-207	24,7	506	800	0	0

Dedicated Outdoor Air System (DOAS) Sizing Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

09/05/2020
06:15

Air System Information

Air System Name **AH-CO-14 DOAS**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **33**
Floor Area **679,9** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

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

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

Cooling Coil Sizing Data

Total coil load **72,5** kW
Total coil load **20,0** L/(s kW)
Sensible coil load **21,9** kW
Coil L/s at Jul 1500 **1448** L/s
Max coil L/s **1448** L/s
Sensible heat ratio **0,303**
Water flow @ 7,5 K rise **N/A**

Load occurs at **Jul 1500**
OA DB / WB **26,8 / 26,5** °C
Entering DB / WB **26,8 / 26,5** °C
Leaving DB / WB **14,1 / 14,1** °C
Bypass Factor **0,100**

Heating Coil Sizing Data

Max coil load **15,3** kW
Coil L/s at Jul 1500 **1448** L/s
Max coil L/s **1448** L/s
Water flow @ 12,0 K drop **N/A**

Load occurs at **Jul 1500**
Ent. DB / Lvg DB **14,1 / 23,0** °C

Ventilation Fan Sizing Data

Actual max L/s **1448** L/s
Standard L/s **1432** L/s
Actual max L/(s·m²) **2,13** L/(s·m²)

Fan motor BHP **2,28** BHP
Fan motor kW **1,81** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **1448** L/s
L/(s·m²) **2,13** L/(s·m²)

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

Zone Sizing Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

09/05/2020
06:15

Air System Information

Air System Name **AH-CO-14 DOAS**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **33**
Floor Area **679,9** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

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

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

Terminal Unit Sizing Data - Cooling

Zone Name	Total Coil Load (kW)	Sens Coil Load (kW)	Coil Entering DB / WB (°C)	Coil Leaving DB / WB (°C)	Water Flow @ 7,5 K (L/s)	Time of Peak Coil Load	Zone L/(s·m²)
Zone 1	3,9	3,4	23,8 / 18,6	16,2 / 15,7	-	Dec 1300	9,17
Zone 2	1,6	1,5	23,7 / 18,4	16,3 / 15,8	-	Dec 1400	10,12
Zone 3	2,2	2,0	23,6 / 18,3	15,9 / 15,4	-	Nov 1500	11,43
Zone 4	2,5	2,3	23,7 / 18,3	15,8 / 15,3	-	Dec 1600	12,59
Zone 5	2,8	2,6	23,7 / 18,1	15,6 / 15,1	-	Nov 1300	13,89
Zone 6	1,7	1,5	23,6 / 18,8	16,6 / 16,1	-	Nov 1300	9,11
Zone 7	1,6	0,9	23,7 / 20,2	16,3 / 16,0	-	Nov 1500	2,37
Zone 8	0,7	0,6	23,7 / 18,5	16,3 / 15,8	-	Jul 1600	9,50
Zone 9	0,7	0,7	23,7 / 18,7	16,8 / 16,3	-	Jul 1500	10,42
Zone 10	0,7	0,7	23,7 / 18,7	16,8 / 16,3	-	Jul 1500	10,42
Zone 11	1,0	1,0	23,5 / 18,8	18,3 / 17,1	-	Oct 1400	20,56
Zone 12	5,0	4,8	23,6 / 17,6	14,8 / 14,3	-	Dec 0100	29,99
Zone 13	3,0	2,8	24,0 / 18,1	15,3 / 14,8	-	May 0600	16,60
Zone 14	7,3	5,9	23,7 / 18,7	15,8 / 15,3	-	Dec 1200	6,81
Zone 15	4,9	4,7	23,7 / 18,0	15,6 / 15,1	-	Jun 2100	15,89
Zone 16	5,0	4,9	23,7 / 18,1	15,8 / 15,3	-	Aug 2000	17,16
Zone 17	2,8	1,9	23,6 / 19,9	17,2 / 16,8	-	Jul 1600	4,38
Zone 18	1,3	1,0	23,5 / 20,0	18,0 / 17,7	-	Oct 1600	6,85
Zone 19	0,4	0,3	23,6 / 19,6	17,3 / 16,9	-	Mar 1600	4,23
Zone 20	0,7	0,6	23,9 / 18,2	15,1 / 14,6	-	May 0600	6,24
Zone 21	0,7	0,6	23,8 / 18,2	15,4 / 14,9	-	Mar 1600	7,18
Zone 22	0,9	0,9	23,6 / 18,7	16,8 / 16,3	-	Sep 1600	11,86
Zone 23	0,9	0,9	23,6 / 18,7	16,8 / 16,3	-	Sep 1600	11,86
Zone 24	1,2	1,2	23,5 / 19,0	17,8 / 17,1	-	Oct 1500	20,11
Zone 25	0,7	0,6	23,9 / 18,3	15,4 / 14,9	-	May 0600	6,12
Zone 26	0,7	0,6	23,8 / 18,2	15,5 / 14,9	-	Feb 1700	7,02
Zone 27	0,9	0,9	23,5 / 18,6	16,7 / 16,2	-	Aug 1700	11,90
Zone 28	0,9	0,9	23,5 / 18,6	16,7 / 16,2	-	Aug 1700	11,90
Zone 29	1,3	1,3	23,6 / 19,1	17,9 / 17,2	-	Oct 1500	21,22
Zone 30	3,0	2,8	24,0 / 18,1	15,3 / 14,8	-	May 0600	16,60
Zone 31	3,1	3,0	23,6 / 18,3	16,1 / 15,6	-	May 1600	17,78
Zone 32	7,3	7,2	23,5 / 18,6	16,8 / 16,3	-	Aug 1700	23,06
Zone 33	3,9	3,9	23,7 / 18,7	16,8 / 16,3	-	Jan 1200	15,13

Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @12,0 K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 1	0,0	-17,8 / -17,8	0,00	375	0,000	0,000	60
Zone 2	0,0	-17,8 / -17,8	0,00	175	0,000	0,000	53
Zone 3	0,0	-17,8 / -17,8	0,00	219	0,000	0,000	38
Zone 4	0,0	-17,8 / -17,8	0,00	242	0,000	0,000	45
Zone 5	0,0	-17,8 / -17,8	0,00	267	0,000	0,000	53
Zone 6	0,0	-17,8 / -17,8	0,00	175	0,000	0,000	23
Zone 7	0,0	21,3 / 21,4	-	106	0,000	0,000	8
Zone 8	0,0	-17,8 / -17,8	0,00	72	0,000	0,000	23

Zone Sizing Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @12,0 K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 9	0,0	-17,8 / -17,8	0,00	83	0,000	0,000	23
Zone 10	0,0	-17,8 / -17,8	0,00	83	0,000	0,000	23
Zone 11	0,1	21,5 / 21,9	-	158	0,000	0,000	23
Zone 12	0,0	-17,8 / -17,8	0,00	456	0,000	0,000	0
Zone 13	0,0	-17,8 / -17,8	0,00	272	0,000	0,000	60
Zone 14	0,2	21,3 / 21,6	-	628	0,000	0,000	60
Zone 15	0,0	-17,8 / -17,8	0,00	486	0,000	0,000	180
Zone 16	0,0	-17,8 / -17,8	0,00	517	0,000	0,000	180
Zone 17	0,0	-17,8 / -17,8	0,00	247	0,000	0,000	8
Zone 18	0,1	21,2 / 21,5	-	153	0,000	0,000	8
Zone 19	0,0	-17,8 / -17,8	0,00	44	0,000	0,000	8
Zone 20	0,0	-17,8 / -17,8	0,00	56	0,000	0,000	23
Zone 21	0,0	-17,8 / -17,8	0,00	64	0,000	0,000	23
Zone 22	0,0	-17,8 / -17,8	0,00	106	0,000	0,000	23
Zone 23	0,0	-17,8 / -17,8	0,00	106	0,000	0,000	23
Zone 24	0,1	21,5 / 21,8	-	175	0,000	0,000	23
Zone 25	0,0	-17,8 / -17,8	0,00	56	0,000	0,000	23
Zone 26	0,0	-17,8 / -17,8	0,00	64	0,000	0,000	23
Zone 27	0,0	-17,8 / -17,8	0,00	108	0,000	0,000	23
Zone 28	0,0	-17,8 / -17,8	0,00	108	0,000	0,000	23
Zone 29	0,1	21,5 / 21,8	-	189	0,000	0,000	23
Zone 30	0,0	-17,8 / -17,8	0,00	272	0,000	0,000	60
Zone 31	0,0	-17,8 / -17,8	0,00	336	0,000	0,000	60
Zone 32	0,0	-17,8 / -17,8	0,00	897	0,000	0,000	120
Zone 33	0,0	-17,8 / -17,8	0,00	475	0,000	0,000	113

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m²)
Zone 1	3,4	Dec 1300	0,1	40,9
Zone 2	1,5	Dec 1300	0,1	17,3
Zone 3	2,0	Dec 1300	0,1	19,2
Zone 4	2,3	Dec 1300	0,1	19,2
Zone 5	2,5	Dec 1300	0,1	19,2
Zone 6	1,5	Dec 1300	0,1	19,2
Zone 7	0,9	Dec 1300	0,0	44,6
Zone 8	0,6	Jun 1500	0,0	7,6
Zone 9	0,7	Jun 1500	0,0	8,0
Zone 10	0,7	Jun 1500	0,0	8,0
Zone 11	1,0	Oct 1500	0,1	7,7
Zone 12	4,7	Jan 2300	0,0	15,2
Zone 13	2,8	Jan 2300	0,0	16,4
Zone 14	6,2	Dec 1200	0,3	92,2
Zone 15	4,7	Jun 1800	0,1	30,6
Zone 16	4,9	Jun 1800	0,1	30,1
Zone 17	2,1	Jul 1500	0,0	56,5
Zone 18	1,0	Sep 1600	0,1	22,3
Zone 19	0,4	Aug 1600	0,0	10,5
Zone 20	0,6	Jan 2300	0,0	8,9
Zone 21	0,6	Aug 1600	0,0	8,9
Zone 22	0,9	Aug 1600	0,0	8,9
Zone 23	0,9	Aug 1600	0,0	8,9
Zone 24	1,2	Oct 1500	0,1	8,7
Zone 25	0,6	Jan 2300	0,0	9,1
Zone 26	0,6	Aug 1600	0,0	9,1
Zone 27	0,9	Aug 1600	0,0	9,1

Zone Sizing Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone Name	Zone Cooling Sensible (kW)	Time of Peak Sensible Cooling Load	Zone Heating Load (kW)	Zone Floor Area (m²)
Zone 28	0,9	Aug 1600	0,0	9,1
Zone 29	1,3	Oct 1500	0,1	8,9
Zone 30	2,8	Jan 2300	0,0	16,4
Zone 31	3,0	Jul 1600	0,1	18,9
Zone 32	7,1	Aug 1600	0,4	38,9
Zone 33	4,0	Dec 1200	0,3	31,4

Zone Sizing Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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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 (m²)	Space L/(s·m²)
Zone 1							
146 - Equipe Adm.	1	3,4	Dec 1300	375	0,1	40,9	9,17
Zone 2							
147 - Diretoria	1	1,5	Dec 1300	175	0,1	17,3	10,12
Zone 3							
148 - Assist. Diretoria	1	2,0	Dec 1300	219	0,1	19,2	11,43
Zone 4							
149 - Eq. Acadêmica	1	2,3	Dec 1300	242	0,1	19,2	12,59
Zone 5							
150 - Lab. Inf	1	2,5	Dec 1300	267	0,1	19,2	13,89
Zone 6							
151 - Equipe Infra.	1	1,5	Dec 1300	175	0,1	19,2	9,11
Zone 7							
152 - Circ.	1	0,9	Dec 1300	106	0,0	44,6	2,37
Zone 8							
153 - Coord. Adm.	1	0,6	Jun 1500	72	0,0	7,6	9,50
Zone 9							
154 - Coord. Infra.	1	0,7	Jun 1500	83	0,0	8,0	10,42
Zone 10							
155 - Coord. Pesquisa	1	0,7	Jun 1500	83	0,0	8,0	10,42
Zone 11							
156 - Coord. Ensino	1	1,0	Oct 1500	158	0,1	7,7	20,56
Zone 12							
157 - CPD/TI	1	4,7	Jan 2300	456	0,0	15,2	29,99
Zone 13							
158 - Reunião	1	2,8	Jan 2300	272	0,0	16,4	16,60
Zone 14							
159 - Recp./Hall/Café	1	6,2	Dec 1200	628	0,3	92,2	6,81
Zone 15							
223 - Sala de Aula	1	4,7	Jun 1800	486	0,1	30,6	15,89
Zone 16							
224 - Sala de Aula	1	4,9	Jun 1800	517	0,1	30,1	17,16
Zone 17							
225 - Circ.	1	2,1	Jul 1500	247	0,0	56,5	4,38
Zone 18							
226 - Circ.	1	1,0	Sep 1600	153	0,1	22,3	6,85
Zone 19							
227 - Circ.	1	0,4	Aug 1600	44	0,0	10,5	4,23
Zone 20							
228 - Esc. Pesquisador	1	0,6	Jan 2300	56	0,0	8,9	6,24
Zone 21							
229 - Esc. Pesquisador	1	0,6	Aug 1600	64	0,0	8,9	7,18
Zone 22							
230 - Esc. Pesquisador	1	0,9	Aug 1600	106	0,0	8,9	11,86
Zone 23							
231 - Esc. Pesquisador	1	0,9	Aug 1600	106	0,0	8,9	11,86
Zone 24							
232 - Esc. Pesquisador	1	1,2	Oct 1500	175	0,1	8,7	20,11
Zone 25							
233 - Esc. Pesquisador	1	0,6	Jan 2300	56	0,0	9,1	6,12
Zone 26							
234 - Esc. Pesquisador	1	0,6	Aug 1600	64	0,0	9,1	7,02
Zone 27							
235 - Esc. Pesquisador	1	0,9	Aug 1600	108	0,0	9,1	11,90
Zone 28							
236 - Esc. Pesquisador	1	0,9	Aug 1600	108	0,0	9,1	11,90
Zone 29							
237 - Esc. Pesquisador	1	1,3	Oct 1500	189	0,1	8,9	21,22
Zone 30							

Zone Sizing Summary for AH-CO-14 DOAS

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Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m²)	Space L/(s·m²)
238 - Reunião	1	2,8	Jan 2300	272	0,0	16,4	16,60
Zone 31							
239 - Pesq. Visitantes	1	3,0	Jul 1600	336	0,1	18,9	17,78
Zone 32							
240 - Est. Biblioteca	1	7,1	Aug 1600	897	0,4	38,9	23,06
Zone 33							
241 - Convívio	1	4,0	Dec 1200	475	0,3	31,4	15,13

Ventilation Sizing Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 1448 L/s

2. Space Ventilation Analysis

2.1 Zone: Zone 1

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
146 - Equipe Adm.	1	40,9	8,0	375,0	7,50	0,00	0,0	0,0	60,0
Totals (incl. Space Multipliers)				375,0					60,0

2.2 Zone: Zone 2

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 2									
147 - Diretoria	1	17,3	7,0	175,0	7,50	0,00	0,0	0,0	52,5
Totals (incl. Space Multipliers)				175,0					52,5

2.3 Zone: Zone 3

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 3									
148 - Assist. Diretoria	1	19,2	5,0	219,4	7,50	0,00	0,0	0,0	37,5
Totals (incl. Space Multipliers)				219,4					37,5

2.4 Zone: Zone 4

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 4									
149 - Eq. Acadêmica	1	19,2	6,0	241,7	7,50	0,00	0,0	0,0	45,0
Totals (incl. Space Multipliers)				241,7					45,0

2.5 Zone: Zone 5

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 5									
150 - Lab. Inf	1	19,2	7,0	266,7	7,50	0,00	0,0	0,0	52,5
Totals (incl. Space Multipliers)				266,7					52,5

Ventilation Sizing Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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2.6 Zone: Zone 6

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 6									
151 - Equipe Infra.	1	19,2	3,0	175,0	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				175,0					22,5

2.7 Zone: Zone 7

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 7									
152 - Circ.	1	44,6	1,0	105,6	7,50	0,00	0,0	0,0	7,5
Totals (incl. Space Multipliers)				105,6					7,5

2.8 Zone: Zone 8

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 8									
153 - Coord. Adm.	1	7,6	3,0	72,2	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				72,2					22,5

2.9 Zone: Zone 9

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 9									
154 - Coord. Infra.	1	8,0	3,0	83,3	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				83,3					22,5

2.10 Zone: Zone 10

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 10									
155 - Coord. Pesquisa	1	8,0	3,0	83,3	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				83,3					22,5

Ventilation Sizing Summary for AH-CO-14 DOAS

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2.11 Zone: Zone 11

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 11									
156 - Coord. Ensino	1	7,7	3,0	158,3	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				158,3					22,5

2.12 Zone: Zone 12

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 12									
157 - CPD/TI	1	15,2	0,0	455,8	7,50	0,00	0,0	0,0	0,0
Totals (incl. Space Multipliers)				455,8					0,0

2.13 Zone: Zone 13

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 13									
158 - Reunião	1	16,4	8,0	272,3	7,50	0,00	0,0	0,0	60,0
Totals (incl. Space Multipliers)				272,3					60,0

2.14 Zone: Zone 14

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 14									
159 - Recp./Hall/Café	1	92,2	8,0	627,8	7,50	0,00	0,0	0,0	60,0
Totals (incl. Space Multipliers)				627,8					60,0

2.15 Zone: Zone 15

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 15									
223 - Sala de Aula	1	30,6	24,0	486,1	7,50	0,00	0,0	0,0	180,0
Totals (incl. Space Multipliers)				486,1					180,0

Ventilation Sizing Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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2.16 Zone: Zone 16

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 16									
224 - Sala de Aula	1	30,1	24,0	516,7	7,50	0,00	0,0	0,0	180,0
Totals (incl. Space Multipliers)				516,7					180,0

2.17 Zone: Zone 17

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 17									
225 - Circ.	1	56,5	1,0	247,2	7,50	0,00	0,0	0,0	7,5
Totals (incl. Space Multipliers)				247,2					7,5

2.18 Zone: Zone 18

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 18									
226 - Circ.	1	22,3	1,0	152,8	7,50	0,00	0,0	0,0	7,5
Totals (incl. Space Multipliers)				152,8					7,5

2.19 Zone: Zone 19

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 19									
227 - Circ.	1	10,5	1,0	44,4	7,50	0,00	0,0	0,0	7,5
Totals (incl. Space Multipliers)				44,4					7,5

2.20 Zone: Zone 20

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 20									
228 - Esc. Pesquisador	1	8,9	3,0	55,6	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				55,6					22,5

Ventilation Sizing Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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2.21 Zone: Zone 21

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 21									
229 - Esc. Pesquisador	1	8,9	3,0	63,9	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				63,9					22,5

2.22 Zone: Zone 22

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 22									
230 - Esc. Pesquisador	1	8,9	3,0	105,6	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				105,6					22,5

2.23 Zone: Zone 23

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 23									
231 - Esc. Pesquisador	1	8,9	3,0	105,6	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				105,6					22,5

2.24 Zone: Zone 24

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 24									
232 - Esc. Pesquisador	1	8,7	3,0	175,0	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				175,0					22,5

2.25 Zone: Zone 25

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 25									
233 - Esc. Pesquisador	1	9,1	3,0	55,7	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				55,7					22,5

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2.26 Zone: Zone 26

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 26									
234 - Esc. Pesquisador	1	9,1	3,0	63,9	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				63,9					22,5

2.27 Zone: Zone 27

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 27									
235 - Esc. Pesquisador	1	9,1	3,0	108,3	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				108,3					22,5

2.28 Zone: Zone 28

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 28									
236 - Esc. Pesquisador	1	9,1	3,0	108,3	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				108,3					22,5

2.29 Zone: Zone 29

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 29									
237 - Esc. Pesquisador	1	8,9	3,0	188,9	7,50	0,00	0,0	0,0	22,5
Totals (incl. Space Multipliers)				188,9					22,5

2.30 Zone: Zone 30

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 30									
238 - Reunião	1	16,4	8,0	272,3	7,50	0,00	0,0	0,0	60,0
Totals (incl. Space Multipliers)				272,3					60,0

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Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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2.31 Zone: Zone 31

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 31									
239 - Pesq. Visitantes	1	18,9	8,0	336,1	7,50	0,00	0,0	0,0	60,0
Totals (incl. Space Multipliers)				336,1					60,0

2.32 Zone: Zone 32

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 32									
240 - Est. Biblioteca	1	38,9	16,0	897,2	7,50	0,00	0,0	0,0	120,0
Totals (incl. Space Multipliers)				897,2					120,0

2.33 Zone: Zone 33

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 33									
241 - Convívio	1	31,4	15,0	475,0	7,50	0,00	0,0	0,0	112,5
Totals (incl. Space Multipliers)				475,0					112,5

Air System Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600 COOLING OA DB / WB 25,4 °C / 25,1 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	63 m²	5356	-	63 m²	-	-
Wall Transmission	195 m²	2266	-	195 m²	1003	-
Roof Transmission	124 m²	4084	-	124 m²	504	-
Window Transmission	63 m²	233	-	63 m²	1075	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	174 m²	2139	-	174 m²	0	-
Ceiling	174 m²	324	-	174 m²	0	-
Overhead Lighting	10199 W	10198	-	0	0	-
Task Lighting	330 W	330	-	0	0	-
Electric Equipment	27700 W	27699	-	0	0	-
People	193	13858	11595	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	66487	11595	-	2583	0
Zone Conditioning	-	65430	11595	-	2600	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Exhaust Fan Load	1448 L/s	0	-	1448 L/s	0	-
Ventilation Load	1448 L/s	2829	36326	1448 L/s	5886	-31
Ventilation Fan Load	1448 L/s	1809	-	1448 L/s	-1809	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	70068	47921	-	6676	-31
Cooling Coil	-	19464	42815	-	-4966	-31
Heating Coil	-	-15274	-	-	14223	-
Terminal Unit Cooling	-	65914	5242	-	-1932	0
Terminal Unit Heating	-	0	-	-	473	-
>> Total Conditioning	-	70104	48057	-	7799	-31
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 20,7 °C / 20,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	6 m²	622	-	6 m²	-	-
Wall Transmission	8 m²	111	-	8 m²	43	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	6 m²	-112	-	6 m²	94	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	614 W	613	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1600 W	1600	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	3419	481	-	137	0

Zone 2	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 20,7 °C / 20,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	5 m²	71	-	5 m²	28	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	-56	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	260 W	259	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	400 W	400	-	0	0	-
People	7	503	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1498	421	-	74	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 3	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 20,7 °C / 20,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	87	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	-56	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1000 W	1000	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1999	300	-	80	0

Zone 4	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 20,7 °C / 20,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	87	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	-56	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1200 W	1200	-	0	0	-
People	6	431	360	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2270	360	-	80	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 5	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 20,7 °C / 20,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	87	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	-56	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1400 W	1400	-	0	0	-
People	7	503	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2542	421	-	80	0

Zone 6	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 20,7 °C / 20,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	87	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	-56	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	600 W	600	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1455	180	-	80	0

Zone Design Load Summary for AH-CO-14 DOAS

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Prepared by: MHA Engenharia Ltda

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Zone 7	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 20,7 °C / 20,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	2 m²	170	-	2 m²	-	-
Wall Transmission	3 m²	41	-	3 m²	16	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	2 m²	-31	-	2 m²	26	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	669 W	669	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	931	60	-	41	0

Zone 8	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,2 °C / 26,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	5 m²	90	-	5 m²	25	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	114 W	114	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	629	180	-	25	0

Zone Design Load Summary for AH-CO-14 DOAS

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Zone 9	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,2 °C / 26,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	129	-	7 m²	36	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	120 W	120	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	675	180	-	36	0

Zone 10	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,2 °C / 26,0 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	129	-	7 m²	36	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	120 W	120	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	675	180	-	36	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 11	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 24,6 °C / 24,3 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	4 m²	302	-	4 m²	-	-
Wall Transmission	14 m²	145	-	14 m²	69	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	4 m²	-6	-	4 m²	68	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	116 W	115	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	982	180	-	137	0

Zone 12	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 13,3 °C / 13,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	228 W	228	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	4500 W	4500	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4738	0	-	0	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 13	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 13,3 °C / 13,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	246 W	246	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2830	481	-	0	0

Zone 14	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1200			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 19,4 °C / 19,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	12 m²	3072	-	12 m²	-	-
Wall Transmission	21 m²	-122	-	21 m²	110	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	12 m²	-308	-	12 m²	208	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	63 m²	752	-	63 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1383 W	1383	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	800 W	800	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	6162	481	-	318	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 15	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 24,1 °C / 23,8 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	1 m²	162	-	1 m²	-	-
Wall Transmission	9 m²	181	-	9 m²	48	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	1 m²	1	-	1 m²	21	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	7 m²	78	-	7 m²	0	-
Ceiling	31 m²	57	-	31 m²	0	-
Overhead Lighting	459 W	459	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	24	1723	1442	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4672	1442	-	69	0

Zone 16	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 24,1 °C / 23,8 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	1 m²	162	-	1 m²	-	-
Wall Transmission	9 m²	181	-	9 m²	48	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	1 m²	1	-	1 m²	21	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	23 m²	277	-	23 m²	0	-
Ceiling	30 m²	56	-	30 m²	0	-
Overhead Lighting	452 W	451	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	24	1723	1442	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4862	1442	-	69	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 17	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,8 °C / 26,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	82 m²	1089	-	82 m²	0	-
Ceiling	57 m²	105	-	57 m²	0	-
Overhead Lighting	848 W	847	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2124	60	-	0	0

Zone 18	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 25,4 °C / 25,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	2 m²	109	-	2 m²	-	-
Wall Transmission	4 m²	52	-	4 m²	18	-
Roof Transmission	13 m²	436	-	13 m²	54	-
Window Transmission	2 m²	6	-	2 m²	26	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	335 W	334	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1036	60	-	97	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 19	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,5 °C / 26,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	3 m²	105	-	3 m²	13	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	158 W	157	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	358	60	-	13	0

Zone 20	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 13,3 °C / 13,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	576	180	-	0	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 21	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,5 °C / 26,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	2 m²	57	-	2 m²	7	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	630	180	-	7	0

Zone 22	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,5 °C / 26,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	300	-	9 m²	36	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	859	180	-	36	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 23	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,5 °C / 26,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	300	-	9 m²	36	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	859	180	-	36	0

Zone 24	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 24,6 °C / 24,3 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	3 m²	252	-	3 m²	-	-
Wall Transmission	7 m²	126	-	7 m²	37	-
Roof Transmission	9 m²	256	-	9 m²	35	-
Window Transmission	3 m²	-4	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	131 W	130	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1185	180	-	119	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Zone 25	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 13,3 °C / 13,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	579	180	-	0	0

Zone 26	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,5 °C / 26,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	2 m²	57	-	2 m²	7	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	633	180	-	7	0

Zone Design Load Summary for AH-CO-14 DOAS

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Zone 27	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,5 °C / 26,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	307	-	9 m²	37	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	869	180	-	37	0

Zone 28	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,5 °C / 26,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	307	-	9 m²	37	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	869	180	-	37	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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Zone 29	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 24,6 °C / 24,3 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	4 m²	366	-	4 m²	-	-
Wall Transmission	7 m²	114	-	7 m²	33	-
Roof Transmission	9 m²	262	-	9 m²	36	-
Window Transmission	4 m²	-6	-	4 m²	68	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1295	180	-	138	0

Zone 30	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 13,3 °C / 13,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	246 W	246	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2830	481	-	0	0

Zone Design Load Summary for AH-CO-14 DOAS

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Zone 31	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,5 °C / 26,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	8 m²	141	-	8 m²	39	-
Roof Transmission	12 m²	375	-	12 m²	47	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	284 W	283	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1600 W	1600	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2997	481	-	86	0

Zone 32	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,5 °C / 26,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	7 m²	403	-	7 m²	-	-
Wall Transmission	30 m²	422	-	30 m²	155	-
Roof Transmission	39 m²	1311	-	39 m²	159	-
Window Transmission	7 m²	65	-	7 m²	119	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	584 W	583	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	3200 W	3200	-	0	0	-
People	16	1149	961	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	7143	961	-	432	0

Zone Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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Zone 33	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1200			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 19,4 °C / 19,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	9 m²	2131	-	9 m²	-	-
Wall Transmission	25 m²	-97	-	25 m²	129	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	9 m²	-214	-	9 m²	145	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	471 W	471	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	600 W	600	-	0	0	-
People	15	1077	901	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	3979	901	-	274	0

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "146 - Equipe Adm." In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 20,7 °C / 20,4 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	6 m²	622	-	6 m²	-	-
Wall Transmission	8 m²	111	-	8 m²	43	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	6 m²	-112	-	6 m²	94	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	614 W	613	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1600 W	1600	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	3419	481	-	137	0

TABLE 1.1.B. Envelope Loads For Space "146 - Equipe Adm." In Zone "Zone 1"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	8	1,513	-	111	-	43
WINDOW 1	6	5,000	0,412	-112	622	94

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 2.1.A. Component Loads For Space "147 - Diretoria" In Zone "Zone 2"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 20,7 °C / 20,4 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	5 m²	71	-	5 m²	28	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	-56	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	260 W	259	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	400 W	400	-	0	0	-
People	7	503	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1498	421	-	74	0

TABLE 2.1.B. Envelope Loads For Space "147 - Diretoria" In Zone "Zone 2"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	5	1,513	-	71	-	28
WINDOW 1	3	5,000	0,412	-56	311	47

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 3.1.A. Component Loads For Space "148 - Assist. Diretoria" In Zone "Zone 3"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 20,7 °C / 20,4 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	87	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	-56	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1000 W	1000	-	0	0	-
People	5	359	300	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1999	300	-	80	0

TABLE 3.1.B. Envelope Loads For Space "148 - Assist. Diretoria" In Zone "Zone 3"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
SE EXPOSURE				(W)	(W)	(W)
WALL	7	1,513	-	87	-	34
WINDOW 1	3	5,000	0,412	-56	311	47

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 4.1.A. Component Loads For Space "149 - Eq. Acadêmica" In Zone "Zone 4"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 20,7 °C / 20,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	87	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	-56	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1200 W	1200	-	0	0	-
People	6	431	360	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2270	360	-	80	0

TABLE 4.1.B. Envelope Loads For Space "149 - Eq. Acadêmica" In Zone "Zone 4"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	7	1,513	-	87	-	34
WINDOW 1	3	5,000	0,412	-56	311	47

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 5.1.A. Component Loads For Space "150 - Lab. Inf" In Zone "Zone 5"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300 COOLING OA DB / WB 20,7 °C / 20,4 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	87	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	-56	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1400 W	1400	-	0	0	-
People	7	503	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2542	421	-	80	0

TABLE 5.1.B. Envelope Loads For Space "150 - Lab. Inf" In Zone "Zone 5"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	7	1,513	-	87	-	34
WINDOW 1	3	5,000	0,412	-56	311	47

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 6.1.A. Component Loads For Space "151 - Equipe Infra." In Zone "Zone 6"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 20,7 °C / 20,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	311	-	3 m²	-	-
Wall Transmission	7 m²	87	-	7 m²	34	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	3 m²	-56	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	288 W	288	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	600 W	600	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1455	180	-	80	0

TABLE 6.1.B. Envelope Loads For Space "151 - Equipe Infra." In Zone "Zone 6"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	7	1,513	-	87	-	34
WINDOW 1	3	5,000	0,412	-56	311	47

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 7.1.A. Component Loads For Space "152 - Circ." In Zone "Zone 7"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 20,7 °C / 20,4 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	2 m²	170	-	2 m²	-	-
Wall Transmission	3 m²	41	-	3 m²	16	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	2 m²	-31	-	2 m²	26	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	669 W	669	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	931	60	-	41	0

TABLE 7.1.B. Envelope Loads For Space "152 - Circ." In Zone "Zone 7"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	3	1,513	-	41	-	16
WINDOW 1	2	5,000	0,412	-31	170	26

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 8.1.A. Component Loads For Space "153 - Coord. Adm." In Zone "Zone 8"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 26,2 °C / 26,0 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	5 m²	90	-	5 m²	25	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	114 W	114	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	629	180	-	25	0

TABLE 8.1.B. Envelope Loads For Space "153 - Coord. Adm." In Zone "Zone 8"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
NE EXPOSURE				(W)	(W)	(W)
WALL	5	1,513	-	90	-	25

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 9.1.A. Component Loads For Space "154 - Coord. Infra." In Zone "Zone 9"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 26,2 °C / 26,0 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	129	-	7 m²	36	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	120 W	120	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	675	180	-	36	0

TABLE 9.1.B. Envelope Loads For Space "154 - Coord. Infra." In Zone "Zone 9"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NE EXPOSURE						
WALL	7	1,513	-	129	-	36

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 10.1.A. Component Loads For Space "155 - Coord. Pesquisa" In Zone "Zone 10"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1500 COOLING OA DB / WB 26,2 °C / 26,0 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	7 m²	129	-	7 m²	36	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	120 W	120	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	675	180	-	36	0

TABLE 10.1.B. Envelope Loads For Space "155 - Coord. Pesquisa" In Zone "Zone 10"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
NE EXPOSURE				(W)	(W)	(W)
WALL	7	1,513	-	129	-	36

Space Design Load Summary for AH-CO-14 DOAS

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TABLE 11.1.A. Component Loads For Space "156 - Coord. Ensino" In Zone "Zone 11"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500 COOLING OA DB / WB 24,6 °C / 24,3 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	4 m²	302	-	4 m²	-	-
Wall Transmission	14 m²	145	-	14 m²	69	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	4 m²	-6	-	4 m²	68	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	116 W	115	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	982	180	-	137	0

TABLE 11.1.B. Envelope Loads For Space "156 - Coord. Ensino" In Zone "Zone 11"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NE EXPOSURE						
WALL	7	1,513	-	31	-	36
SE EXPOSURE						
WALL	7	1,513	-	114	-	33
WINDOW 1	4	5,000	0,412	-6	302	68

Space Design Load Summary for AH-CO-14 DOAS

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TABLE 12.1.A. Component Loads For Space "157 - CPD/TI" In Zone "Zone 12"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 13,3 °C / 13,1 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	228 W	228	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	4500 W	4500	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4738	0	-	0	0

TABLE 12.1.B. Envelope Loads For Space "157 - CPD/TI" In Zone "Zone 12"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-CO-14 DOAS

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TABLE 13.1.A. Component Loads For Space "158 - Reunião" In Zone "Zone 13"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 13,3 °C / 13,1 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	246 W	246	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2830	481	-	0	0

TABLE 13.1.B. Envelope Loads For Space "158 - Reunião" In Zone "Zone 13"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 14.1.A. Component Loads For Space "159 - Recp./Hall/Café" In Zone "Zone 14"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1200 COOLING OA DB / WB 19,4 °C / 19,1 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	12 m²	3072	-	12 m²	-	-
Wall Transmission	21 m²	-122	-	21 m²	110	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	12 m²	-308	-	12 m²	208	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	63 m²	752	-	63 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	1383 W	1383	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	800 W	800	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	6162	481	-	318	0

TABLE 14.1.B. Envelope Loads For Space "159 - Recp./Hall/Café" In Zone "Zone 14"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
SE EXPOSURE						
WALL	2	1,513	-	16	-	10
WINDOW 1	12	5,000	0,845	-308	3072	208
NE EXPOSURE						
WALL	20	1,513	-	-138	-	100

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 15.1.A. Component Loads For Space "223 - Sala de Aula" In Zone "Zone 15"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 24,1 °C / 23,8 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	1 m²	162	-	1 m²	-	-
Wall Transmission	9 m²	181	-	9 m²	48	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	1 m²	1	-	1 m²	21	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	7 m²	78	-	7 m²	0	-
Ceiling	31 m²	57	-	31 m²	0	-
Overhead Lighting	459 W	459	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	24	1723	1442	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4672	1442	-	69	0

TABLE 15.1.B. Envelope Loads For Space "223 - Sala de Aula" In Zone "Zone 15"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NW EXPOSURE						
WALL	9	1,513	-	181	-	48
WINDOW 1	1	5,000	0,500	1	162	21

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 16.1.A. Component Loads For Space "224 - Sala de Aula" In Zone "Zone 16"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1800 COOLING OA DB / WB 24,1 °C / 23,8 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	1 m²	162	-	1 m²	-	-
Wall Transmission	9 m²	181	-	9 m²	48	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	1 m²	1	-	1 m²	21	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	23 m²	277	-	23 m²	0	-
Ceiling	30 m²	56	-	30 m²	0	-
Overhead Lighting	452 W	451	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	24	1723	1442	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4862	1442	-	69	0

TABLE 16.1.B. Envelope Loads For Space "224 - Sala de Aula" In Zone "Zone 16"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NW EXPOSURE						
WALL	9	1,513	-	181	-	48
WINDOW 1	1	5,000	0,500	1	162	21

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 17.1.A. Component Loads For Space "225 - Circ." In Zone "Zone 17"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1500			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,8 °C / 26,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	82 m²	1089	-	82 m²	0	-
Ceiling	57 m²	105	-	57 m²	0	-
Overhead Lighting	848 W	847	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2124	60	-	0	0

TABLE 17.1.B. Envelope Loads For Space "225 - Circ." In Zone "Zone 17"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 18.1.A. Component Loads For Space "226 - Circ." In Zone "Zone 18"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1600 COOLING OA DB / WB 25,4 °C / 25,1 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	2 m²	109	-	2 m²	-	-
Wall Transmission	4 m²	52	-	4 m²	18	-
Roof Transmission	13 m²	436	-	13 m²	54	-
Window Transmission	2 m²	6	-	2 m²	26	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	335 W	334	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1036	60	-	97	0

TABLE 18.1.B. Envelope Loads For Space "226 - Circ." In Zone "Zone 18"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	4	1,513	-	52	-	18
WINDOW 1	2	5,000	0,500	6	109	26
H EXPOSURE						
ROOF	13	1,199	-	436	-	54

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TABLE 19.1.A. Component Loads For Space "227 - Circ." In Zone "Zone 19"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 26,5 °C / 26,2 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 23,0 °C			OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	3 m²	105	-	3 m²	13	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	158 W	157	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	0 W	0	-	0	0	-
People	1	72	60	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	358	60	-	13	0

TABLE 19.1.B. Envelope Loads For Space "227 - Circ." In Zone "Zone 19"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	3	1,199	-	105	-	13

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 20.1.A. Component Loads For Space "228 - Esc. Pesquisador" In Zone "Zone 20"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 13,3 °C / 13,1 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	576	180	-	0	0

TABLE 20.1.B. Envelope Loads For Space "228 - Esc. Pesquisador" In Zone "Zone 20"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

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TABLE 21.1.A. Component Loads For Space "229 - Esc. Pesquisador" In Zone "Zone 21"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 26,5 °C / 26,2 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	2 m²	57	-	2 m²	7	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	630	180	-	7	0

TABLE 21.1.B. Envelope Loads For Space "229 - Esc. Pesquisador" In Zone "Zone 21"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
H EXPOSURE				(W)	(W)	(W)
ROOF	2	1,199	-	57	-	7

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 22.1.A. Component Loads For Space "230 - Esc. Pesquisador" In Zone "Zone 22"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 26,5 °C / 26,2 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	300	-	9 m²	36	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	859	180	-	36	0

TABLE 22.1.B. Envelope Loads For Space "230 - Esc. Pesquisador" In Zone "Zone 22"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	9	1,199	-	300	-	36

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 23.1.A. Component Loads For Space "231 - Esc. Pesquisador" In Zone "Zone 23"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 26,5 °C / 26,2 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	300	-	9 m²	36	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	859	180	-	36	0

TABLE 23.1.B. Envelope Loads For Space "231 - Esc. Pesquisador" In Zone "Zone 23"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	9	1,199	-	300	-	36

Space Design Load Summary for AH-CO-14 DOAS

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TABLE 24.1.A. Component Loads For Space "232 - Esc. Pesquisador" In Zone "Zone 24"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500 COOLING OA DB / WB 24,6 °C / 24,3 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	3 m²	252	-	3 m²	-	-
Wall Transmission	7 m²	126	-	7 m²	37	-
Roof Transmission	9 m²	256	-	9 m²	35	-
Window Transmission	3 m²	-4	-	3 m²	47	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	131 W	130	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1185	180	-	119	0

TABLE 24.1.B. Envelope Loads For Space "232 - Esc. Pesquisador" In Zone "Zone 24"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
SE EXPOSURE						
WALL	7	1,513	-	126	-	37
WINDOW 1	3	5,000	0,500	-4	252	47
H EXPOSURE						
ROOF	9	1,199	-	256	-	35

Space Design Load Summary for AH-CO-14 DOAS

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TABLE 25.1.A. Component Loads For Space "233 - Esc. Pesquisador" In Zone "Zone 25"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 13,3 °C / 13,1 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	9 m²	17	-	9 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	579	180	-	0	0

TABLE 25.1.B. Envelope Loads For Space "233 - Esc. Pesquisador" In Zone "Zone 25"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

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Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 26.1.A. Component Loads For Space "234 - Esc. Pesquisador" In Zone "Zone 26"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 26,5 °C / 26,2 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	2 m²	57	-	2 m²	7	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	633	180	-	7	0

TABLE 26.1.B. Envelope Loads For Space "234 - Esc. Pesquisador" In Zone "Zone 26"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	2	1,199	-	57	-	7

Space Design Load Summary for AH-CO-14 DOAS

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TABLE 27.1.A. Component Loads For Space "235 - Esc. Pesquisador" In Zone "Zone 27"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 26,5 °C / 26,2 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	307	-	9 m²	37	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	869	180	-	37	0

TABLE 27.1.B. Envelope Loads For Space "235 - Esc. Pesquisador" In Zone "Zone 27"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	9	1,199	-	307	-	37

Space Design Load Summary for AH-CO-14 DOAS

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TABLE 28.1.A. Component Loads For Space "236 - Esc. Pesquisador" In Zone "Zone 28"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 26,5 °C / 26,2 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	9 m²	307	-	9 m²	37	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	137 W	136	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	869	180	-	37	0

TABLE 28.1.B. Envelope Loads For Space "236 - Esc. Pesquisador" In Zone "Zone 28"						
				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
H EXPOSURE						
ROOF	9	1,199	-	307	-	37

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 29.1.A. Component Loads For Space "237 - Esc. Pesquisador" In Zone "Zone 29"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Oct 1500 COOLING OA DB / WB 24,6 °C / 24,3 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	4 m²	366	-	4 m²	-	-
Wall Transmission	7 m²	114	-	7 m²	33	-
Roof Transmission	9 m²	262	-	9 m²	36	-
Window Transmission	4 m²	-6	-	4 m²	68	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	134 W	133	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	200 W	200	-	0	0	-
People	3	215	180	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	1295	180	-	138	0

TABLE 29.1.B. Envelope Loads For Space "237 - Esc. Pesquisador" In Zone "Zone 29"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
SE EXPOSURE						
WALL	7	1,513	-	114	-	33
WINDOW 1	4	5,000	0,500	-6	366	68
H EXPOSURE						
ROOF	9	1,199	-	262	-	36

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
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TABLE 30.1.A. Component Loads For Space "238 - Reunião" In Zone "Zone 30"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jan 2300 COOLING OA DB / WB 13,3 °C / 13,1 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	0 m²	0	-	0 m²	0	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	246 W	246	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	2000 W	2000	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2830	481	-	0	0

TABLE 30.1.B. Envelope Loads For Space "238 - Reunião" In Zone "Zone 30"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 31.1.A. Component Loads For Space "239 - Pesq. Visitantes" In Zone "Zone 31"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600 COOLING OA DB / WB 26,5 °C / 26,2 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	8 m²	141	-	8 m²	39	-
Roof Transmission	12 m²	375	-	12 m²	47	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	7 m²	14	-	7 m²	0	-
Overhead Lighting	284 W	283	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	1600 W	1600	-	0	0	-
People	8	574	481	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	2997	481	-	86	0

TABLE 31.1.B. Envelope Loads For Space "239 - Pesq. Visitantes" In Zone "Zone 31"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
NE EXPOSURE						
WALL	8	1,513	-	141	-	39
H EXPOSURE						
ROOF	12	1,199	-	375	-	47

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 32.1.A. Component Loads For Space "240 - Est. Biblioteca" In Zone "Zone 32"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Aug 1600 COOLING OA DB / WB 26,5 °C / 26,2 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	7 m²	403	-	7 m²	-	-
Wall Transmission	30 m²	422	-	30 m²	155	-
Roof Transmission	39 m²	1311	-	39 m²	159	-
Window Transmission	7 m²	65	-	7 m²	119	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	584 W	583	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	3200 W	3200	-	0	0	-
People	16	1149	961	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	7143	961	-	432	0

TABLE 32.1.B. Envelope Loads For Space "240 - Est. Biblioteca" In Zone "Zone 32"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
NE EXPOSURE						
WALL	17	1,513	-	271	-	90
SE EXPOSURE						
WALL	13	1,513	-	151	-	65
WINDOW 1	7	5,000	0,500	65	403	119
H EXPOSURE						
ROOF	39	1,199	-	1311	-	159

Space Design Load Summary for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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TABLE 33.1.A. Component Loads For Space "241 - Convívio" In Zone "Zone 33"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1200 COOLING OA DB / WB 19,4 °C / 19,1 °C OCCUPIED T-STAT 23,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 21,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	9 m²	2131	-	9 m²	-	-
Wall Transmission	25 m²	-97	-	25 m²	129	-
Roof Transmission	0 m²	0	-	0 m²	0	-
Window Transmission	9 m²	-214	-	9 m²	145	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	471 W	471	-	0	0	-
Task Lighting	10 W	10	-	0	0	-
Electric Equipment	600 W	600	-	0	0	-
People	15	1077	901	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	3979	901	-	274	0

TABLE 33.1.B. Envelope Loads For Space "241 - Convívio" In Zone "Zone 33"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
NE EXPOSURE						
WALL	20	1,513	-	-142	-	103
SE EXPOSURE						
WALL	5	1,513	-	45	-	26
WINDOW 1	9	5,000	0,845	-214	2131	145

System Psychrometrics for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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September DESIGN COOLING DAY, 1600

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	25,4	0,02029	1448	400	2829	36326
Vent - Return Mixing	Outlet	25,4	0,02029	1448	0	-	-
Vent. Cooling Coil	Outlet	14,1	0,01015	1448	400	19464	42815
Vent. Heating Coil	Outlet	23,0	0,01015	1448	400	15274	-
Ventilation Fan	Outlet	24,0	0,01015	1448	400	1809	-
Cold Supply Duct	Outlet	24,0	0,01015	1448	400	0	-
Zone Air	-	23,7	0,01164	1448	1155	65430	11595
Return Plenum	Outlet	23,7	0,01164	1448	1155	0	-

System Psychrometrics for AH-CO-14 DOAS

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Prepared by: MHA Engenharia Ltda

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Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)
Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Zone 1 (Cooling)							
Ventilation Air	-	-	-	60	-	-	-
Cooling Coil Inlet	-	23,8	0,01165	375	0	-	-
Cooling Coil Outlet	-	16,5	0,01131	375	0	3254	383
Heating Coil Inlet	-	16,5	0,01131	375	0	-	-
Heating Coil Outlet	-	16,5	0,01131	375	0	0	-
Zone Air	-	23,7	0,01194	375	1155	3235	-
Zone 2 (Cooling)							
Ventilation Air	-	-	-	53	-	-	-
Cooling Coil Inlet	-	23,7	0,01148	175	0	-	-
Cooling Coil Outlet	-	16,9	0,01148	175	0	1434	0
Heating Coil Inlet	-	16,9	0,01148	175	0	-	-
Heating Coil Outlet	-	16,9	0,01148	175	0	0	-
Zone Air	-	23,6	0,01206	175	1155	1412	-
Zone 3 (Cooling)							
Ventilation Air	-	-	-	38	-	-	-
Cooling Coil Inlet	-	23,7	0,01139	219	0	-	-
Cooling Coil Outlet	-	16,3	0,01113	219	0	1943	167
Heating Coil Inlet	-	16,3	0,01113	219	0	-	-
Heating Coil Outlet	-	16,3	0,01113	219	0	0	-
Zone Air	-	23,7	0,01164	219	1155	1928	-
Zone 4 (Cooling)							
Ventilation Air	-	-	-	45	-	-	-
Cooling Coil Inlet	-	23,8	0,01120	242	0	-	-
Cooling Coil Outlet	-	16,1	0,01097	242	0	2212	160
Heating Coil Inlet	-	16,1	0,01097	242	0	-	-
Heating Coil Outlet	-	16,1	0,01097	242	0	0	-
Zone Air	-	23,7	0,01143	242	1155	2197	-
Zone 5 (Cooling)							
Ventilation Air	-	-	-	53	-	-	-
Cooling Coil Inlet	-	23,8	0,01115	267	0	-	-
Cooling Coil Outlet	-	16,1	0,01098	267	0	2452	138
Heating Coil Inlet	-	16,1	0,01098	267	0	-	-
Heating Coil Outlet	-	16,1	0,01098	267	0	0	-
Zone Air	-	23,8	0,01140	267	1155	2439	-
Zone 6 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,6	0,01204	175	0	-	-
Cooling Coil Outlet	-	17,0	0,01169	175	0	1395	184
Heating Coil Inlet	-	17,0	0,01169	175	0	-	-
Heating Coil Outlet	-	17,0	0,01169	175	0	0	-
Zone Air	-	23,6	0,01233	175	1155	1383	-
Zone 7 (Cooling)							
Ventilation Air	-	-	-	8	-	-	-
Cooling Coil Inlet	-	23,7	0,01387	106	0	-	-
Cooling Coil Outlet	-	16,7	0,01169	106	0	881	672
Heating Coil Inlet	-	16,7	0,01169	106	0	-	-
Heating Coil Outlet	-	16,7	0,01169	106	0	0	-
Zone Air	-	23,7	0,01416	106	1155	878	-
Zone 8 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,7	0,01146	72	0	-	-
Cooling Coil Outlet	-	16,7	0,01145	72	0	602	4
Heating Coil Inlet	-	16,7	0,01145	72	0	-	-
Heating Coil Outlet	-	16,7	0,01145	72	0	0	-
Zone Air	-	23,6	0,01206	72	1155	590	-

System Psychrometrics for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Zone 9 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,7	0,01164	83	0	-	-
Cooling Coil Outlet	-	17,6	0,01164	83	0	614	0
Heating Coil Inlet	-	17,6	0,01164	83	0	-	-
Heating Coil Outlet	-	17,6	0,01164	83	0	0	-
Zone Air	-	23,6	0,01220	83	1155	604	-
Zone 10 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,7	0,01164	83	0	-	-
Cooling Coil Outlet	-	17,6	0,01164	83	0	614	0
Heating Coil Inlet	-	17,6	0,01164	83	0	-	-
Heating Coil Outlet	-	17,6	0,01164	83	0	0	-
Zone Air	-	23,6	0,01220	83	1155	604	-
Zone 11 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,6	0,01180	158	0	-	-
Cooling Coil Outlet	-	18,7	0,01181	158	0	937	0
Heating Coil Inlet	-	18,7	0,01181	158	0	-	-
Heating Coil Outlet	-	18,7	0,01181	158	0	0	-
Zone Air	-	23,6	0,01209	158	1155	926	-
Zone 12 (Cooling)							
Ventilation Air	-	-	-	0	-	-	-
Cooling Coil Inlet	-	23,6	0,01020	456	0	-	-
Cooling Coil Outlet	-	14,8	0,01001	456	0	4777	261
Heating Coil Inlet	-	14,8	0,01001	456	0	-	-
Heating Coil Outlet	-	14,8	0,01001	456	0	0	-
Zone Air	-	23,6	0,01020	456	0	4777	-
Zone 13 (Cooling)							
Ventilation Air	-	-	-	60	-	-	-
Cooling Coil Inlet	-	24,0	0,01059	272	0	-	-
Cooling Coil Outlet	-	15,3	0,01036	272	0	2827	186
Heating Coil Inlet	-	15,3	0,01036	272	0	-	-
Heating Coil Outlet	-	15,3	0,01036	272	0	0	-
Zone Air	-	24,0	0,01071	272	1155	2830	-
Zone 14 (Cooling)							
Ventilation Air	-	-	-	60	-	-	-
Cooling Coil Inlet	-	23,6	0,01210	628	0	-	-
Cooling Coil Outlet	-	16,6	0,01146	628	0	5252	1187
Heating Coil Inlet	-	16,6	0,01146	628	0	-	-
Heating Coil Outlet	-	16,6	0,01146	628	0	0	-
Zone Air	-	23,6	0,01231	628	1155	5224	-
Zone 15 (Cooling)							
Ventilation Air	-	-	-	180	-	-	-
Cooling Coil Inlet	-	23,8	0,01079	486	0	-	-
Cooling Coil Outlet	-	16,0	0,01080	486	0	4514	0
Heating Coil Inlet	-	16,0	0,01080	486	0	-	-
Heating Coil Outlet	-	16,0	0,01080	486	0	0	-
Zone Air	-	23,7	0,01116	486	1155	4441	-
Zone 16 (Cooling)							
Ventilation Air	-	-	-	180	-	-	-
Cooling Coil Inlet	-	23,9	0,01081	517	0	-	-
Cooling Coil Outlet	-	16,6	0,01081	517	0	4544	0
Heating Coil Inlet	-	16,6	0,01081	517	0	-	-
Heating Coil Outlet	-	16,6	0,01081	517	0	0	-
Zone Air	-	23,9	0,01115	517	1155	4518	-
Zone 17 (Cooling)							
Ventilation Air	-	-	-	8	-	-	-
Cooling Coil Inlet	-	23,7	0,01354	247	0	-	-
Cooling Coil Outlet	-	17,6	0,01232	247	0	1809	883
Heating Coil Inlet	-	17,6	0,01232	247	0	-	-
Heating Coil Outlet	-	17,6	0,01232	247	0	0	-

System Psychrometrics for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Zone Air	-	23,7	0,01365	247	1155	1806	-
Zone 18 (Cooling)							
Ventilation Air	-	-	-	8	-	-	-
Cooling Coil Inlet	-	23,6	0,01347	153	0	-	-
Cooling Coil Outlet	-	18,2	0,01280	153	0	983	302
Heating Coil Inlet	-	18,2	0,01280	153	0	-	-
Heating Coil Outlet	-	18,2	0,01280	153	0	0	-
Zone Air	-	23,5	0,01365	153	1155	978	-
Zone 19 (Cooling)							
Ventilation Air	-	-	-	8	-	-	-
Cooling Coil Inlet	-	23,7	0,01302	44	0	-	-
Cooling Coil Outlet	-	17,5	0,01222	44	0	329	103
Heating Coil Inlet	-	17,5	0,01222	44	0	-	-
Heating Coil Outlet	-	17,5	0,01222	44	0	0	-
Zone Air	-	23,7	0,01359	44	1155	325	-
Zone 20 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,9	0,01088	56	0	-	-
Cooling Coil Outlet	-	15,4	0,01045	56	0	564	71
Heating Coil Inlet	-	15,4	0,01045	56	0	-	-
Heating Coil Outlet	-	15,4	0,01045	56	0	0	-
Zone Air	-	23,9	0,01138	56	1155	561	-
Zone 21 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,9	0,01109	64	0	-	-
Cooling Coil Outlet	-	15,9	0,01079	64	0	612	58
Heating Coil Inlet	-	15,9	0,01079	64	0	-	-
Heating Coil Outlet	-	15,9	0,01079	64	0	0	-
Zone Air	-	23,8	0,01160	64	1155	607	-
Zone 22 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,6	0,01159	106	0	-	-
Cooling Coil Outlet	-	16,8	0,01151	106	0	861	28
Heating Coil Inlet	-	16,8	0,01151	106	0	-	-
Heating Coil Outlet	-	16,8	0,01151	106	0	0	-
Zone Air	-	23,5	0,01199	106	1155	848	-
Zone 23 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,6	0,01159	106	0	-	-
Cooling Coil Outlet	-	16,8	0,01151	106	0	861	28
Heating Coil Inlet	-	16,8	0,01151	106	0	-	-
Heating Coil Outlet	-	16,8	0,01151	106	0	0	-
Zone Air	-	23,5	0,01199	106	1155	848	-
Zone 24 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,7	0,01204	175	0	-	-
Cooling Coil Outlet	-	18,3	0,01204	175	0	1125	0
Heating Coil Inlet	-	18,3	0,01204	175	0	-	-
Heating Coil Outlet	-	18,3	0,01204	175	0	0	-
Zone Air	-	23,7	0,01233	175	1155	1116	-
Zone 25 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,9	0,01088	56	0	-	-
Cooling Coil Outlet	-	15,4	0,01042	56	0	569	75
Heating Coil Inlet	-	15,4	0,01042	56	0	-	-
Heating Coil Outlet	-	15,4	0,01042	56	0	0	-
Zone Air	-	23,9	0,01138	56	1155	566	-
Zone 26 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,8	0,01094	64	0	-	-
Cooling Coil Outlet	-	15,5	0,01054	64	0	631	76
Heating Coil Inlet	-	15,5	0,01054	64	0	-	-

System Psychrometrics for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Heating Coil Outlet	-	15,5	0,01054	64	0	0	-
Zone Air	-	23,7	0,01137	64	1155	623	-
Zone 27 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,7	0,01172	108	0	-	-
Cooling Coil Outlet	-	17,0	0,01165	108	0	869	24
Heating Coil Inlet	-	17,0	0,01165	108	0	-	-
Heating Coil Outlet	-	17,0	0,01165	108	0	0	-
Zone Air	-	23,6	0,01214	108	1155	857	-
Zone 28 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,7	0,01172	108	0	-	-
Cooling Coil Outlet	-	17,0	0,01165	108	0	869	24
Heating Coil Inlet	-	17,0	0,01165	108	0	-	-
Heating Coil Outlet	-	17,0	0,01165	108	0	0	-
Zone Air	-	23,6	0,01214	108	1155	857	-
Zone 29 (Cooling)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	23,7	0,01210	189	0	-	-
Cooling Coil Outlet	-	18,3	0,01210	189	0	1221	0
Heating Coil Inlet	-	18,3	0,01210	189	0	-	-
Heating Coil Outlet	-	18,3	0,01210	189	0	0	-
Zone Air	-	23,6	0,01237	189	1155	1211	-
Zone 30 (Cooling)							
Ventilation Air	-	-	-	60	-	-	-
Cooling Coil Inlet	-	24,0	0,01059	272	0	-	-
Cooling Coil Outlet	-	15,3	0,01036	272	0	2827	186
Heating Coil Inlet	-	15,3	0,01036	272	0	-	-
Heating Coil Outlet	-	15,3	0,01036	272	0	0	-
Zone Air	-	24,0	0,01071	272	1155	2830	-
Zone 31 (Cooling)							
Ventilation Air	-	-	-	60	-	-	-
Cooling Coil Inlet	-	23,9	0,01145	336	0	-	-
Cooling Coil Outlet	-	16,7	0,01141	336	0	2888	42
Heating Coil Inlet	-	16,7	0,01141	336	0	-	-
Heating Coil Outlet	-	16,7	0,01141	336	0	0	-
Zone Air	-	23,9	0,01174	336	1155	2878	-
Zone 32 (Cooling)							
Ventilation Air	-	-	-	120	-	-	-
Cooling Coil Inlet	-	23,7	0,01172	897	0	-	-
Cooling Coil Outlet	-	17,1	0,01172	897	0	7078	0
Heating Coil Inlet	-	17,1	0,01172	897	0	-	-
Heating Coil Outlet	-	17,1	0,01172	897	0	0	-
Zone Air	-	23,7	0,01197	897	1155	7030	-
Zone 33 (Cooling)							
Ventilation Air	-	-	-	113	-	-	-
Cooling Coil Inlet	-	23,6	0,01136	475	0	-	-
Cooling Coil Outlet	-	17,3	0,01137	475	0	3568	0
Heating Coil Inlet	-	17,3	0,01137	475	0	-	-
Heating Coil Outlet	-	17,3	0,01137	475	0	0	-
Zone Air	-	23,5	0,01175	475	1155	3499	-

System Psychrometrics for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	1448	400	-5886	31
Vent - Return Mixing	Outlet	17,6	0,01035	1448	0	-	-
Vent. Cooling Coil	Outlet	14,7	0,01035	1448	400	4966	31
Vent. Heating Coil	Outlet	23,0	0,01035	1448	400	14223	-
Ventilation Fan	Outlet	24,0	0,01035	1448	400	1809	-
Cold Supply Duct	Outlet	24,0	0,01035	1448	400	0	-
Zone Air	-	21,0	0,01035	1448	400	-2600	0
Return Plenum	Outlet	21,0	0,01035	1448	400	0	-

System Psychrometrics for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)
Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Zone 1 (Heating)							
Ventilation Air	-	-	-	60	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	375	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	375	0	0	0
Heating Coil Inlet	-	21,5	0,01035	375	0	-	-
Heating Coil Outlet	-	21,5	0,01035	375	0	0	-
Zone Air	-	21,0	0,01035	375	400	-155	-
Zone 2 (Heating)							
Ventilation Air	-	-	-	53	-	-	-
Cooling Coil Inlet	-	21,8	0,01035	175	0	-	-
Cooling Coil Outlet	-	21,8	0,01035	175	0	0	0
Heating Coil Inlet	-	21,8	0,01035	175	0	-	-
Heating Coil Outlet	-	21,8	0,01035	175	0	0	-
Zone Air	-	20,9	0,01035	175	400	-49	-
Zone 3 (Heating)							
Ventilation Air	-	-	-	38	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	219	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	219	0	0	0
Heating Coil Inlet	-	21,5	0,01035	219	0	-	-
Heating Coil Outlet	-	21,5	0,01035	219	0	0	-
Zone Air	-	21,0	0,01035	219	400	-95	-
Zone 4 (Heating)							
Ventilation Air	-	-	-	45	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	242	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	242	0	0	0
Heating Coil Inlet	-	21,5	0,01035	242	0	-	-
Heating Coil Outlet	-	21,5	0,01035	242	0	0	-
Zone Air	-	21,0	0,01035	242	400	-107	-
Zone 5 (Heating)							
Ventilation Air	-	-	-	53	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	267	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	267	0	0	0
Heating Coil Inlet	-	21,5	0,01035	267	0	-	-
Heating Coil Outlet	-	21,5	0,01035	267	0	0	-
Zone Air	-	20,9	0,01035	267	400	-63	-
Zone 6 (Heating)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	21,3	0,01035	175	0	-	-
Cooling Coil Outlet	-	21,3	0,01035	175	0	0	0
Heating Coil Inlet	-	21,3	0,01035	175	0	-	-
Heating Coil Outlet	-	21,3	0,01035	175	0	0	-
Zone Air	-	20,9	0,01035	175	400	-46	-
Zone 7 (Deadband)							
Ventilation Air	-	-	-	8	-	-	-
Cooling Coil Inlet	-	21,3	0,01035	106	0	-	-
Cooling Coil Outlet	-	21,3	0,01035	106	0	0	0
Heating Coil Inlet	-	21,3	0,01035	106	0	-	-
Heating Coil Outlet	-	21,4	0,01035	106	0	20	-
Zone Air	-	21,0	0,01035	106	400	-46	-
Zone 8 (Deadband)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	22,0	0,01035	72	0	-	-
Cooling Coil Outlet	-	21,6	0,01035	72	0	40	0
Heating Coil Inlet	-	21,6	0,01035	72	0	-	-
Heating Coil Outlet	-	21,6	0,01035	72	0	0	-
Zone Air	-	21,1	0,01035	72	400	-37	-

System Psychrometrics for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Zone 9 (Deadband)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	21,9	0,01035	83	0	-	-
Cooling Coil Outlet	-	21,6	0,01035	83	0	27	0
Heating Coil Inlet	-	21,6	0,01035	83	0	-	-
Heating Coil Outlet	-	21,6	0,01035	83	0	0	-
Zone Air	-	21,1	0,01035	83	400	-50	-
Zone 10 (Deadband)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	21,9	0,01035	83	0	-	-
Cooling Coil Outlet	-	21,6	0,01035	83	0	27	0
Heating Coil Inlet	-	21,6	0,01035	83	0	-	-
Heating Coil Outlet	-	21,6	0,01035	83	0	0	-
Zone Air	-	21,1	0,01035	83	400	-50	-
Zone 11 (Deadband)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	158	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	158	0	0	0
Heating Coil Inlet	-	21,5	0,01035	158	0	-	-
Heating Coil Outlet	-	21,9	0,01035	158	0	68	-
Zone Air	-	21,1	0,01035	158	400	-145	-
Zone 12 (Deadband)							
Ventilation Air	-	-	-	0	-	-	-
Cooling Coil Inlet	-	21,0	0,01036	456	0	-	-
Cooling Coil Outlet	-	21,0	0,01036	456	0	0	0
Heating Coil Inlet	-	21,0	0,01036	456	0	-	-
Heating Coil Outlet	-	21,0	0,01036	456	0	0	-
Zone Air	-	21,0	0,01035	456	0	0	-
Zone 13 (Deadband)							
Ventilation Air	-	-	-	60	-	-	-
Cooling Coil Inlet	-	21,7	0,01035	272	0	-	-
Cooling Coil Outlet	-	21,0	0,01036	272	0	215	0
Heating Coil Inlet	-	21,0	0,01036	272	0	-	-
Heating Coil Outlet	-	21,0	0,01036	272	0	0	-
Zone Air	-	21,0	0,01035	272	400	0	-
Zone 14 (Deadband)							
Ventilation Air	-	-	-	60	-	-	-
Cooling Coil Inlet	-	21,3	0,01035	628	0	-	-
Cooling Coil Outlet	-	21,3	0,01035	628	0	0	0
Heating Coil Inlet	-	21,3	0,01035	628	0	-	-
Heating Coil Outlet	-	21,6	0,01035	628	0	188	-
Zone Air	-	21,1	0,01035	628	400	-400	-
Zone 15 (Deadband)							
Ventilation Air	-	-	-	180	-	-	-
Cooling Coil Inlet	-	22,2	0,01035	486	0	-	-
Cooling Coil Outlet	-	21,3	0,01035	486	0	504	0
Heating Coil Inlet	-	21,3	0,01035	486	0	-	-
Heating Coil Outlet	-	21,3	0,01035	486	0	0	-
Zone Air	-	21,2	0,01035	486	400	-107	-
Zone 16 (Deadband)							
Ventilation Air	-	-	-	180	-	-	-
Cooling Coil Inlet	-	22,1	0,01035	517	0	-	-
Cooling Coil Outlet	-	21,1	0,01036	517	0	574	0
Heating Coil Inlet	-	21,1	0,01036	517	0	-	-
Heating Coil Outlet	-	21,1	0,01036	517	0	0	-
Zone Air	-	21,1	0,01035	517	400	-60	-
Zone 17 (Deadband)							
Ventilation Air	-	-	-	8	-	-	-
Cooling Coil Inlet	-	21,1	0,01036	247	0	-	-
Cooling Coil Outlet	-	21,0	0,01036	247	0	27	0
Heating Coil Inlet	-	21,0	0,01036	247	0	-	-
Heating Coil Outlet	-	21,0	0,01036	247	0	0	-

System Psychrometrics for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Zone Air	-	21,0	0,01035	247	400	0	-
Zone 18 (Deadband)							
Ventilation Air	-	-	-	8	-	-	-
Cooling Coil Inlet	-	21,2	0,01036	153	0	-	-
Cooling Coil Outlet	-	21,2	0,01036	153	0	0	0
Heating Coil Inlet	-	21,2	0,01036	153	0	-	-
Heating Coil Outlet	-	21,5	0,01036	153	0	71	-
Zone Air	-	21,0	0,01035	153	400	-98	-
Zone 19 (Heating)							
Ventilation Air	-	-	-	8	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	44	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	44	0	0	0
Heating Coil Inlet	-	21,5	0,01035	44	0	-	-
Heating Coil Outlet	-	21,5	0,01035	44	0	0	-
Zone Air	-	21,0	0,01035	44	400	-6	-
Zone 20 (Deadband)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	22,2	0,01035	56	0	-	-
Cooling Coil Outlet	-	21,0	0,01036	56	0	81	0
Heating Coil Inlet	-	21,0	0,01036	56	0	-	-
Heating Coil Outlet	-	21,0	0,01036	56	0	0	-
Zone Air	-	21,0	0,01035	56	400	0	-
Zone 21 (Deadband)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	22,1	0,01035	64	0	-	-
Cooling Coil Outlet	-	21,2	0,01036	64	0	71	0
Heating Coil Inlet	-	21,2	0,01036	64	0	-	-
Heating Coil Outlet	-	21,2	0,01036	64	0	0	-
Zone Air	-	21,1	0,01035	64	400	-8	-
Zone 22 (Heating)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	21,6	0,01035	106	0	-	-
Cooling Coil Outlet	-	21,6	0,01035	106	0	0	0
Heating Coil Inlet	-	21,6	0,01035	106	0	-	-
Heating Coil Outlet	-	21,6	0,01035	106	0	0	-
Zone Air	-	21,0	0,01035	106	400	-30	-
Zone 23 (Heating)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	21,6	0,01035	106	0	-	-
Cooling Coil Outlet	-	21,6	0,01035	106	0	0	0
Heating Coil Inlet	-	21,6	0,01035	106	0	-	-
Heating Coil Outlet	-	21,6	0,01035	106	0	0	-
Zone Air	-	21,0	0,01035	106	400	-30	-
Zone 24 (Deadband)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	175	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	175	0	0	0
Heating Coil Inlet	-	21,5	0,01035	175	0	-	-
Heating Coil Outlet	-	21,8	0,01035	175	0	57	-
Zone Air	-	21,1	0,01035	175	400	-134	-
Zone 25 (Deadband)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	22,2	0,01035	56	0	-	-
Cooling Coil Outlet	-	21,0	0,01036	56	0	81	0
Heating Coil Inlet	-	21,0	0,01036	56	0	-	-
Heating Coil Outlet	-	21,0	0,01036	56	0	0	-
Zone Air	-	21,0	0,01035	56	400	0	-
Zone 26 (Deadband)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	22,1	0,01035	64	0	-	-
Cooling Coil Outlet	-	21,2	0,01036	64	0	71	0
Heating Coil Inlet	-	21,2	0,01036	64	0	-	-

System Psychrometrics for AH-CO-14 DOAS

Project Name: FIOCRUZ RONDÔNIA DOAS
Prepared by: MHA Engenharia Ltda

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Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Heating Coil Outlet	-	21,2	0,01036	64	0	0	-
Zone Air	-	21,1	0,01035	64	400	-8	-
Zone 27 (Heating)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	108	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	108	0	0	0
Heating Coil Inlet	-	21,5	0,01035	108	0	-	-
Heating Coil Outlet	-	21,5	0,01035	108	0	0	-
Zone Air	-	20,8	0,01035	108	400	-34	-
Zone 28 (Heating)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	108	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	108	0	0	0
Heating Coil Inlet	-	21,5	0,01035	108	0	-	-
Heating Coil Outlet	-	21,5	0,01035	108	0	0	-
Zone Air	-	20,8	0,01035	108	400	-34	-
Zone 29 (Deadband)							
Ventilation Air	-	-	-	23	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	189	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	189	0	0	0
Heating Coil Inlet	-	21,5	0,01035	189	0	-	-
Heating Coil Outlet	-	21,8	0,01035	189	0	70	-
Zone Air	-	21,1	0,01035	189	400	-147	-
Zone 30 (Deadband)							
Ventilation Air	-	-	-	60	-	-	-
Cooling Coil Inlet	-	21,7	0,01035	272	0	-	-
Cooling Coil Outlet	-	21,0	0,01036	272	0	215	0
Heating Coil Inlet	-	21,0	0,01036	272	0	-	-
Heating Coil Outlet	-	21,0	0,01036	272	0	0	-
Zone Air	-	21,0	0,01035	272	400	0	-
Zone 31 (Heating)							
Ventilation Air	-	-	-	60	-	-	-
Cooling Coil Inlet	-	21,5	0,01035	336	0	-	-
Cooling Coil Outlet	-	21,5	0,01035	336	0	0	0
Heating Coil Inlet	-	21,5	0,01035	336	0	-	-
Heating Coil Outlet	-	21,5	0,01035	336	0	0	-
Zone Air	-	21,0	0,01035	336	400	-84	-
Zone 32 (Heating)							
Ventilation Air	-	-	-	120	-	-	-
Cooling Coil Inlet	-	21,2	0,01036	897	0	-	-
Cooling Coil Outlet	-	21,2	0,01036	897	0	0	0
Heating Coil Inlet	-	21,2	0,01036	897	0	-	-
Heating Coil Outlet	-	21,2	0,01036	897	0	0	-
Zone Air	-	20,7	0,01035	897	400	-316	-
Zone 33 (Heating)							
Ventilation Air	-	-	-	113	-	-	-
Cooling Coil Inlet	-	21,7	0,01035	475	0	-	-
Cooling Coil Outlet	-	21,7	0,01035	475	0	0	0
Heating Coil Inlet	-	21,7	0,01035	475	0	-	-
Heating Coil Outlet	-	21,7	0,01035	475	0	0	-
Zone Air	-	20,9	0,01035	475	400	-260	-



Ministério da Saúde

FIOCRUZ
Fundação Oswaldo Cruz



CONTRATAÇÃO DE OBRA DE REFORMA DE EDIFICAÇÃO
EXISTENTE VISANDO A IMPLANTAÇÃO DO BLOCO DE ENSINO
E PESQUISA DA FIOCRUZ RONDÔNIA EM PORTO VELHO/RO.

MEMORIAL DE CÁLCULO E DESCRITIVO

PROJETO EXECUTIVO


HVAC

INFRA PARA O EMPREENDIMENTO “C”


SETEMBRO/2020

CONTRATO RDC ELETRÔNICO N.º 31/2019-COGIC
PROCESSO: 25389.000189/2017-19

MEMORIAL: 30000393-03-OS5-C00-HVA-MC-0001-R01


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CONTROLE DE REVISÃO					
REV.	DESCRIÇÃO	ELABORADO		APROVADO	
R00	EMIÇÃO INICIAL	RAYMOND	SETEMBRO 2020	SALIM	SETEMBRO 2020
R01	REVISÃO	RAYMOND	NOVEMBRO 2020	SALIM	NOVEMBRO 2020


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APRESENTAÇÃO

A ARCHITECTUS vem por meio deste documento apresentar o memorial descritivo da fase de Projeto Executivo de HVAC.


É importante que este documento seja visto em conjunto com os projetos apresentados para o perfeito entendimento de ambos.

Elementos Contratuais

Contrato de Serviços de Arquitetura e Engenharia nº 31/2019
 Processo nº 25389.000189/2017-19
 RDC Eletrônico nº 08/2019-COGIC
 Data de Assinatura do Contrato 12.08.2019
 Data da Ordem de Serviço 16.09.2019
 Prazo de Execução dos Serviços 540 (quinhentos e quarenta) dias
 Endereço do Empreendimento BR-364, Km 5,5 – Porto Velho - RO

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1 INTRODUÇÃO

O Campus da Fiocruz localizado em Porto Velho – RO é composto por três empreendimentos (A, B e C) e uma previsão de expansão (D), conforme tabela abaixo:


CAMPUS FIOCRUZ RONDÔNIA		
EMPREENDIMENTO	Nº DO PRÉDIO	NOME DO PRÉDIO
A	-	Gestão e Ensino
	-	Eventos
	-	Auditório
	-	Subestação 3/Central Técnica
	-	Guarita 1
	-	Guarita 2
B	B01	Bloco de Laboratórios Fase A
	B02	Bloco de Laboratórios Fase B
	B03	Biotério
	B04	Apoio Técnico e Logístico
	B05	Central de Resíduos
	B06	Central de Água Gelada
	B07	Central de Gases
	B08	Subestação 1
	B09	ETE
	B10	ETA/Castelo d'água
	B11	Galinheiro
	B12	Cabine de Entrada
	B13	Depósito de Inflamáveis
	B14	Cisterna
	B15	Compostagem
C	C00	Ensino e Pesquisa
D (Expansão)	-	Laboratórios
	-	Curral de Lhamas

Tabela 1 - Empreendimentos do Campus Fiocruz-RO

1.1 EDIFICAÇÃO


O objeto desse relatório é o prédio C00 - Ensino e Pesquisa. Por ser executado na Fase 01, que é a primeira fase de execução do campus, o bloco concentrará, inicialmente, todas as atividades do Campus.

O prédio possui pavimento térreo, superior e técnico, contendo ambientes para pesquisa, laboratórios, biotério, copas, salas de aula e administrativas, banheiros e vestiários.

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1.2 OBJETIVO


Este documento tem por objetivo descrever e especificar os materiais e equipamentos dos sistemas de ar condicionado e ventilação mecânica da infraestrutura necessária para a operação dos sistemas de climatização da fase de Projeto Executivo e complementar as informações constantes nos desenhos do Empreendimento C, prédio Ensino e Pesquisa.

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2 HVAC


2.1 DOCUMENTOS DE REFERÊNCIA

30000393-03-OS8-G00-HVA-CE-0001	CADERNO DE ESPECIFICAÇÕES TÉCNICAS
30000393-03-OS5-G00-HVA-DE-0001	IMPLANTAÇÃO FASE 1 - SETOR B E DETALHES EXECUTIVOS
30000393-03-OS5-B06-HVA-DE-0001	PL. BAIXA PAV. TÉRREO / CORTES / DETALHES EXECUTIVOS
30000393-03-OS5-B08-HVA-DE-0001	PL. BAIXA PAV. TÉRREO / CORTES / DETALHES EXECUTIVOS

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2.2 NORMAS TÉCNICAS APLICÁVEIS

- NBR 16101 – Filtros para partículas em suspensão no ar – Determinação da eficiência para filtros grossos, médios e finos;
- NBR 16401 – Instalações centrais de ar condicionado para conforto, Parte 1, 2 e 3;
- ASHRAE – American Society of Heating, Refrigeration and Air Conditioning Engineers;
- SMACNA – Sheet Metal and Air Conditioning Contractors National Association;
- SMACNA – Manuais HVAC duct system design e HVAC duct construction standards a serem utilizados no projeto e fabricação das redes de dutos.
- SMACNA – Manual distribution system - as recomendações contidas neste manual deverão ser seguidas por ocasião do “start up”, balanceamento e regulação das instalações.
- ASTM – American Society for Testing and Materials;
- AMCA – Air Movement & Control Association International;
- DW 143 - Ductwork Leakage Testing
- ANSI – American National Standards Institute;
- Ministério da Saúde – Portaria 3523/GM (28/08/1998) - Qualidade do ar de interiores e prevenção de riscos à saúde dos ocupantes de ambientes climatizados;
- ANVISA – Agência Nacional de Vigilância Sanitária – Resolução 09 (16/01/2003) - Revisão e atualização da RE 176 padrões referenciais de qualidade de ar interior em ambientes climatizados artificialmente de uso público e coletivo;

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3 PARÂMETROS DO PROJETO

3.1 LOCAL / ESTADO

O empreendimento estará localizado na cidade de Porto Velho, Rondônia.


3.2 CONDIÇÕES EXTERNAS

Valores retirados da NBR 16401-1, Tabela A.

	VERÃO – Para resfriamento	INVERNO – Para aquecimento
Temperatura de bulbo seco	35,5°C	17,6°C
Temperatura de bulbo úmido	25,7°C	

3.3 CONDIÇÕES INTERNAS

AMBIENTE	TEMPERATURA DE BULBO SECO (°C)	UMIDADE RELATIVA (%)	AQUECI- MENTO	CLASSE DE FILTRAGEM
Subestação	De 25 a 39 °C	Sem controle direto	Não	G4
Sala de quadros da CAG	24 +/- 2	Sem controle direto	Não	G3

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3.4 DISSIPACÕES

O projeto deverá indicar os valores de dissipação térmica considerados na iluminação, pessoas e equipamentos, por ambiente, utilizando no mínimo:

▪ Iluminação

- Ambientes comuns 10 W/m².

▪ Pessoas

- Ambientes ocupação conforme layout;
- Dissipação ambientes em geral 75 W_{sensível}/pessoa; 55 W_{latente}/pessoa;


▪ Equipamentos

- Subestação 28.000 W;
- Sala de quadros da CAG 4.000 W;

3.5 CERTIFICAÇÕES

O sistema de climatização atenderá aos seguintes itens:

- Ashrae 90.1-2019 – Eficiência de equipamentos
- Chillers com refrigerantes livres de CFC
- Variadores de frequência nas bombas de água gelada dos circuitos secundários e em todos os condicionadores de ar e ventiladores com filtragem acima da classe G3.

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Todas as soluções foram conduzidas com intuito de atendimento integral à Legislação do PROCEL - PBE Edifica para a obtenção da etiquetagem da edificação, Nível A, de modo a atender a IN-01/2010 do Ministério do Planejamento.

3.6 FILTRAGEM DO AR

- A filtragem do ar será composta por:

Subestação: classe G4 (MERV 8);

Sala de quadros da CAG: classe G3 (MERV 7);

4 DESCRIÇÃO DOS SISTEMAS

4.1 DESCRIÇÃO GERAL

Sistema de resfriamento

A carga térmica máxima é em 200 TR. A Central de água gelada (CAG) terá chillers com condensação a ar com circuito primário e secundário de água gelada. A CAG atenderá também aos prédios de Laboratório e Biotério, que não estão contemplados no presente documento. Cada prédio terá um circuito secundário com vazão variável conforme a operação do prédio.

Um sistema de controle de corrosão e tratamento biocida será fornecido para o sistema de água gelada.

Distribuição de água gelada será feita com tubulação de aço carbono isolada termicamente + cavaletes de interligação de todos os condicionadores de ar);

A tubulação de água gelada do circuito secundário que atenderá ao prédio de Ensino e Pesquisas será instalada em uma canaleta de concreto enterrada e inspecionável, entre a CAG e o prédio.

4.2 DESCRIÇÕES ESPECÍFICAS DE CADA AMBIENTE CLIMATIZADO


Subestação

A subestação será climatizada por um sistema de expansão direta tipo split, com rede de dutos e bocas de ar.

Na primeira fase, empreendimento "C", haverá dois splits com capacidade de 10 TR cada, sendo um operante e outro reserva. Quando os prédios de Laboratórios e Biotério forem implantados, os dois splits serão operacionais. Nesse caso, no caso da quebra de um condicionador, o outro manterá o ambiente a uma temperatura máxima de 40°C para garantir a operação dos trafos e painéis elétricos do ambiente.

Sala de quadros da CAG

A sala de quadros comportará os painéis elétricos da CAG e será climatizada através de fancoletes individuais instalados fora da sala.

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4.3 ESPECIFICAÇÃO DOS EQUIPAMENTOS

4.3.1 CHILLER

Unidade resfriadora de água com condensadores resfriados a ar, com compressores do tipo Scroll operando com R-410A.

A unidade será fornecida completa com gabinete de chapa galvanizada e perfis metálicos, pintado conforme padrão do fabricante, condensador, compressor, válvula de serviço na saída do condensador, filtro secador, visor de líquido com indicador de umidade, válvula de expansão, termostato eletrônico de controle, termostato anticongelamento, termostatos de proteção interna dos ventiladores, pressostato de alta e baixa, pressostato de óleo, carga inicial de refrigerante, óleo lubrificante, quadro elétrico de controle, proteção e comando e banco de capacitores para a correção do fator de potência da unidade,

A unidade deverá ser instalada sobre amortecedores de vibrações, selecionados pelo próprio fabricante, composto de molas helicoidais e borracha, e convenientemente locados onde determinado pelo fabricante do equipamento.

Não serão aceitos equipamentos que utilizem gases refrigerantes à base de CFC.

O COP e IPLV do equipamento deverão atender a ASHRAE 90.1 última versão.

GABINETE

Será construído em chapas de aço galvanizadas e perfis de aço carbono, pintado com primer de proteção, acabamento em esmalte conforme padrão do fabricante.

COMPRESSOR


Deverá ser do tipo Scroll controlado por inversor de frequência, acoplado diretamente a motor elétrico trifásico, 380 Volts, 60 Hz. O motor elétrico deverá ser adequado para variações de tensão de +/- 10 % da nominal, para a qual foi projetado e para trabalhar com gás refrigerante R-410a ou R-32.

CONDENSADOR

Deverão ser resfriados a ar com ventiladores axiais de alta eficiência e baixo nível de ruído com as serpentinas de sub-resfriamento integral construídas com aletas de alumínio mecanicamente ligadas aos tubos de cobre sem emendas. Todos os componentes do condensador serão inseridos no conjunto Chiller, e serão dotados de válvula de serviço, registros e termômetros.

EVAPORADOR

Poderá ser do tipo placas brasadas ou casco tubo, com válvulas de expansão do refrigerante, sistema de proteção contra falta de água (Water Flow-Switch), termômetro, manômetro, etc.

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QUADRO DE COMANDO

A unidade resfriadora de líquido deverá ser provida de controle **MICROPROCESSADO** que monitore e permita a leitura pelo usuário de no mínimo os seguintes parâmetros de funcionamento:

- Temperatura de entrada e saída da água gelada;
- Temperatura de entrada e saída da água do condensador;
- Temperatura e pressão do refrigerante no condensador e no evaporador;
- Temperatura de sucção no compressor;
- Porcentagem RLA para cada compressor;
- Porcentagem de tensão na linha;
- Partidas e horas de operação dos compressores;

Além de permitir a fácil alteração dos set-points para temperatura de saída da água gelada e limite de corrente para os compressores.

Deverá ter instalado no próprio conjunto, contendo chave de partida, equipamento para controle, comando e sinalização:


- Contator magnéticos tripolar;
- Relés de sobrecarga dos motores dos ventiladores;
- Botoeira liga/desliga;
- Lâmpadas piloto de sinalização;
- Contatores auxiliares e terminais para o Inter travamento com as bombas de água gelada.

Além dos equipamentos elétricos o quadro deverá conter também os dispositivos de proteção e controle do refrigerante tais como:

- Pressostatos de alta e baixa;
- Termostato anti congelamento do evaporador;
- Manômetro para gás alta e baixa pressão;

Todos os equipamentos deverão estar encerrados em caixa moldada de chapa, com pintura de proteção e acabamento no próprio gabinete.

UNIDADE RESFRIADORA DE LÍQUIDO COM CONDENSAÇÃO A AR			
Unidade Resfriadora	nº	UR-TE-01/02	
Local Instalado		CAG	
Capacidade Efetiva	TR	110	
Quantidade	un	2	
COP/IPLV		Mínimo atendendo ASHRAE 90.1	
Nível de ruído a 10m		66 dB(A)	
EVAPORADOR			
Vazão água gelada	m³/h	55	
Temp entrada água	°C	12	
Temp. saída água	°C	6	
Delta T água gelada	°C	6	
CONDENSADOR			
Vazão de ar	m³/h	---	
Temp entrada ar	°C	35,5	
COMPRESSOR			
Tipo de compressor		SCROLL	
Gás refrigerante		410A	
DADOS ELÉTRICOS			
Ponto de força	V/Hz/F	220/60/3	
Amperagem (Nominal)	KW	160	
Fator de potência		0,95	
Soft starter		SIM	
Variador de frequência		NÃO	
DADOS GERAIS			
Marca de referência		TRANE	
Modelo de referência		CGAM-120	
Nível de ruído	db(A)	—	
Peso de operação	kg		
Observações			
Revisão		0	

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4.3.2 BOMBAS DE ÁGUA GELADA

CONSTRUÇÃO

Montagem tipo vertical in-line com motor montado a castelo cilíndrico flangeado preso à carcaça da bomba e acoplamento metálico rígido que permite revisão do selo mecânico sem a necessidade de desacoplar a bomba do motor e dispensando a necessidade de realinhamento.

O corpo deverá ser do tipo voluta de simples aspiração, com sucção e descarga flangeadas.

O rotor será em metalurgia compatível com o fluido bombeado, (Ferro fundido ou Bronze), do tipo fechado, com fluxo radial centrífugo balanceado estática e dinamicamente, fundido em uma única peça e chavetado diretamente a árvore de acionamento, fixado por meio de parafuso com arruela trava resistente à corrosão.

A vedação dinâmica será feita por selagem mecânica do tipo balanceado, em aço, fixado por meio de parafusos, com vedação secundária em EPDM, lubrificação das faces do selo mecânico feita internamente à bomba, não necessitando de tubulações externas da voluta ao selo mecânico, minimizando intervenções para limpezas ou falhas de refrigeração das faces do selo.

O acoplamento será dividido, permitindo a sua remoção e deixando espaço entre os eixos suficiente para substituir os componentes do selo mecânico sem necessitar desacoplar a bomba do motor e dispensando a necessidade de realinhamento.

A bomba deverá possuir sistema interno de resfriamento do selo mecânico, sem conexões hidráulicas externas por tubulações com o fluido bombeado.

Para as bombas selecionadas, o fabricante deverá garantir que possui assistência técnica em todo o Território Nacional Brasileiro.

A instalação dos equipamentos será executada de forma que:

- Permita fácil manutenção e remoção de componentes;
- Não transmita ruídos ou vibrações.

O fechamento hidráulico do equipamento conterà os acessórios indicados nos desenhos e detalhes, garantindo a regulagem e medição da vazão de água.

Após a montagem deverão ser executadas inspeções visuais para verificação da instalação e de ruídos anormais.


Deverão ser regulados todos os dispositivos de proteção elétrica do equipamento.

MOTOR

Tipo indução, trifásico, IP-54, IV pólos, isolamento classe B.

O rotor deverá ser acoplado por meio de luva elástica flexível a motor elétrico trifásico de alto rendimento com carcaça em ferro fundido, de baixa tensão, frequência de 60Hz, proteção IP55 (TFVE), ponta de eixo padrão, carcaça semifechada à prova de pingos, obedecendo às normas ABNT, IEC e NEMA, montado sobre base de chapa de aço ou ferro perfilado independente para cada bomba.

CARACTERÍSTICAS DAS BOMBAS DE ÁGUA GELADA			
Bomba de água	nº	BAGP-TE-01 a 03	BAGS-TE-01 a 02
Local Instalado		CAG	CAG
Quantidade Operante	un	3	2
Quantidade Reserva	un	1	1
DADOS DE OPERAÇÃO			
Tipo de fluido		Água	Água
Vazão de água	m3/h	55	105
Altura manométrica	mca	15	40
Rendimento	%	--	--
Potência absorvida	bhp	---	---
Motor elétrico	cv	5	25
DADOS TÉCNICOS			
Diâmetro do rotor		--	--
Tipo do rotor		Centrifugo	Centrifugo
Tipo da montagem		Castelo	Castelo
Vedação do eixo		Selo mecânico	Selo mecânico
Montagem		horizontal	horizontal
Acoplamento		Direto com luva	Direto com luva
Base única		sim	sim
DADOS ELÉTRICOS			
Ponto de força	V/Hz/F	220/60/3	220/60/3
Nº de pólos / rpm		4/1.740	4/1.740
Fator de potência		0,95	0,95
Variador de frequência		Não	Sim
Soft starter		---	---
Motor elétrico		Alta eficiência	Alta eficiência
DADOS GERAIS			
Marca de referência		KSB	KSB
Modelo de referência		100-065-200	125-080-315
Nível de ruído	db(A)		
Peso de operação	kg		
Observações			
Revisão		0	0

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4.3.3 **CONDICIONADOR DE AR TIPO SPLIT**

Unidades compactas bipartidas em unidade condensadora (externa) e unidade (s) evaporadora (s) instalada dentro do ambiente e que tem a finalidade de promover a sua climatização. As unidades são interligadas entre si através de tubulações frigoríficas.

Trata-se de um sistema de climatização para conforto no verão com expansão direta de gás refrigerante R410A.

EVAPORADORA

GABINETE

Gabinete em chapa de aço galvanizado. Terá painéis removíveis em chapa de aço para inspeção e limpeza, isolamento termo/acústico interno com 25mm de espessura de poliuretano.

VENTILADOR

Os ventiladores serão do tipo centrífugo com rotor sirocco. Os ventiladores terão motor elétrico trifásico.

O rotor deverá ser balanceado estática e dinamicamente e os mancais deverão ser auto lubrificantes e blindados.

SERPENTINA

A serpentina deverá ser construída com tubos de cobre para refrigeração, sem costura, soldados com phoscooper ou silphoscooper e fixadas por meio de expansão mecânica dos tubos.

As serpentinas deverão ser testadas com uma pressão de 21 kgf/cm².

FILTRO

Para as evaporadoras do tipo parede os filtros montados nas unidades devem ser descartáveis com grau de filtração G4.

CONDENSADORA

GABINETE

O gabinete deverá ser construído em chapa de aço tratado contra corrosão com pintura epóxi ou em plástico de alta resistência.

Deverá ter painéis removíveis para inspeção e limpeza.

VENTILADOR

Será do tipo axial ou centrífugo com baixo nível de ruído, acionado por motor elétrico trifásico.

O rotor deverá ser balanceado estática e dinamicamente e os mancais deverão ser auto lubrificantes e blindados.

SERPENTINA

A serpentina deverá ser construída com tubos de cobre para refrigeração, sem costura, soldados com phoscooper ou silphoscooper, com diâmetro mínimo Ø1/2" e aletas de alumínio espaçadas no máximo de 1/8" e fixadas por meio de expansão mecânica dos tubos.

A fixação da serpentina ao gabinete deverá ser isolada de modo a não ocorrer corrosão eletrolítica.

Deverá ser projetado para que a capacidade seja suficiente para trabalhar em conjunto com os compressores especificados.

COMPRESSOR

Deverá ser do tipo Scroll, para R 410A e deverá ter dispositivo de proteção, válvula de serviço e deverá ser montado sobre base antivibrante.


Deverá ter controle de capacidade através de inversor de frequência ou tecnologia equivalente.

ALIMENTAÇÃO

O acionamento deverá ser efetuado através de motor elétrico do tipo indução, IP-54, classe de isolamento B, trifásico, 60 Hz.

O painel deverá comportar interligação de força para as unidades evaporadoras, chaves de partida dos motores dos ventiladores e compressores, relês de sobrecarga e todos os circuitos de controle e segurança.

TAG	Ambiente	Capacidade (TR)	220V/3F Potência (KW)	Vazão de ar (m³/h)	Ventilador	Qtde	OBS
UE-TE-01/02	Subestação	10	12,5	6800	Centrífugo - sirocco	2	Filtro G4 / pressão disp 15mmca
UC-TE-01/02			1,5	13600	Axial	2	

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4.3.4 FANCOLETE HIDRÔNICO

Unidades individuais compactas instaladas normalmente sobre o forro. Esses fancoletes têm o objetivo de promover a climatização do ambiente atendido pelo mesmo.

O gabinete deverá ser construído em chapa metálica com porta filtro (built-in, embutido sobre o forro).

Os ventiladores deverão ser do tipo tangencial, acionados por motor elétrico monofásico, de baixo nível de ruído (máximo de 40 dB(A) em velocidade alta).

As serpentinas deverão ser de tubos de cobre, com aletas de alumínio.


Os filtros de ar deverão ser do tipo descartável **classe G3** (ABNT/NBR 16401:2008), instalados na entrada de ar do condicionador.

A bandeja coletora de condensado deverá ser construída em aço tratado contra corrosão isolado termicamente ou plástico reforçado ABS. Deverá ainda ter o comprimento estendido para cobrir a área de eventuais pingamentos das válvulas.

Os controles das unidades consistirão em um interruptor com três velocidades de ventilador (BAIXO-MED-ALTO) e um sensor de temperatura digital para controle da válvula de controle on/off.

Todos os fancoletes deverão possuir pressão estática máxima da linha de fabricação disponível – ref. “heavy duty”.

TAG	Ambiente	Capacidade (BTU/h)	Tipo	Vazão Agelada (m³/h)	Qtde
FC-TE-01/02	Sala de Quadros CAG	30.000	Built-In Heavy duty filtro G3	1,3	2

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4.3.5 TRATAMENTO DE ÁGUA

Deverão ser instalados sistemas automáticos independentes de tratamento de água.

Os sistemas deverão ter controles automáticos monitorados pelo sistema de supervisão predial para controlar corrosão, crescimento de fungos e algas.

As recomendações de tratamento de água específicas serão incorporadas nas instalações depois que uma análise da água a ser utilizada nos sistemas for feita, levando em consideração, composição, temperatura e aplicação.


Os elementos utilizados no tratamento químico deverão atender às exigências da legislação local. A instaladora deverá prever em seu escopo os procedimentos necessários para garantir as seguintes características da água gelada em circulação:

Parâmetros			
Alcalinidade total	mg/l	CaCO ₃	Max 250
Cloretos	mg/l	Cl	Max 200
Dureza total	mg/l	CaCO ₃	Max 200
Ferro	mg/l	Fe	Max 1
Sílica	mg/l	SiO ₂	Max 150
PH			8,0 a 10,0
Condutividade	(Micro-MHOS/CM)		Max 2000
STD	mg/l	NaCl	Max 1000
Nitrito	mg/l	NO ₂	300 - 500

A empresa contratada para o tratamento de água deverá fornecer um sistema adequado, prevendo tipo de tratamento, especificando produtos registrados nos órgãos normalizadores, utilizando dosadores automáticos (desde que não comprometam o sistema quanto à concentração, purga e reposição de água e adição de agentes químicos) e, indicando frequência de manutenção e sequência de operação de tratamento.

A instaladora de ar condicionado deverá prever as válvulas de espera para o sistema de tratamento de água.

Todos os equipamentos deverão ser instalados com válvulas de trancamento e proteção contra vazamento dos produtos químicos.

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4.3.6 SISTEMAS DE DISTRIBUIÇÃO DE AR

DUTOS GERAIS

Os dutos devem ser construídos em chapa de aço galvanizado, obedecendo às bitolas e detalhes construtivos de juntas e reforços especificados pela **NBR 16401**.

A rede de dutos para distribuição de ar pode ser aparente ou embutida no forro falso. Quando aplicados em sistemas de condicionamento de ar, obrigatoriamente isolados sempre que estiver em contato com outras fontes de calor ou instalada ao tempo.

As junções laterais dos dutos devem ser perfeitamente vedadas com silicone.

Todas as junções ou costuras tem tratamento anticorrosivo.

Todas as curvas são de raio longo para atenuar a perda de carga. Não são permitidos joelhos.

As ligações dos dutos às unidades condicionadoras, à ventiladores, etc., são feitas com conexões flexíveis, a fim de eliminar vibrações.

Os dutos têm fixação própria à estrutura, independentemente das sustentações de forros falsos e aparelhos de iluminação, etc., por meio de suportes e chumbadores, observado o espaçamento máximo de 1,50 m (um metro e meio) entre os suportes.

Os dutos de ar condicionado são revestidos externamente com material isolante, de alta resistência térmica, firmemente fixada, sendo as juntas dos mesmos fechadas com adesivos próprios, evitando-se a formação de bolsas de ar entre a chapa do duto e o isolante.

As cantoneiras e barras de sustentação e fixação dos dutos, são de aço SAE 1020, com proteção anticorrosiva.

Serão instalados registros com os respectivos quadrantes, de bronze, em locais acessíveis, para regulação da distribuição de ar pelos diversos ramais. Devem ser obtidos o perfeito alinhamento de eixo e total vedação contra vazamento de ar.

Todas as superfícies internas dos dutos, visíveis através das bocas de insuflação ou retorno, devem ser pintadas com tinta preta fosca.

Os dutos aparentes de ventilação/exaustão devem ser vincados e pintados em cor a ser especificada pela arquitetura.


Todas as derivações de dutos de insuflação devem ter “botas” para melhor direcionamento de ar.

Deverão ser fixados por ferro cantoneira e/ou vergalhões, presos na laje ou viga por pinos Walsywa ou chumbador metálico. Todos os suportes são revestidos com tratamento anticorrosivo.

Os dutos flexíveis devem ter isolamento termo-acústico revestido internamente com polietileno perfurado e externamente com papel kraft aluminizado.

Os dutos flexíveis pré-fabricados (diâmetro máximo 10" e comprimento máximo de 2,5m) tem ajustes para todos os dispositivos de distribuição de ar na rede de dutos de baixa pressão.

Todos os dutos devem ter portas estanques para inspeção e limpeza a cada 6m e em cada curva.

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Os dutos de exaustão do Biotério devem ter classe de selagem A (CL 3) do manual SMACNA - HVAC Duct Construction Standards, Metal and Flexible.

ISOLAMENTOS TÉRMICOS DE DUTOS

Os dutos de ar condicionado (insuflação e retorno), deverão ser isolados termicamente com placas de lã de vidro ($\lambda < 0,0034 \text{ W/M}^\circ\text{K}$ e comportamento a fogo classe II-A, conforme IT-10 - Corpo de Bombeiros – São Paulo) com 32 kg/m^3 e 25mm de espessura, revestidos com papel kraft aluminizado.

FILTROS

A) FILTROS GROSSOS - CLASSE G3/G4

Eficiência acima de 85% conforme teste gravimétrico ASHRAE 52.1-1992 e EU-3 conforme Eurovent 4/9; meio filtrante em mantas descartáveis de fibra de vidro;

Quadro-montante em chapa de aço galvanizada.

- Pressão diferencial inicial máxima: 50 Pa (2,5m/s)
- Pressão diferencial final máxima: 220 Pa

4.4 BOCAS DE AR

GRELHAS

As grelhas deverão ser de alumínio anodizado. As grelhas de exaustão e retorno deverão ter aletas fixas horizontais, registro e fixação invisível (arquiteturais).

As grelhas de insuflação deverão ter dupla deflexão.

As grelhas de porta deverão ser indevassáveis com contra-moldura.


VENEZIANAS

As venezianas deverão ser de alumínio anodizado. As venezianas deverão ter tela protetora de arame ondulado e galvanizado e pingadeira.

As venezianas completas deverão ter damper e filtro com no mínimo 60% de eficiência em teste gravimétrico.

As venezianas deverão ter todos os acessórios instalados de fábrica.

As venezianas deverão ser instaladas conforme as recomendações do fabricante e todos as conexões dutos\venezianas deverão estar livre de vazamentos de ar.

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As venezianas que estão instaladas com comunicação direta entre ambientes sem dutos deverão ser instaladas com filtro.

DAMPERS DE REGULAGEM E SOBREPRESSÃO

Os dampers de regulagem deverão ser de chapa de aço galvanizado com lâminas de fechamento opostas em chapa de aço ou perfil de alumínio.

Os dampers de regulagem instalados em condicionadores de ar, ventiladores e exaustores deverão ser reforçados.

Os dampers de sobrepressão deverão ser de alumínio, fabricados para operar com velocidade do ar de até 30m/s.

DAMPERS CORTA FOGO

Deverão ser montados em todos os ramais de dutos de ar condicionado, ar externo, ventilação e exaustão que passam de um pavimento para outro.

Testado conforme Norma NBR 6479/1992 no Instituto de Pesquisas Tecnológicas IPT - São Paulo
Vedação da aleta à temperatura do ambiente conforme EN 1366-2


Os dampers corta fogo deverão ser fornecidos com uma guarnição perimetral encaixada num perfil de aço dobrado para garantir estanqueidade contra fumaça fria ($t < 70\text{ }^{\circ}\text{C}$) conforme a Norma DIN 4102.

Uma guarnição termo expansiva que garante uma estanqueidade contra fumaça quente a partir de ($t > 140\text{ }^{\circ}\text{C}$)

Materiais:

- Carcaça e acessórios em chapa de aço zincada conf.
- Norma NBR 7008 ZC Revestimento B.
- Aleta em material termo isolante especial
- Eixos em aço inoxidável AISI 304
- Buchas em latão e material sintético

Fechamento por mola e retorno por servo-motor controlado pelo sistema de detecção e combate a fogo. Serão fornecidos com interruptor de fim de curso, com monitoramento de status e prolongador para montagem em alvenaria.

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4.4.1 REDE HIDRÁULICA

TUBOS

A rede hidráulica será em tubos de aço carbono com costura ASTM A-53 ou A-120, SCH-40. Para diâmetros até 2" será com conexão roscada BSP classe 10 e para diâmetros de 2.1/2" e acima será com extremidades biseladas para solda e conexões por flange.

Para balanceamento do sistema hidráulico estão previstas válvulas de balanceamento dinâmico independente de pressão conjugadas com as válvulas de controle em cada equipamento.

Para os equipamentos com capacidade térmica até 2,5TR deve ser utilizada válvula de controle de vazão on/off e para os equipamentos com capacidade térmica de 3,0TR e acima utilizar válvula de controle de vazão proporcional.

Todas as tubulações de água gelada e água quente deverão ser isoladas termicamente com espuma elastomérica de células fechadas ($K \leq 0,035 \text{ w/m}^2\text{°C}$ ou $\mu \geq 10.000$) à base de borracha sintética, com classificação para resistência a fogo M-1 (UNE-23727), resistência ao vapor de água.

Todas as tubulações deverão ser apoiadas sobre suportes com amortecedores apropriados, de modo a evitar a transmissão de vibrações à estrutura do prédio.

Para tubos até D= 50mm as conexões deverão ser rosqueadas.

As roscas deverão ser vedadas através de:

- Fita de teflon, para tubos até D= 25mm
- Sisal, para tubos de D= 32mm até D= 50mm

Para tubos maiores que D= 50mm as conexões deverão ser soldadas.

As soldas deverão ser de "topo", com extremidades chanfradas em "V" com ângulo de 75 graus (bisel).


Poderão ser utilizados outros além dos listados acima desde que atendam tecnicamente as especificações

Todas as uniões empregadas deverão ter assento cônico em bronze, com porca hexagonal de aço forjado ASTM A.105 grau II.

Os suportes deverão ser preferencialmente apoiados em elementos estruturais e nunca em paredes ou elementos de alvenaria.

Os espaçamentos entre suportes para tubulação horizontal, não deverão ser superior a:

- Tubos até Ø 1"1,2m
- Tubos de Ø 1.¼" a 2"1,5m
- Tubos de Ø 2.½" a 3" 2,5m
- Tubos acima de Ø 3"4,0m

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CONEXÕES

Joelhos, Tês, luvas, Uniões etc, Ø até 2" inclusive deverão ser adotadas conexões em ferro maleável com rosca BSP classe 10. Curvas acima de Ø 2" deverão ser adotadas conexões de aço forjado, sem costura ASTM A-234 ou ASTM A-120, padrão ANSI B.16.9, SCH-40 biseladas para solda, nunca curvas de gomos.

Para derivações tipo 'T' em tubulação acima de 2" poderão ser utilizadas bocas de lobo.

Flange em aço forjado, face plana, com padrão ANSI B.16.1

ACESSÓRIOS

REGISTROS DE BLOQUEIO

Até 2", serão do tipo gaveta com corpo em bronze ASTM-B-62 ou B-584, castelo roscado, internos de bronze, haste fixa, rosca BSP, classe 200 lbs.

De 2 ½ " a 5", serão do tipo gaveta com corpo, castelo e sobre-castelo em ferro fundido ASTM-126a, castelo aparafusado, internos em bronze, haste ascendente, volante fixo e flanges com face plana ANSI-B-16.5, classe 150 lbs.

VÁLVULAS DE REGULAGEM

Até 2", serão do tipo globo com corpo de bronze ASTM-B-62, castelo roscado, internos de bronze, haste fixa, rosca BSP, classe 200 lbs.

De 2 ½ " a 5", serão do tipo globo com corpo e castelo em ferro fundido ASTM-A-126a, castelo aparafusado, internos de bronze, haste ascendente com flanges plana padrão ANSI-B-16.1, classe 150 lbs.

REGISTROS DE BLOQUEIO E REGULAGEM


6" e acima, serão do tipo borboleta, corpo Wafer em ferro fundido, ASTM A126 CLB, pescoço longo, disco em aço dúctil com revestimento de níquel, sede de Buna N, eixo em aço inox 416, vedação para 150 lbs, acionamento por alavanca com memória, flanges com face plana, classe 150 lbs;

10" e acima, idem, porém com acionamento por meio de caixa de engrenagens, volante e corrente.

VÁLVULAS GLOBO

Até 2", com rosca, classe 150:

- Corpo, castelo roscado em bronze ASTM B-62
- Haste ascendente e preme gaxeta em latão laminado ASTM B.124
- Volante de alumínio ou ferro nodular ou maleável
- Porca em bronze ASTM B.16
- Junta e gaxeta de papelão hidráulico
- Rosca interna BSP.

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Acima de Ø 2", com flange, classe 125:

- Corpo, cunha, volante, tampa em ferro fundido ASTM A.126 CL.B, gaxeta em asberit.
- Haste ascendente em aço carbono SAE-1020 ou latão laminado ASTM B.124
- Anéis roscados em bronze ASTM B.62
- Junta e gaxeta em papelão hidráulico
- Flange com padrão ANSI B.16.1 (face plana)

VÁLVULA DE RETENÇÃO

- Flangeada
- Tipo Duplex classe 150 libras
- Corpo em ferro modular ASTM A 536, disco duplex em alumínio

VÁLVULA DE ESFERA

1/4 ou 1/2" (NPT), com rosca, classe 150

- Corpo em bronze, latão ou aço carbono.
- Esfera e haste em aço inoxidável AISI 316 ou 304
- Anéis de Teflon reforçado (150 PSI)
- Juntas de teflon, buna ou etileno propileno
- Rosca externa e interna BSP
- Conectar com tubo sifão ou trombeta

MANÔMETRO

- Tipo Bourdon com rosca 1/4" ou 1/2" (BSP) , com soquete e mecanismo de latão.
- Caixa e aro de aço estampado pintado
- Escala dupla em lbs/pol² e kg/cm²
- Elemento elástico de tombak
- Tolerância de 2% sobre o valor total da escala


FILTRO Y

Até D=50 mm com rosca, classe 150.

- Corpo e tampa em bronze ASTM B.62
- Elemento filtrante em chapa de aço inoxidável
- MESH 20
- Rosca interna BSP

De D=50 mm a D=150mm, com flange, classe 125.

- Corpo e tampão em ferro fundido ASTM A.126 CL B
- Elemento filtrante em chapa de aço inoxidável
- MESH 16
- Flange com padrão ANSI B.16.1 (face plana)

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- Tipo cesto acima de D=150 mm, com flange, classe 125.
- Corpo e tampa em ferro fundido ASTM A.126 CL B
- Elemento filtrante em chapa de aço inoxidável
- MESH 7, até D=300 mm e MESH 5, acima de D=300 mm.
- Flange com padrão ANSI B.16.1 (face plana)

FILTROS ANGULARES (Y)

- Flange, classe 125
- Corpo e tampa em ferro fundido ASTM A.126 CL.B, elemento em tela de aço inox, gaxeta em asberite.

JUNTAS DE EXPANSÃO

As ligações da rede hidráulica à unidade resfriadora e bomba deverão ser executadas através de juntas de expansão de borracha sintética, JEBLF, classe 150 libras.

PURGADORES DE AR AUTOMÁTICO

Deverão possuir corpo em aço ASTM-A-278, classe 30, internos em aço inox, rosca BSP e pressão máxima de 10 kg/cm².

VÁLVULAS DE BALANCEAMENTO


O balanceamento hidrônico deverá ser feito por ação dinâmica independente da flutuação da pressão do sistema. O controle de temperatura deverá ser feito através de atuador elétrico de ação proporcional ou on-off dependendo da aplicação e indicação nos desenhos.

Para permitir a tarificação, o atuador elétrico deverá possuir sinal de feedback (4-20 mA ou 0-10VDC) com display indicativo da posição de operação, e a válvula deverá ser capaz de controlar a vazão com precisão de +/- 2% da vazão máxima. No caso de falha de energia a válvula deverá ser comandada para a posição fechada.

Utilização das válvulas de controle independente de pressão para garantir o balanceamento hidráulico de forma dinâmica, e o controle preciso de todas as vazões, para o controle de temperatura e/ou umidade relativa. O balanceamento hidráulico dinâmico e o controle devem satisfazer as vazões especificadas em projeto.

Todas as válvulas de controle independente de pressão devem ter uma autoridade constante de 100% em relação a faixa total de pressão admissível, e faixa de vazão. As válvulas devem oferecer uma manopla/volante para o ajuste de vazão de projeto, sendo este ajuste minimamente entre 30% a 100% do fundo de escala (vazão máxima da válvula), de forma graduada.

O volante deve ser ajustável com a válvula em operação, e com o atuador instalado. Por questões operacionais, não serão aceitas tabelas de relação, entre ajuste e vazão.

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Todas as válvulas de controle independente de pressão terão de forma integrada ao seu corpo, pontos de medição auto vedantes (pontos de teste), para medir a pressão diferencial na válvula e a temperatura do fluido, utilizando pontas de teste padrão para pressão e temperatura.

As válvulas devem possuir um anel de travamento, ou dispositivo similar, para garantir o lacre da posição de balanceamento durante a operação e evitar um reposicionamento, ou ajuste indesejado, do volante após a regulagem.

Os atuadores devem ser fornecidos pelo fabricante das válvulas. Todos os atuadores devem ser capazes de operar sobre o fluxo total e faixa de pressão da válvula, e ter sinal de ação de controle proporcional, 0 a 10Vcc / 2 posições (on/off) / 3 posições (floating), conforme descrito no projeto.

Por questões operacionais não será permitida a utilização de válvulas de controle independente de pressão que utilizem a tecnologia de cartuchos, ou que não utilizarem a tecnologia de membrana com mola.

O corpo da válvula deve ser:

- Em DZR (liga metálica resistente a de-zincagem) ou bronze, para os tamanhos de DN15 a DN50, conexão rosca BSP;
- Em ferro fundido para os tamanhos de DN65 a DN150, conexão flangeada.
- Dados Técnicos:
- Válvula tipo; globo;
- Selo do disco: em PTFE ou EPDM;
- Selo da haste: livre de manutenção, selo com O-Ring duplo;
- Max. Temperatura de operação: 120°C;
- Min. Temperatura de operação: -10°C;
- Max. Pressão de operação: 16 bar (PN16);
- Mín. Pressão diferencial: 150mbar
- Max. Pressão diferencial: 4,00 bar
- Conexão: DN15 a DN50: tipo rosca interna (fêmea) BSP; DN65 a DN150: tipo flange, DIN EN 10922;

TANQUE EXPANSÃO

Tanque de expansão hidropneumático constituído de aço, dotado de bolsa flexível inerte e atóxica para armazenagem de água e bomba para recalque para reposição.

A fim de obter o correto funcionamento, o conjunto bomba e tanque de expansão deve conter os seguintes dispositivos: válvula de retenção, válvula de segurança (sobrepessão), chave pressostática e registro.

CARACTERÍSTICAS DO TANQUE			
Tanque	nº	TQ-TE-01	
Local Instalado		CAG	
Quantidade	un	1	
DADOS DE OPERAÇÃO			
Tipo de fluido		Água	
Volume	L	135	
Motor elétrico bomba	CV	0,75	
DADOS TÉCNICOS BOMBA			
Diâmetro do rotor	mm	-	
Vazão	L/h	7.300	
Pressão	mca	40	
Vedação do eixo		Selo mecânico	
Desmontagem			
Acoplamento		Direto	
Marca de referência		IMI	
Modelo de referência			
DADOS ELÉTRICOS BOMBA			
Ponto de força	V/Hz/F	220/60/3	
Variador de frequência		Não	
Soft starter		Não	
DADOS GERAIS TANQUE			
Marca de referência			
Modelo de referência		Stático +Pleno Connect PI 9.1	
Revisão		0	

4.4.2 ISOLAMENTOS TÉRMICOS

Todas as tubulações de água gelada deverão ser isoladas termicamente com espuma elastomérica de células fechadas ($K \leq 0,035 \text{ w/m}^2\text{°C}$ ou $\mu \geq 10.000$) à base de borracha sintética, com classificação para resistência a fogo M-1 (UNE-23727), resistência ao vapor de água.

CIRCUITO	DIÂMETRO	ESPESSURA
Água Gelada	até 2"	(36,8 à 58,7 mm)
Água Gelada	2 1/2" e 4"	(38,4 à 65,4 mm)
Água Gelada	5" e 6"	(43,3 à 72,5 mm)
Água Gelada	a partir de 8"	(80,7mm + dupla capa)

Na CAG, no pavimento técnico e onde as tubulações forem montadas ao tempo, as mesmas deverão ser revestidas em alumínio liso de 0,8 mm de espessura.

Para os pontos de sustentação da tubulação deverão ser utilizados suportes específicos em espuma elastomérica rígida revestida com alumínio para tubulações até 8" do tipo Armafix/AF da Armacell ou equivalente para outros fabricantes.

4.4.3 SISTEMAS ELÉTRICOS

Os quadros elétricos deverão ser projetados, atendendo às normas NBR-6808 (Conjunto de Manobra e Controle de Baixa Tensão Montados em Fábrica) e NR 10 – (Segurança em Instalações e Serviços em Eletricidade), sendo alimentados em 380V/3F/60Hz.

Os quadros elétricos deverão ser projetados segundo normas ABNT e fornecidos os desenhos em diagrama unifilar e do esquema funcional. Deverão possuir régua de bornes numerada, por fiação.

Os quadros deverão ser projetados com espaços de reserva para eventuais expansões.


VARIADORES DE FREQUÊNCIA

Os variadores de frequência serão utilizados nas bombas de água gelada secundária, Fan Coils e Ventiladores.

Os variadores de frequência deverão ser do tipo digital microprocessado, utilizando o conceito PWM (Pulse Width Modulation), Controle Vetorial de Voltagem (VVC), com características de torque quadrático, adequado à potência e à voltagem do motor.

Deverão ter as seguintes características de operação e segurança:

- Filtro de rádio e frequência (RFI) atendendo requisitos conforme VDE 0875.
- Filtro de transientes provenientes da rede de alimentação (EMC).

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- Monitorador de fases da rede de alimentação.
- Proteção contra curto-circuito, fase-fase e fase-terra.
- Indutores trifásicos na saída do conversor para distâncias entre o inversor de frequência e o motor acima
- Indutâncias para supressão de interferências harmônicas na rede intermediária e garantia de interligação em redes com baixa impedância, é obrigatória para os modelos listados acima que não possuírem indutor no link CC incorporado a instalação de uma indutância
- Display Alfanumérico para visualização de parâmetros: (corrente, frequência, tensão, potência e energia consumida).
- Bornes para recebimento do sinal de comando para ligar/desligar o conversor, proveniente do controlador
- Borne para recebimento do sinal 4-20 mA, para modulação de frequência do motor, proveniente de contatos livres de voltagem (relês para envio de sinal de funcionamento normal/defeito para os controladores.
- Estar apto à operar continuamente a plena carga com temperatura ambiente de 45°C
- Enquadrar-se dentro das normas referentes à distorção harmônica e rádio interferência.

As instalações dos variadores de frequência deverão ser próximas aos quadros de alimentação elétrica e os espaços de instalações de acordo com o fabricante.

4.4.4 SISTEMAS DE SUPERVISÃO E CONTROLE


O sistema de controle será do tipo digital direto (DDC) e especificado no projeto de automação.

A automação será responsável pelo fornecimento dos seguintes dispositivos:

- Válvulas de controle
- Atuadores para:
 - Válvula motorizadas,
 - Dampers motorizados
 - Dampers corta-fogo
- Instrumentação (sensores de temperatura, umidade e pressão)
- Cabeamento para conexão de toda a instrumentação (do quadro elétrico para o dispositivo de instrumentação)

A instaladora de ar condicionado será responsável pelos seguintes procedimentos:

- Instalação das válvulas motorizadas e de controle, dampers motorizados e corta-fogo. O instalador de ar condicionado deverá ser coresponsável pela compatibilização dos atuadores com os dispositivos mecânicos.
- Instalação de infraestrutura para a montagem da instrumentação em dutos e tubos (pontos de tomada de temperatura, umidade e pressão)
- Interface com automação para funcionamento e integração entre os sistemas de ar condicionado, ventilação e automação.

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4.4.5 DESCRITIVO DE LÓGICA DE OPERAÇÃO

CENTRAL DE ÁGUA GELADA - CAG

O circuito primário de água gelada da CAG é composto pelos seguintes equipamentos:

- 2 Unidades Resfriadoras de Água de 110 TR cada;
- 3 Bombas de Água Gelada Primária (BAGP) dedicadas, sendo duas operantes e uma reserva;
- 2 Bombas de Água Gelada secundária, com variadores de frequência, sendo uma operante e uma reserva;

Deverão ser instalados sensores de temperatura na alimentação e retorno geral do circuito primário.

A capacidade de refrigeração correspondente será calculada em função da vazão medida e do diferencial de temperatura entre o retorno e alimentação de água do circuito: $CARGA = Q \times (T_{(RAG)} - T_{(AAG)})$.

Para ligar uma UR de selecionada deverá proceder com as seguintes seqüências:

- Selecionar e ligar a bomba de água de gelada (BAGP) dedicada a respectivas UR;
- Comandar para habilitar a UR selecionada para iniciar o processo de partida;

Qualquer equipamento que acusar falha deverá ser substituído automaticamente por outro disponível com menor tempo totalizado. A falha é detectada quando o equipamento comandado não retornar o sinal de estado após um tempo pré-definido, e ou o equipamento comandado e em operação perder o sinal de estado, e ainda quando for detectado alarme de falha/defeito onde disponível.

Onde houver bombas efetivas dedicadas a UR, como as BAGPs deste projeto, o sistema de supervisão deverá gerar um alarme quando da detecção de falha, sendo que a substituição por reserva será feita manualmente.

Para desligar uma UR em operação deverá implementar as seguintes seqüências:


- Retirar o comando Habilita da UR com maior tempo acumulado entre as URs operantes para iniciar o processo de desligamento, e disparar um cronômetro;
- Comandar para desligar a BAGP, após o tempo de retardo necessário para a UR recolher o gás refrigerante / equalizar (tempo de retardo conforme o fabricante);

CIRCUITO SECUNDÁRIO VARIÁVEL

O circuito secundário variável é composto por bombas que tem a função de circular a água gelada entre os chillers e os condicionadores de ar, mantendo a pressão diferencial constante. A pressão diferencial será controlada através da modulação da velocidade de rotação das bombas acionadas por variadores de frequência.

A pressão diferencial deverá ser medida na entrada da tubulação de água gelada no pavimento técnico do prédio de Ensino e pesquisa.

Deverá ter um sensor de vazão do tipo eletromagnético ou ultrasônico que permita a instalação e manutenção com tubulação pressurizada (hot tap), podendo ser instalado na alimentação ou retorno onde tiver disponível um trecho com comprimento de tubulação reta, igual ou maior que o requerido para instalação do sensor (comprimentos mínimos equivalentes de 10 diâmetros à montante e 5

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diâmetros à jusante).

As vazões medidas serão utilizadas para escalonar o número de bombas, e totalização da demanda.

CONDICIONADORES DE AR

Composto por condicionadores de ar para controle de temperatura mínima e máxima.

O controlador para esta climatização deverá ter a seguinte programação lógica:

- Controle para resfriamento através da modulação da válvula de 2 vias de água gelada, em função da temperatura máxima;

ESPECIFICAÇÃO DOS CONTROLES DOS EQUIPAMENTOS

CHILLERS A AR

A unidade deve ter um sistema de controle microprocessado e um controlador da unidade.

Os chillers serão controlados pela temperatura de alimentação da água gelada.


Os parâmetros abaixo devem ser disponibilizados pelo sistema fornecido com o equipamento:

- Temperaturas da água gelada que entra e sai
- Temperaturas da água do condensador que sai e entra
- Pressão do refrigerante saturado do evaporador
- Pressão do refrigerante saturado do condensador
- Percentual da velocidade (por compressor)
- % da amperagem nominal de toda unidade
- Velocidade atual do compressor, velocidade máxima, percentual da velocidade
- Temperaturas de entrada e saída da água do evaporador, temperatura e pressão do refrigerante
- Temperaturas de entrada e saída da água do condensador, temperatura e pressão do refrigerante
- Temperatura da linha de líquido
- Setpoint da água gelada
- Estado do compressor e estado de unidade e entrada e valores digitais e analógicos de saída

Um histórico de falhas deve ser exibido usando mensagens coloridas fáceis de decifrar com data e hora.

O histórico dos alarmes deve ser baixado da porta USB da unidade. Um manual de operação e manutenção específico da unidade deve ser visível na tela.

Ação corretiva automática para reduzir ciclismo desnecessário deve ser feita através do controle preventivo em condições pressão de descarga do evaporador baixa ou alta para manter a operação da unidade em condições anormais temporárias.

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O (s) controlador (es) de fábrica deverá (ão) suportar a operação em rede BACnet®, Modbus® ou LONWORKS® através de um link de dados/camadas físicas, conforme especificado pelo fornecedor da Automação Predial (BAS) abaixo.

- Modbus
- BACnet MS/TP master (Clause 9)
- BACnet IP, (Annex J)
- BACnet ISO 8802-3, (Ethernet)
- LonTalk® FTT-10A. Controlador certificado LONMARK®.

As informações entre o BAS e controladores de fábrica da unidade incluirá a leitura e gravação de dados que permitam monitoramento da unidade, alerta dos controles e alarme, conforme especificado na sequência de operação da unidade.

Para chillers com comunicação com a rede LonMark, o correspondente LONMARK eXternal Interface File (XIF) devem ser fornecidos com os dados do chiller.

Toda a comunicação do controlador da unidade, conforme especificado será por meio de objetos padrão BACnet. Objetos proprietários BACnet não serão permitidos. A comunicação BACnet deve obedecer ao protocolo BACnet (ANSI/ASHRAE135-2001). O Protocolo de implementação BACnet (PICS) deve ser fornecido juntamente com a proposta da unidade.

BOMBA DE ÁGUA

Será dotado com variador de frequência, exceto as bombas de água gelada do circuito primário.

TRATAMENTO DE ÁGUA

Deverão ser fornecidos sistemas automáticos de tratamento de água para o circuito de água gelada.

Os sistemas deverão ter bombas dosadoras e respectivos reservatórios de produtos, controles automáticos para controlar corrosão, crescimento de fungos e algas.

CONDICIONADORES DE AR TIPO FANCOLETE

Os controles das unidades serão do tipo stand alone e não serão ligados a automação. Consistirão em um interruptor com duas velocidades de ventilador (BAIXO-MED) e um sensor de temperatura digital para controle da válvula de controle on/off.

DAMPERS CORTA FOGO E FUMAÇA

Fechamento por mola e retorno por servo-motor controlado pelo sistema de detecção e combate a fogo.

Serão fornecidos com interruptor de fim de curso, com monitoramento de status.



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Tabela técnica sobre escopo de automação:

ITENS DE ESCOPO	RESPONSÁVEL	
	AUTOMAÇÃO	HVAC
Revisão do projeto básico de automação para complemento de infraestrutura.	X	
Instalação do complemento de infra-estrutura para O Sistema de Automação e Supervisão Predial - SASP.	X	
Instalação de infra-estrutura conforme projeto básico de automação.		X
Fornecimento dos quadros de controle montados e prontos para interligação com elementos de campo e alimentação	X	
Revisão de interfaces dos quadros elétricos e equipamentos com os quais a automação se interliga. Indicação de necessidades.	X	
Revisão de projeto e fornecimento de interfaces, conforme indicação de necessidades, nos quadros elétricos e equipamentos, e.g. disponibilização em régua de bornes de todos os pontos de controle/supervisão indicados na lista de pontos de automação.		X
Seleção e fornecimento de todos os elementos sensores, transdutores, válvulas e atuadores.	X	
Instalação de elementos sensores que interferem nos serviços das instaladoras, e.g. poços de sensores em tubulações, transdutores, válvulas e atuadores.		X
Passagem de enfição geral do SASP, tais como buses de comunicação e interligações entre sensores de campo e painéis de controle.	X	
Instalação de quadros e elementos sensores de campo que não interferem nos serviços das instaladoras.	X	
Comissionamento dos sistemas em manual.		X
Comissionamento dos sistemas de controle após comprovada a operação manual.	X	
Testes de operação dos processos em automático.	X	X
Testes de aceitação.	X	X

OBS: A RESPONSABILIDADE DOS ITENS ASSINALADOS COMO INSTALADOR SERÁ DE CADA UMA DAS UTILIDADES (ELÉTRICA, HIDRÁULICA OU AR CONDICIONADO) QUE POSSUAM ALGUM TIPO DE INTERFACE COM A AUTOMAÇÃO.

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5 MEMÓRIA CÁLCULO CARGA TÉRMICA E20 CARRIER VERSÃO 5.11



Ministério da Saúde

FIOCRUZ
Fundação Oswaldo Cruz



Contratação de Serviço de Engenharia para Elaboração de
Projeto do Bloco de Laboratórios da Fiocruz/Rondônia.

ANEXO A
CARGA TÉRMICA
SUBESTAÇÃO
INFRA PARA O EMPREENDIMENTO “C”
SETEMBRO/2020

CONTRATO RDC ELETRÔNICO N.º 31/2019-COGIC
PROCESSO: 25389.000189/2017-19

MEMORIAL: 30000393-03-OS5-G00-GRL-MC-0001-R00

Air System Sizing Summary for AH-TEC-03 SUBESTAÇÃO

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
06:49

Air System Information

Air System Name **AH-TEC-03 SUBESTAÇÃO**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **59,0** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **29,9** kW
Sensible coil load **29,9** kW
Coil L/s at Jul 1700 **1705** L/s
Max block L/s **1705** L/s
Sum of peak zone L/s **1705** L/s
Sensible heat ratio **1,000**
L/(s kW) **57,0**
m²/kW **2,0**
W/m² **507,2**
Water flow @ 7,5 K rise **0,95** L/s

Load occurs at **Jul 1700**
OA DB / WB **34,5 / 25,5** °C
Entering DB / WB **38,6 / 26,5** °C
Leaving DB / WB **24,0 / 22,7** °C
Coil ADP **22,3** °C
Bypass Factor **0,100**
Resulting RH **39** %
Design supply temp. **25,0** °C
Zone T-stat Check **1 of 1** OK
Max zone temperature deviation **0,0** K

Supply Fan Sizing Data

Actual max L/s **1705** L/s
Standard L/s **1687** L/s
Actual max L/(s·m²) **28,90** L/(s·m²)

Fan motor BHP **2,69** BHP
Fan motor kW **2,13** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **85** L/s
L/(s·m²) **1,44** L/(s·m²)

L/s/person **0,00** L/s/person

Zone Sizing Summary for AH-TEC-03 SUBESTAÇÃO

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
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Air System Information

Air System Name **AH-TEC-03 SUBESTAÇÃO**
Equipment Class **CW AHU**
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Number of zones **1**
Floor Area **59,0** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	1705	1705	28,90	0,0	0,00	0,0	0,00	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 ²)
Zone 1	28,5	Jul 1700	1,1	59,0

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 ²)	Space L/(s·m ²)
Zone 1							
502 - Subestação	1	28,5	Jul 1700	1705	1,1	59,0	28,90

Ventilation Sizing Summary for AH-TEC-03 SUBESTAÇÃO

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

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1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 85 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
502 - Subestação	1	59,0	0,0	1705,1	0,00	0,00	0,0	5,0	85,3
Totals (incl. Space Multipliers)				1705,1					85,3

Air System Design Load Summary for AH-TEC-03 SUBESTAÇÃO

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1700 COOLING OA DB / WB 34,5 °C / 25,5 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	67 m²	-6	-	67 m²	648	-
Roof Transmission	59 m²	1405	-	59 m²	453	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	24 m²	-881	-	24 m²	6	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	28000 W	27999	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	28517	0	-	1107	0
Zone Conditioning	-	28241	0	-	1202	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	1705 L/s	0	-	1705 L/s	0	-
Ventilation Load	85 L/s	-449	-6	85 L/s	694	0
Supply Fan Load	1705 L/s	2131	-	1705 L/s	-2131	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	29923	-6	-	-236	0
Central Cooling Coil	-	29923	0	-	-236	0
>> Total Conditioning	-	29923	0	-	-236	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TEC-03 SUBESTAÇÃO

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

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Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,5 °C / 25,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 39,0 °C			OCCUPIED T-STAT 24,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	67 m²	-6	-	67 m²	648	-
Roof Transmission	59 m²	1405	-	59 m²	453	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	24 m²	-881	-	24 m²	6	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	28000 W	27999	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	28517	0	-	1107	0

Space Design Load Summary for AH-TEC-03 SUBESTAÇÃO

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

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TABLE 1.1.A. Component Loads For Space "502 - Subestação" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1700 COOLING OA DB / WB 34,5 °C / 25,5 °C OCCUPIED T-STAT 39,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 24,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	67 m²	-6	-	67 m²	648	-
Roof Transmission	59 m²	1405	-	59 m²	453	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	24 m²	-881	-	24 m²	6	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	28000 W	27999	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	28517	0	-	1107	0

TABLE 1.1.B. Envelope Loads For Space "502 - Subestação" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
N EXPOSURE						
WALL	27	1,513	-	130	-	259
W EXPOSURE						
WALL	13	1,513	-	32	-	130
S EXPOSURE						
WALL	27	1,513	-	-168	-	260
H EXPOSURE						
ROOF	59	1,199	-	1405	-	453

System Psychrometrics for AH-TEC-03 SUBESTAÇÃO

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
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July DESIGN COOLING DAY, 1700

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,5	0,01703	85	400	-449	-6
Vent - Return Mixing	Outlet	38,6	0,01705	1705	585	-	-
Central Cooling Coil	Outlet	24,0	0,01705	1705	585	29923	0
Supply Fan	Outlet	25,0	0,01705	1705	585	2131	-
Cold Supply Duct	Outlet	25,0	0,01705	1705	585	-	-
Zone Air	-	38,9	0,01705	1705	595	28241	0
Return Plenum	Outlet	38,9	0,01705	1705	595	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	28517	Deadband	28241	38,9	1705	595	0	0

System Psychrometrics for AH-TEC-03 SUBESTAÇÃO

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
06:49

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	85	400	-694	0
Vent - Return Mixing	Outlet	24,1	0,01035	1705	585	-	-
Central Cooling Coil	Outlet	24,0	0,01035	1705	585	236	0
Supply Fan	Outlet	25,0	0,01035	1705	585	2131	-
Cold Supply Duct	Outlet	25,0	0,01035	1705	585	-	-
Zone Air	-	24,4	0,01035	1705	595	-1202	0
Return Plenum	Outlet	24,4	0,01035	1705	595	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-1107	Deadband	-1202	24,4	1705	595	0	0

System Psychrometrics for AH-TEC-03 SUBESTAÇÃO

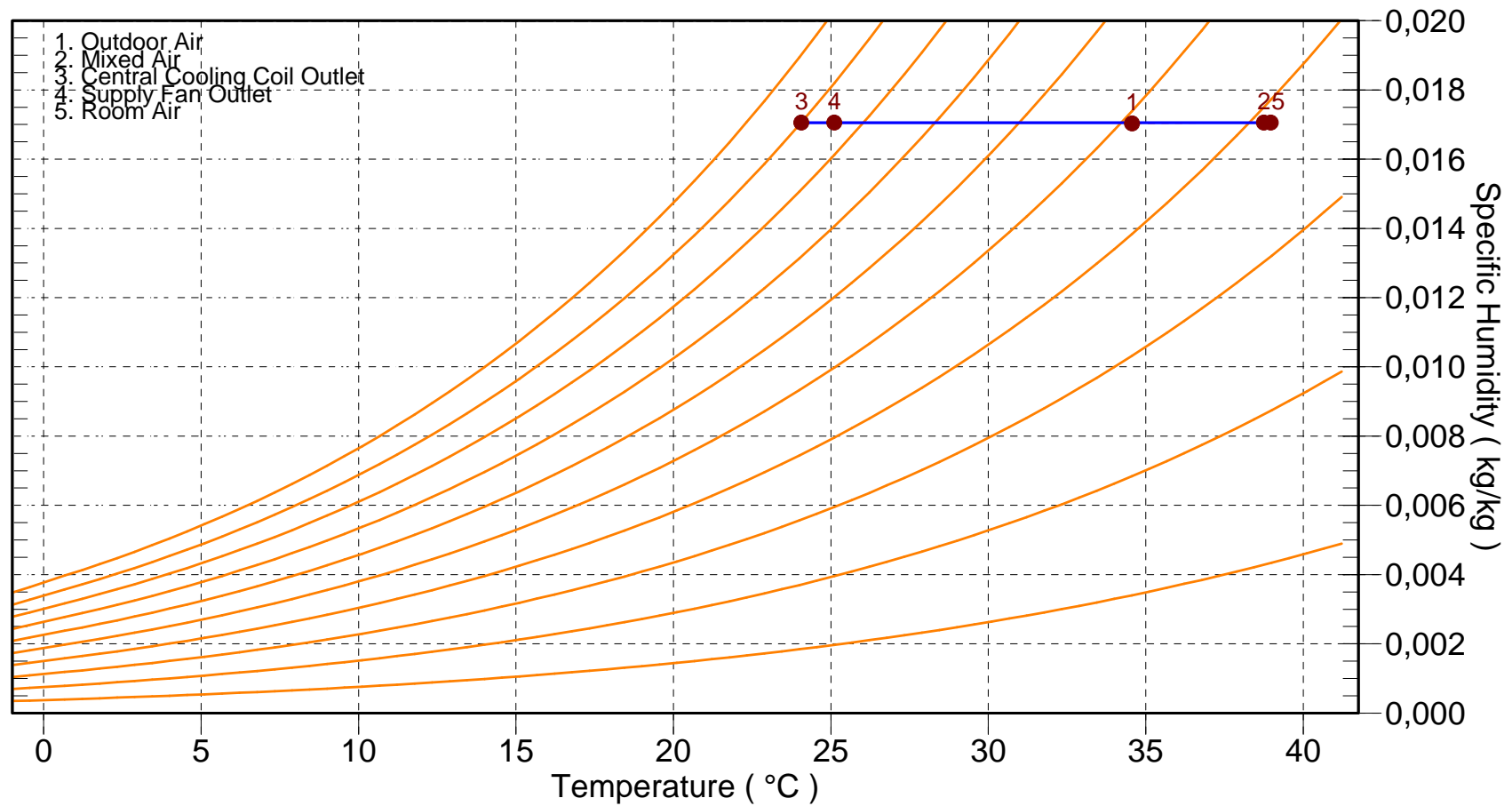
Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
06:49

Location: Porto Velho, Brazil

Altitude: 88,0 m.

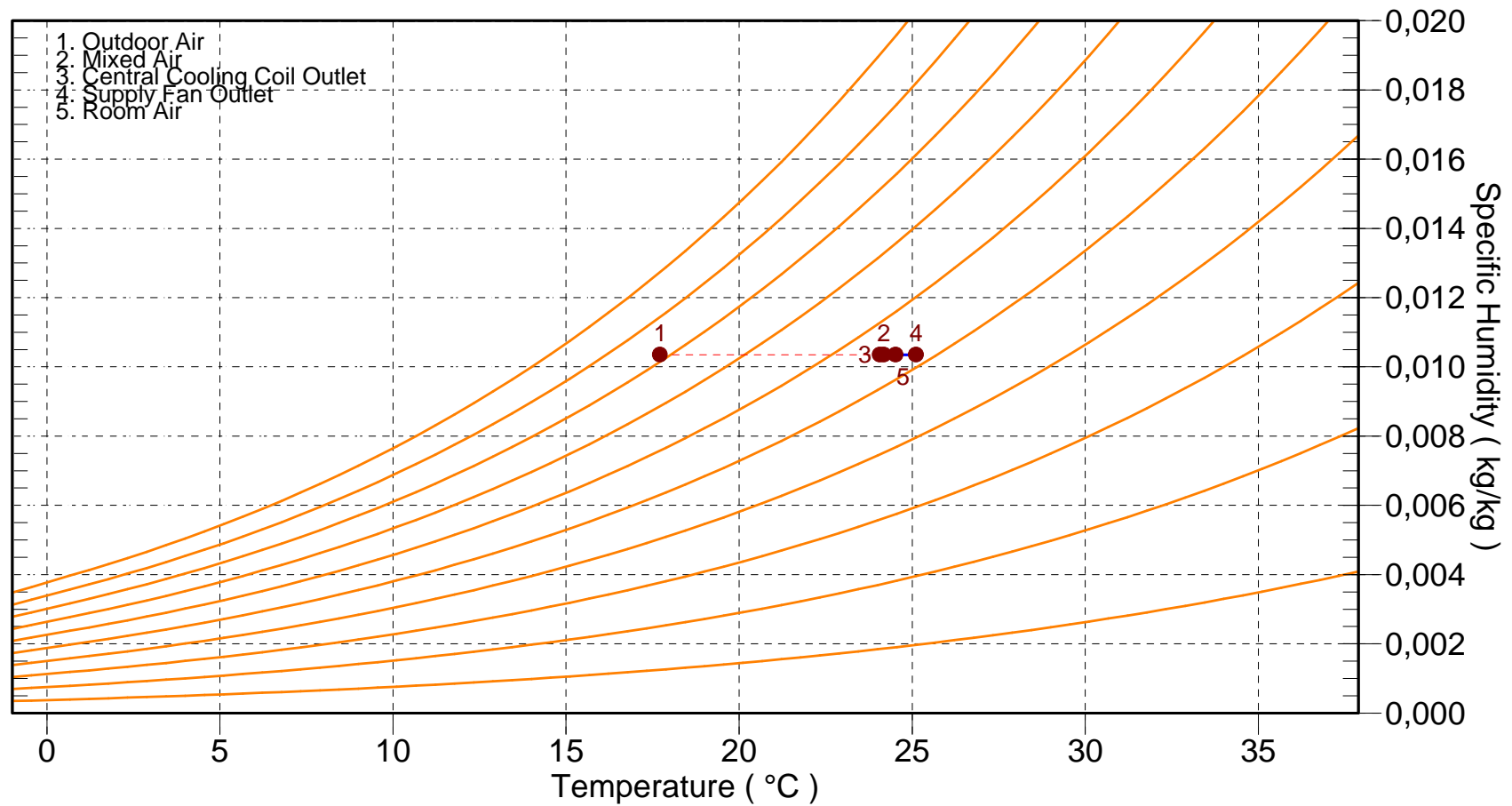
Data for: July DESIGN COOLING DAY, 1700



Location: Porto Velho, Brazil

Altitude: 88,0 m.

Data for: WINTER DESIGN HEATING



Air System Sizing Summary for AH-TEC-03 SUBESTAÇÃO PARCIAL

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
06:50

Air System Information

Air System Name **AH-TEC-03 SUBESTAÇÃO PARCIAL**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **59,0** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **40,8** kW
Sensible coil load **37,8** kW
Coil L/s at Jul 1600 **3406** L/s
Max block L/s **3406** L/s
Sum of peak zone L/s **3406** L/s
Sensible heat ratio **0,925**
L/(s kW) **83,4**
m²/kW **1,4**
W/m² **692,2**
Water flow @ 7,5 K rise **1,30** L/s

Load occurs at **Jul 1600**
OA DB / WB **35,2 / 25,6** °C
Entering DB / WB **25,4 / 19,0** °C
Leaving DB / WB **16,2 / 15,5** °C
Coil ADP **15,1** °C
Bypass Factor **0,100**
Resulting RH **55** %
Design supply temp. **17,2** °C
Zone T-stat Check **1 of 1** OK
Max zone temperature deviation **0,0** K

Supply Fan Sizing Data

Actual max L/s **3406** L/s
Standard L/s **3371** L/s
Actual max L/(s·m²) **57,74** L/(s·m²)

Fan motor BHP **5,37** BHP
Fan motor kW **4,26** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **170** L/s
L/(s·m²) **2,89** L/(s·m²)

L/s/person **0,00** L/s/person

Zone Sizing Summary for AH-TEC-03 SUBESTAÇÃO PARCIAL

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
06:50

Air System Information

Air System Name **AH-TEC-03 SUBESTAÇÃO PARCIAL**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **59,0** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	3406	3406	57,74	0,0	0,00	0,0	0,00	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 ²)
Zone 1	31,7	Jul 1700	0,9	59,0

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 ²)	Space L/(s·m ²)
Zone 1							
503 - Subestação Parcial	1	31,7	Jul 1700	3406	0,9	59,0	57,74

Ventilation Sizing Summary for AH-TEC-03 SUBESTAÇÃO PARCIAL

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B

Prepared by: MHA Engenharia Ltda

09/17/2020

06:50

1. Summary

Ventilation Sizing Method Sum of Space OA Airflows

Design Ventilation Airflow Rate 170 L/s

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
503 - Subestação Parcial	1	59,0	0,0	3406,4	0,00	0,00	0,0	5,0	170,3
Totals (incl. Space Multipliers)				3406,4					170,3

Air System Design Load Summary for AH-TEC-03 SUBESTAÇÃO PARCIAL

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1600 COOLING OA DB / WB 35,2 °C / 25,6 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	67 m²	1275	-	67 m²	547	-
Roof Transmission	59 m²	2398	-	59 m²	382	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	24 m²	-65	-	24 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	28000 W	27999	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	31608	0	-	929	0
Zone Conditioning	-	31443	0	-	-386	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	3406 L/s	0	-	3406 L/s	0	-
Ventilation Load	170 L/s	2088	3051	170 L/s	-62	0
Supply Fan Load	3406 L/s	4258	-	3406 L/s	-4258	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	37789	3051	-	-4706	0
Central Cooling Coil	-	37789	3054	-	-4706	0
>> Total Conditioning	-	37789	3054	-	-4706	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TEC-03 SUBESTAÇÃO PARCIAL

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
06:50

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,5 °C / 25,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 25,0 °C			OCCUPIED T-STAT 23,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	67 m²	1412	-	67 m²	547	-
Roof Transmission	59 m²	2396	-	59 m²	382	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	24 m²	-65	-	24 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	28000 W	27999	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	31742	0	-	929	0

Space Design Load Summary for AH-TEC-03 SUBESTAÇÃO PARCIAL

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
06:50

TABLE 1.1.A. Component Loads For Space "503 - Subestação Parcial" In Zone "Zone 1"						
	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1700 COOLING OA DB / WB 34,5 °C / 25,5 °C OCCUPIED T-STAT 25,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 23,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	67 m²	1412	-	67 m²	547	-
Roof Transmission	59 m²	2396	-	59 m²	382	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	24 m²	-65	-	24 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	0 W	0	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	28000 W	27999	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	31742	0	-	929	0

TABLE 1.1.B. Envelope Loads For Space "503 - Subestação Parcial" In Zone "Zone 1"						
	Area	U-Value	Shade	COOLING	COOLING	HEATING
	(m²)	(W/(m².K))	Coeff.	TRANS	SOLAR	TRANS
				(W)	(W)	(W)
N EXPOSURE						
WALL	27	1,513	-	696	-	218
W EXPOSURE						
WALL	13	1,513	-	316	-	110
S EXPOSURE						
WALL	27	1,513	-	400	-	219
H EXPOSURE						
ROOF	59	1,199	-	2396	-	382

System Psychrometrics for AH-TEC-03 SUBESTAÇÃO PARCIAL

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
06:50

July DESIGN COOLING DAY, 1600

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	35,2	0,01702	170	400	2088	3051
Vent - Return Mixing	Outlet	25,4	0,01118	3406	585	-	-
Central Cooling Coil	Outlet	16,2	0,01088	3406	585	37789	3054
Supply Fan	Outlet	17,2	0,01088	3406	585	4258	-
Cold Supply Duct	Outlet	17,2	0,01088	3406	585	-	-
Zone Air	-	24,9	0,01088	3406	595	31443	0
Return Plenum	Outlet	24,9	0,01088	3406	595	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	31608	Deadband	31443	24,9	3406	595	0	0

System Psychrometrics for AH-TEC-03 SUBESTAÇÃO PARCIAL

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/17/2020
06:50

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	170	400	62	0
Vent - Return Mixing	Outlet	17,3	0,01035	3406	585	-	-
Central Cooling Coil	Outlet	16,2	0,01035	3406	585	4706	0
Supply Fan	Outlet	17,2	0,01035	3406	585	4258	-
Cold Supply Duct	Outlet	17,2	0,01035	3406	585	-	-
Zone Air	-	17,3	0,01035	3406	595	386	0
Return Plenum	Outlet	17,3	0,01035	3406	595	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

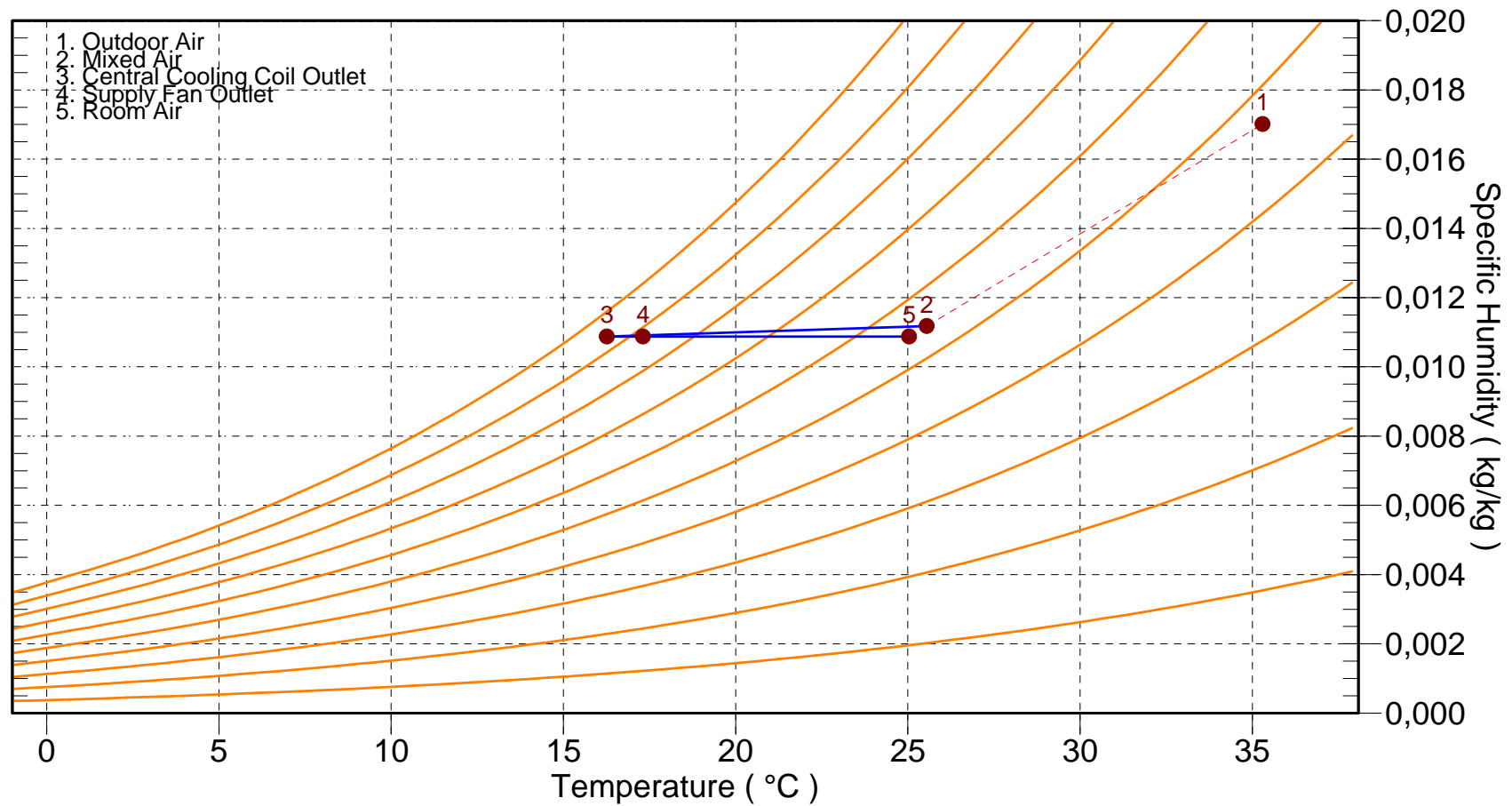
TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-929	Deadband	386	17,3	3406	595	0	0

Location: Porto Velho, Brazil

Altitude: 88,0 m.

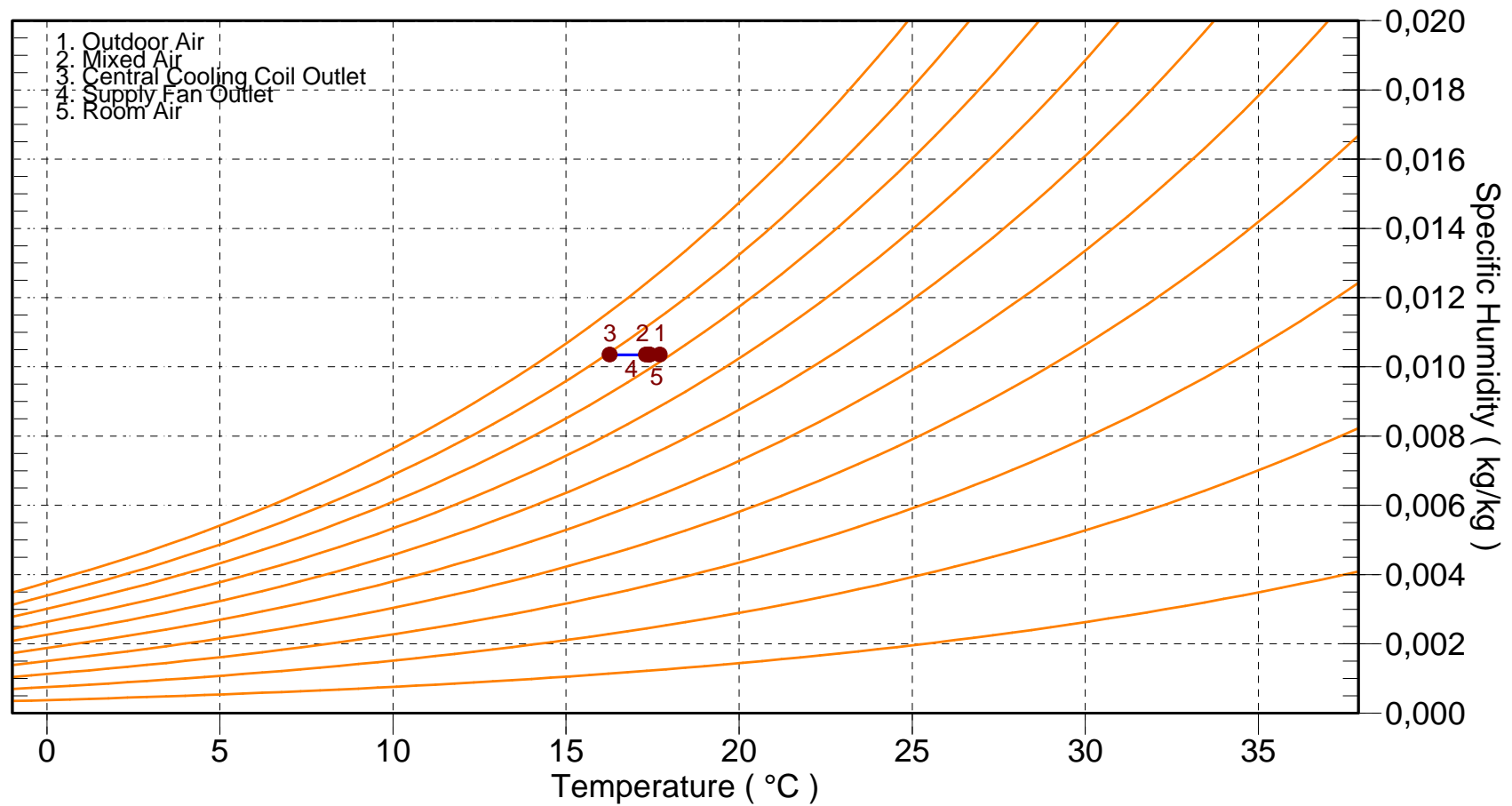
Data for: July DESIGN COOLING DAY, 1600



Location: Porto Velho, Brazil

Altitude: 88,0 m.

Data for: WINTER DESIGN HEATING





Ministério da Saúde

FIOCRUZ
Fundação Oswaldo Cruz



Contratação de Serviço de Engenharia para Elaboração de
Projeto do Bloco de Laboratórios da Fiocruz/Rondônia.

ANEXO B

MEMÓRIA DE CÁLCULO

SALA DE QUADROS DA CAG

INFRA PARA O EMPREENDIMENTO “C”

SETEMBRO/2020

CONTRATO RDC ELETRÔNICO N.º 31/2019-COGIC
PROCESSO: 25389.000189/2017-19

MEMORIAL: 30000393-03-OS5-G00-GRL-MC-0001-R00

Air System Sizing Summary for AH-TEC-04 QUADROS CAG

Project Name: FIOCRUZ RONDONIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/22/2020
09:46

Air System Information

Air System Name **AH-TEC-04 QUADROS CAG**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **12,1** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 **5,2** kW
Coil L/s at Jul 1700 **363** L/s
Max block L/s **363** L/s
Sum of peak zone L/s **363** L/s
Sensible heat ratio **1,000**
L/(s kW) **70,0**
m²/kW **2,3**
W/m² **428,7**
Water flow @ 7,5 K rise **0,17** L/s

Load occurs at **Jul 1700**
OA DB / WB **34,5 / 25,5** °C
Entering DB / WB **24,9 / 13,4** °C
Leaving DB / WB **13,0 / 8,3** °C
Coil ADP **11,6** °C
Bypass Factor **0,100**
Resulting RH **25** %
Design supply temp. **14,0** °C
Zone T-stat Check **1 of 1** OK
Max zone temperature deviation **0,0** K

Humidifier Sizing Data

Max steam flow at Des Htg **0,00** kg/hr
Airflow Rate **0** L/s

Air mass flow **0,00** kg/hr
Moisture gain **,00000** kg/kg

Supply Fan Sizing Data

Actual max L/s **363** L/s
Standard L/s **359** L/s
Actual max L/(s·m²) **30,02** L/(s·m²)

Fan motor BHP **0,57** BHP
Fan motor kW **0,45** kW
Fan static **750** Pa

Outdoor Ventilation Air Data

Design airflow L/s **0** L/s
L/(s·m²) **0,00** L/(s·m²)

L/s/person **0,00** L/s/person

Zone Sizing Summary for AH-TEC-04 QUADROS CAG

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/22/2020
09:46

Air System Information

Air System Name **AH-TEC-04 QUADROS CAG**
Equipment Class **CW AHU**
Air System Type **CAV/RH**

Number of zones **1**
Floor Area **12,1** m²
Location **Porto Velho, Brazil**

Sizing Calculation Information

Calculation 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 ²)	Reheat Coil Load (kW)	Reheat Coil Water L/s @ 12,0 K	Zone Htg Unit Coil Load (kW)	Zone Htg Unit Water L/s @ 12,0 K	Mixing Box Fan Airflow (L/s)
Zone 1	363	363	30,02	0,0	0,00	0,0	0,00	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 ²)
Zone 1	4,8	Jul 1700	0,2	12,1

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 ²)	Space L/(s·m ²)
Zone 1							
504 - Quadros CAG	1	4,8	Jul 1700	363	0,2	12,1	30,02

Ventilation Sizing Summary for AH-TEC-04 QUADROS CAG

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B

Prepared by: MHA Engenharia Ltda

09/22/2020

09:46

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 (m²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
504 - Quadros CAG	1	12,1	0,0	363,2	0,00	0,00	0,0	0,0	0,0
Totals (incl. Space Multipliers)				363,2					0,0

Air System Design Load Summary for AH-TEC-04 QUADROS CAG

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/22/2020
09:46

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,5 °C / 25,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	8 m²	195	-	8 m²	73	-
Roof Transmission	12 m²	491	-	12 m²	93	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	36 m²	-95	-	36 m²	10	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	182 W	181	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	4000 W	4000	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4773	0	-	175	0
Zone Conditioning	-	4733	0	-	-750	0
Plenum Wall Load	0%	0	-	0	0	-
Plenum Roof Load	0%	0	-	0	0	-
Plenum Lighting Load	0%	0	-	0	0	-
Return Fan Load	363 L/s	0	-	363 L/s	0	-
Ventilation Load	0 L/s	0	0	0 L/s	0	0
Supply Fan Load	363 L/s	454	-	363 L/s	-454	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	5187	0	-	-1204	0
Central Cooling Coil	-	5187	0	-	-1204	0
Humidification Load	-	-	0	-	-	0
>> Total Conditioning	-	5187	0	-	-1204	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

Zone Design Load Summary for AH-TEC-04 QUADROS CAG

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/22/2020
09:46

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34,5 °C / 25,5 °C			HEATING OA DB / WB 17,6 °C / 15,6 °C		
	OCCUPIED T-STAT 25,0 °C			OCCUPIED T-STAT 24,0 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	8 m²	195	-	8 m²	73	-
Roof Transmission	12 m²	491	-	12 m²	93	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	36 m²	-95	-	36 m²	10	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	182 W	181	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	4000 W	4000	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4773	0	-	175	0

Space Design Load Summary for AH-TEC-04 QUADROS CAG

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

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09:46

TABLE 1.1.A. Component Loads For Space "504 - Quadros CAG" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jul 1700 COOLING OA DB / WB 34,5 °C / 25,5 °C OCCUPIED T-STAT 25,0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 17,6 °C / 15,6 °C OCCUPIED T-STAT 24,0 °C		
		Sensible	Latent		Sensible	Latent
SPACE LOADS	Details	(W)	(W)	Details	(W)	(W)
Window & Skylight Solar Loads	0 m²	0	-	0 m²	-	-
Wall Transmission	8 m²	195	-	8 m²	73	-
Roof Transmission	12 m²	491	-	12 m²	93	-
Window Transmission	0 m²	0	-	0 m²	0	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	0 m²	0	-	0 m²	0	-
Partitions	36 m²	-95	-	36 m²	10	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	182 W	181	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	4000 W	4000	-	0	0	-
People	0	0	0	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	0% / 0%	0	0	0%	0	0
>> Total Zone Loads	-	4773	0	-	175	0

TABLE 1.1.B. Envelope Loads For Space "504 - Quadros CAG" In Zone "Zone 1"

				COOLING	COOLING	HEATING
	Area	U-Value	Shade	TRANS	SOLAR	TRANS
	(m²)	(W/(m².K))	Coeff.	(W)	(W)	(W)
N EXPOSURE						
WALL	8	1,513	-	195	-	73
H EXPOSURE						
ROOF	12	1,199	-	491	-	93

System Psychrometrics for AH-TEC-04 QUADROS CAG

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/22/2020
09:46

July DESIGN COOLING DAY, 1700

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	34,5	0,01703	0	400	0	0
Vent - Return Mixing	Outlet	24,9	0,00492	363	800	-	-
Central Cooling Coil	Outlet	13,0	0,00492	363	800	5187	0
Supply Fan	Outlet	14,0	0,00492	363	800	454	-
Humidifier	Outlet	14,0	0,00492	363	800	-	0
Cold Supply Duct	Outlet	14,0	0,00492	363	800	-	-
Zone Air	-	24,9	0,00492	363	800	4733	0
Return Plenum	Outlet	24,9	0,00492	363	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	4773	Deadband	4733	24,9	363	800	0	0

System Psychrometrics for AH-TEC-04 QUADROS CAG

Project Name: FIOCRUZ RONDÔNIA EMPREENDIMENTO B
Prepared by: MHA Engenharia Ltda

09/22/2020
09:46

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°C)	Specific Humidity (kg/kg)	Airflow (L/s)	CO2 Level (ppm)	Sensible Heat (W)	Latent Heat (W)
Ventilation Air	Inlet	17,6	0,01035	0	400	0	0
Vent - Return Mixing	Outlet	15,7	0,00492	363	800	-	-
Central Cooling Coil	Outlet	13,0	0,00492	363	800	1204	0
Supply Fan	Outlet	14,0	0,00492	363	800	454	-
Humidifier	Outlet	14,0	0,00492	363	800	-	0
Cold Supply Duct	Outlet	14,0	0,00492	363	800	-	-
Zone Air	-	15,7	0,00492	363	800	750	0
Return Plenum	Outlet	15,7	0,00492	363	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1,207; At site altitude = 1,195 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947,6; At site altitude = 2916,9 W/(L/s)

Site Altitude = 88,0 m

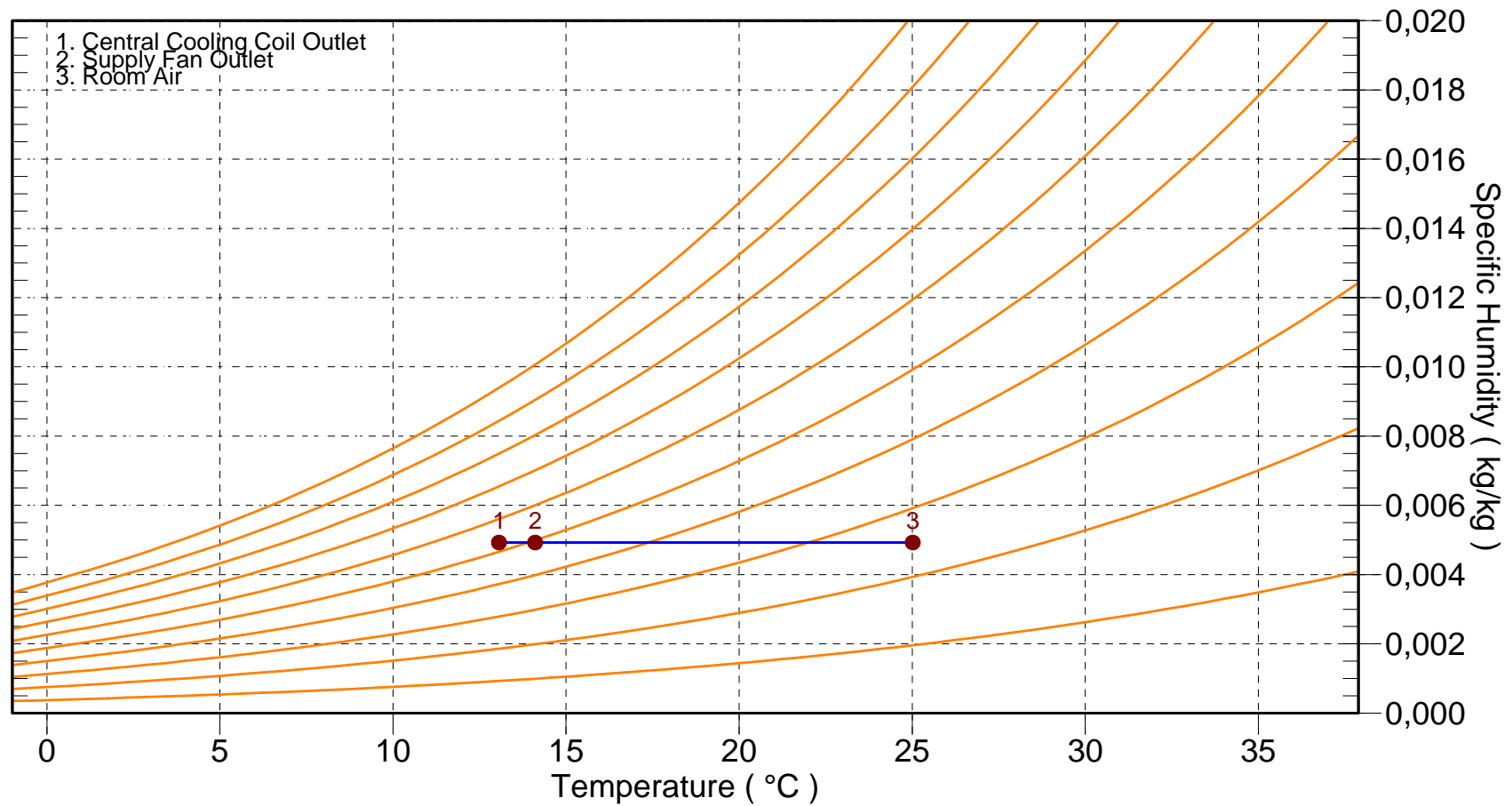
TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (W)	T-stat Mode	Zone Cond (W)	Zone Temp (°C)	Zone Airflow (L/s)	CO2 Level (ppm)	Terminal Heating Coil (W)	Zone Heating Unit (W)
Zone 1	-175	Deadband	750	15,7	363	800	0	0

Location: Porto Velho, Brazil

Altitude: 88,0 m.

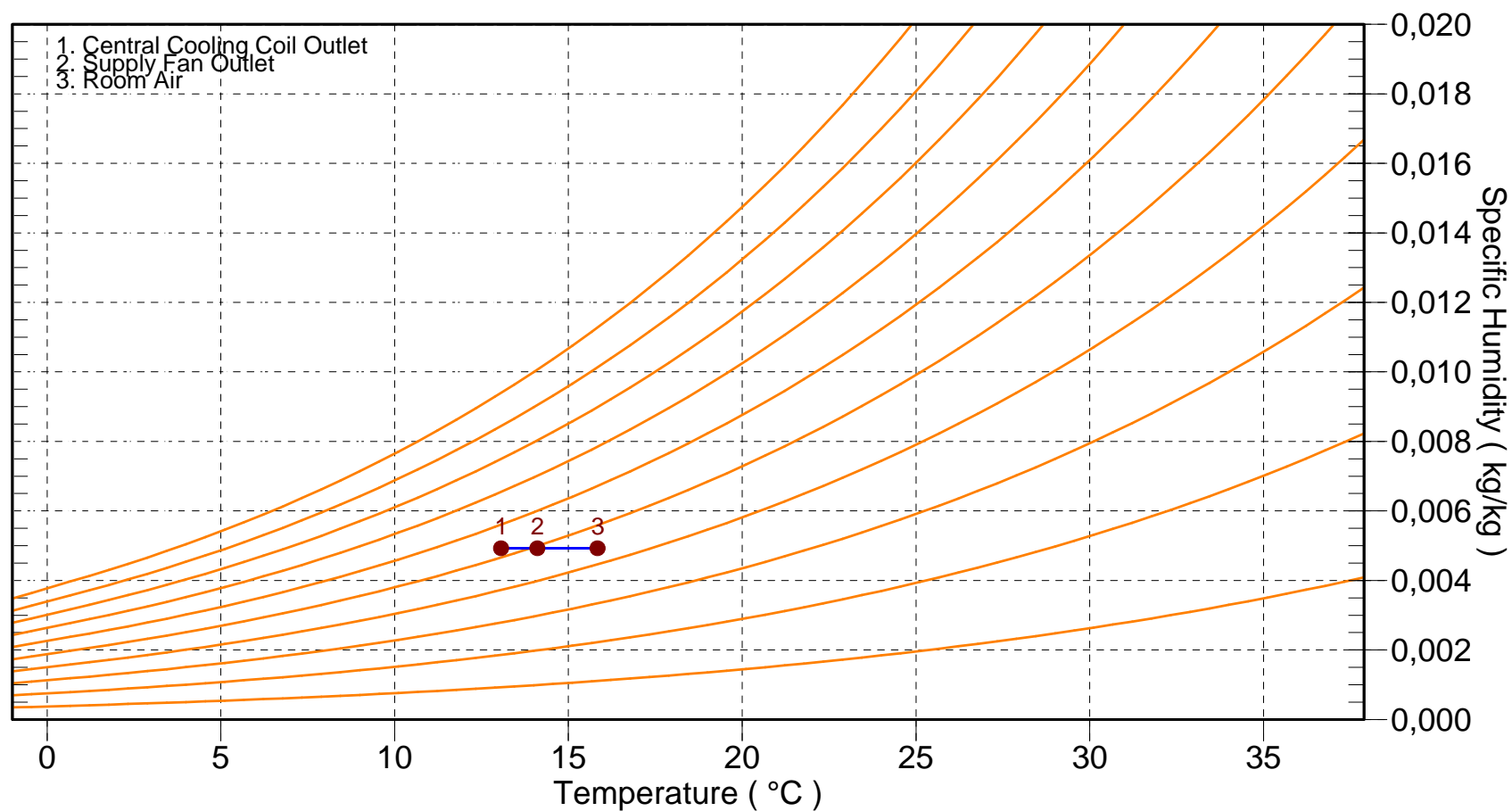
Data for: July DESIGN COOLING DAY, 1700



Location: Porto Velho, Brazil

Altitude: 88,0 m.

Data for: WINTER DESIGN HEATING





Ministério da Saúde

FIOCRUZ
Fundação Oswaldo Cruz



Contratação de Serviço de Engenharia para Elaboração de
Projeto do Bloco de Laboratórios da Fiocruz/Rondônia.

ANEXO C

MEMÓRIA DE CÁLCULO

BOMBAS - CAG

INFRA PARA O EMPREENDIMENTO “C”

SETEMBRO/2020

CONTRATO RDC ELETRÔNICO N.º 31/2019-COGIC
PROCESSO: 25389.000189/2017-19

MEMORIAL: 30000393-03-OS5-G00-GRL-MC-0001-R00

VAZÃO DE PROJETO	55,00	m³/h
QUANTIDADE DE BOMBAS	1	
VAZÕES POR BOMBA	55	m³/h
MATERIAL DA TUBULAÇÃO	SCH40	

INFORMAÇÕES - RECALQUE		
COMPRIMENTO - TUBULAÇÃO		10 m
COMPRIMENTO - PERDAS		86 m
Curvas de 90°	4	8 m
curvas de 45°	2	4 m
Válvulas	2	4 m
Trocador	1	70 m
COMPRIMENTO EQUIVALENTE DO RECALQUE		96 m

INFORMAÇÕES - SUÇÃO		
COMPRIMENTO - TUBULAÇÃO		10 m
COMPRIMENTO - PERDAS		12 m
Curvas de 90°	4	8 m
curvas de 45°		0 m
Válvulas	2	4 m
COMPRIMENTO DESENVOLVIDO NA SUÇÃO		22 m

SUÇÃO - INFORMAÇÕES

DIÂMETRO DA TUBULAÇÃO		5"
DIÂMETRO EXTERNO EM MILÍMETROS		141,3 mm
ESPESSURA DA PAREDE DO TUBO		6,55 mm
DIÂMETRO INTERNO		128,20 mm
CÁLCULO DE "J" DA SUÇÃO		
J	PERDA DE CARGA LINAR	4,00 %
ALTURA DEVIDO AS PERDAS DA SUÇÃO (Hp)		
Hp	ALTURA DEVIDO AS PERDAS NA SUÇÃO	0,88 m
ALTURA REPRESENTATIVA DA VELOCIDADE (Hv)		
V	VELOCIDADE DO ESCOAMENTO	1,65 m/s
g	ACELERAÇÃO DA GRAVIDADE	9,81 m/s²
Hv	ALTURA	0,08 m
ALTURA MANOMÉTRICA NA SUÇÃO (Hms)		
Hms	ALTURA MANOMÉTRICA NA SUÇÃO	0,96 m

RECALQUE - INFOMAÇÕES

DIÂMETRO DA TUBULAÇÃO DE RECALQUE		5"
DIÂMETRO EXTERNO EM MILÍMETROS		141,3 mm
ESPESSURA DA PAREDE DO TUBO		6,55 mm
DIÂMETRO INTERNO		128,2 mm
CÁLCULO DE "J" DO RECALQUE		
J	PERDA DE CARGA LINAR	4,00 %
ALTURA DEVIDO AS PERDAS DA SUÇÃO (Hp)		
Hp	ALTURA DEVIDO AS PERDAS NO RECALQUE	3,84 m
ALTURA REPRESENTATIVA DA VELOCIDADE (Hv)		
V	VELOCIDADE DO ESCOAMENTO	2,00 m/s
g	ACELERAÇÃO DA GRAVIDADE	9,81 m/s²
Hv	ALTURA	0,10 m
ALTURA MANOMÉTRICA TOTAL (Hms)		
Hms	ALTURA MANOMÉTRICA NO RECALQUE	13,94 m
ALTURA MANOMÉTRICA TOTAL		14,91 m

POTÊNCIA DA BOMBA DE ÁGUA DE CONDENSADOS (BAP)		
Q	VAZÃO	55,00 m³/h
Hm	ALTURA MANOMÉTRICA	14,91 m
n	RENDIMENTO DO CONJUNTO	65%
P	POTÊNCIA	4,67 CV

SOLUÇÃO 02 - CHILLER RESFRIADO A AR - CIRCUITO PRIMÁRIO - ENSINO E PESQUISA			
INFORMAÇÕES PARA SELEÇÃO			
1	VAZÃO TOTAL	55,00	m³/h
2	QUANTIDADE DE BOMBAS PRÉ-SELECIONADAS PARA OPERAÇÃO	1,00	unid.
3	VAZÃO POR BOMBA	55,00	m³/h
4	ALTURA MANOMÉTRICA TOTAL	14,91	m
RESUMO - SELEÇÃO PRELIMINAR - BOMBAS			
ITEM	DESCRIÇÃO	VALOR	GRANDEZA
1	QUANTIDADE DE BOMBAS (OPERAÇÃO + STAND BY)	1+ 1	UNID.
2	MODELO DE REFERÊNCIA	100-065-200	--
3	POTÊNCIA ESTIMADA DO MOTOR	5	CV
4	DIÂMETRO DA SUÇÃO/RECALQUE	5" / 5"	POLEGADAS

VAZÃO DE PROJETO	105,00	m³/h
QUANTIDADE DE BOMBAS	1	
VAZÕES POR BOMBA	105,00	m³/h
MATERIAL DA TUBULAÇÃO	SCH40	

INFORMAÇÕES - RECALQUE		
COMPRIMENTO - TUBULAÇÃO		200 m
COMPRIMENTO - PERDAS		78 m
Curvas de 90°	20	40 m
curvas de 45°	4	8 m
Válvulas	3	30 m
COMPRIMENTO EQUIVALENTE DO RECALQUE		278 m

INFORMAÇÕES - SUCCÃO		
COMPRIMENTO - TUBULAÇÃO		200 m
COMPRIMENTO - PERDAS		70 m
Curvas de 90°	20	40 m
curvas de 45°		0 m
Válvulas	3	30 m
COMPRIMENTO DESENVOLVIDO NA SUCCÃO		270 m

SUCCÃO - INFORMAÇÕES

DIÂMETRO DA TUBULAÇÃO		6"
DIÂMETRO EXTERNO EM MILÍMETROS		168,3 mm
ESPESSURA DA PAREDE DO TUBO		7,11 mm
DIÂMETRO INTERNO		154,08 mm
CÁLCULO DE "J" DA SUCCÃO		
J	PERDA DE CARGA LINAR	4,00 %
ALTURA DEVIDO AS PERDAS DA SUCCÃO (Hp)		
Hp	ALTURA DEVIDO AS PERDAS NA SUCCÃO	10,80 m
ALTURA REPRESENTATIVA DA VELOCIDADE (Hv)		
V	VELOCIDADE DO ESCOAMENTO	1,65 m/s
g	ACELERAÇÃO DA GRAVIDADE	9,81 m/s²
Hv	ALTURA	0,08 m
ALTURA MANOMÉTRICA NA SUCCÃO (Hms)		
Hms	ALTURA MANOMÉTRICA NA SUCCÃO	10,88 m

RECALQUE - INFOMAÇÕES

DIÂMETRO DA TUBULAÇÃO DE RECALQUE		6"
DIÂMETRO EXTERNO EM MILÍMETROS		168,3 mm
ESPESSURA DA PAREDE DO TUBO		7,11 mm
DIÂMETRO INTERNO		154,08 mm
CÁLCULO DE "J" DO RECALQUE		
J	PERDA DE CARGA LINAR	4,00 %
ALTURA DEVIDO AS PERDAS DORECALQUE (Hp)		
Hp	ALTURA DEVIDO AS PERDAS NO RECALQUE	11,12 m
ALTURA REPRESENTATIVA DA VELOCIDADE (Hv)		
V	VELOCIDADE DO ESCOAMENTO	3,00 m/s
g	ACELERAÇÃO DA GRAVIDADE	9,81 m/s²
Hv	ALTURA	0,15 m
ALTURA MANOMÉTRICA NORECALQUE (Hms)		
Hms	ALTURA MANOMÉTRICA NO RECALQUE	11,27 m
Hms	PERDAS NO CONDICIONADOR DE AR	10,00 m
Hms	FOLGA TÉCNICA	5,00 m
ALTURA MANOMÉTRICA TOTAL		27,16 m

POTÊNCIA DA BOMBA DE ÁGUA GELADA SECUNDARIA (BAS)		
Q	VAZÃO	105,00 m³/h
Hm	ALTURA MANOMÉTRICA	38,04 m
n	RENDIMENTO DO CONJUNTO	65%
P	POTÊNCIA	22,76 CV

SOLUÇÃO 02 - CHILLER RESFRIADO A AR - CIRCUITO SECUNDÁRIO - ENSINO E PESQUISA

INFORMAÇÕES PARA SELEÇÃO		
1	VAZÃO TOTAL	105,00 m³/h
2	QUANTIDADE DE BOMBAS PRÉ-SELECIONADAS PARA OPERAÇÃO	1,00 unid.
3	VAZÃO POR BOMBA	105,00 m³/h
4	ALTURA MANOMÉTRICA TOTAL	38,04 m

RESUMO - SELEÇÃO PRELIMINAR - BOMBAS			
ITEM	DESCRIÇÃO	VALOR	GRANDEZA
1	QUANTIDADE DE BOMBAS (OPERAÇÃO + STAND BY)	1 + 1	UNID.
2	MODELO DE REFERÊNCIA	125-080-315	--
3	POTÊNCIA ESTIMADA DO MOTOR	25	CV
4	DIÂMETRO DA SUCCÃO/RECALQUE	6"/6"	POLEGADAS