

Air System Sizing Summary for Rooftop System

Project Name: SMH Cleanroom_Light
 Prepared by: Winsor & Associates, Inc.

05/16/2010
 09:14PM

Air System Information

Air System Name **Rooftop System**
 Equipment Class **CW AHU**
 Air System Type **SZCAV**

Number of zones **1**
 Floor Area **730.0** ft²
 Location **New Orleans IAP, Louisiana**

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM **Peak zone sensible load**
 Space CFM **Coincident space loads**

Calculation Months **Jan to Dec**
 Sizing Data **User-Modified**

Central Cooling Coil Sizing Data

Total coil load **5.0** Tons
 Total coil load **60.3** MBH
 Sensible coil load **44.6** MBH
 Coil CFM at Sep 1300 **1933** CFM
 Max block CFM **2432** CFM
 Sum of peak zone CFM **2381** CFM
 Sensible heat ratio **0.740**
 ft²/Ton **145.3**
 BTU/(hr-ft²) **82.6**
 Water flow @ 12.0 °F rise **10.05** gpm

Load occurs at **Sep 1300**
 OA DB / WB **89.3 / 77.6** °F
 Entering DB / WB **72.2 / 61.4** °F
 Leaving DB / WB **50.8 / 49.9** °F
 Coil ADP **48.4** °F
 Bypass Factor **0.100**
 Resulting RH **49** %
 Design supply temp. **53.3** °F
 Zone T-stat Check **1 of 1** OK
 Max zone temperature deviation **0.0** °F

Central Heating Coil Sizing Data

Max coil load **9.6** MBH
 Coil CFM at Des Htg **178** CFM
 Max coil CFM **2432** CFM
 Water flow @ 20.0 °F drop **0.96** gpm

Load occurs at **Des Htg**
 BTU/(hr-ft²) **13.1**
 Ent. DB / Lvg DB **63.2 / 113.0** °F

Supply Fan Sizing Data

Actual max CFM **2432** CFM
 Standard CFM **2429** CFM
 Actual max CFM/ft² **3.33** CFM/ft²

Fan motor BHP **2.13** BHP
 Fan motor kW **1.58** kW
 Fan static **3.00** in wg

Outdoor Ventilation Air Data

Design airflow CFM **370** CFM
 CFM/ft² **0.51** CFM/ft²

CFM/person **74.00** CFM/person

Air System Design Load Summary for Rooftop System

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	DESIGN COOLING			DESIGN HEATING		
	COOLING DATA AT Sep 1300			HEATING DATA AT DES HTG		
	COOLING OA DB / WB 89.3 °F / 77.6 °F			HEATING OA DB / WB 30.0 °F / 25.3 °F		
ZONE LOADS	Details	Sensible (BTU/hr)	Latent (BTU/hr)	Details	Sensible (BTU/hr)	Latent (BTU/hr)
Window & Skylight Solar Loads	94 ft²	5185	-	94 ft²	-	-
Wall Transmission	266 ft²	539	-	266 ft²	922	-
Roof Transmission	730 ft²	5524	-	730 ft²	3014	-
Window Transmission	94 ft²	1110	-	94 ft²	2255	-
Skylight Transmission	0 ft²	0	-	0 ft²	0	-
Door Loads	0 ft²	0	-	0 ft²	0	-
Floor Transmission	730 ft²	0	-	730 ft²	525	-
Partitions	715 ft²	1585	-	715 ft²	1320	-
Ceiling	0 ft²	0	-	0 ft²	0	-
Overhead Lighting	1205 W	4110	-	0	0	-
Task Lighting	300 W	1024	-	0	0	-
Electric Equipment	3100 W	10577	-	0	0	-
People	5	1225	1025	0	0	0
Infiltration	-	0	0	-	0	0
Miscellaneous	-	0	0	-	0	0
Safety Factor	10% / 10%	3088	103	10%	804	0
>> Total Zone Loads	-	33967	1128	-	8840	0
Zone Conditioning	-	32930	1128	-	8784	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	2381 CFM	0	-	2381 CFM	0	-
Ventilation Load	300 CFM	6548	14530	28 CFM	1172	0
Supply Fan Load	1933 CFM	4307	-	178 CFM	-397	-
Space Fan Coil Fans	-	0	-	-	0	-
Duct Heat Gain / Loss	3%	827	-	3%	20	-
>> Total System Loads	-	44612	15658	-	9580	0
Central Cooling Coil	-	44612	15670	-	0	0
Central Heating Coil	-	0	-	-	9580	-
>> Total Conditioning	-	44612	15670	-	9580	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 Rooftop System

Project Name: SMH Cleanroom_Light
 Prepared by: Winsor & Associates, Inc.

05/16/2010
 09:14PM

September DESIGN COOLING DAY, 1300

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	89.3	0.01772	300	400	6548	14530
Vent - Return Mixing	Outlet	72.2	0.00910	1933	619	-	-
Central Cooling Coil	Outlet	50.8	0.00739	1933	619	44612	15670
Central Heating Coil	Outlet	50.8	0.00739	1933	619	0	-
Supply Fan	Outlet	52.9	0.00739	1933	619	4307	-
Cold Supply Duct	Outlet	53.3	0.00739	1875	619	-	-
Zone Air	-	69.6	0.00752	1875	661	32930	1128
Return Plenum	Outlet	69.6	0.00752	1875	661	0	-
Duct Leakage Air	Outlet	52.9	0.00741	58	619	-	-
Return Duct	Outlet	69.1	0.00751	2381	660	-	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.079 BTU/(hr-CFM-F)
Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4741.5 BTU/(hr-CFM)
 Site Altitude = 30.0 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	33967	Cooling	32930	69.6	1875	661	0	0

System Psychrometrics for Rooftop System

Project Name: SMH Cleanroom_Light
 Prepared by: Winsor & Associates, Inc.

05/16/2010
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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	30.0	0.00172	28	400	-1172	0
Vent - Return Mixing	Outlet	63.2	0.00172	178	453	-	-
Central Cooling Coil	Outlet	63.2	0.00172	178	453	0	0
Central Heating Coil	Outlet	113.0	0.00172	178	453	9580	-
Supply Fan	Outlet	115.1	0.00172	178	453	397	-
Cold Supply Duct	Outlet	115.0	0.00172	173	453	-	-
Zone Air	-	67.9	0.00172	173	462	-8784	0
Return Plenum	Outlet	67.9	0.00172	173	462	0	-
Duct Leakage Air	Outlet	115.1	0.00172	5	453	-	-
Return Duct	Outlet	69.3	0.00172	2381	462	-	-

Air Density x Heat Capacity x Conversion Factor: At sea level = 1.080; At site altitude = 1.079 BTU/(hr-CFM-F)

Air Density x Heat of Vaporization x Conversion Factor: At sea level = 4746.6; At site altitude = 4741.5 BTU/(hr-CFM)

Site Altitude = 30.0 ft

TABLE 2: ZONE DATA

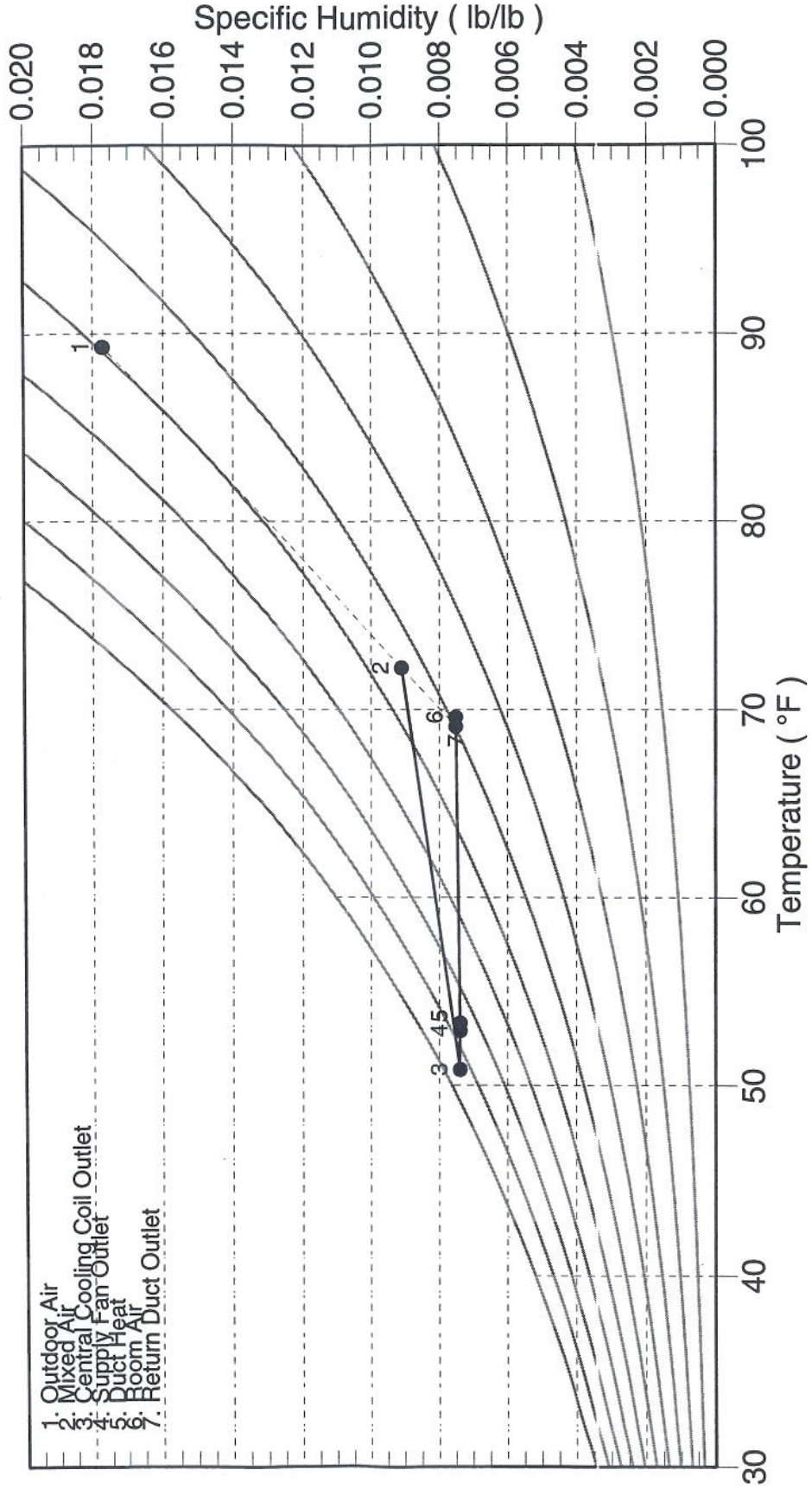
Zone Name	Zone Sensible Load (BTU/hr)	T-stat Mode	Zone Cond (BTU/hr)	Zone Temp (°F)	Zone Airflow (CFM)	CO2 Level (ppm)	Terminal Heating Coil (BTU/hr)	Zone Heating Unit (BTU/hr)
Zone 1	-8840	Heating	-8784	67.9	173	462	0	0

Psychrometric Analysis for Rooftop System

05/16/2010
09:14PM

Project Name: AH Cleanroom_Light
Prepared by: v.v.insor & Associates, Inc.

Location: New Orleans IAP, Louisiana
Altitude: 30.0 ft.
Data for: September DESIGN COOLING DAY, 1300

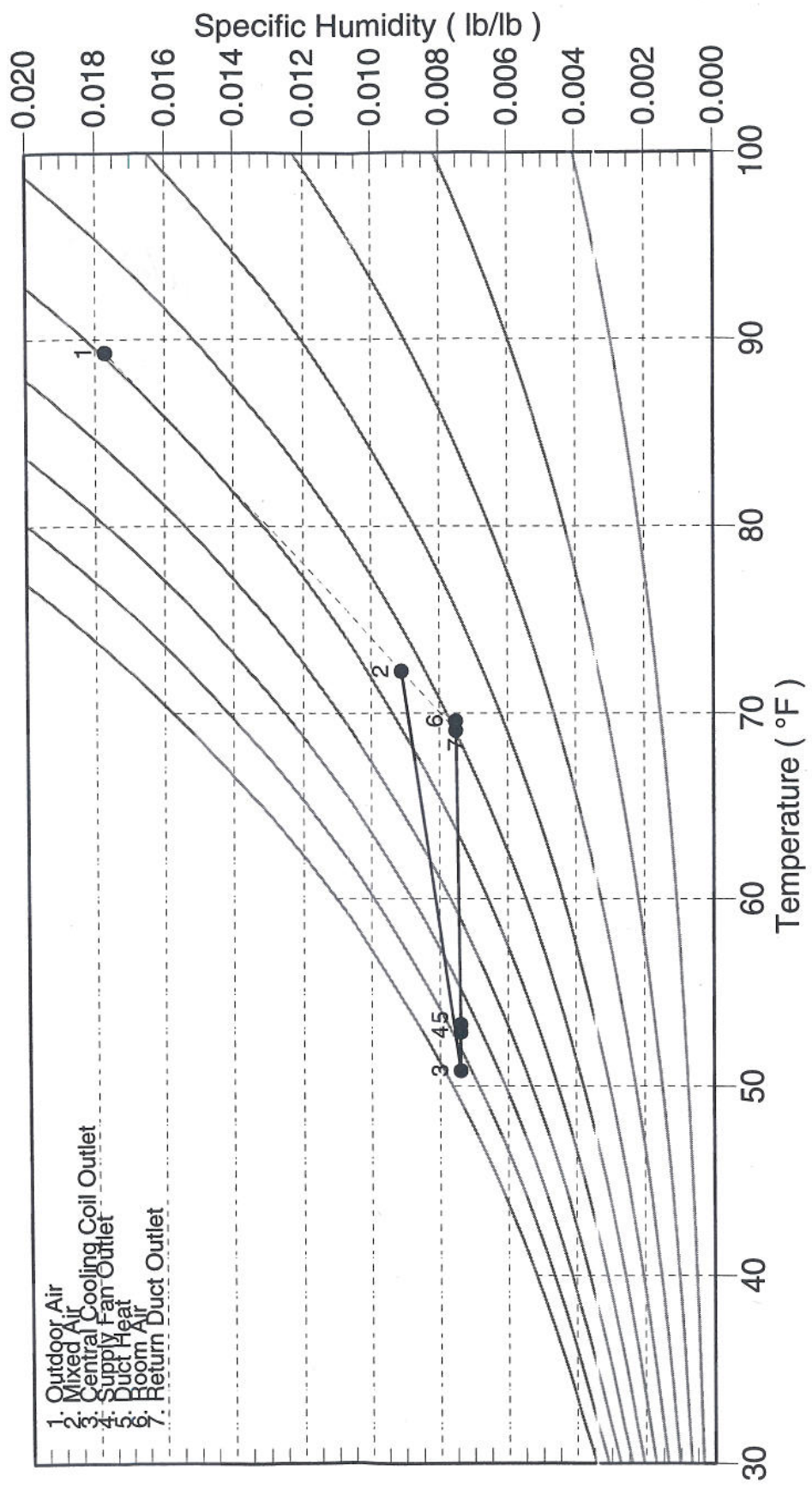


Psychrometric Analysis for Rooftop System

05/16/2010
09:14PM

Project Name: MH Cleanroom_Light
Prepared by: ...nsor & Associates, Inc.

Location: New Orleans IAP, Louisiana
Altitude: 30.0 ft.
Data for: September DESIGN COOLING DAY, 1300



2210 S.A.



PSYCHROMETRIC CHART

© 1960 THE TRANE COMPANY, LA CROSSE, WISCONSIN
Barometric Pressure 29.921 Inches of Mercury

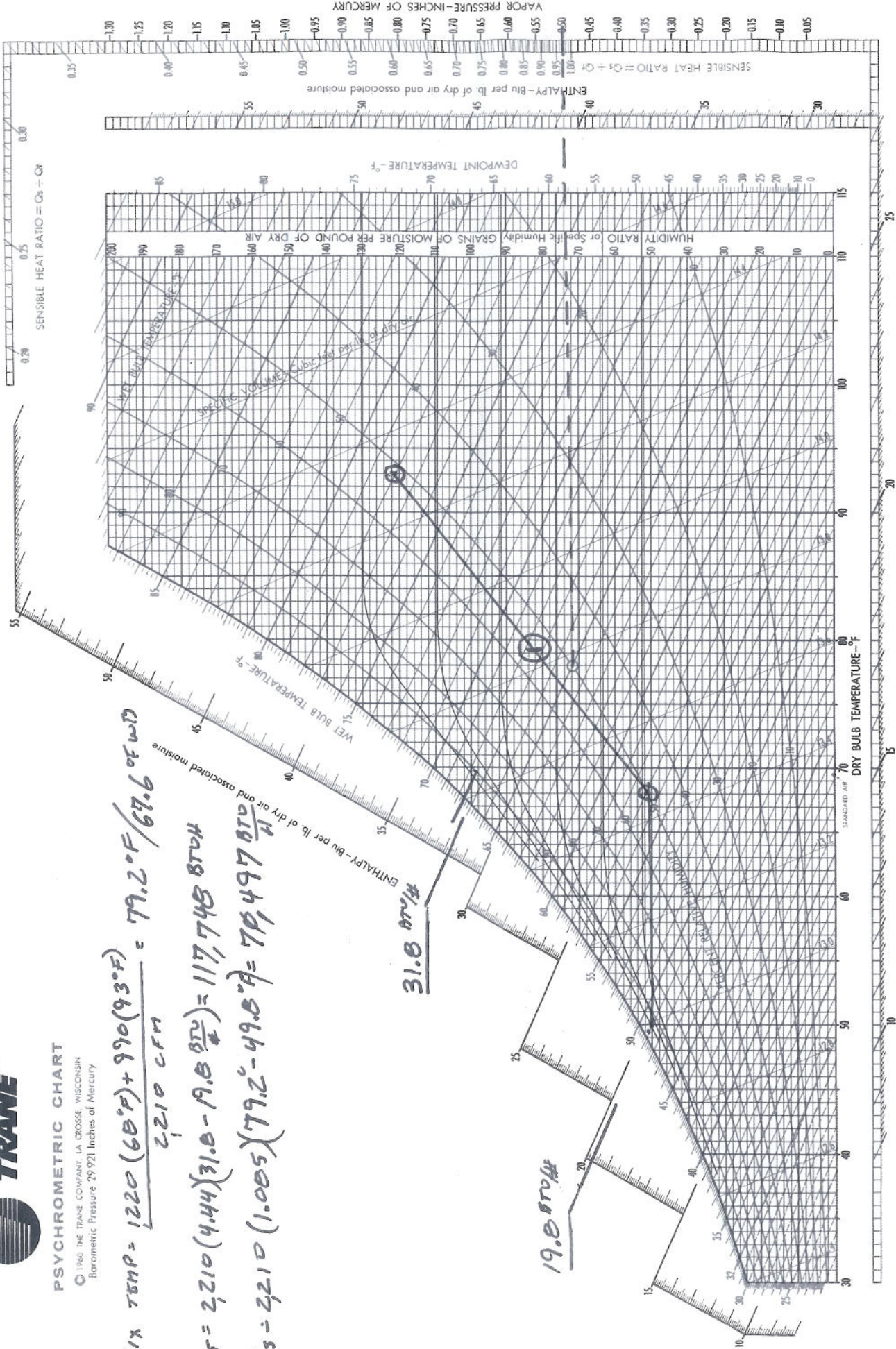
MIX TEMP = $\frac{1220 (60^{\circ}\text{F}) + 990 (93^{\circ}\text{F})}{2210 \text{ CFM}} = 79.2^{\circ}\text{F} / 67.6 \text{ of wtd}$

$Q_T = 2210 (4.44) (31.0 - 19.8 \frac{\text{BTU}}{\text{lb}}) = 117,748 \text{ BTUH}$

$Q_S = 2210 (1.005) (79.2 - 49.8 \frac{\text{BTU}}{\text{lb}}) = 70,497 \text{ BTUH}$

31.0 BTU/lb

19.8 BTU/lb



ENTHALPY - Btu per lb. of dry air and associated moisture

2310 S.A.

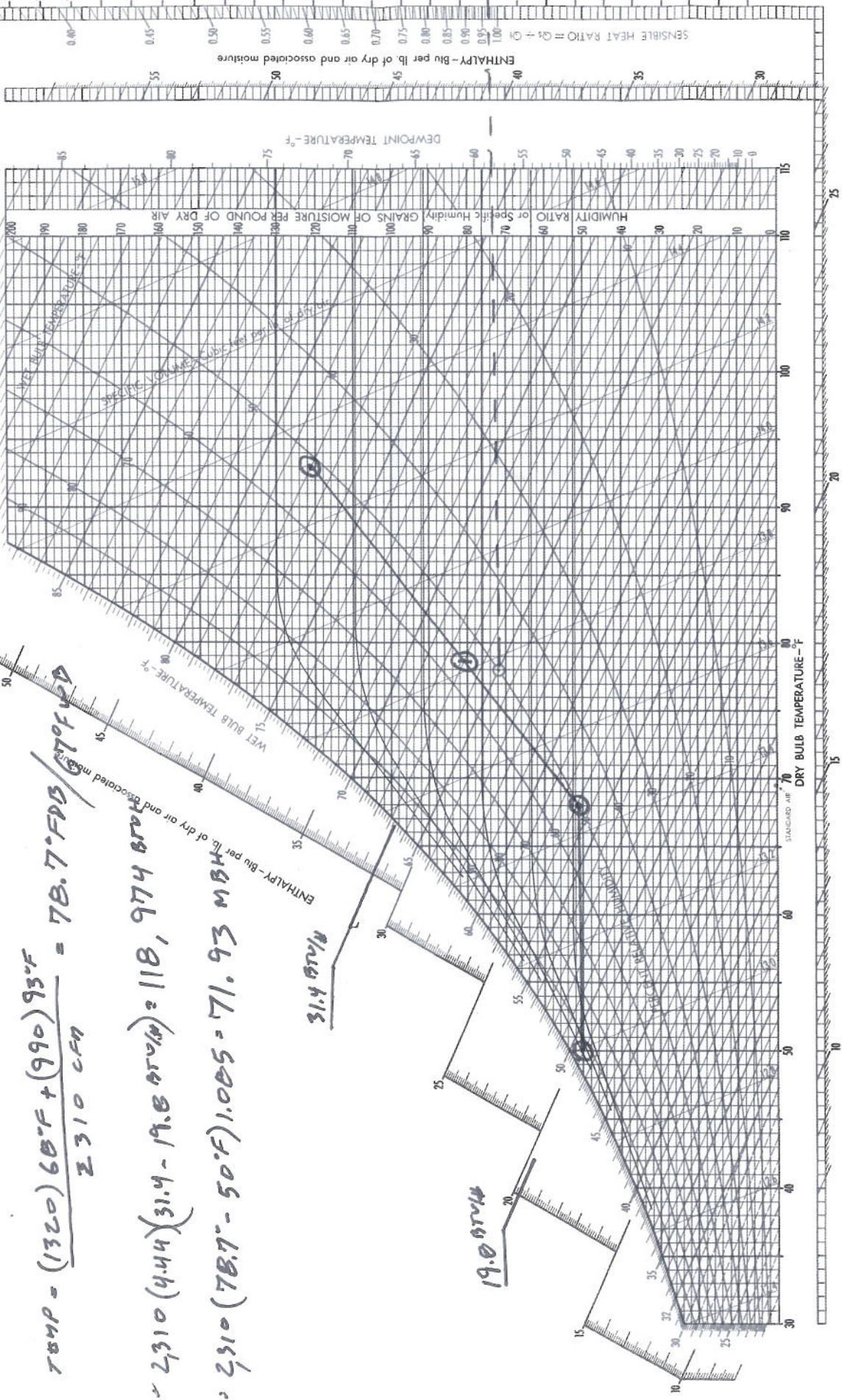
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TRANE™

PSYCHROMETRIC CHART

© 1920 THE TRANE COMPANY LA. CROSSE, WISCONSIN
Barometric Pressure 29.921 inches of Mercury



MIX TEMP = $\frac{(1320) 68^\circ\text{F} + (990) 93^\circ\text{F}}{2310 \text{ CFM}} = 78.7^\circ\text{FDB} / 67.9^\circ\text{FDB}$

$Q_T = 2310 (4.44) (31.4 - 19.8 \text{ BTU/lb}) = 118,974 \text{ BTU/h}$

$Q_s = 2310 (78.7 - 50^\circ\text{F}) 1.085 = 71,93 \text{ MBH}$

31.4 BTU/lb

19.8 BTU/lb