

Course No. 1528

Chilled Water Systems & Central Cooling Plants Training Course

**HVAC, REFRIGERATION & BUILDING SERVICES
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS**

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Chilled Water Systems & Central Cooling Plants Training Course provides a comprehensive professional program focused on the engineering principles, design considerations, operation, maintenance, and performance optimization of chilled water systems and central cooling plants. The course examines the complete cooling cycle, from chilled water production through pumps and distribution networks to air handling units, fan coil units, condenser water systems, cooling towers, and automated control systems.

Chilled water systems are widely used in government buildings, commercial facilities, hospitals, airports, industrial complexes, oil and gas facilities, and large-scale infrastructure where reliable and efficient cooling is essential. Effective operation of central cooling plants directly supports energy efficiency, equipment reliability, thermal comfort, operational continuity, and long-term asset performance.

This Chilled Water Systems & Central Cooling Plants Training Course focuses on the practical engineering knowledge required by HVAC engineers, facility professionals, maintenance teams, energy managers, and technical supervisors. Participants will examine equipment selection, cooling load fundamentals, chilled water flow, pump selection, condenser water systems, cooling tower operation, hydraulic balancing, temperature and pressure control, and systematic troubleshooting.

The course also connects system design with operation, maintenance, energy management, and performance monitoring. This integrated approach enables participants to evaluate the cooling plant as a complete system rather than treating individual components in isolation. The program supports better operational decisions, improved reliability, reduced energy waste, effective maintenance planning, and continuous improvement of central cooling plant performance.

Objectives

- Analyze the main components of chilled water systems and central cooling plants and explain their functions within the system during the training program.
- Evaluate the fundamental principles of chilled water circuit design, including flow rates, temperature differentials, and hydraulic requirements.
- Apply practical methods for assessing cooling loads and determining appropriate cooling equipment capacities.

- Analyze the operational performance of chillers, pumps, cooling towers, heat exchangers, and associated equipment using relevant performance indicators.
- Evaluate chilled water distribution systems and identify factors affecting hydraulic balance and system performance.
- Apply appropriate principles for selecting and operating chilled water pumps and condenser water pumps based on system requirements.
- Develop systematic approaches for monitoring temperature, pressure, flow, and equipment operating conditions.
- Assess central cooling plant control strategies and improve coordination between chillers, pumps, cooling towers, and distribution systems.
- Analyze common causes of reduced cooling capacity, excessive energy consumption, and recurring equipment failures.
- Apply preventive and predictive maintenance practices to improve equipment reliability and reduce unplanned downtime.
- Evaluate energy optimization opportunities using plant operating data and appropriate performance indicators.
- Develop an integrated operational and maintenance improvement plan for a chilled water system or central cooling plant.

Who Should Attend

The Chilled Water Systems & Central Cooling Plants Training Course is designed for professionals involved in the design, operation, maintenance, supervision, and management of HVAC and central cooling systems. It is particularly relevant to mechanical engineers, HVAC engineers, refrigeration engineers, facilities engineers, energy engineers, maintenance engineers, operations engineers, HVAC technicians, facility technicians, and building services professionals.

The course is also suitable for facility managers, maintenance managers, operations managers, energy managers, engineering department heads, project managers, technical supervisors, consultants, contractors, and professionals responsible for the performance and reliability of central cooling infrastructure. It is valuable for specialists working in government facilities, commercial buildings, hospitals, industrial plants, airports, hotels, manufacturing facilities, oil and gas installations, and other large-scale facilities where cooling reliability and energy efficiency are critical.

Learning Outcomes

- Identify the major components of chilled water systems and explain their operational relationships.
- Explain the refrigeration cycle and heat transfer principles applied in central cooling plants.
- Evaluate chiller performance using operating temperatures, pressures, flow rates, and relevant efficiency indicators.
- Analyze chilled water distribution networks and determine appropriate flow and temperature requirements.
- Assess operating requirements for chillers, pumps, cooling towers, and heat exchangers under different load conditions.
- Diagnose common causes of reduced cooling efficiency and determine their relationship to operating conditions.
- Interpret plant monitoring data to identify abnormal operating conditions and performance deviations.
- Apply systematic troubleshooting methods to chillers, pumps, cooling towers, heat exchangers, and control systems.
- Develop preventive maintenance approaches for major central cooling plant equipment.
- Evaluate sequencing strategies for operating multiple chillers according to changing cooling demand.
- Identify practical opportunities for improving energy efficiency and reducing unnecessary equipment operation.
- Prepare an integrated improvement plan for the operation, maintenance, reliability, and efficiency of a chilled water system.

Course Outline

DAY 01

Fundamentals of Chilled Water Systems & Central Cooling Plants

- Fundamentals of refrigeration and heat transfer in chilled water systems
- Major components of central cooling plants and their operational functions
- Chiller types, configurations, and selection considerations

DAY 01 — CONTINUED

- Chilled water and condenser water circuits
- Relationship between chillers, pumps, cooling towers, air handling units, and fan coil units
- Central cooling applications in commercial, industrial, institutional, and large-scale facilities

PRACTICAL APPLICATION

Analyze a central cooling plant schematic and identify major components and flow paths

DAY 02

Chilled Water System Design & Equipment Selection

- Cooling load fundamentals and their influence on plant capacity
- Chilled water distribution network design principles
- Chilled water flow requirements and temperature differential
- Selection principles for chilled water pumps and condenser water pumps
- Pressure loss and hydraulic resistance in chilled water networks
- Cooling tower and heat exchanger selection considerations
- Constant-flow and variable-flow chilled water systems
- Primary, secondary, and primary-secondary pumping arrangements

PRACTICAL APPLICATION

Evaluate a chilled water distribution system and identify potential flow and hydraulic issues

DAY 03

Central Cooling Plant Operation & Performance Management

- Fundamentals of central cooling plant operation
- Equipment start-up and shutdown sequences
- Cooling load management and chiller load distribution
- Pump operation and chilled water flow control
- Cooling tower operation and condenser water temperature management
- Automated control and monitoring systems for cooling plants

DAY 03 — CONTINUED

- Operating data collection and performance monitoring
- Chiller sequencing and plant optimization under changing loads
- Key operational indicators for cooling plant performance

PRACTICAL APPLICATION

Analyze cooling plant operating data and evaluate system performance

DAY 04

Maintenance, Troubleshooting & Reliability Improvement

- Preventive and predictive maintenance strategies for central cooling plants
- Maintenance of chillers, heat exchangers, pumps, and cooling towers
- Low chilled water flow and its impact on cooling performance
- High condensing pressure and reduced heat transfer efficiency
- Diagnosis of temperature, pressure, and flow abnormalities
- Pump and motor performance problems, vibration, noise, and overheating
- Scaling, fouling, corrosion, and water-side performance issues
- Cooling water quality management and its impact on equipment reliability
- Root cause analysis of recurring equipment failures

PRACTICAL APPLICATION

Troubleshoot a central cooling plant failure scenario and develop corrective actions

DAY 05

Energy Efficiency & Central Cooling Plant Optimization

- Energy efficiency indicators for chilled water systems and central cooling plants
- Evaluation of chiller, pump, and cooling tower energy consumption
- Chiller sequencing based on actual cooling demand
- Variable-speed operation of pumps and cooling tower fans
- Optimization of chilled water and condenser water temperatures

DAY 05 — CONTINUED

- Strategies for reducing cooling plant energy consumption
- Building management systems and automated plant monitoring
- Development of operational and maintenance performance indicators
- Energy optimization opportunities and lifecycle operating considerations

FINAL WORKSHOP

Develop an integrated action plan for improving the operation, maintenance, reliability, and energy efficiency of a central cooling plant

Register or Request More Information

Course page: <https://quest-training.com/courses/chilled-water-systems-central-cooling-plants-training-course>

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