شركة ميرك العربية السعودية
MEIRC Saudi Arabia

Cooling Towers
Operation & Maintenance

Duration 5 Days

Introduction

Cooling towers are a very important part of many chemical plants. They represent a relatively inexpensive and dependable means of removing low grade heat from cooling water. For reducing cost and getting more value out of your cooling water system, engineers need multi-disciplinary knowledge of cooling water microbiology, chemistry and mechanics.

Who should Attend

Plant engineers, technically trained operating personnel, chemical supervisory personnel concerned with the selection, supervision, operation and maintenance of critical water cooling systems and capital equipment for industrial, utility, institutional and commercial plants.

Course Objectives

At the end of the program, participants will be able to:

- Understand the working principles of cooling towers
- Operate cooling towers safely
- Maintain and troubleshoot cooling towers

Course Outlines

1. INTRODUCTION
- 1.1. COOLING TOWER CONSTRUCTION
  - 1.1.1. Functions of a cooling tower
  - 1.1.2. Types of cooling towers and their applications: closed air-cooled systems, evaporative cooling towers - induced and forced draft, counter-flow versus cross-flow
  - 1.1.3. Materials of construction
  - 1.1.4. Efficiency of latest types of cooling towers and the cost savings associated with them

2. COOLING TOWER FUNDAMENTALS
- 2.1. Heat transfer surfaces-design and maintenance
- 2.2. Water distribution system on its effect on performance
- 2.3. Cooling tower fill performance
- 2.4. Air recirculation and the effect on performance
- 2.5. Causes of performance deterioration

3. CONTROL SYSTEMS
- 3.1. Use of DDC controls for proactive, user-friendly diagnostics
- 3.2. Monitoring capacity including use of computers
- 3.3. Water treatment control
- 3.4. Latest fan control options
- 3.5. Specifications
- 3.6. Using controls for cost reduction

4. INSPECTION
- 4.1. HOW TO INSPECT INDUSTRIAL/COMMERCIAL COOLING TOWER
  - 4.1.1. Year round operation

4.1.2. Motor, fan and clearance
4.1.3. Nozzles
4.1.4. Fill
4.1.5. Solids filtration efficiency
4.1.6. Fouling, scaling, corrosion
4.1.7. Water contamination
4.1.8. How to assess your existing cooling tower

4.2. SOURCES AND QUALITY OF MAKE-UP WATER
4.2.1. Water quality as it relates to cooling towers
4.2.2. Microbiological activity- types of micro organisms and strategies for control
4.2.3. Prevention of scaling, fouling and corrosion
4.2.4. Cycles of concentration
4.2.5. Minimizing cost at its source
4.2.6. Solids filtration efficiency
4.2.7. Fouling, scaling, corrosion
4.2.8. Water contamination

5. WATER QUALITY PROBLEMS IN CIRCULATING SYSTEM
5.1. Effects of microbiological activity on total cooling program success, as well as circulating system integrity and efficiency
5.2. Strategies for defouling and microbial control
5.3. Prevention of scaling, fouling and corrosion
5.4. Cycles of concentration
5.5. Non-destructive testing of tube bundles

6. OZONE TREATMENT OPTION
6.1. The ozone treatment system for cooling water- as compared to mechanical and chemical treatment
6.2. Efficiency in controlling microbiological contamination, fouling, scaling and corrosion
6.3. Cost considerations of operation, energy, water, environmental and liability considerations, and cycles of concentration

7. WATER TREATMENT
7.1. CHEMICAL TREATMENT OPTION
7.1.1. The chemical treatment system for cooling water as compared to mechanical and ozone treatment
7.1.2. Efficiency in controlling microbiological contamination, fouling, scaling and corrosion
7.1.3. Cost considerations of operation, energy, water, environmental and liability considerations, and cycles of concentration

7.2. ENVIRONMENTAL ISSUES
7.2.1. Water conservation methods
7.2.2. Comparison of water treatment methods from environmental standpoint
7.2.3. Controlling microbiological contamination, fouling, scaling and corrosion using environmentally friendly water treatment options
7.2.4. Recycling system efficiency to control concentration cycles

8. COST SAVINGS
8.1. Water consumption
8.2. Operating costs
8.3. WINTER OPERATION

8.4. Using free cooling during winter
8.5. Icing

9. COOLING TOWER MAINTENANCE GUIDELINES

9.1. What causes deterioration of cooling towers
9.2. Standard maintenance procedures
9.3. Troubleshooting
9.4. Seasonal operation
9.5. Startup/shutdown
9.6. Standard maintenance procedures
9.7. Do's and don'ts for efficient operation
9.8. Example of cost reduction through preventive maintenance
9.9. Life cycle cost analysis
9.10. Economics of rebuilding and upgrading for process improvement and its comparison to replacement
9.11. Upgrading for capacity improvement, energy conservation, water conservation and overall efficiency-wood and steel towers
9.12. Minimizing cost of rebuilding, upgrading and replacement options
9.13. Specifying retrofit, upgrade or replacement work