
SPLIT SYSTEM AIR CONDITIONING
Demonstrate knowledge of split system
air conditioning principles and
applications

level:	3
credit:	5
planned review date:	February 2010
sub-field:	Mechanical Engineering
purpose:	<p>This unit standard is for use in the training of installers of split system air conditioning, and covers underpinning principles and their application.</p> <p>People credited with this unit standard are able to demonstrate knowledge of: refrigerants and their hazards; electrical hazards and limits of electrical work relevant to split system air conditioning; physics related to air conditioning; the refrigeration cycle; types of split system air conditioning; and air conditioning principles as they relate to human comfort.</p>
entry information:	Open.
accreditation option:	Evaluation of documentation and visit by NZQA.
moderation option:	A national moderation system of regional panels and assessor networks has been established by Competenz.
special notes:	<p>1 References Building Act 2004; Hazardous Substances and New Organisms Act 1996; Health and Safety in Employment Act 1992; Ozone Layer Protection Act 1996; Electricity Regulations 1997; Ozone Layer Protection Regulations 1996. <i>Code of Practice for the reduction of emissions of fluorocarbon refrigerants in refrigeration and air conditioning applications.</i> Institute of Refrigeration, Heating and Air Conditioning Engineers of New Zealand (IRHACE New Zealand), 2001. Available from IRHACE, 28 E Lambie Drive, Manukau City.</p>

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- 2 Definitions
- Split system air conditioning* refers to pre-assembled, pre-charged air conditioning units (excluding ducted systems) for use in domestic or light commercial applications.
- ASHRAE* refers to the American Society of Heating, Refrigerating and Air-Conditioning Engineers.
- SI* – Système International d’Unités, or International System of Units.

Elements and Performance Criteria

element 1

Demonstrate knowledge of refrigerants and their hazards.

performance criteria

- 1.1 Hazards associated with the handling of refrigerants are described.
- Range: flammability, toxicity, asphyxiation, ozone depletion effects, over-pressurisation.
- 1.2 Methods of managing refrigerant hazards are described.
- Range: avoidance of leakage, ventilation, first aid measures, retention of recovered refrigerant.
- 1.3 Methods of recovering refrigerants are outlined in accordance with current industry and hazardous materials practice.
- Range: vapour, push/pull recovery methods.
- 1.4 Methods of safe storage of refrigerants are outlined.
- Range: approved cylinders, recovery bags.

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- 1.5 The chemical composition of unitary and zoetrope refrigerants are identified from ASHRAE 'R' number, cylinder colour code, and pressure temperature charts.

element 2

Demonstrate knowledge of electrical hazards and limits of electrical work relevant to split system air conditioning.

performance criteria

- 2.1 Electrical hazards are described in terms of potential effects on personnel, plant, and equipment.
- 2.2 Range of electrical work permissible for holders of different electrical licences is identified.
- Range: licences – unlicensed electrical workers, Electrical Service Technicians 'A' (EST-A) licence, Electrical Service Technicians 'B' (EST-B) licence, and licenced electricians.

element 3

Demonstrate knowledge of physics related to air conditioning.

performance criteria

- 3.1 The three methods of heat transfer are explained with reference to their application in air conditioning.
- 3.2 The SI units for temperature and pressure, related to air conditioning, are stated together with symbols.
- 3.3 Dalton's Law of Partial Pressures is described in terms of psychrometric theory.

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element 4

Demonstrate knowledge of the refrigeration cycle.

performance criteria

- 4.1 *Glide point, bubble point, and dew point* are explained with the aid of a simplified Mollier chart.
- 4.2 A refrigeration cycle schematic is sketched to illustrate the transfer of energy.
- 4.3 Coefficient of performance is illustrated by a simple energy equation.
- 4.4 The refrigeration cycle is explained with the aid of a given diagram, and with reference to changes in volume, temperature, pressure, and state of the refrigerant.
- 4.5 The effects of pressure on a refrigerant are described.
- Range: compression and expansion, pressure-volume-saturated temperature relationships.
- 4.6 The importance of maintaining a critical charge is described in terms of energy efficiency, human comfort, and the minimisation of component wear.

element 5

Demonstrate knowledge of types of split system air conditioning.

Range: types – high-wall, under-ceiling, cassette, floor console, facia.

performance criteria

- 5.1 Major components are identified and their functions described.
- 5.2 Compressors are identified and their differences explained.
- 5.3 Basic electrical components and controls are identified and their functions described.

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- 5.4 The need to use thicker-walled copper pipework in some systems but not in others is explained.
- 5.5 Simple de-ice controls are described in terms of their purpose and application.

element 6

Demonstrate knowledge of air conditioning principles as they relate to human comfort.

performance criteria

- 6.1 The effects of air movement and micro-climates on human comfort are described.
- 6.2 Relationship between net radiant energy exchange and air temperature is described.
- 6.3 Effects of air stratification and equipment location are described.
- 6.4 Effects of low and high humidity are described.
- 6.5 Given sample conditions taken by a sling psychrometer, are plotted using a psychrometric chart to illustrate zones of human comfort.

Comments on this unit standard

Please contact [Competenz qualifications@competenz.org.nz](mailto:Competenz_qualifications@competenz.org.nz) if you wish to suggest changes to the content of this unit standard.

Please Note

Providers must be accredited by the Qualifications Authority or a delegated inter-institutional body before they can register credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be accredited by the Qualifications Authority before they can register credits from assessment against unit standards.

Accredited providers and Industry Training Organisations assessing against unit standards must engage with the moderation system that applies to those standards.

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Accreditation requirements and an outline of the moderation system that applies to this standard are outlined in the Accreditation and Moderation Action Plan (AMAP). The AMAP also includes useful information about special requirements for providers wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

This unit standard is covered by AMAP 0013 which can be accessed at <http://www.nzqa.govt.nz/site/framework/search.html>.