

Air System Sizing Summary for HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

Air System Information

Air System Name HVAC
Equipment Class SPLT AHU
Air System Type SZCAV

Number of zones 1
Floor Area 1774.0 ft²
Location Carnaby, United Kingdom

Sizing Calculation Information

Calculation Months Jan to Dec
Sizing Data Calculated

Zone CFM Sizing Sum of space airflow rates
Space CFM Sizing Individual peak space loads

Central Cooling Coil Sizing Data

Total coil load 2.6 Tons
Total coil load 30.7 MBH
Sensible coil load 27.5 MBH
Coil CFM at Jun 1800 1393 CFM
Max block CFM 1393 CFM
Sum of peak zone CFM 1393 CFM
Sensible heat ratio 0.895
CFM/Ton 543.8
ft²/Ton 692.5
BTU/(hr-ft²) 17.3
Water flow @ 10.0 °F rise N/A

Load occurs at Jun 1800
OA DB / WB 67.3 / 60.9 °F
Entering DB / WB 76.2 / 63.8 °F
Leaving DB / WB 57.7 / 56.3 °F
Coil ADP 55.2 °F
Bypass Factor 0.120
Resulting RH 51 %
Design supply temp. 55.0 °F
Zone T-stat Check 1 of 1 OK
Max zone temperature deviation 0.0 °F

Central Heating Coil Sizing Data

Max coil load 19.3 MBH
Coil CFM at Des Htg 1393 CFM
Max coil CFM 1393 CFM
Water flow @ 20.0 °F drop N/A

Load occurs at Des Htg
BTU/(hr-ft²) 10.9
Ent. DB / Lvg DB 69.3 / 82.2 °F

Supply Fan Sizing Data

Actual max CFM 1393 CFM
Standard CFM 1382 CFM
Actual max CFM/ft² 0.79 CFM/ft²

Fan motor BHP 0.00 BHP
Fan motor kW 0.00 kW
Fan static 0.00 in wg

Outdoor Ventilation Air Data

Design airflow CFM 0 CFM
CFM/ft² 0.00 CFM/ft²

CFM/person 0.00 CFM/person

Zone Sizing Summary for HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

Air System Information

Air System Name HVAC
Equipment Class SPLT AHU
Air System Type SZCAV

Number of zones 1
Floor Area 1774.0 ft²
Location Carnaby, United Kingdom

Sizing Calculation Information

Calculation Months Jan to Dec
Sizing Data Calculated

Zone CFM Sizing Sum of space airflow rates
Space CFM Sizing Individual peak space loads

Zone Terminal Sizing Data

Zone Name	Design Supply Airflow (CFM)	Minimum Supply Airflow (CFM)	Zone CFM/ft ²	Reheat Coil Load (MBH)	Reheat Coil Water gpm @ 20.0 °F	Zone Htg Unit Coil Load (MBH)	Zone Htg Unit Water gpm @ 20.0 °F	Mixing Box Fan Airflow (CFM)
Zone 1	1393	1393	0.79	0.0	-	0.0	-	0

Zone Peak Sensible Loads

Zone Name	Zone Cooling Sensible (MBH)	Time of Peak Sensible Cooling Load	Zone Heating Load (MBH)	Zone Floor Area (ft ²)
Zone 1	29.8	Jun 1700	20.2	1774.0

Space Loads and Airflows

Zone Name / Space Name	Mult.	Cooling Sensible (MBH)	Time of Peak Sensible Load	Air Flow (CFM)	Heating Load (MBH)	Floor Area (ft ²)	Space CFM/ft ²
Zone 1							
Meeting Room	1	11.5	Jun 1800	538	7.2	754.0	0.71
Vacant Space 1	1	9.7	Jun 1700	453	6.6	570.0	0.80
Vacant Space 2	1	8.6	Jun 1700	401	6.4	450.0	0.89

Ventilation Sizing Summary for HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

1. Summary

Ventilation Sizing Method Sum of Space OA Airflows
Design Ventilation Airflow Rate 0 CFM

2. Space Ventilation Analysis

Zone Name / Space Name	Mult.	Floor Area (ft²)	Maximum Occupants	Maximum Supply Air (CFM)	Required Outdoor Air (CFM/person)	Required Outdoor Air (CFM/ft²)	Required Outdoor Air (CFM)	Required Outdoor Air (% of supply)	Uncorrected Outdoor Air (CFM)
Zone 1									
Meeting Room	1	754.0	5.0	538.4	0.00	0.00	0.0	0.0	0.0
Vacant Space 1	1	570.0	5.0	453.4	0.00	0.00	0.0	0.0	0.0
Vacant Space 2	1	450.0	5.0	401.1	0.00	0.00	0.0	0.0	0.0
Totals (incl. Space Multipliers)				1393.0					0.0

Engineer's Team

Air System Design Load Summary for HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1800 COOLING OA DB / WB 67.3 °F / 60.9 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 22.0 °F / 18.4 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	108 ft²	8518	-	108 ft²	-	-
Wall Transmission	2694 ft²	1239	-	2694 ft²	11781	-
Roof Transmission	1774 ft²	1997	-	1774 ft²	2669	-
Window Transmission	108 ft²	-558	-	108 ft²	3048	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	190 ft²	-501	-	190 ft²	2736	-
Floor Transmission	1466 ft²	0	-	1466 ft²	0	-
Partitions	1258 ft²	0	-	1258 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1774 W	5009	-	0	0	-
Task Lighting	1774 W	5473	-	0	0	-
Electric Equipment	600 W	1890	-	0	0	-
People	15	2883	3075	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	3892	154	0%	0	0
>> Total Zone Loads	-	29842	3229	-	20234	0
Zone Conditioning	-	27510	3229	-	19316	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	1393 CFM	0	-	1393 CFM	0	-
Ventilation Load	0 CFM	0	0	0 CFM	0	0
Supply Fan Load	1393 CFM	0	-	1393 CFM	0	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	0%	0	-	0%	0	-
>> Total System Loads	-	27510	3229	-	19316	0
Central Cooling Coil	-	27510	3230	-	0	0
Central Heating Coil	-	0	-	-	19316	-
>> Total Conditioning	-	27510	3230	-	19316	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 HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

Zone 1	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 68.7 °F / 61.5 °F			HEATING OA DB / WB 22.0 °F / 18.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	108 ft²	8609	-	108 ft²	-	-
Wall Transmission	2694 ft²	1038	-	2694 ft²	11781	-
Roof Transmission	1774 ft²	2187	-	1774 ft²	2669	-
Window Transmission	108 ft²	-503	-	108 ft²	3048	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	190 ft²	-452	-	190 ft²	2736	-
Floor Transmission	1466 ft²	0	-	1466 ft²	0	-
Partitions	1258 ft²	0	-	1258 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1774 W	4936	-	0	0	-
Task Lighting	1774 W	5432	-	0	0	-
Electric Equipment	600 W	1879	-	0	0	-
People	15	2828	3075	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	3893	154	0%	0	0
>> Total Zone Loads	-	29846	3229	-	20234	0

Space Design Load Summary for HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

TABLE 1.1.A. Component Loads For Space "Meeting Room" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1800			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 67.3 °F / 60.9 °F			HEATING OA DB / WB 22.0 °F / 18.4 °F		
	OCCUPIED T-STAT 75.0 °F			OCCUPIED T-STAT 70.0 °F		
SPACE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	36 ft²	2839	-	36 ft²	-	-
Wall Transmission	1027 ft²	585	-	1027 ft²	4491	-
Roof Transmission	754 ft²	849	-	754 ft²	1134	-
Window Transmission	36 ft²	-186	-	36 ft²	1016	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	37 ft²	-98	-	37 ft²	533	-
Floor Transmission	448 ft²	0	-	448 ft²	0	-
Partitions	300 ft²	0	-	300 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	754 W	2129	-	0	0	-
Task Lighting	754 W	2326	-	0	0	-
Electric Equipment	200 W	630	-	0	0	-
People	5	961	1025	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	1505	51	0%	0	0
>> Total Zone Loads	-	11541	1076	-	7174	0

TABLE 1.1.B. Envelope Loads For Space "Meeting Room" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	193	0.091	-	-60	-	844
DOOR	37	0.300	-	-98	-	533
S EXPOSURE						
WALL	290	0.091	-	222	-	1268
E EXPOSURE						
WALL	290	0.091	-	309	-	1268
W EXPOSURE						
WALL	254	0.091	-	114	-	1111
WINDOW 1	36	0.588	0.811	-186	2839	1016
H EXPOSURE						
ROOF	754	0.031	-	849	-	1134

Space Design Load Summary for HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

TABLE 1.2.A. Component Loads For Space "Vacant Space 1" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700 COOLING OA DB / WB 68.7 °F / 61.5 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 22.0 °F / 18.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	36 ft²	2870	-	36 ft²	-	-
Wall Transmission	896 ft²	283	-	896 ft²	3918	-
Roof Transmission	570 ft²	703	-	570 ft²	857	-
Window Transmission	36 ft²	-168	-	36 ft²	1016	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	58 ft²	-138	-	58 ft²	835	-
Floor Transmission	570 ft²	0	-	570 ft²	0	-
Partitions	350 ft²	0	-	350 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	570 W	1586	-	0	0	-
Task Lighting	570 W	1745	-	0	0	-
Electric Equipment	200 W	626	-	0	0	-
People	5	943	1025	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	1268	51	0%	0	0
>> Total Zone Loads	-	9718	1076	-	6627	0

TABLE 1.2.B. Envelope Loads For Space "Vacant Space 1" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	315	0.091	-	-108	-	1377
S EXPOSURE						
WALL	278	0.091	-	176	-	1216
DOOR	37	0.300	-	-88	-	533
E EXPOSURE						
WALL	159	0.091	-	166	-	695
DOOR	21	0.300	-	-50	-	302
W EXPOSURE						
WALL	144	0.091	-	49	-	630
WINDOW 1	36	0.588	0.811	-168	2870	1016
H EXPOSURE						
ROOF	570	0.031	-	703	-	857

Space Design Load Summary for HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

TABLE 1.3.A. Component Loads For Space "Vacant Space 2" In Zone "Zone 1"

	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Jun 1700 COOLING OA DB / WB 68.7 °F / 61.5 °F OCCUPIED T-STAT 75.0 °F			HEATING DATA AT DES HTG HEATING OA DB / WB 22.0 °F / 18.4 °F OCCUPIED T-STAT 70.0 °F		
		Sensible (BTU/hr)	Latent (BTU/hr)		Sensible (BTU/hr)	Latent (BTU/hr)
SPACE LOADS	Details			Details		
Window & Skylight Solar Loads	36 ft²	2870	-	36 ft²	-	-
Wall Transmission	771 ft²	247	-	771 ft²	3372	-
Roof Transmission	450 ft²	555	-	450 ft²	677	-
Window Transmission	36 ft²	-168	-	36 ft²	1016	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	95 ft²	-226	-	95 ft²	1368	-
Floor Transmission	448 ft²	0	-	448 ft²	0	-
Partitions	608 ft²	0	-	608 ft²	0	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	450 W	1252	-	0	0	-
Task Lighting	450 W	1378	-	0	0	-
Electric Equipment	200 W	626	-	0	0	-
People	5	943	1025	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	15% / 5%	1122	51	0%	0	0
>> Total Zone Loads	-	8598	1076	-	6433	0

TABLE 1.3.B. Envelope Loads For Space "Vacant Space 2" In Zone "Zone 1"

	Area (ft²)	U-Value (BTU/(hr-ft²-°F))	Shade Coeff.	COOLING TRANS (BTU/hr)	COOLING SOLAR (BTU/hr)	HEATING TRANS (BTU/hr)
N EXPOSURE						
WALL	267	0.091	-	-92	-	1168
DOOR	37	0.300	-	-88	-	533
S EXPOSURE						
WALL	267	0.091	-	170	-	1168
DOOR	37	0.300	-	-88	-	533
E EXPOSURE						
WALL	126	0.091	-	131	-	551
DOOR	21	0.300	-	-50	-	302
W EXPOSURE						
WALL	111	0.091	-	38	-	485
WINDOW 1	36	0.588	0.811	-168	2870	1016
H EXPOSURE						
ROOF	450	0.031	-	555	-	677

System Psychrometrics for HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

June DESIGN COOLING DAY, 1800

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°F)	Specific Humidity (lb/lb)	Airflow (CFM)	CO2 Level (ppm)	Sensible Heat (BTU/hr)	Latent Heat (BTU/hr)
Ventilation Air	Inlet	67.3	0.01002	0	400	0	0
Vent - Return Mixing	Outlet	76.2	0.00990	1393	3384	-	-
Central Cooling Coil	Outlet	57.7	0.00941	1393	3384	27510	3230
Central Heating Coil	Outlet	57.7	0.00941	1393	3384	0	-
Supply Fan	Outlet	57.7	0.00941	1393	3384	0	-
Cold Supply Duct	Outlet	57.7	0.00941	1393	3384	-	-
Zone Air	-	76.2	0.00990	1393	3384	27510	3229
Return Plenum	Outlet	76.2	0.00990	1393	3384	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.072 BTU/(hr-CFM-F)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4710.2 BTU/(hr-CFM)

Site Altitude = 213.0 ft

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (BTU/hr)	T-stat Mode	Zone Cond (BTU/hr)	Zone Temp (°F)	Zone Airflow (CFM)	CO2 Level (ppm)	Terminal Heating Coil (BTU/hr)	Zone Heating Unit (BTU/hr)
Zone 1	29842	Cooling	27510	76.2	1393	3384	0	0

System Psychrometrics for HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

WINTER DESIGN HEATING

TABLE 1: SYSTEM DATA

Component	Location	Dry-Bulb Temp (°F)	Specific Humidity (lb/lb)	Airflow (CFM)	CO2 Level (ppm)	Sensible Heat (BTU/hr)	Latent Heat (BTU/hr)
Ventilation Air	Inlet	22.0	0.00120	0	400	0	0
Vent - Return Mixing	Outlet	69.3	0.01547	1393	800	-	-
Central Cooling Coil	Outlet	69.3	0.01547	1393	800	0	0
Central Heating Coil	Outlet	82.2	0.01547	1393	800	19316	-
Supply Fan	Outlet	82.2	0.01547	1393	800	0	-
Cold Supply Duct	Outlet	82.2	0.01547	1393	800	-	-
Zone Air	-	69.3	0.01547	1393	800	-19316	0
Return Plenum	Outlet	69.3	0.01547	1393	800	0	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.072 BTU/(hr-CFM-F)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4710.2 BTU/(hr-CFM)

Site Altitude = 213.0 ft

TABLE 2: ZONE DATA

Zone Name	Zone Sensible Load (BTU/hr)	T-stat Mode	Zone Cond (BTU/hr)	Zone Temp (°F)	Zone Airflow (CFM)	CO2 Level (ppm)	Terminal Heating Coil (BTU/hr)	Zone Heating Unit (BTU/hr)
Zone 1	-20234	Heating	-19316	69.3	1393	800	0	0

System Psychrometrics for HVAC

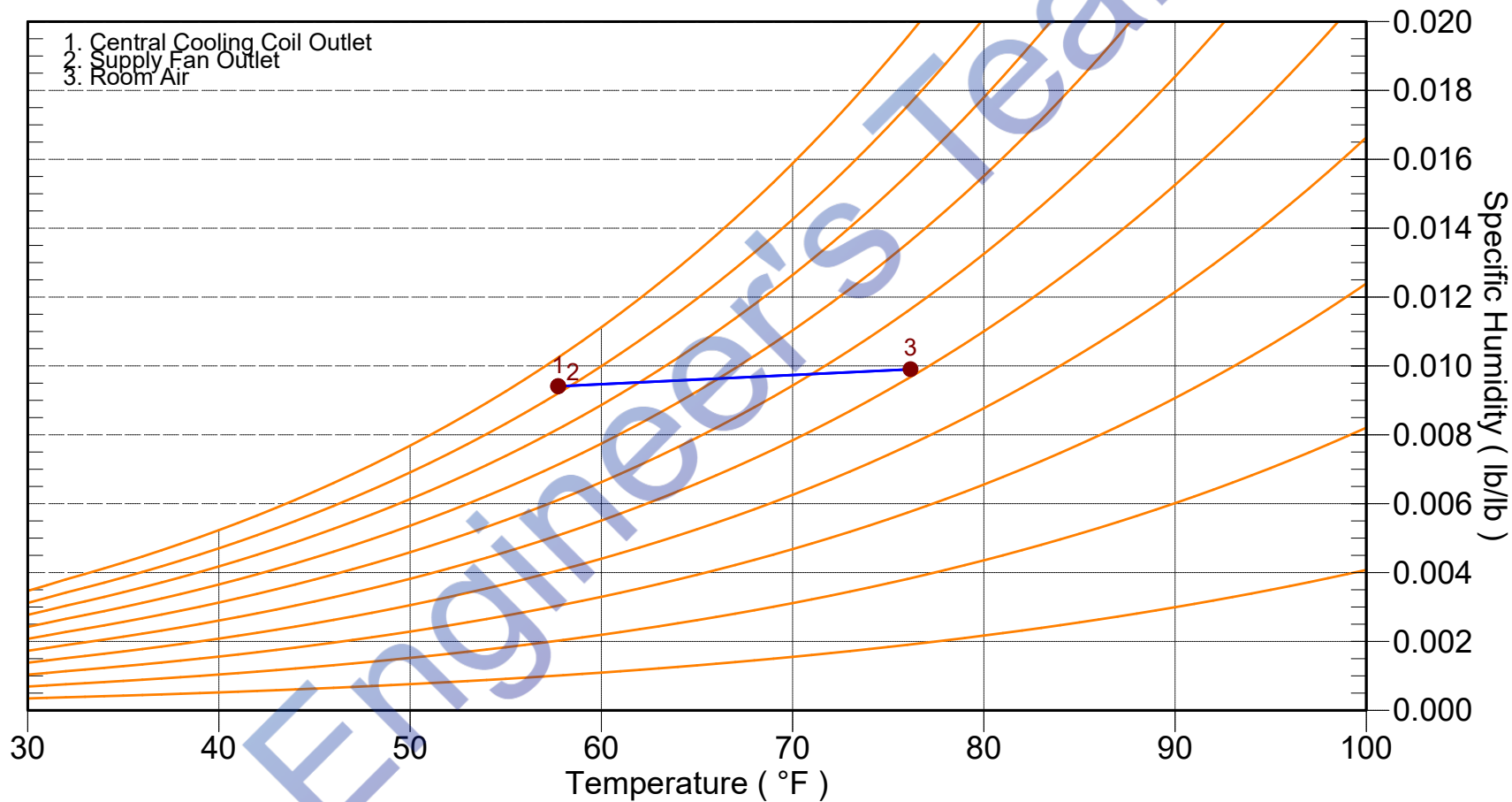
Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

Location: Carnaby, United Kingdom

Altitude: 213.0 ft.

Data for: June DESIGN COOLING DAY, 1800



System Psychrometrics for HVAC

Project Name: Project 124
Prepared by: E Lab

12/06/2024
05:54PM

Location: Carnaby, United Kingdom
Altitude: 213.0 ft.
Data for: WINTER DESIGN HEATING

