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| MODULE TITLE | COOLING PLANT MAINTENANCE PROCEDURES |
| Nominal Duration | One module |
| Module Code or Number | EA152 |
| Module Purpose | <p>This module provides the student with the knowledge and skills necessary to identify the proper, and required maintenance procedures of cooling towers and other plant as determined by Australian Standard 3666. Students will also be able to list the various water treatments and water filtering options available and be able to develop a maintenance program for a specified plant.</p> |
| Relationship to Competency Standards | <p>This module will be modified in line with the requirements of the national metals and Engineering Standards when they become available.</p> <p>The module contains the knowledge and skills identified and agreed by all state/territories. It has been developed on the assumption that these will be reflected in the Standards.</p> |
| Prerequisites | EA146 Introduction to Air Conditioning |
| Summary of Content | <p>Cooling towers/evaporative condensers</p> <ul style="list-style-type: none">-Types, applications.-Cleaning,-Decontamination. <p>Humidifiers</p> <ul style="list-style-type: none">-Types, applications.-Cleaning,-Decontamination. <p>Condensate Trays and drains</p> <ul style="list-style-type: none">-Fall,-Cleaning. |

Water treatment

- Water tests,
- Water testing procedures,
- Ph,
- Micro-biological,
- Suspended solids,
- Corrosion,
- Bleed,
- Filtration,
- Chemical Treatment,
- Cathodic Protection.

Air Filters

- Types, applications.
- Pressure drop,
- Face Velocity,
- Cleaning, Changing,
- Fit.

Maintenance programs.

- Purpose,
- Methods of establishing specific requirements,
- Planning,
- Manual and Computer programs,
- Log books

Personal Safety

- Risks to service personnel and public,
- Safe practices,
- Person protective equipment.

Legal Requirements

- Duty of Care.

Codes and regulations

- Regulation under Workplace Health and Safety Act,
- NH&MRC recommendations,
- Code of practice,
- AS3666.

Delivery

This module contains learning outcomes that will require both theory and practical instruction. As such, it will require resources to facilitate both on and off the job delivery strategies.

These strategies may involve:

*co-operative registered off-the-job provider/ employer delivery sharing available resources.

*delivery by an employer who is sub-registered as an off-the-job provider, with qualified trainers in-house using resources to facilitate on and off-the-job delivery.

*off-the-job objectives should focus on the industry context while on-the-job objectives should reflect application within enterprise operations.

Assessment instruments will need to be developed by the module provider. These instruments will need to reflect consistency with stated module learning outcomes and related assessment criteria.

Student records will be the responsibility of the off-the-job provider and where more than one off-the-job provider is involved, formal processes for transfer of student information must be established.

Learning outcomes

On completion of this module the learner will be able to:

Learning outcome 1

Identify proper and required maintenance procedures as determined by AS3666.

Assessment criteria

- 1.1 State the economic, social and legal needs for regular planned maintenance procedures for cooling towers and other plant.
- 1.2 List the relevant sections or clauses of regulations under government acts, codes of practice and Australian Standards that pertain to maintenance of HVAC plant.

Conditions

Normally learning will take place in the classroom or other suitable study environment.

During learning, access to Australian standards, codes, and regulations as well as a variety of cooling towers and other plant.

Assessment method

Short answer test,
Assignments.

Learning outcome 2

List water treatments for a specified plant.

Assessment criteria

- 2.1 Specify the correct and appropriate water treatments for cooling towers and other plant.
- 2.2 Specify the correct and safe decontamination procedures in the event of unsafe micro-biological levels.

Conditions

Normally learning will take place in the classroom or other suitable study environment.

During learning, access to a variety of water quality testing and water treatment equipment as applied to cooling towers and other plant.

Assessment method

Short answer test,
Practical exercises,
Assignments.

Learning outcome 3

List water filtering options for a specified plant.

Assessment criteria

- 3.1 Discuss and list water filtering options for cooling towers and other plant.

Conditions

Normally learning will take place in the classroom or other suitable study environment.

During learning, access to water filtering equipment as applied to cooling towers and other plant.

Assessment method

Short answer test,
Practical exercises,
Assignments.

Learning outcome 4

Develop maintenance programs for specified plant.

Assessment criteria

4.1 Develop manual and computer based maintenance programs for a variety of specified plant representative of typical HVAC plant as found in industry.

Conditions

Normally learning will take place on-the-job and in the classroom or other suitable study environment.

During learning, access to Australian standards, codes, and regulations as well as a variety of cooling towers and other plant, computers with spread sheet capabilities.

Assessment method

Short answer test,
Assignments.

Suggested Learning Resources

Airflow Developments Ltd. Airflow Measurements in Buildings.

Boyle. Australian Refrigeration and Air Conditioning. Trust publications.

Cooling Tower Institute. Code of Practice.

Dossat R.J. Principles of Refrigeration. SI Edition., M_cGrawHill.

SMACNA 1988. HVAC Systems Testing Adjusting and Balancing

Standards Australia-Latest Editions to be used:

AS1132 Methods of Test for Air Filters for Use in Air Conditioning and General Ventilation.

AS1323 Glossary of Terms for Air Filters for Use in Air Conditioning and General Ventilation.

AS1324 Air Filters for Use in Air Conditioning and General Ventilation.

AS1668 parts 1 & 2. The use of Mechanical Ventilation and Air Conditioning in Buildings.

AS1682 parts 1 & 2. Fire Dampers.

AS2913 Evaporative Air Conditioning Equipment.

AS3666 Air Handling and Water Systems of Buildings - Microbial Control.

AS HB40 The Australian Refrigeration and Air Conditioning Code of Good Practice.

Stoecker W.F., Jones J.W., 1982. Refrigeration and Air Conditioning, M_cGraw-Hill.

The Trane Company 1986. Trane Air Conditioning Manual.

Additionally further information may be sourced from;

Journal Articles.

Literature from water treatment companies.

Literature from hydronic system specialist companies. Literature from hydronic system specialist companies.