

Title	Service commercial refrigeration and/or air conditioning systems		
Level	4	Credits	20

Purpose	<p>This unit standard is for people who work in the refrigeration and air conditioning sector of the engineering industry.</p> <p>People credited with this unit standard are able to, for commercial refrigeration and/or air conditioning systems: interpret system drawings and diagrams; diagnose faults and rectify common faults in systems; retrofit existing systems with alternative refrigerants; recondition components; and complete servicing activities and documentation, and recommission systems.</p>
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Classification	Mechanical Engineering > Refrigeration and Air Conditioning
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Available grade	Achieved
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Prerequisites	People undergoing training and assessment towards the competencies in this unit standard must be licensed by the Electrical Workers Registration Board as Electrical Service Technician.
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Guidance Information

- Recommended skills and knowledge:
 - Unit 28960, *Demonstrate knowledge of commercial RAC system maintenance and servicing*;
 - Unit 28965, *Maintain and service commercial RAC systems and equipment under supervision*.
- Legislation and standards
 - Health and Safety at Work Act 2015;
 - Building Act 2004;
 - Climate Change Response Act 2002;
 - Electricity (Safety) Regulations 2010;
 - Electricity Act 1992;
 - Hazardous Substances and New Organisms Amendment Act 2015;
 - Ozone Layer Protection Act 1996;
 - AS/NZS 5149:2016 *Parts 1:5 Refrigerating Systems and Heat pumps – Safety and environment requirements*;
 - AS/NZS 817:2016 *Refrigerants – Designation and safety classification*;
 - AS/NZS 3000:2007 *Electrical installations (known as the Australian/New Zealand Wiring Rules)*;

and any subsequent amendments.

3 Reference

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

Institute of Refrigeration, Heating and Air Conditioning Engineers of New Zealand (IRHACE New Zealand). 2001 *Code of Practice for the reduction of emissions of fluorocarbon refrigerants in refrigeration and air conditioning applications*. Available from IRHACE, <http://www.irhace.org.nz/>.

- 4 All worksite practices must meet recognised codes of practice and documented safety procedures and safety plans (where these exceed the code) for personal and worksite safety, and obligations required under current legislation.

5 Definitions

Approved industry practices refer to approved codes of practice and standardised procedures accepted by the wider refrigeration and air conditioning industry sectors as examples of best practice.

Commercial refrigeration and/or air conditioning systems refer to items such as: refrigeration equipment as found in retail food outlets, truck and shipping-container refrigeration, horticultural cool room refrigeration, controlled atmosphere fruit stores; and packaged or split air conditioning equipment as found in commercial buildings and computer rooms.

EWRB refers to the Electrical Workers Registration Board.

Worksite procedures refer to documented procedures used by the organisation carrying out the work and applicable to the tasks being carried out. They may include but are not limited to – standard operating procedures, site safety procedures, equipment operating procedures, codes of practice, quality assurance procedures, housekeeping standards, procedures to comply with legislative and local body requirements.

6 Range

Competence is to be demonstrated on the maintenance of three systems. These systems may be any of – refrigeration; air conditioning; or combined refrigeration and air conditioning.

Outcomes and performance criteria

Outcome 1

Interpret commercial refrigeration and/or air conditioning system drawings and diagrams.

Performance criteria

- 1.1 Componentry is recognised and layout of systems is established from site drawings.
- 1.2 Correct sequence of system operation is determined from wiring diagrams and piping schematics.

1.3 Timeframes for servicing are established and agreed with stakeholders in accordance with approved industry practice.

Range stakeholders may include but are not limited to – manager, supervisor, contract manager, contractor, internal staff.

Outcome 2

Diagnose faults in commercial refrigeration and/or air conditioning systems.

Performance criteria

2.1 Faults are identified and diagnosed through information provided by users and/or operators, and the use of human senses.

Range human senses may include any of – sight, hearing, smell, touch.

2.2 Faults are identified and diagnosed through pressure drops, temperatures, and superheats.

2.3 Faults are identified and diagnosed through tests.

Range tests may include but are not limited to – electrical circuit's continuity and mode, conductor and insulation resistance, componentry integrity, voltages, current draw, phase sequence.

Outcome 3

Rectify common faults in commercial refrigeration and/or air conditioning systems.

Performance criteria

3.1 Isolating valves and evacuating connections are fitted as required by plant and operating environment.

3.2 Components in refrigeration and air conditioning systems are pumped-down and isolated in accordance with worksite procedures.

3.3 Faults are rectified in accordance with worksite procedures.

Range faults may include but are not limited to – electrical, mechanical, electronic, fluid.

3.4 Procedures are implemented to protect personnel, equipment, and property in accordance with worksite procedures.

Range may include but is not limited to – warning notices, identifications, equipment isolation, electrical isolation.

Outcome 4

Retrofit existing commercial refrigeration and/or air conditioning systems with alternative refrigerants.

Performance criteria

- 4.1 Refrigerant is recovered and stored in accordance with worksite procedures.
- 4.2 Equipment and components' suitability for retrofit is confirmed.
- 4.3 Unsuitable components are removed and replaced in accordance with worksite procedures.
- 4.4 Alternative refrigerants and their appropriate oils are selected and charged into existing systems in accordance with worksite procedures.

Outcome 5

Recondition components for commercial refrigeration and/or air conditioning systems.

Performance criteria

- 5.1 Refrigeration and air conditioning components are reconditioned and overhauled in accordance with worksite procedures.
Range compressors, pressure regulating valves, pumps, fans, motors.

Outcome 6

Complete servicing activities and documentation, and recommission systems.

Performance criteria

- 6.1 Servicing activities are completed in accordance with agreed timeframes.
- 6.2 Where applicable, the integrity of building penetrations is confirmed by appropriate visual and tactile checks.
- 6.3 Relocated, repaired, and/or converted equipment and systems are reassembled, tested, and recommissioned to meet system specifications.
- 6.4 Manuals are updated to match current specifications.
- 6.5 Job content, materials, and labour inputs are described for both invoicing and customer reports in accordance with worksite procedures.

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	9 April 1995	31 December 2017
Revision	2	14 April 1997	31 December 2017
Revision	3	5 January 1999	31 December 2017
Revision	4	13 November 2001	31 December 2017
Review	5	20 June 2006	31 December 2019
Review	6	18 June 2015	31 December 2020
Revision	7	16 February 2017	N/A
Revision	8	22 October 2020	N/A

Consent and Moderation Requirements (CMR) reference

0013

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

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