

Title	Demonstrate advanced knowledge of refrigerants and their management		
Level	4	Credits	5

Purpose	<p>This unit standard is for use in the later stages of training of apprentices in the refrigeration and air conditioning trade, and covers more advanced knowledge of the use and management of refrigerants.</p> <p>People credited with this unit standard are able to demonstrate knowledge of: pressure-enthalpy diagrams for refrigerants, refrigeration oil, the effect of moisture in refrigerant and its management, methods of detecting refrigerant leakage, Approved Handler certification, retrofitting, and HC refrigerants; and demonstrate knowledge of changes to industry procedures as a result of the Tamahere cool store fire.</p>
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Classification	Mechanical Engineering > Refrigeration and Air Conditioning
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Available grade	Achieved
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Entry information	
Recommended skills and knowledge	<p>Unit Standard 28970, <i>Demonstrate knowledge of the principles of refrigeration and air conditioning</i>, Unit Standard 28952, <i>Demonstrate knowledge of refrigerants and their management</i>, Unit Standard 28950, <i>Meet requirements for Approved Filler Test Certificate for refrigerants</i>, or demonstrate equivalent knowledge and skills.</p>

Explanatory notes

1 References

Althouse, Turnquist, Bracciano. *Modern Refrigeration and Air Conditioning*. 19th edition. Tinley Park, Illinois: The Goodhouse-Willcox Company Inc. ISBN 1-59070-280-8.

Hydrocarbon refrigerant safety awareness training programme. Climate Control Companies Association (CCCA). October 2012. Available from CCCA, 42 Ormiston Road, Unit 5, Flat Bush, Auckland 2016.

Hazardous Substances and New Organisms Act 1996.

Safe use of hydrocarbon refrigerants. Factsheet. Worksafe New Zealand. Available at <http://www.business.govt.nz/worksafe/information-guidance/all-guidance-items/hydrocarbon-refrigerants>

Coroner's *Certificate of Findings in the Matter of Derek Francis Lovell*. Available at <http://www.tamahereforum.co.nz/wp-content/uploads/2012/03/Derek-Lovell-Finding.pdf>.

Office of the Chief Coroner of New Zealand. *Recommendations Recap – A summary of coronial recommendations and comments made between 1 January and 31 March 2012, Issue 2*. Available at <http://www.justice.govt.nz/courts/coroners-court/publications/>

Worksafe New Zealand – Approved Handler -

<http://www.business.govt.nz/worksafe/notifications-forms/hsno-activities-certification-qualifications-licensing/certification-of-people/approved-handlers>

2 Definitions

HC – Hydrocarbon.

HSNO Act – Hazardous Substances and New Organisms Act 1996.

RAC – refrigeration and air conditioning.

Outcomes and evidence requirements

Outcome 1

Demonstrate knowledge of pressure-enthalpy diagrams for refrigerants.

Evidence requirements

1.1 Thermodynamic terms relevant to pressure-enthalpy diagrams for refrigerants are explained.

Range enthalpy, saturated vapour, saturated liquid, critical point, superheated vapour.

1.2 Typical cycles for a given freezer and a heat pump are superimposed on the refrigerant pressure/enthalpy diagrams.

Outcome 2

Demonstrate knowledge of refrigeration oil.

Evidence requirements

2.1 The five required properties of a refrigerant oil are identified and described.

2.2 Suitable lubricants are determined for four common refrigerants.

2.3 Methods for detecting contaminants in oil are described.

2.4 The negative effects of moisture in refrigeration systems are explained.

2.5 Common devices for detecting and removing excess moisture in a system are identified and their operation explained.

Outcome 3

Demonstrate knowledge of methods of detecting refrigerant leakage.

Evidence requirements

3.1 Methods of detecting refrigerant leaks are described in accordance with industry practice.

Range Three of – bubble solution, refrigerant dye, fluorescent dye, halide torch detector, electronic leak detectors.

3.2 Two methods of leak detection are demonstrated in accordance with manufacturers' instructions.

Outcome 4

Demonstrate knowledge of Approved Handler (Test Certificates).

Range in accordance with the HSNO Act.

Evidence requirements

4.1 The provisions of the HSNO Act relevant to an Approved Handler are outlined.

Range purpose and principles, offence and defence provisions, penalties and liabilities, compliance orders.

4.2 The requirements for becoming an Approved Handler are outlined.

4.3 The responsibilities of an approved handler in the work place are outlined.

Outcome 5

Demonstrate knowledge of retrofitting in accordance with industry practice.

Evidence requirements

5.1 The concept of retrofitting is explained.

5.2 The key issues involved with retrofitting are outlined.

Outcome 6

Demonstrate knowledge of HC refrigerants.

Evidence requirements

6.1 The growing popularity of hydrocarbon refrigerants is explained with reference to advantages and disadvantages.

- 6.2 Precautionary measures for use in conjunction with HC refrigerants are explained in accordance with *industry practice*.

Range a minimum of six measures.

Outcome 7

Demonstrate knowledge of changes to industry procedures as a result of the Tamahere cool store fire.

Evidence requirements

- 7.1 The underlying causes of the fire are identified from the Coroners Certificate of Findings.
- 7.2 Lessons to be learnt from the fire are identified from the Coroners Certificate of Findings.
- 7.3 Changes to industry procedures to address the underlying causes of the fire are explained.

Planned review date	31 December 2020
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	18 June 2015	N/A

Consent and Moderation Requirements (CMR) reference	0013
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMRs). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact Competenz at qualifications@competenz.org.nz if you wish to suggest changes to the content of this unit standard.