



Arabian Institute For Training

Cooling Towers Operation, Maintenance and Troubleshooting

INTRODUCTION

- Cooling Towers are considered a vital element of the overall water-cooling system in power generation plants, as well as in process and petrochemical plants. The efficiency of cooling towers relies on the accurate and reliable information on the outdoor wet bulb temperature, required to avoid cooling tower increased water and energy usage and reduced lifetime of fans and pumps. Operations of cooling towers in general faces many safety and health challenges related to the use of water, which requires continuous control of corrosion rate and microbiological growth, the corresponding chemical and physical water treatments represent important element in the overall energy consumption.
- This Cooling Towers training course will cover many important aspects of cooling tower process control, correct operation and water management. Methods of efficiency improvement of the cooling tower operation will be explained and discussed. Best practices for preventive and corrective maintenance as well as problem solving, and troubleshooting will be illustrated through several real-world case studies and presented in the form of workshops. Maintenance and repair of the auxiliary mechanical equipment such as fans and pumps will be explained in detail.

Participants on the Cooling Towers training course will develop the following competencies:

- Better understanding of cooling tower technologies
 - Understanding water treatments effective methods
 - Understanding chemical reaction inside cooling towers
 - Knowledge about effective operation and maintenance of cooling towers
 - Complete understanding of water treatment and its impact on performance
 - Knowledge to perform effective inspection & preventive maintenance of equipment
 - Skill to perform RBI and FMEA for cooling towers, most modern and new techniques
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PROGRAMME OBJECTIVES

- Explanation of the role of cooling tower in the plant's overall water-cooling system
- Understanding of the operation and efficiency of different types of cooling towers
- Elements of safety of chemical and physical water treatment
- Performance monitoring and record keeping
- Identification of important steps in inspection of cooling towers
- Recommendation of the best practices for preventive maintenance of cooling tower

WHO SHOULD ATTEND?

- Engineers and Technicians in Process Plants
- Cooling Tower Operators and Supervisors
- Technical Personnel in Charge of Maintenance and Repair
- Technicians and Operators dealing with HVAC Installations

TRAINING METHODOLOGY

- This training course will be conducted along workshop principles with formal lectures and interactive worked examples. The emphasis will be on the explanation of all technical points and providing answers to problems that are encountered in everyday industrial practice regarding the efficient operation and maintenance of cooling towers. Each learning point will be reinforced with practical examples and case studies. There will be ample opportunities for active discussion during the workshops and video presentations. The sharing professional experiences and exchange will help solidify the gained knowledge. All training course materials will be provided.

PROGRAMME SUMMARY

- This Cooling Towers training course covers essential skills in operation and maintenance of cooling towers including normal operation and intermittent operation with start-ups and shutdowns. Procedures for preventive and corrective maintenance programs will also be explained, including water treatment required for achieving high efficiency of operation as well as the safety and mechanical integrity of equipment. The training course will provide guidelines for solving and troubleshooting of problems encountered in everyday practice.

PROGRAM OUTLINE

Overview of Cooling Towers and Applications

- Cooling Towers Types and System Configurations
 - Main Construction Elements
 - Essential cooling tower treatments
 - Why treat the waters?
 - Explain the cyclic process in cooling towers
 - Associated Equipment: Air Fans and Circulating Water Pumps
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Operation and Efficiency

- Cooling Load Profile, Water Temperature Range, Approach and Drift Loss
- Define efficiency in cooling towers
- Operation of Cooling Towers: Regular and Intermittent Use: Year-Round Plan
- Modern controls and techniques in cooling towers
- PLC and DCS explanation for cooling towers control systems
- Water quality requirements and how to measure
- Cooling Tower Start Up & Shut Down: Efficiency of Operation
- Efficiency Considerations: Ways to Improve Overall Performance

Operation and Water Management

- Cooling Water Quality Management: Treatment and Monitoring
- Water Treatment System Controls: Chemical Dosing
- Bleed-Off Water Quality Control
- Secondary efficiency measure
- Concentration ratio measurement
- Cathodic protection techniques to increase life time
- Modern coating techniques

Water Treatment and Control

- Corrosion: Causes, Problems and Prevention Methods
- Chemical Water Treatment: Inhibitors and Passive Methods: DCC Control
- Explain Basic motors types in Cooling towers
- Prober connection for all accessories (Electrical, Instrumentation)
- Grounding connection
- Physical Water Treatment Methods: Filtration Systems and Efficiency

Maintenance, Repairs and Troubleshooting

- Maintenance & Repair: Routine and Preventive Best Practices
 - Inspection Check List for Mechanical Equipment: Fans and Pumps
 - Applying FMEA, DFMEA and PFMEA modern techniques to extend life time
 - Safe operation as per manufactures
 - Different tests must be applied for all auxiliary systems
 - Risk Management of Cooling Tower System
 - Occupational Health & Safety Considerations
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