



Chillers and Chilled Water Systems

This 3-day seminar is

Chilled Water System

- Understand the design & overall operation of chilled water cooling system
- Recognize & identify individual components
- Learn applicable codes & standards

Thermodynamics

- Understand specific heat, sensible heat, latent heat, & superheat
- Relationship of heat & temperature
- Understand the theory of heat transfer
- What is atmospheric pressure, & how it varies by location
- Understand pressure, temperature, & volume relationships
- Know what a vacuum is & how it is used
- Gas laws

Refrigeration Theory

- Method of heat transfer
- Compression-cycle refrigeration theory
- Absorption-cycle refrigeration theory
- Differences in heat transfer from liquids to liquids, liquids to gases, & gases to liquids

Refrigerants

- Recognize the differences between CFC, HCFC, & HFC refrigerants
- Understand the basic of absorption-machine compounds such as lithium bromide & ammonia

Refrigeration Prime Movers

- Difference between reciprocating, centrifugal, scroll, & screw compressors
- Hermetic, semihermetic, & open compressors
- Theory & operation of absorption machines
- Direct- & indirect-fired absorption Machines

Evaporators & Liquid Coolers

- Purpose of evaporator or liquid cooler in the chiller system
- Shell-and-tube, tube-in-tube, & shell-and-coil designs
- Direct-expansion & flooded evaporators

Condensers

- Purpose of the condenser
- Water-cooled & air-cooled condensers
- How evaporative condensers work
- Principle of subcooling
- Maintenance procedures required to keep condenser working properly

Metering (Expansion) Devices

- Types of expansion devices
- Operation of expansion devices
- Recognize the symptoms of a malfunctioning metering device
- Theory & operation of economizers

Controls & Control Systems

- Recognize the type of controls
- Purpose of each control in relation to the entire system
- Role of controls in system operation & efficiency

Pumps

- Theory of centrifugal pumps
- Components & purpose centrifugal pumps
- Installation, operation, & maintenance of pumps in chilled water systems

Piping Systems

- Differences among K, L, DWV, & ACR copper tubing & their uses
- Soft copper & hard-drawn copper
- Learn to identify Schedule 40 & Schedule 80 steel pipe
- Understand National Pipe Taper
- Plug, gate, ball, globe, & butterfly valves & their purpose
- How a check valve operates

Conditioned Space Systems

- Theory of psychrometrics
- Types of coils used
- Coil maintenance procedures & importance
- Different types of fans used in air-handling systems & their operation & maintenance procedures
- Filter design, construction, & maintenance

Closed-Loop System Fluids

- Characteristics of closed-loop system operating fluids
- How to prevent scale, corrosion, & fouling within the system
- Understand the use of glycol (antifreeze) heat transfer fluids



Heat Rejection Systems

- Design & overall operation of chilled-water heat rejection systems
- Once-through & recirculating heat rejection systems
- Mechanical-draft, induced-draft, forced-draft, natural draft, counterflow, & crossflow cooling towers

Open System Water Quality

- Methods of cooling system water treatment, including products used for scale, corrosion, & fouling prevention
- Importance of preventative maintenance for cooling towers, including risk of bacterial growth & Legionnaire's disease
- Importance of selecting the best water treatment service company & how to work with the selected vendor

Heat Recovery Systems

- Understand the basic premise of heat recovery
- Which types of systems can benefit from heat recovery
- Potential energy savings by implementing heat recovery on existing systems

Thermal Storage Systems

- Design & operation of thermal storage systems
- Types of thermal storage systems
- How different modes of operation relate to energy consumption
- Benefits derived from thermal storage systems

