

1. Module details

Module name

Room Air Conditioners

Suggested structured learning time

A learner possessing the prerequisite skills and knowledge should achieve the module purpose in 18 to 20 hours.

Module code

NUE142

Field of Education code

031315

2. Module purpose

This module provides the knowledge and skills to install, commission, service, fault find and repair room air conditioners.

Learners will gain an understanding of principles of operation and the Codes and Regulations that cover room air conditioners.

It covers the Codes and Regulations covering room air conditioners, single room heat load calculations, system operation, installation, commissioning, service, fault finding and repair of room air conditioners.

3. Learning pathway

Intended use in the structured learning program

This module intended to supplement extensive workplace exposure to domestic appliance servicing work. In particular it applies to testing and servicing of room air conditioners to ensure they comply with requirements and are safe to use. Therefore before undertaking this module an apprentice should have a clear understanding and experience of:

- the basic fundamentals of air conditioning, the associated processes, as well as the basic principles of psychometrics and heat load calculations.
- the appropriate SAA codes associated with air conditioning systems.
- the knowledge and skills to service and fault find single and three phase motors and their associated circuits, applicable to appliance, refrigeration and air conditioning applications.
- selection, installation, charging and commissioning of refrigeration and air conditioning systems that utilise a capillary tube as a metering device.

Recommended prerequisites

For the most effective learning this module should be undertaken only after modules in Air Conditioning Fundamentals; Appliance Motors and Circuits and Capillary Systems have been completed.

4. Relationship to competency standards

This module provides part of the underpinning knowledge and skills in the 'Evidence Guide' of specific units of competency in the National Electrotechnology Training Package and provides similar support, where mapped, to equivalent units in the National Metals and Engineering Competency Standards. For details refer to the module to unit maps, available from EEQSBA.

5. Content

Summary of content

1. Relevant Codes
 - Building codes
 - Electrical
 - Health
 - Environmental
 - Noise
 - Drainage
 - Other
 - Council regulations
2. System Operation
 - Construction, operation and application of room air conditioners
 - Refrigeration system
 - Control system
 - Air distribution
 - Fans
 - Filters
 - Registers
 - Vibration
3. Heat Load Calculations
 - Design conditions
 - Residence survey
 - Typical heat load sources
 - Load calculations
 - Equipment sizing
4. Installation and Commissioning
 - Unit location
 - Services
 - Controls - operating and safety
 - Customer familiarisation

- 5. Maintenance, Service, Fault Finding and Repair
 - Typical faults from symptoms
 - Test equipment
 - Code of Practice
 - Periodic maintenance as per manufacturers' manuals
 - Testing procedures
 - Fault finding and repair
 - Electrical safety
 - Respect for customers premises
 - Customer communication

6. Assessment strategy

Assessment methods

Assessment should be progressive reflecting a holistic approach to ensure the module is met. To assist in ensuring validity, reliability and fairness assessment instruments should include practical exercises, assignments and written tests consisting of item types, such as multiple choice, short answer and problem solving.

Conditions of assessment

Normally learning and assessment will take place in a formal learning environment.

7. Learning outcome details

Learning outcome 1

Apply the relevant codes to installation and service of room air conditioners.

Assessment criteria

- 1.1 Identify and apply the relevant codes and council regulation to the installation and service of room air conditioners.

Learning outcome 2

Describe the construction, operation and application of room air conditioners.

Assessment criteria

- 2.1 Identify the major components, describe their and operation within the system.
- 2.2 Describe the overall system operation of a typical room air conditioner.

Learning outcome 3

Use appropriate methods to size a room air conditioner for a specific residential application.

Assessment criteria

- 3.1 Select the design conditions for a given installation.
- 3.2 Identify typical heat load sources relevant to a residential installation.

	<p>3.3 Use a short method to determine the heat load of a residential installation.</p> <p>3.4 From a determined set of conditions, select the most appropriate room air conditioner to satisfy requirements.</p>
Learning outcome 4	<p>Describe the installation and commissioning procedures for a room air conditioner.</p>
Assessment criteria	<p>4.1 Develop installation specifications to suit a typical room air conditioner.</p> <p>4.2 Specify the commissioning procedures to be adopted when commissioning a room air conditioner.</p> <p>4.3 Demonstrate correct lifting and moving techniques consistent with the installation and service of room air conditioners.</p>
Learning outcome 5	<p>Use appropriate resources to service, fault find and repair room air conditioners.</p>
Assessment criteria	<p>5.1 Using manufacturers' manuals select and use appropriate test equipment to maintain and fault find typical room air conditioners.</p> <p>5.2 Apply appropriate codes of practice, select and use tools and equipment to maintain, service, fault finding and repair room air conditioners.</p> <p>5.3 Isolate electrically and make safe components and the overall system.</p> <p>5.4 Prepare a report to the customer.</p>
8. Delivery of the module	
Delivery strategy	<p>Delivery strategies must be suitable for learning both theoretical and practical aspects described in the module purpose. It is considered that the most effective method to achieve this is by integration of theory and practice where students learn by experimentation, research and reports. It is recommended that learning and assessment be facilitated in a holistic manner that may require a learning outcome sequence other than that indicated in the module.</p>
Resource requirements	<p>Resources should be sufficient for students to carry out exercises on an individual basis.</p>

Useful references include:

ASHRAE Handbook, *Refrigeration Systems and Applications*, SI Version, ASHRAE, Atlanta

Boyle, G. *Australian Refrigeration and Air Conditioning Volumes 1 and 2 and Glossary*, A CR&D Project Trust Publication.

Dossatt, R.J. *Principles of Refrigeration* (SI Version)

Olivo, C.T. *Principles of Refrigeration* (3rd Edition)

Ozone protection Acts and Regulations

Standards Australia, Standards New Zealand:

AS/NZS HB40 (Latest edition) *Code of Good Practice for the Reduction of Emissions of Fluorocarbon Refrigerants Domestic and Residential Refrigeration Systems*.

AS/NZS 3760 (Latest edition) *In-service Safety Inspection and Testing of Electrical Equipment*

AS/NZS 4836 (Latest edition) *Safe Working Practice on Low-voltage Electrical Installations*

WorkCover NSW, *WorkCover Code of Practice - Low Voltage Electrical Work Local electricity distributor and authority regulations*

Where this module is used in an approved Traineeship or Apprenticeship program learners should be advised to obtain, where available, respective EE-Oz Training Standards¹ **User Guides** (these outline in detail what training and work performance the Learner is required to undertake for the program).

Occupational health and safety requirements

A safe and healthy environment will be provided for learners and teachers. Safety procedures for the particular learning facilities shall be followed as part of the learning / teaching activity and assessment.

¹ EE-Oz Training Standards – ElectroComms and EnergyUtilities Industry Skills Council Ltd formally EEQSBA