QUEST
Professional Center

PROFESSIONAL TRAINING COURSE

Course No. 1563

Industrial Chilled Water Systems Training Course

UTILITIES & PLANT ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION
5 Days

DELIVERY
Classroom

Course Overview

The Industrial Chilled Water Systems Training Course provides a comprehensive professional framework for understanding, operating, monitoring, maintaining, and optimizing chilled water systems used across industrial facilities, large commercial complexes, oil and gas installations, petrochemical plants, power generation facilities, manufacturing environments, and critical infrastructure. The course connects engineering principles with practical operating requirements to help professionals improve cooling system reliability, efficiency, and operational continuity.

Industrial chilled water systems are essential for maintaining controlled operating temperatures across process equipment, heat exchangers, production systems, HVAC applications, utilities, and other temperature-sensitive operations. Inefficient cooling, inadequate water flow, poor hydraulic balancing, fouled heat exchangers, pump problems, improper control, and poor water quality can negatively affect equipment performance, energy consumption, maintenance requirements, and production continuity. Understanding these factors is therefore essential for professionals responsible for industrial cooling infrastructure.

The course examines the major components and operating principles of industrial chilled water systems, including chillers, chilled water pumps, heat exchangers, cooling towers, expansion tanks, piping networks, valves, instrumentation, control systems, and water treatment arrangements. Participants will explore chilled water supply and return temperatures, cooling loads, flow rates, pressure losses, heat transfer, hydraulic balancing, system control, and water quality management.

A strong emphasis is placed on operational performance and troubleshooting. Participants will learn how to interpret temperature, pressure, flow, and equipment performance data; identify abnormal operating conditions; investigate common problems affecting chillers, pumps, heat exchangers, cooling towers, and distribution networks; and establish practical corrective actions. The course also addresses preventive maintenance, condition monitoring, reliability improvement, and energy optimization.

Through practical exercises, technical discussions, case studies, and workplace-oriented scenarios, the Industrial Chilled Water Systems Training Course enables engineers, operators, supervisors, maintenance professionals, and managers to translate technical knowledge into practical performance improvements. The program supports organizations in strengthening cooling system reliability, improving energy performance, reducing avoidable operational losses, and enhancing

coordination between engineering, operations, maintenance, and facilities teams.

Objectives

- Analyze the operating principles and configurations of industrial chilled water systems and identify the function of major components during the course.
- Develop the ability to evaluate chilled water supply and return temperatures, flow rates, pressure levels, and cooling loads using practical operating data.
- Assess the performance of chillers, pumps, heat exchangers, cooling towers, valves, piping networks, and associated control equipment.
- Apply hydraulic balancing principles to identify flow distribution problems and improve chilled water circulation throughout the system.
- Evaluate the relationship between chilled water temperature, flow, heat transfer, equipment loading, and overall system performance.
- Identify common operational, mechanical, and hydraulic problems affecting chilled water systems and apply structured troubleshooting techniques.
- Improve the ability to assess pump performance, pressure losses, cavitation indicators, flow restrictions, and abnormal operating conditions.
- Strengthen practical understanding of water quality, corrosion, scaling, fouling, and their impact on heat transfer and equipment reliability.
- Implement appropriate monitoring, inspection, and maintenance approaches for critical chilled water system components.
- Design practical performance improvement measures that support energy efficiency, equipment reliability, and operational continuity.
- Analyze system operating trends to identify opportunities for optimizing cooling capacity, water circulation, equipment utilization, and energy performance.
- Develop a practical action plan for improving the reliability, efficiency, maintainability, and operational performance of an industrial chilled water system.

Who Should Attend

This course is designed for engineers and technical professionals responsible for the design, operation, maintenance, monitoring, and performance management of chilled water systems in industrial and large-scale facilities. It is particularly relevant to mechanical engineers, HVAC and refrigeration engineers, facilities engineers, energy engineers, operations and maintenance

engineers, reliability engineers, process engineers, utilities engineers, and technical specialists responsible for cooling and industrial utility systems.

The program is also suitable for facilities managers, maintenance managers, operations managers, engineering managers, energy managers, mechanical supervisors, facilities supervisors, chilled water plant operators, maintenance teams, reliability professionals, instrumentation and control specialists, and technical coordinators. It is particularly valuable for professionals working in oil and gas, petrochemical, power generation, manufacturing, healthcare, government facilities, commercial complexes, and other environments where reliable chilled water systems are critical to operations.

The course can also benefit project managers, asset managers, engineering leaders, and decision makers involved in cooling system selection, capacity planning, equipment upgrades, energy management, maintenance strategies, and operational improvement. It is suitable for professionals who require an integrated understanding of the relationship between chillers, pumps, piping networks, heat exchangers, cooling towers, control systems, and water quality.

Learning Outcomes

- Explain the complete operating cycle and configuration of an industrial chilled water system from cooling generation through distribution and heat-load return.
- Identify major chilled water system components and explain their operational functions, interfaces, and performance requirements.
- Evaluate chilled water supply and return temperatures and determine their significance for system efficiency and cooling performance.
- Analyze chilled water flow rates, pressure differentials, and hydraulic conditions to identify distribution and circulation problems.
- Assess the operational performance of chillers, pumps, heat exchangers, cooling towers, valves, and piping systems.
- Diagnose common chilled water problems such as inadequate cooling, low flow, excessive pressure loss, temperature instability, and equipment performance degradation.
- Identify operating indicators associated with pump cavitation, fouling, scaling, air entrainment, and flow restrictions.
- Evaluate the impact of water quality and treatment conditions on corrosion, scaling, fouling, heat transfer, and system reliability.

- Apply practical hydraulic balancing techniques to improve chilled water distribution and system performance.
- Develop monitoring and preventive maintenance practices for critical chilled water equipment.
- Analyze operating data to identify opportunities for improving cooling efficiency, equipment loading, reliability, and energy performance.
- Prepare a practical improvement plan addressing reliability, maintenance, energy efficiency, and operational performance of a chilled water system.

Course Outline

DAY 01

Fundamentals of Industrial Chilled Water Systems

- Role and applications of chilled water systems in industrial and large-scale facilities
- Basic principles of refrigeration and chilled water generation
- Industrial cooling loads and factors affecting cooling demand
- Chilled water supply and return temperature principles
- Major chilled water system configurations and components
- Chillers, pumps, heat exchangers, piping, valves, tanks, and control systems
- Primary and secondary chilled water system concepts

> **PRACTICAL APPLICATION**
> Mapping and analyzing a typical industrial chilled water system

DAY 02

Chillers, Pumps and Heat Transfer Equipment

- Types and operating principles of industrial chillers
- Chiller capacity, efficiency, loading, and operating conditions
- Chilled water pumps and pump performance characteristics
- Pump head, flow, pressure losses, and system resistance
- Pump cavitation, air entrainment, vibration, and abnormal operating conditions
- Heat exchangers and principles of heat transfer

DAY 02 — CONTINUED

- Cooling towers and heat rejection systems

PRACTICAL APPLICATION

Evaluating chiller and pump operating performance

DAY 03

Chilled Water Distribution and Hydraulic Performance

- Chilled water distribution networks and piping arrangements
- Flow measurement and pressure monitoring
- Hydraulic resistance and pressure-drop analysis
- Hydraulic balancing of chilled water distribution systems
- Control valves, isolation valves, balancing valves, and regulating devices
- Variable-flow and constant-flow system concepts
- Differential pressure management and flow optimization
- Identifying flow restrictions, blockages, air pockets, and distribution imbalances

PRACTICAL APPLICATION

Analyzing a chilled water distribution problem and developing corrective actions

DAY 04

Water Quality, Maintenance and Troubleshooting

- Importance of chilled water quality for system reliability
- Corrosion, scaling, fouling, and biological contamination
- Water treatment principles and monitoring requirements
- Impact of poor water quality on heat exchangers, chillers, pumps, and piping
- Preventive and condition-based maintenance of chilled water equipment
- Inspection of pumps, valves, heat exchangers, chillers, cooling towers, and piping
- Troubleshooting inadequate cooling, high temperatures, low flow, high pressure loss, and unstable operation

DAY 04 — CONTINUED

- Root-cause analysis of recurring chilled water system failures

PRACTICAL APPLICATION

Diagnosing a complex chilled water system fault

DAY 05

System Optimization, Energy Efficiency and Performance Improvement

- Measuring and evaluating chilled water system performance
- Relationship between cooling load, flow, temperature difference, and energy consumption
- Improving chiller operating efficiency and equipment loading
- Pump optimization and reduction of unnecessary circulation losses
- Optimizing cooling tower and heat rejection performance
- System control, instrumentation, alarms, and operational monitoring
- Identifying energy-saving and reliability-improvement opportunities
- Developing performance indicators for chilled water system management

FINAL WORKSHOP

Comprehensive assessment of an industrial chilled water system

- Final implementation exercise: Developing an action plan for improving system efficiency, reliability, maintenance, and operational performance

Register or Request More Information

Course page: https://quest-training.com/courses/industrial-chilled-water-systems-training-course
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