Title	**Fabricate and assemble components for refrigeration or air conditioning systems under supervision**		
Level	**2**	**Credits**	**8**

Purpose	This unit standard is intended for people under training in the refrigeration and/or air conditioning (RAC) industries. People credited with this unit standard are able to, under supervision: prepare to fabricate, and fabricate secondary components for refrigeration or air conditioning systems; prepare to assemble, and assemble refrigeration or air-conditioning components; check assembled components for compliance with drawings and instructions; and complete the fabrication and assembly tasks.

Classification	Mechanical Engineering > Refrigeration and Air Conditioning

Available grade	Achieved

Guidance Information

1 Legislation and references relevant to this unit standard include:
Althouse, Turnquist, Bracciano. *Modern Refrigeration and Air Conditioning,* 20th edition. Tinley Park, Illinois: The Goodhouse-Willcox Company Inc. ISBN 1-59070-280-8.
Health and Safety at Work Act 2015;
Montreal Protocol and its amendments;
Building Act 2004;
Electricity Act 1992;
Electricity (Safety) Regulations 2010;
AS/NZS 3000:2007, *Electrical installations known as the Australian/New Zealand Wiring Rules*;
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, 5/42 Ormiston Road, Flat Bush, Auckland 2016. https://www.irhace.org.nz/.

2 Definitions
Drawings – for the purpose of this unit standard include engineering technical drawings and freehand sketches, provided they contain all technical data required to build a system.
Instructions – include written and verbal instructions from the supervisor.
Primary components – evaporator, condenser, compressor set, expansion device.

Refrigeration or air conditioning systems refers to equipment found in: retail food outlets, truck and shipping container refrigeration, horticultural cool rooms, controlled atmosphere fruit stores; and packaged or split air conditioning equipment as found in commercial buildings and computer rooms.
Secondary components – refers to items such as valves, sensors, switches, control mechanisms, cabinets, panels, tubing, fittings, mounting brackets, seismic restraints.
Standard industry practices – 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 who takes overall responsibility for the work carried out.
Workplace procedures – 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, industry codes of practice, quality assurance procedures, housekeeping standards, procedures to comply with legislative and local body requirements.

3 Recommended units for entry:
Unit 21911*, Demonstrate knowledge of safety on engineering worksites*;
Unit 2191*2, Apply safe working practices on an engineering* worksite;
Unit 29655*, Manually produce engineering sketches.*

4 Assessment Information
This unit standard is intended to cover the skills required to fabricate secondary components, and assemble primary and secondary components into a functioning refrigeration or air conditioning system ready for installation. The skills must be demonstrated on job in a workshop facility, remote from the installation site.

5 Range
All work must be carried out under supervision, in accordance with workplace procedures, standard industry practices and AS/NZS 5149:2016 *Refrigerating systems and heat pumps – Safety and environmental requirements* parts 1 through 4.

Outcomes and performance criteria

Outcome 1

Prepare to fabricate secondary components for refrigeration or air conditioning systems.

Range components include but are not limited to – duct fittings, pipes, mounting brackets, seismic restraints, cabinets, trays, panels.
Candidates must complete one sheet metal component, one pipe assembly that includes at least one bend, and one other component type.

Performance criteria

1.1 Fabrication tasks are established from drawings and instructions.

1.2 Required parts and materials are identified from drawings and instructions, and obtained.

1.3 Tooling and equipment appropriate for the tasks, are identified and obtained.

Range may include but is not limited to – hand tools, guillotine, folder, pipe bender, flaring tools, brazing and/or soldering equipment.

Outcome 2

Fabricate secondary components for refrigeration or air conditioning systems.

Performance criteria

2.1 Materials are worked in accordance with drawings and instructions.

Range may include but is not limited to – marked out, bend allowance calculated, cut, drilled, shaped, bent, folded, deburred, flared.

2.2 Worked parts are joined in accordance with drawings and instructions.

Range joining methods may include but are not limited to – soldering, brazing, riveting, fastening, sealing, lock forming, spot welding.

Outcome 3

Prepare to assemble components for refrigeration or air conditioning systems.

Range primary components, secondary components.

Performance criteria

3.1 Work area is prepared, and tooling and equipment appropriate for the tasks, are identified and obtained.

3.2 Required components and parts are identified from drawings and instructions and obtained.

Outcome 4

Assemble components for refrigeration or air-conditioning systems.

Performance criteria

4.1 Parts are checked against drawings and made ready for assembly.

4.2 Mechanical parts are assembled and/or connected in accordance with drawings and instructions.

Range may include but is not limited to – located, mounted, fastened, lock formed, brazed, sealed, glued.

4.3 Electrical components are fitted and connected in accordance with drawings and instructions.

Outcome 5

Check assembled components for compliance with drawings and instructions.

Performance criteria

5.1 Mechanical fasteners are checked for security of attachment and/or locking.

5.2 Electrical connections are checked for polarity and security of attachment.

5.3 Fluid joints are checked for leakage.

Outcome 6

Complete the fabrication and assembly tasks.

Performance criteria

6.1 Refrigeration or air conditioning system is prepared for storage, or transportation to site.

6.2 Tooling, equipment and work area are left in a condition ready for the next task.

6.3 Waste materials and leftover parts are processed or disposed of.

Range processing may include but is not limited to – packed, returned to store, reworked for another job.

6.4 Documentation is completed.

Replacement information	This unit standard and unit standard 31810 replaced unit standard 28967.

Planned review date	31 December 2024

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 June 2019	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.