

<b>Title</b>	<b>Maintain and service RAC systems and equipment in controlled temperature transport applications</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>20</b>

<b>Purpose</b>	<p>This unit standard is for people who maintain and service commercial refrigeration and air conditioning (RAC) equipment in transport applications.</p> <p>People credited with this unit standard are able to: prepare to maintain and service RAC systems, maintain and service RAC mechanical systems and components; repair faults in RAC mechanical systems and components; maintain and service RAC electrical and electronic systems and components; repair faults in RAC electrical and electronic systems; retrofit refrigerants; and complete maintenance and/or servicing activities.</p>
----------------	--

<b>Classification</b>	Mechanical Engineering > Refrigeration and Air Conditioning
-----------------------	---

<b>Available grade</b>	Achieved
------------------------	----------

<b>Prerequisites</b>	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.
----------------------	--

---

## 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;  
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 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

*Controlled temperature transport applications* refer to refrigeration and air conditioning systems used in road vehicles, and truck and shipping containers.

*EWRB* refers to Electrical Workers Registration Board.

*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 practice* refers to standard and proven industry practices accepted by the refrigeration and air conditioning industry.

*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 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 in accordance with worksite procedures.

## Outcomes and performance criteria

### Outcome 1

Prepare to maintain and service RAC systems.

#### Performance criteria

- 1.1 Work to be carried out is established from maintenance plans and/or service instructions.

Range service instructions may be written or verbal

- 1.2 System operation and performance parameters are established from specifications and/or drawings.
- 1.3 System operating and performance history is acquired and interpreted.
- Range may include – verbal reports, written records, downloaded digital records.
- 1.4 Resources required are determined and obtained.
- Range tools, equipment, materials, refrigerants, lubricants, documents, publications.
- 1.5 Any work required by other trades is coordinated to meet the work schedule and minimise lost time.
- 1.6 Work area is made ready for maintenance or servicing in accordance with worksite procedures.

## Outcome 2

Maintain and service RAC mechanical systems and components.

Range evidence relating to maintenance and/or servicing on – compressors, filters, valves, piping, tubing, defrost systems, drains and trays; and a least two of – lubrication systems, de-ice systems, fans, pumps, heat exchangers, ducting, heat transfer mediums, doors and latches, guards, supporting structure and restraints, thermal insulation, moveable dividing walls.

### Performance criteria

- 2.1 Refrigerant and lubricating oil are checked against system specifications.
- 2.2 System and components are checked for condition and operation and maintained in accordance with the maintenance plan and/or service instructions.
- Range coil cleanliness, performance, hardware, piping, clamps.
- 2.3 Components and ducting are cleaned and sanitised in accordance with standard industry practices.

## Outcome 3

Repair faults in RAC mechanical systems and components.

Range at least ten repairs covering different mechanical faults.

### Performance criteria

- 3.1 Reported faults are investigated in accordance with standard industry practices and underlying causes identified.

3.2 Investigation establishes that the source of the fault is mechanical in nature.

3.3 Faults are rectified in accordance with standard industry practices.

Range repair, adjust, replace components.

#### **Outcome 4**

Maintain and service RAC electrical and electronic systems and components.

Range evidence relating to maintenance and/or servicing on six of – motors, controllers, batteries, alternators, generators, data loggers, protective devices, wiring, sensors, thermostats, relays, switches, contactors.

#### **Performance criteria**

4.1 System and components are checked for condition and operation and maintained/and or serviced in accordance with the maintenance plan and/or service instructions.

4.2 Electrical quantities are measured in accordance with standard industry practices.

Range voltage, current, insulation, resistance, continuity.

#### **Outcome 5**

Repair faults in RAC electrical and electronic systems.

Range at least ten repairs covering different electrical and/or electronic faults.

#### **Performance criteria**

5.1 Reported faults are investigated in accordance with standard industry practices and underlying causes identified.

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

5.3 Faults are rectified in accordance with standard industry practices.

Range repair, adjust, replace components, motor bearing replacement.

#### **Outcome 6**

Retrofit refrigerants.

#### **Performance criteria**

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

- 6.2 Existing refrigerant is recovered, stored, and disposed of in accordance with standard industry practices.
- 6.3 Systems are charged with alternative refrigerants and appropriate oils in accordance with standard industry practice.
- 6.4 System labelling is amended in to reflect new refrigerant and oil in accordance with standard industry practices.

### Outcome 7

Complete maintenance and/or servicing activities.

#### Performance criteria

- 7.1 System is recommissioned in accordance with standard industry practices.
- 7.2 Tests are carried out and verify that system performance meets specifications.
- 7.3 Worksite and equipment is returned to its required operational state and affected personal are notified.
- 7.4 Changes in plant characteristics, operational requirements, and/or regulatory requirements affecting maintenance schedules and/or system description are identified and reported in accordance with worksite procedures.
- 7.5 Recommendations that will improve system performance or reduce maintenance requirements are advised to customers.
- Range in relation to – product handling, operating practices, hardware replacement, further maintenance work.
- 7.6 Documentation is completed in accordance with worksite procedures.
- Range may include but is not limited to – records of work carried out; reports; changes to system specification, operating instructions, maintenance instructions, manuals; work orders for follow up actions.

<b>Planned review date</b>	31 December 2020
----------------------------	------------------

#### Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	18 June 2015	31 December 2020
Revision	2	16 February 2017	N/A
Revision	3	22 October 2020	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	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](mailto:qualifications@competenz.org.nz) if you wish to suggest changes to the content of this unit standard.