

Dedicated Outdoor Air System (DOAS) Sizing Summary for BIBLIOTECA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

Air System Information

Air System Name **BIBLIOTECA**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **1**
Floor Area **55.6** m²
Location **Rio de Janeiro, Brazil**

Sizing Calculation Information

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

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

Ventilation Fan Sizing Data

Actual max L/s **108** L/s
Standard L/s **108** L/s
Actual max L/(s·m²) **1.95** L/(s·m²)

Fan motor BHP **0.00** BHP
Fan motor kW **0.00** kW
Fan static **0** Pa

Outdoor Ventilation Air Data

Design airflow L/s **108** L/s
L/(s·m²) **1.95** L/(s·m²)

L/s/person **7.22** L/s/person

Zone Sizing Summary for BIBLIOTECA

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Air System Information

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Number of zones **1**
Floor Area **55.6** m²
Location **Rio de Janeiro, Brazil**

Sizing Calculation Information

Calculation 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 @ 5.6 K (L/s)	Time of Peak Coil Load	Zone L/(s·m ²)
Zone 1	18.1	15.0	26.0 / 18.4	13.6 / 12.9	-	Dec 1600	18.08

Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @11.1 K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 1	3.0	20.3 / 22.7	-	1005	0.000	0.000	108

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	13.2	Jan 1700	2.4	55.6

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m ²)	Space L/(s·m ²)
Zone 1							
11 BIBLIOTECA	1	13.2	Jan 1700	1005	2.4	55.6	18.08

Ventilation Sizing Summary for BIBLIOTECA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
 09:30

1. Summary

Ventilation Sizing Method **Sum of Space OA Airflows**
 Design Ventilation Airflow Rate **108** 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									
11 BIBLIOTECA	1	55.6	15.0	1005.4	5.00	0.60	0.0	0.0	108.4
Totals (incl. Space Multipliers)				1005.4					108.4

Air System Design Load Summary for BIBLIOTECA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 38.0 °C / 26.0 °C			HEATING OA DB / WB 15.0 °C / 9.7 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	26 m²	3897	-	26 m²	-	-
Wall Transmission	62 m²	2473	-	62 m²	939	-
Roof Transmission	31 m²	1165	-	31 m²	299	-
Window Transmission	26 m²	2210	-	26 m²	1088	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	31 m²	0	-	31 m²	50	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	834 W	735	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	598 W	566	-	0	0	-
People	15	877	902	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 5%	1192	45	0%	0	0
>> Total Zone Loads	-	13115	947	-	2376	0
Zone Conditioning	-	13197	947	-	2227	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	108 L/s	0	-	108 L/s	0	-
Ventilation Load	108 L/s	1765	2231	108 L/s	772	0
Ventilation Fan Load	108 L/s	0	-	108 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	14962	3178	-	2999	0
Terminal Unit Cooling	-	14962	3179	-	0	0
Terminal Unit Heating	-	0	-	-	2999	-
>> Total Conditioning	-	14962	3179	-	2999	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Psychrometrics for BIBLIOTECA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
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December 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	38.0	0.01631	108	400	1765	2231
Vent - Return Mixing	Outlet	38.0	0.01631	108	0	-	-
Ventilation Fan	Outlet	38.0	0.01631	108	400	0	-
Cold Supply Duct	Outlet	38.0	0.01631	108	400	0	-
Zone Air	-	24.5	0.00932	108	1184	13197	947
Return Plenum	Outlet	24.5	0.00932	108	1184	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2945.5 W/(L/s)

Site Altitude = 5.8 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	-	-	-	108	-	-	-
Cooling Coil Inlet	-	26.0	0.01008	1005	0	-	-
Cooling Coil Outlet	-	13.6	0.00901	1005	0	14962	3179
Heating Coil Inlet	-	13.6	0.00901	1005	0	-	-
Heating Coil Outlet	-	13.6	0.00901	1005	0	0	-
Zone Air	-	24.5	0.00932	1005	1184	13197	-

System Psychrometrics for BIBLIOTECA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
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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	15.0	0.00528	108	400	-772	0
Vent - Return Mixing	Outlet	15.0	0.00528	108	0	-	-
Ventilation Fan	Outlet	15.0	0.00528	108	400	0	-
Cold Supply Duct	Outlet	15.0	0.00528	108	400	0	-
Zone Air	-	20.9	0.00528	108	400	-2227	0
Return Plenum	Outlet	20.9	0.00528	108	400	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2945.5 W/(L/s)

Site Altitude = 5.8 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	-	-	-	108	-	-	-
Cooling Coil Inlet	-	20.3	0.00528	1005	0	-	-
Cooling Coil Outlet	-	20.3	0.00528	1005	0	0	0
Heating Coil Inlet	-	20.3	0.00528	1005	0	-	-
Heating Coil Outlet	-	22.7	0.00528	1005	0	2999	-
Zone Air	-	20.9	0.00528	1005	400	-2227	-

Dedicated Outdoor Air System (DOAS) Sizing Summary for ESTÚDIO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

Air System Information

Air System Name **ESTÚDIO**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **1**
Floor Area **6.3** m²
Location **Rio de Janeiro, Brazil**

Sizing Calculation Information

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

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

NOTE: No other data is applicable for a Terminal Units air system without a Dedicated Outdoor Air System (DOAS).

Zone Sizing Summary for ESTÚDIO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

Air System Information

Air System Name **ESTÚDIO**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **1**
Floor Area **6.3** m²
Location **Rio de Janeiro, Brazil**

Sizing Calculation Information

Calculation 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 @ 5.6 K (L/s)	Time of Peak Coil Load	Zone L/(s·m ²)
Zone 1	2.0	1.6	25.9 / 18.7	14.0 / 13.3	-	Dec 1900	17.36

Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @11.1 K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 1	0.4	20.3 / 23.2	-	109	0.000	0.000	14

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	1.4	Dec 1900	0.3	6.3

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m ²)	Space L/(s·m ²)
Zone 1							
04 ESTUDIO	1	1.4	Dec 1900	109	0.3	6.3	17.36

Ventilation Sizing Summary for ESTÚDIO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
 09:30

1. Summary

Ventilation Sizing Method Sum of Space OA Airflows

2. Space Ventilation Analysis

2.1 Zone: Zone 1

Zone Name / Space Name	Mult.	Floor Area (m ²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m ²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
04 ESTUDIO	1	6.3	2.0	109.4	5.00	0.60	0.0	0.0	13.8
Totals (incl. Space Multipliers)				109.4					13.8

Air System Design Load Summary for ESTÚDIO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1900			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 34.7 °C / 25.2 °C			HEATING OA DB / WB 15.0 °C / 9.7 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	0 m ²	0	-	0 m ²	-	-
Wall Transmission	14 m ²	770	-	14 m ²	209	-
Roof Transmission	6 m ²	265	-	6 m ²	60	-
Window Transmission	0 m ²	0	-	0 m ²	0	-
Skylight Transmission	0 m ²	0	-	0 m ²	0	-
Door Loads	0 m ²	0	-	0 m ²	0	-
Floor Transmission	6 m ²	0	-	6 m ²	12	-
Partitions	0 m ²	0	-	0 m ²	0	-
Ceiling	0 m ²	0	-	0 m ²	0	-
Overhead Lighting	95 W	85	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	68 W	65	-	0	0	-
People	2	122	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 5%	131	6	0%	0	0
>> Total Zone Loads	-	1439	126	-	281	0
Zone Conditioning	-	1414	126	-	285	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	0 L/s	0	-	0 L/s	0	-
Ventilation Load	14 L/s	166	271	14 L/s	100	0
Ventilation Fan Load	0 L/s	0	-	0 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	1581	397	-	385	0
Terminal Unit Cooling	-	1581	400	-	0	0
Terminal Unit Heating	-	0	-	-	385	-
>> Total Conditioning	-	1581	400	-	385	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Psychrometrics for ESTÚDIO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
 09:30

December DESIGN COOLING DAY, 1900

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	34.7	0.01631	14	400	166	271
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	24.7	0.00964	109	104	1414	126
Return Plenum	Outlet	-17.8	0.00964	109	104	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2945.5 W/(L/s)

Site Altitude = 5.8 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	-	-	-	14	-	-	-
Cooling Coil Inlet	-	25.9	0.01049	109	0	-	-
Cooling Coil Outlet	-	14.0	0.00925	109	0	1581	400
Heating Coil Inlet	-	14.0	0.00925	109	0	-	-
Heating Coil Outlet	-	14.0	0.00925	109	0	0	-
Zone Air	-	24.7	0.00964	109	0	1414	-

System Psychrometrics for ESTÚDIO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
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07/20/2024
09:30

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	15.0	0.00528	14	400	-100	0
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	21.0	0.00528	109	0	-285	0
Return Plenum	Outlet	-17.8	0.00528	109	0	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2945.5 W/(L/s)

Site Altitude = 5.8 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	-	-	-	14	-	-	-
Cooling Coil Inlet	-	20.3	0.00528	109	0	-	-
Cooling Coil Outlet	-	20.3	0.00528	109	0	0	0
Heating Coil Inlet	-	20.3	0.00528	109	0	-	-
Heating Coil Outlet	-	23.2	0.00528	109	0	385	-
Zone Air	-	21.0	0.00528	109	0	-285	-

Dedicated Outdoor Air System (DOAS) Sizing Summary for INCUBADORA CULTURA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

Air System Information

Air System Name **INCUBADORA CULTURA**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **1**
Floor Area **24.8** m²
Location **Rio de Janeiro, Brazil**

Sizing Calculation Information

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

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

NOTE: No other data is applicable for a Terminal Units air system without a Dedicated Outdoor Air System (DOAS).

Zone Sizing Summary for INCUBADORA CULTURA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
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Air System Information

Air System Name **INCUBADORA CULTURA**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **1**
Floor Area **24.8** m²
Location **Rio de Janeiro, Brazil**

Sizing Calculation Information

Calculation 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 @ 5.6 K (L/s)	Time of Peak Coil Load	Zone L/(s·m ²)
Zone 1	9.0	7.5	25.8 / 18.2	13.6 / 12.9	-	Dec 1600	20.75

Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @11.1 K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 1	1.7	20.5 / 23.3	-	514	0.000	0.000	50

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	6.8	Dec 1700	1.4	24.8

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							
13 INCUBADORA CULTURAL	1	6.8	Dec 1700	514	1.4	24.8	20.75

Ventilation Sizing Summary for INCUBADORA CULTURA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
 09:30

1. Summary

Ventilation Sizing Method Sum of Space OA Airflows

2. Space Ventilation Analysis

2.1 Zone: Zone 1

Zone Name / Space Name	Mult.	Floor Area (m ²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m ²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
13 INCUBADORA CULTURAL	1	24.8	7.0	514.5	5.00	0.60	0.0	0.0	49.9
Totals (incl. Space Multipliers)				514.5					49.9

Air System Design Load Summary for INCUBADORA CULTURA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
 09:30

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1600			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 38.0 °C / 26.0 °C			HEATING OA DB / WB 15.0 °C / 9.7 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	18 m²	1646	-	18 m²	-	-
Wall Transmission	21 m²	960	-	21 m²	320	-
Roof Transmission	25 m²	926	-	25 m²	238	-
Window Transmission	18 m²	1561	-	18 m²	768	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	25 m²	0	-	25 m²	41	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	372 W	328	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	267 W	253	-	0	0	-
People	7	409	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 5%	608	21	0%	0	0
>> Total Zone Loads	-	6690	442	-	1366	0
Zone Conditioning	-	6731	442	-	1384	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	0 L/s	0	-	0 L/s	0	-
Ventilation Load	50 L/s	817	1035	50 L/s	364	0
Ventilation Fan Load	0 L/s	0	-	0 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	7548	1476	-	1748	0
Terminal Unit Cooling	-	7548	1483	-	0	0
Terminal Unit Heating	-	0	-	-	1748	-
>> Total Conditioning	-	7548	1483	-	1748	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Psychrometrics for INCUBADORA CULTURA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
 09:30

December 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	38.0	0.01631	50	400	817	1035
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	24.4	0.00927	514	77	6731	442
Return Plenum	Outlet	-17.8	0.00927	514	77	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2945.5 W/(L/s)

Site Altitude = 5.8 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	-	-	-	50	-	-	-
Cooling Coil Inlet	-	25.8	0.00996	514	0	-	-
Cooling Coil Outlet	-	13.6	0.00898	514	0	7548	1483
Heating Coil Inlet	-	13.6	0.00898	514	0	-	-
Heating Coil Outlet	-	13.6	0.00898	514	0	0	-
Zone Air	-	24.4	0.00927	514	0	6731	-

System Psychrometrics for INCUBADORA CULTURA

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

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	15.0	0.00528	50	400	-364	0
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	21.0	0.00528	514	0	-1384	0
Return Plenum	Outlet	-17.8	0.00528	514	0	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2945.5 W/(L/s)

Site Altitude = 5.8 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	-	-	-	50	-	-	-
Cooling Coil Inlet	-	20.5	0.00528	514	0	-	-
Cooling Coil Outlet	-	20.5	0.00528	514	0	0	0
Heating Coil Inlet	-	20.5	0.00528	514	0	-	-
Heating Coil Outlet	-	23.3	0.00528	514	0	1748	-
Zone Air	-	21.0	0.00528	514	0	-1384	-

Dedicated Outdoor Air System (DOAS) Sizing Summary for SALA MULTIUSO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

Air System Information

Air System Name **SALA MULTIUSO**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **1**
Floor Area **31.2** m²
Location **Rio de Janeiro, Brazil**

Sizing Calculation Information

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

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

NOTE: No other data is applicable for a Terminal Units air system without a Dedicated Outdoor Air System (DOAS).

Zone Sizing Summary for SALA MULTIUSO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

Air System Information

Air System Name **SALA MULTIUSO**
Equipment Class **TERM**
Air System Type **SPLT-FC**

Number of zones **1**
Floor Area **31.2** m²
Location **Rio de Janeiro, Brazil**

Sizing Calculation Information

Calculation 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 @ 5.6 K (L/s)	Time of Peak Coil Load	Zone L/(s·m ²)
Zone 1	10.3	8.7	25.7 / 18.1	13.6 / 12.9	-	Dec 1600	19.09

Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @11.1 K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 1	2.0	20.6 / 23.4	-	596	0.000	0.000	54

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	7.8	Dec 1600	1.6	31.2

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							
14 SALA MULTIUSO	1	7.8	Dec 1600	596	1.6	31.2	19.09

Ventilation Sizing Summary for SALA MULTIUSO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
 09:30

1. Summary

Ventilation Sizing Method Sum of Space OA Airflows

2. Space Ventilation Analysis

2.1 Zone: Zone 1

Zone Name / Space Name	Mult.	Floor Area (m ²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m ²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
14 SALA MULTIUSO	1	31.2	7.0	595.6	5.00	0.60	0.0	0.0	53.7
Totals (incl. Space Multipliers)				595.6					53.7

Air System Design Load Summary for SALA MULTIUSO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1600 COOLING OA DB / WB 38.0 °C / 26.0 °C			HEATING DATA AT DES HTG HEATING OA DB / WB 15.0 °C / 9.7 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	20 m²	1940	-	20 m²	-	-
Wall Transmission	26 m²	1156	-	26 m²	401	-
Roof Transmission	31 m²	1165	-	31 m²	299	-
Window Transmission	20 m²	1720	-	20 m²	846	-
Skylight Transmission	0 m²	0	-	0 m²	0	-
Door Loads	0 m²	0	-	0 m²	0	-
Floor Transmission	31 m²	0	-	31 m²	50	-
Partitions	0 m²	0	-	0 m²	0	-
Ceiling	0 m²	0	-	0 m²	0	-
Overhead Lighting	468 W	412	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	336 W	318	-	0	0	-
People	7	409	421	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 5%	712	21	0%	0	0
>> Total Zone Loads	-	7832	442	-	1597	0
Zone Conditioning	-	7853	442	-	1643	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	0 L/s	0	-	0 L/s	0	-
Ventilation Load	54 L/s	875	1123	54 L/s	396	0
Ventilation Fan Load	0 L/s	0	-	0 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	8728	1565	-	2039	0
Terminal Unit Cooling	-	8728	1568	-	0	0
Terminal Unit Heating	-	0	-	-	2039	-
>> Total Conditioning	-	8728	1568	-	2039	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Psychrometrics for SALA MULTIUSO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

December 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	38.0	0.01631	54	400	875	1123
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	24.5	0.00921	596	67	7853	442
Return Plenum	Outlet	-17.8	0.00921	596	67	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2945.5 W/(L/s)

Site Altitude = 5.8 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	-	-	-	54	-	-	-
Cooling Coil Inlet	-	25.7	0.00986	596	0	-	-
Cooling Coil Outlet	-	13.6	0.00897	596	0	8728	1568
Heating Coil Inlet	-	13.6	0.00897	596	0	-	-
Heating Coil Outlet	-	13.6	0.00897	596	0	0	-
Zone Air	-	24.5	0.00921	596	0	7853	-

System Psychrometrics for SALA MULTIUSO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

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	15.0	0.00528	54	400	-396	0
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	21.1	0.00528	596	0	-1643	0
Return Plenum	Outlet	-17.8	0.00528	596	0	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2945.5 W/(L/s)

Site Altitude = 5.8 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 (Deadband)							
Ventilation Air	-	-	-	54	-	-	-
Cooling Coil Inlet	-	20.6	0.00528	596	0	-	-
Cooling Coil Outlet	-	20.6	0.00528	596	0	0	0
Heating Coil Inlet	-	20.6	0.00528	596	0	-	-
Heating Coil Outlet	-	23.4	0.00528	596	0	2039	-
Zone Air	-	21.1	0.00528	596	0	-1643	-

Dedicated Outdoor Air System (DOAS) Sizing Summary for SECRETARIA/RECEPCAO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

Air System Information

Air System Name SECRETARIA/RECEPCAO
Equipment Class TERM
Air System Type SPLT-FC

Number of zones 1
Floor Area 10.0 m²
Location Rio de Janeiro, Brazil

Sizing Calculation Information

Calculation Months Jan to Dec
Sizing Data Calculated

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

NOTE: No other data is applicable for a Terminal Units air system without a Dedicated Outdoor Air System (DOAS).

Zone Sizing Summary for SECRETARIA/RECEPCAO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

Air System Information

Air System Name SECRETARIA/RECEPCAO
Equipment Class TERM
Air System Type SPLT-FC

Number of zones 1
Floor Area 10.0 m²
Location Rio de Janeiro, Brazil

Sizing Calculation Information

Calculation 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 @ 5.6 K (L/s)	Time of Peak Coil Load	Zone L/(s·m ²)
Zone 1	3.2	2.7	25.6 / 18.1	13.7 / 13.0	-	Dec 1700	19.12

Terminal Unit Sizing Data - Heating, Fan, Ventilation

Zone Name	Heating Coil Load (kW)	Heating Coil Ent/Lvg DB (°C)	Htg Coil Water Flow @11.1 K (L/s)	Fan Design Airflow (L/s)	Fan Motor (BHP)	Fan Motor (kW)	OA Vent Design Airflow (L/s)
Zone 1	0.6	20.6 / 23.3	-	191	0.000	0.000	16

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	2.5	Jan 1700	0.5	10.0

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (kW)	Time of Peak Sensible Load	Air Flow (L/s)	Heating Load (kW)	Floor Area (m ²)	Space L/(s·m ²)
Zone 1							
01 SECRETARIA/RECEPCAO	1	2.5	Jan 1700	191	0.5	10.0	19.12

Ventilation Sizing Summary for SECRETARIA/RECEPCAO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
 09:30

1. Summary

Ventilation Sizing Method Sum of Space OA Airflows

2. Space Ventilation Analysis

2.1 Zone: Zone 1

Zone Name / Space Name	Mult.	Floor Area (m ²)	Maximum Occupants	Maximum Supply Air (L/s)	Required Outdoor Air (L/s/person)	Required Outdoor Air (L/(s·m ²))	Required Outdoor Air (L/s)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (L/s)
Zone 1									
01 SECRETARIA/RECEPCAO	1	10.0	2.0	191.2	5.00	0.60	0.0	0.0	16.0
Totals (incl. Space Multipliers)				191.2					16.0

Air System Design Load Summary for SECRETARIA/RECEPCAO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
 09:30

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Dec 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 37.3 °C / 25.8 °C			HEATING OA DB / WB 15.0 °C / 9.7 °C		
ZONE LOADS	Details	Sensible (W)	Latent (W)	Details	Sensible (W)	Latent (W)
Window & Skylight Solar Loads	1 m ²	421	-	1 m ²	-	-
Wall Transmission	22 m ²	992	-	22 m ²	328	-
Roof Transmission	10 m ²	390	-	10 m ²	96	-
Window Transmission	1 m ²	111	-	1 m ²	56	-
Skylight Transmission	0 m ²	0	-	0 m ²	0	-
Door Loads	0 m ²	0	-	0 m ²	0	-
Floor Transmission	6 m ²	0	-	6 m ²	14	-
Partitions	0 m ²	0	-	0 m ²	0	-
Ceiling	0 m ²	0	-	0 m ²	0	-
Overhead Lighting	150 W	133	-	0	0	-
Task Lighting	0 W	0	-	0	0	-
Electric Equipment	108 W	102	-	0	0	-
People	2	119	120	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 5%	227	6	0%	0	0
>> Total Zone Loads	-	2494	126	-	494	0
Zone Conditioning	-	2494	126	-	508	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	0 L/s	0	-	0 L/s	0	-
Ventilation Load	16 L/s	246	332	16 L/s	118	0
Ventilation Fan Load	0 L/s	0	-	0 L/s	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	2741	459	-	625	0
Terminal Unit Cooling	-	2741	461	-	0	0
Terminal Unit Heating	-	0	-	-	625	-
>> Total Conditioning	-	2741	461	-	625	0
Key:	Positive values are clg loads Negative values are htg loads			Positive values are htg loads Negative values are clg loads		

System Psychrometrics for SECRETARIA/RECEPCAO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
Prepared by: Carvalho

07/20/2024
09:30

December 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	37.3	0.01631	16	400	246	332
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	24.5	0.00926	191	59	2494	126
Return Plenum	Outlet	-17.8	0.00926	191	59	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2945.5 W/(L/s)

Site Altitude = 5.8 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	-	-	-	16	-	-	-
Cooling Coil Inlet	-	25.6	0.00986	191	0	-	-
Cooling Coil Outlet	-	13.7	0.00904	191	0	2741	461
Heating Coil Inlet	-	13.7	0.00904	191	0	-	-
Heating Coil Outlet	-	13.7	0.00904	191	0	0	-
Zone Air	-	24.5	0.00926	191	0	2494	-

System Psychrometrics for SECRETARIA/RECEPCAO

Project Name: MÓDULO OBRIGATÓRIO EDIFICADO
 Prepared by: Carvalho

07/20/2024
 09:30

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	15.0	0.00528	16	400	-118	0
Vent - Return Mixing	Outlet	-17.8	0.00000	0	0	-	-
Ventilation Fan	Outlet	-17.8	0.00000	0	0	0	-
Zone Air	-	21.1	0.00528	191	0	-508	0
Return Plenum	Outlet	-17.8	0.00528	191	0	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.207; At site altitude = 1.206 W/(L/s-K)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 2947.6; At site altitude = 2945.5 W/(L/s)

Site Altitude = 5.8 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	-	-	-	16	-	-	-
Cooling Coil Inlet	-	20.6	0.00528	191	0	-	-
Cooling Coil Outlet	-	20.6	0.00528	191	0	0	0
Heating Coil Inlet	-	20.6	0.00528	191	0	-	-
Heating Coil Outlet	-	23.3	0.00528	191	0	625	-
Zone Air	-	21.1	0.00528	191	0	-508	-