



*Training Course:
HVAC Absorption Chiller Operation and
Maintenance*

25 - 29 May 2025

Cairo (Egypt)

Holiday Inn & Suites Cairo Maadi, an IHG Hotel

Training Course: HVAC Absorption Chiller Operation and Maintenance

Training Course code: EN235828 From: 25 - 29 May 2025 Venue: Cairo (Egypt) - Holiday Inn & Suites Cairo Maadi, an IHG Hotel Training Course Fees: 4200 € Euro

Introduction

In modern HVAC applications, absorption chillers play a significant role in energy-efficient cooling, especially in facilities where waste heat or alternative heat sources are available. Unlike traditional vapor compression chillers that rely on electrical power and mechanical compressors, absorption chillers utilize heat energy to drive the refrigeration cycle, making them ideal for industrial processes, district cooling, cogeneration plants, and buildings aiming for energy sustainability.

Absorption chillers operate using a combination of water and lithium bromide LiBr or ammonia as the refrigerant-absorbent pair. Their ability to harness waste heat from steam, hot water, or exhaust gases makes them an environmentally friendly option for reducing operational costs and improving energy efficiency. However, their maintenance and operation require specialized knowledge due to their unique thermodynamic principles, chemical interactions, and vacuum-based operation.

This 5-day training program is designed to provide a comprehensive understanding of the design, operation, troubleshooting, and maintenance of absorption chillers. Participants will gain in-depth knowledge of the key components, working principles, energy optimization techniques, and best practices for preventive and corrective maintenance. The program will also focus on system performance monitoring, common operational challenges, safety protocols, and troubleshooting strategies to ensure reliable and efficient chiller operation.

Through a combination of theoretical concepts, case studies, and practical insights, this training will enable engineers, technicians, and facility managers to enhance their expertise in absorption cooling technology. By the end of the program, participants will be equipped with the skills needed to operate, maintain, and optimize absorption chillers in a variety of industrial and commercial settings.

Target Audience

This course is designed for:

- HVAC Technicians & Engineers responsible for chiller operation and maintenance
- Facility & Maintenance Managers overseeing HVAC systems in commercial and industrial settings
- Industrial Plant Operators working with waste heat recovery and cogeneration systems
- Energy Managers & Sustainability Professionals focusing on energy efficiency and cost reduction
- Mechanical Engineers involved in designing and maintaining HVAC systems
- Building Maintenance Personnel looking to improve knowledge of absorption chiller technology

Training Objectives

By the end of this training, participants will be able to:

1. **Understand** the fundamental principles and working mechanisms of absorption chillers.
2. **Identify** different types of absorption chillers and their applications in various industries.
3. **Operate** absorption chillers effectively, including startup and shutdown procedures.
4. **Perform** routine maintenance to ensure system reliability and efficiency.
5. **Diagnose and troubleshoot** common issues related to absorption chillers.
6. **Optimize energy efficiency** and minimize operational costs.
7. **Apply safety protocols** and follow best practices in chiller operation and maintenance.

Training Outlines

Day 1:

Fundamentals of Absorption Chillers

- Introduction to HVAC cooling systems and the role of absorption chillers
- Comparison: Absorption chillers vs. Mechanical vapor compression chillers
- Types of absorption chillers:
 - Single-effect vs. Double-effect chillers
 - Direct-fired, indirect-fired steam, hot water, exhaust gas-driven
- Working principle of absorption cooling cycles
- Thermodynamic principles:
 - Heat transfer
 - Refrigeration cycle
 - Absorption-desorption processes
- Refrigerant-absorbent pairs:
 - Water-Lithium Bromide LiBr
 - Ammonia-Water
- Heat sources and efficiency considerations
- Common applications in industrial, commercial, and district cooling systems

Day 2:

Absorption Chiller Components and Operation

- Key components and their functions:
 - Generator
 - Absorber
 - Condenser
 - Evaporator
 - Heat exchangers
 - Pumps and control valves
 - Expansion devices
- Absorption chiller cycles:
 - How lithium bromide and ammonia-water systems operate
 - Interaction between refrigerant and absorbent
- Water treatment requirements and impact on performance
- Chiller operational cycles and sequencing
- Startup and shutdown procedures for different types of absorption chillers
- Safety considerations and best practices in operation

Day 3:

Maintenance Best Practices

- Preventive and predictive maintenance strategies
- Common issues and maintenance solutions:
 - Scaling, corrosion, and crystallization problems
 - Cleaning heat exchangers and tubes
 - Preventing refrigerant leaks and vacuum loss
- Routine inspection checklists and performance monitoring

- Lubrication and maintenance of moving parts
- Refrigerant and absorbent management
- Water quality control and chemical treatment procedures
- Long-term chiller performance improvement strategies
- Developing a structured maintenance plan

Day 4:

Troubleshooting and Fault Diagnosis

- Identifying abnormal operating conditions
- Diagnosing and fixing common problems:
 - Low cooling capacity and efficiency loss
 - Excessive crystallization and vacuum loss
 - Refrigerant and absorbent leaks
 - Poor heat exchanger performance
 - Electrical and control system failures
- Advanced diagnostic tools and monitoring systems
- Corrective maintenance techniques
- Case studies on real-world troubleshooting scenarios
- Workshop: Hands-on exercises in troubleshooting and fault detection

Day 5:

Energy Efficiency Optimization and Safety

- Evaluating chiller performance COP, EER, Efficiency Ratio
- Energy-saving strategies:
 - Optimizing operating conditions
 - Using heat recovery and renewable energy sources
 - Integrating absorption chillers with building management systems BMS

- Reducing energy consumption in large-scale cooling systems
- Best practices for maintaining system efficiency over time
- Safety protocols in chiller operation and maintenance
- Emergency shutdown procedures and risk mitigation
- Regulatory compliance and environmental considerations
- Final Q&A and course evaluation

Registration form on the Training Course: HVAC Absorption Chiller Operation and Maintenance

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