



Module Outline

Welcome to the AIRAH 'Cooling Towers in HVAC&R Part 2 – Installation, Operation and Maintenance course

The purpose of this course is to provide participants with the information required to assist in understanding the appropriate Installation, Operation and Maintenance requirements when applying cooling towers as the heat rejection in an HVAC&R system.

Some prior knowledge and/or experience in HVAC&R systems and their components will help ensure participants gain optimum benefit from the course.

How to Work Through this Course:

You can navigate through the course content by using the navigational arrows in the course content or the table of contents in the side bar. You can return to the main menu at any time by using the link provided in the table of contents

Activities / Assessment overview etc

For every one of the Topics in this course, there is a self-assessment section. You need to complete this assessment (which may entail reading articles, visiting websites or referring to one of the reference texts), to demonstrate your knowledge and competency. There are multiple self-assessments methods used including:

- Multiple choice questions
- Drop and Drag to diagram
- Labelling diagrams and other images
- Performing calculations

Introduction

This module covers the following topics.

Topic 1: Preparing for installation

- Standards and regulations
- Design check – 3666.1
- Water Treatment
- Locating a cooling tower
- Interference and recirculation
- Providing cooling tower access

Topic 2: Cooling tower installation

- Installing for operation/maintenance safety
- Electrical safety
- Vibration
- Typical pipework arrangement
- Pipework installation
- Multi-cell cooling towers
- Multiple cooling towers
- Balance pipe
- Air flow control strategies
- Controlling multiple cells or towers
- Controlling closed circuit or hybrid towers
- Installation in plantrooms
- Fire protection

Topic 3: Commissioning and testing

- Importance of commissioning
- Extent of commissioning
- Cooling Tower – Commissioning TAB
- Water balance
- Air side measurement
- Performance testing
- System cleaning, flushing, pre-treatment and passivation
- Commissioning checklist
- Commissioning documentation
- Analysis of results

Topic 4: System operation

- Managing microbial risk
- System water conservation
- System energy consumption

- Optimising water treatment systems
- Diagnosing poor performance
- Upgrades and replacements
- Cooling tower as a system

Topic 5: System maintenance

- Cooling tower maintenance overview
- Managing microbial control
- Water treatment
- Maintenance staff safety
- Personal protective equipment (PPE)
- Standards and regulations
- Cooling tower maintenance – AS/NZS 3666.2
- Cooling tower cleaning
- AS/NZS 3666.2 and AS/NZS 3666.3 compliance
- Managing water quality
- Managing trade waste
- Maintenance program
- Best practice cooling tower management

Learning Outcomes

At the completion of this course participants will be able to:

- identify the relevant standards and codes to comply with when installing cooling towers
- Explain the scope and content of the AS/NZS 3666 series of standards
- Outline the main design objectives for a water treatment system
- Identify the considerations to take into account when siting cooling towers
- Explain the de-rating phenomena of interference and recirculation
- Identify how interference and recirculation can be avoided at installation
- Identify how interference and recirculation in existing systems can be addressed
- Describe the importance of cooling tower access
- Outline the main provisions that should be made for a safe installation
- Identify considerations for unit supports, vibration control
- Describe a typical cooling water system pipework layout and installation practice
- Identify the specific considerations when installing multi-cell or multiple towers
- Describe the primary air flow control strategies used
- Explain how to optimise cooling tower fan energy outcomes
- Describe the primary air flow control strategies used
- Identify the main considerations when installing cooling towers in plantrooms
- Explain the reasons for and importance of system commissioning
- Outline the overall commissioning procedure
- Define the specific requirements of cooling tower testing, adjustment and balancing (TAB)
- Complete air and water side measurements
- Outline the system cleaning and flushing procedures
- Specify system pre-treatment and passivation where required
- Identify cooling tower operational impacts that need to be considered by system operators
- Outline the process for managing microbial risk in cooling towers
- Identify the main parameters when optimising system water use
- Identify the main parameters when optimising system energy use
- Identify how monitoring can help optimise water treatment
- Explain the main issues when managing cooling tower performance
- Identify the most common causes of poor cooling tower performance
- List common upgrades that are applied to existing cooling towers
- Provide an overview of cooling tower maintenance
- Provide an overview of water treatment for existing systems
- List the main considerations for maintenance staff safety
- Explain the role of PPE and the importance of safe access
- Outline the requirements of AS/NZS 3666.2 for cooling tower maintenance
- Describe cooling tower cleaning and inspection protocols
- Evaluate compliance with AS/NZS 3666.2 and/or AS/NZS 3666.3
- Describe a shut-down and start-up procedure
- Explain system disinfection and decontamination procedures
- Outline the importance and methods of managing water quality

- Specify a maintenance program for a cooling tower
- Identify the main faults/risks that occur in cooling water systems
- Describe a best practice approach to cooling tower management