

Title	Maintain and service commercial RAC systems and equipment under supervision		
Level	3	Credits	12

Purpose	<p>This unit standard is for people working in the refrigeration and air conditioning (RAC) industry under supervision.</p> <p>People credited with this unit standard are able to: prepare to maintain and/or service commercial RAC systems; maintain and service RAC mechanical systems and components; maintain and service RAC electrical and electronic systems and components; retrofit refrigerants; and complete maintenance and servicing activities.</p>
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Classification	Mechanical Engineering > Refrigeration and Air Conditioning
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Available grade	Achieved
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Guidance Information

- 1 Recommended skills and knowledge
Unit 28960, *Demonstrate knowledge of commercial RAC system maintenance and servicing.*
- 2 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 References
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 Definitions

Maintain and service refers to activities carried out to ensure the ongoing serviceability of an RAC system. It includes scheduled activities carried out in accordance with a maintenance plan (e.g. filter replacement) and unscheduled rectification work resulting from faults, failures, or performance deterioration.

Standard industry practices refer to standard and proven industry practices accepted by the refrigeration and air conditioning industry.

Under supervision means under the oversight and guidance of an experienced and authorised person holding an electrical service technician licence who takes overall responsibility for the work carried out.

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.

5 Assessment information

This unit standard may be assessed in the workplace using naturally occurring evidence or in a simulated environment that demands performance equivalent to that required in the workplace.

All work must be carried out under supervision and in accordance with worksite procedures.

Outcomes and performance criteria

Outcome 1

Prepare to maintain and/or service commercial RAC systems.

Performance criteria

- 1.1 Work to be carried out is established from maintenance plans and/or service instructions.
- 1.2 System operation and performance parameters are established from specifications and/or drawings.
- 1.3 Resources required for work are determined and obtained.

Range	tools, equipment, materials, refrigerants, lubricants, documents, publications.
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- 1.4 Any work required by other trades is coordinated to meet the work schedule and minimises lost time.
- 1.5 Worksite and equipment is made ready for maintenance or servicing and affected personnel are notified.

Outcome 2

Maintain and service RAC mechanical systems and components.

Range components may include but are not limited to – fans, pumps, compressors, heat exchangers, filters, valves, piping, tubing, ducting, heat transfer mediums, doors and latches, guards, supporting structure and restraints, thermal insulation, drains and trays;
evidence must be provided for at least three different types of maintenance and/or servicing activities, and at least two different types of fault repairs.

Performance criteria

- 2.1 System and components are checked for condition and operation, and maintained in accordance with the maintenance plan and/or service instructions.
- 2.2 Refrigerant and lubricating oil are checked against system specifications.
- 2.3 Components and ducting are cleaned and sanitised in accordance with standard industry practices.
- 2.4 Reported faults are investigated in accordance with standard industry practices and underlying causes identified.
- 2.5 Investigation establishes that the source of the fault is mechanical in nature.
- 2.6 Faults are rectified in accordance with standard industry practices.

Range repair, adjust, replace components.

Outcome 3

Maintain and service RAC electrical and electronic systems and components.

Range components may include but are not limited to – motors, controllers, protective devices, wiring, sensors, thermostats, relays, switches, contactors;
evidence must be provided for at least three different types of maintenance and/or servicing activities, and at least two different types of fault repairs.

Performance criteria

- 3.1 System and components are checked for condition and operation, and maintained in accordance with the maintenance plan and/or service instructions.
- 3.2 Electrical quantities are measured in accordance with standard industry practices.

Range voltage, current, insulation, resistance, continuity
- 3.3 Reported faults are investigated in accordance with standard industry practices and underlying causes identified.

3.4 Investigation establishes that the source of faults is electrical or electronic in nature.

3.5 Faults are rectified in accordance with standard industry practices.

Range repair, adjust, replace components.

Outcome 4

Retrofit refrigerants.

Performance criteria

4.1 Suitability of equipment for retrofit is investigated and justified in terms of lifecycle cost and industry practice.

4.2 Existing refrigerant is recovered and stored in accordance with standard industry practices.

4.3 Systems are charged with alternative refrigerants and appropriate oils in accordance with standard industry practice and manufacturers specifications.

4.4 System labelling is amended to reflect new refrigerant and oil in accordance with standard industry practices.

Outcome 5

Complete maintenance and servicing activities.

Performance criteria

5.1 System is recommissioned in accordance with standard industry practices.

5.2 Tests are carried out and verify that system performance meets specifications.

5.3 Worksite and equipment is returned to its required operational state and affected personnel are notified.

5.4 Changes in plant characteristics, operational requirements, and/or regulatory requirements affecting maintenance schedules and/or system description are identified and reported.

5.5 Documentation is completed and processed.

Range may include – records of work carried out; reports; changes to system specification, operating instructions, maintenance instructions, manuals; work orders for follow up actions.

Replacement information	This unit standard, and unit standard 28960 replaced unit standard 22704.
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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
Revision	2	22 October 2020	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>.

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.