

# COOLING COIL OPPORTUNITIES

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# COIL PARAMETERS

- Water Supply Temperature
- Water Temperature Rise Across the Coil
- Water Velocity
- Water Pressure Drop
- Heat Transfer Fluid
- Air Velocity
- Air Pressure Drop
- Capacity – Sensible, latent
- Supply Air Temperature

# COMMON CHILLED WATER SUPPLY TEMPERATURES

- 35 deg. F - Ice Storage Systems
- 39 deg. F - Chilled Water Storage
- 40 deg. F - Common Supply Temperature for Systems using 15 deg. F Differential
- 42 deg. F - District Energy Supply
- 44 deg. F - District Energy Supply with Heat Exchanger
  - ◆ Pressure Isolation, water treatment, freeze protection
- 45 deg. F - Most of my career
- 50 deg. F - Well Water – Removed these systems in the 1990s.

## COIL PERFORMANCE

- A Heating Coil only has to provide heat.
- A Cooling Coil has to remove two types of heat.
  - Sensible Heat – Measurable temperature difference
  - Latent Heat – Removal of water vapor
- Sensible Heat Ratio (SHR)

$$\text{SHR} = \frac{\text{(Sensible Heat)}}{\text{(Sensible Heat + Latent Heat)}}$$

# OFFICE COOLING LOAD CALCULATION

Office

1,000 Square Feet

5 People

85 CFM Outside Air

25% glass

		Sensible	Latent
Lighting	1 watt/sq ft	3,413	--
Computer	0.5 watt/sq ft	1,707	--
Conduction – walls and glass		3,485	
Solar – Glass		3,432	
People		1,156	925
Outside Air Infiltration		446	553
		<hr/>	
		<b>13,639</b>	<b>1,478</b>
SHR		0.9	
Outside Air		893	1,107

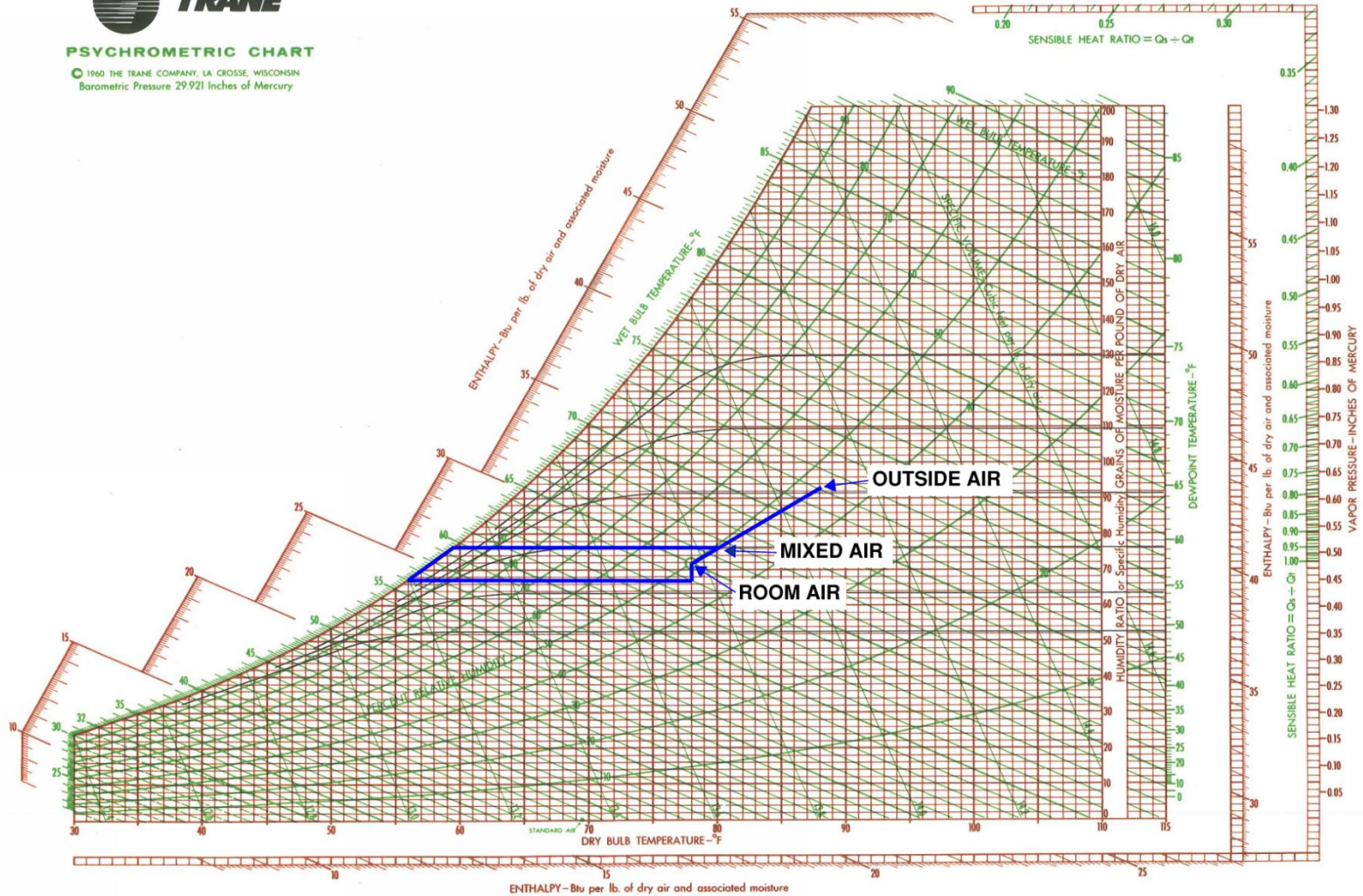
# OFFICE COOLING

## Psychrometric Chart



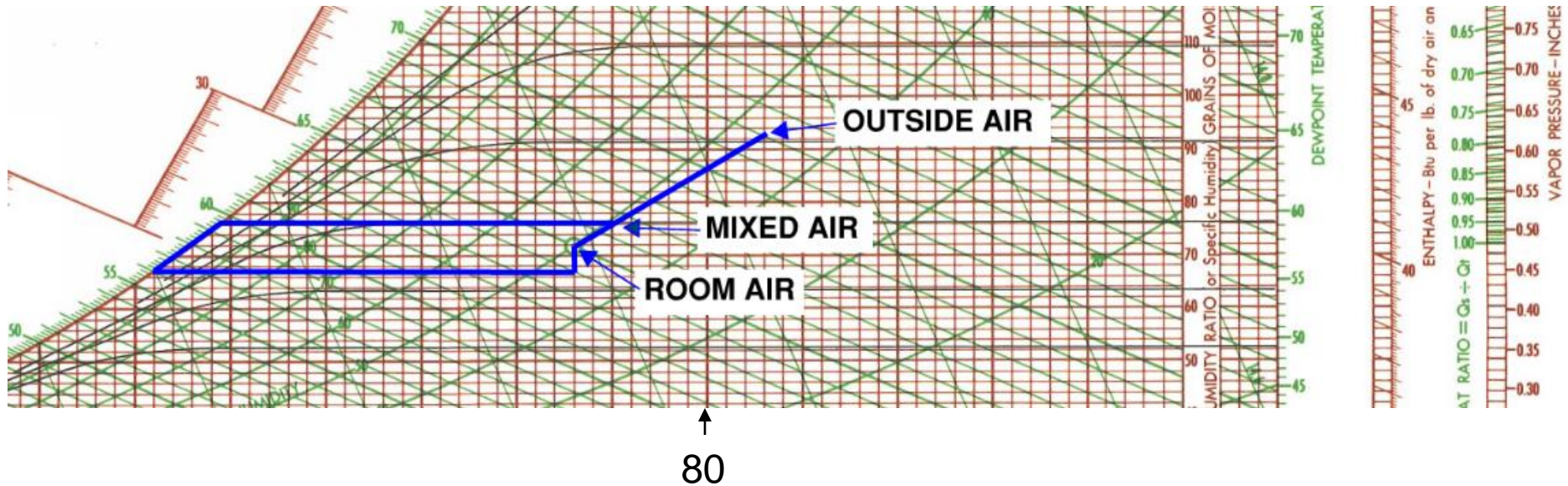
### PSYCHROMETRIC CHART

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Barometric Pressure 29.921 inches of Mercury





# Psychrometric Chart - Office



# CONFERENCE ROOM COOLING LOAD CALCULATION

## Conference Room

1,000 Square Feet

50 People

310 CFM Outside Air

25% glass

		Sensible	Latent	BTU/Hr
Lighting	1 watt/sq ft	3,413	--	
Computer	0.2 watt/sq ft	683	--	
Conduction – walls and glass		3,485		
Solar – Glass		3,432		
People		11,350	7,150	
Outside Air Infiltration		446	553	
		<b>22,809</b>	<b>7,703</b>	
SHR		0.75		
Outside Air		3,255	4,036	



# CONFERENCE COOLING

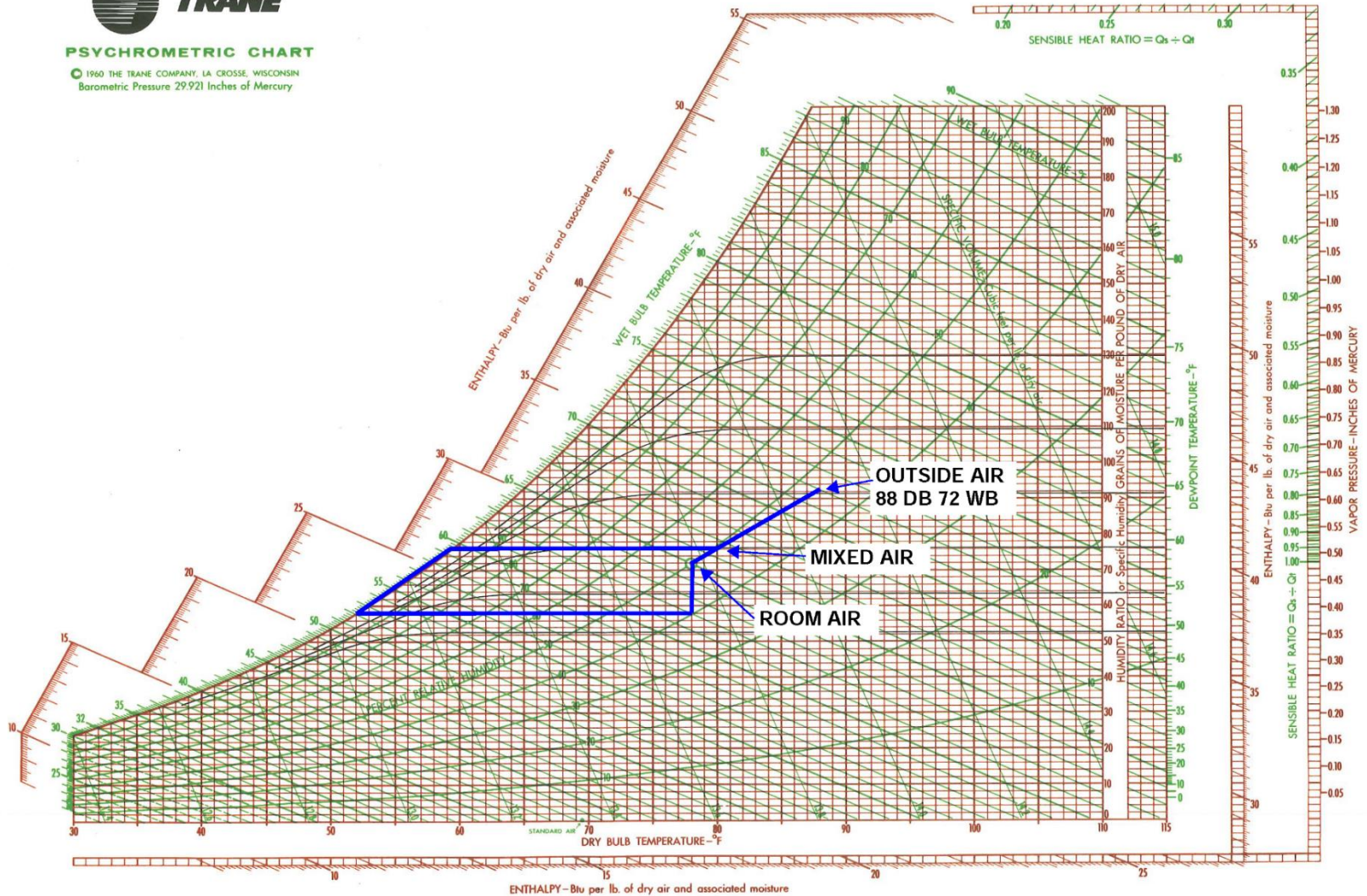
## Psychrometrics Chart



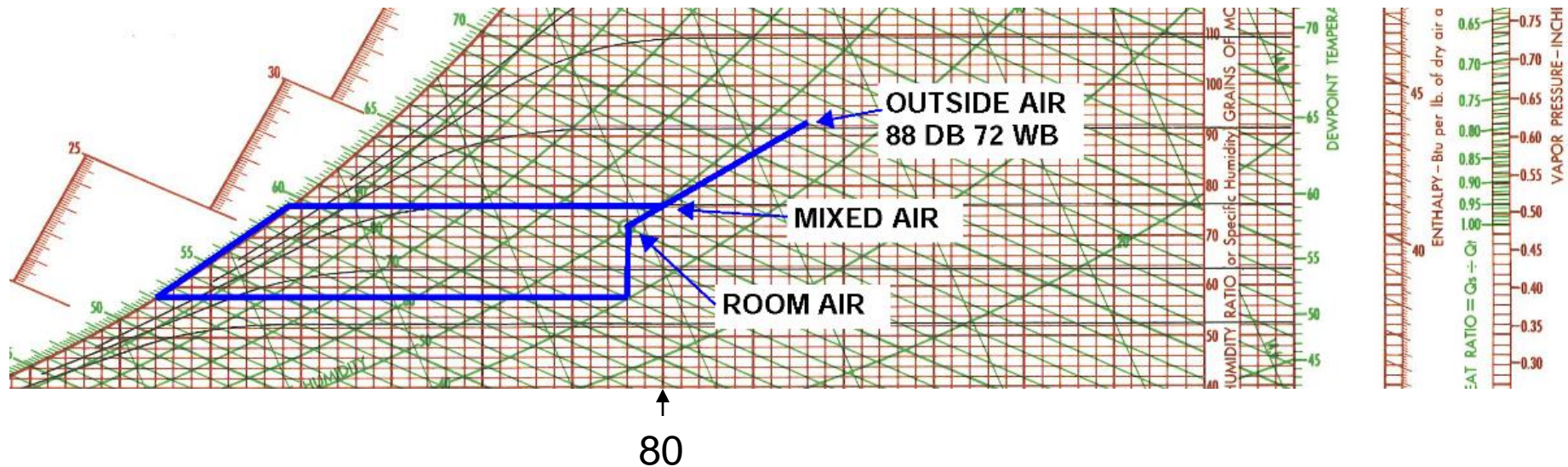
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### PSYCHROMETRIC CHART

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# Psychrometrics Conference Cooling



# COOLING WATER COIL SELECTIONS

	Number of Rows	Supply Water Temperature	Water Temp Difference	Water GPM	Water PD	APD	SA DB Temperature	SA WB Temperature
Presumed Original Coil	6	42	14	51	4.8	0.6	55	54.3
Presumed Original Coil	6	44	11.3	63	7	0.6	55	54.3
Presumed Original Coil	6	44	13	51	4.8	0.6	55.9	55
Higher Performance - 6 Row	6	44	15	46	4	0.6	55	54.7
Highest Performance - 6 Row	6	44	15	47	4	0.7	54	53.9
High Performance - 8 Row	8	44	15	56	7	0.85	52	51.9

# HEATING HOT WATER COIL OPPORTUNITIES

- Long Time Standard - 180 deg F supply and 20 deg F differential.
- Last Major Project was 140 deg F supply and 40 deg differential.
- Largest Hot Water differential that I have designed is 100 deg F.



Thank you!