Title	**Demonstrate knowledge of refrigeration principles applicable to domestic appliances**		
Level	**4**	**Credits**	**6**

Purpose	This unit standard covers the basic principles of refrigeration and their application in domestic appliances and is intended for use in the training of electrical technicians and service persons. People credited with this unit standard are able to demonstrate knowledge of: – the basic principles of refrigeration; – the operating principles of refrigerators, freezers, dehumidifiers, and air conditioners; – common refrigerants, their application, and safe storage and handling; – the materials and components used in refrigeration systems, and their functions; and – the essential requirements of cold food storage.

Classification	Electrical Engineering > Electrical Appliance Servicing

Available grade	Achieved

Guidance Information

1 This unit standard has been developed for learning and assessment off-job.

2 References
Hazardous Substances and New Organisms Act 1996;
Health and Safety in Employment Act 1992, and associated regulations;
and all subsequent amendments and replacements.

3 Definition
Electrical technicians and service persons – for the purposes of this unit standard means, people who hold or who are working towards electrical registration as an Electrical Service Technician, Electrical Appliance Serviceperson (endorsed to disconnect and connect), or Electrical Appliance Serviceperson.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of the basic principles of refrigeration.

Performance criteria

1.1 Methods of heat transfer and the effects of pressure on a refrigerant are described.

Range compression and expansion, refrigeration laws, pressure-volume-temperature relationships, condensers, evaporators, compressors.

1.2 The refrigeration cycle is described and explained with the aid of diagrams, and with reference to changes in volume, temperature, and pressure of the refrigerant.

1.3 Effects of dirt and moisture are stated and methods of prevention described.

Outcome 2

Demonstrate knowledge of the operating principles of refrigerators, freezers, dehumidifiers, and air conditioners.

Performance criteria

2.1 The typical operation of refrigerators, freezers, and dehumidifiers are described.

Range refrigerator and freezer types – manual defrost, cyclic defrost, frost free;
dehumidifier types – hot gas defrost, cyclic;
operating principles – cooling, heating, defrosting, draining.

2.2 The typical operation of air conditioners are described.

Range air conditioner types – fixed window, split, ducted, cooling, reverse cycle;
operating principles – cooling, heating, defrosting, draining, reverse cycle operation, heat source and sink temperature limitations for efficient operation.

Outcome 3

Demonstrate knowledge of common refrigerants, their application, and safe storage and handling.

Performance criteria

3.1 Properties of common refrigerants are described together with their means of identification.

Range chlorofluorocarbons (CFC) – Freon 12;
hydro chlorofluorocarbons (HCFC) – R12, R22, 134A, ICEON49;
alternative refrigerants.

3.2 Hazards associated with the handling of common refrigerants are described.

Range toxicity, asphyxiation, ozone depletion effects, injurious effects.

3.3 Methods of safe storage and handling of refrigerants are described.

Range avoidance of leakage, ventilation, breathing apparatus, first aid measures, retention of recovered refrigerant.

3.4 The steps to safely recover, purge and recharge refrigerants are described in accordance with current industry and hazardous materials practice.

Outcome 4

Demonstrate knowledge of the materials and components used in refrigeration systems, and their functions.

Performance criteria

4.1 Materials required for insulation and sealing of cabinets are identified and described.

4.2 Evaporators and condensers are identified according to purpose, including type and location of hidden evaporators or condensers, and materials used.

4.3 Refrigeration components are identified, and their functions described.

4.4 A refrigeration compressor is described, and its operation explained.

4.5 Electrical components are identified, and their function described.

4.6 Materials commonly used for pipe work are identified as aluminium, copper, steel-based, or Bundy.

Outcome 5

Demonstrate knowledge of the essential requirements of cold food storage.

Performance criteria

5.1 Describe the effect of storage temperature on food with reference to quality, food safety, and growth of microorganisms.

5.2 State the safe temperature ranges for storing food in domestic refrigerators and freezers.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	28 January 2001	31 December 2013
Review	2	20 June 2006	31 December 2022
Rollover and Revision	3	20 September 2012	31 December 2022
Revision	4	15 January 2014	31 December 2022
Review	5	28 January 2021	31 December 2022

Consent and Moderation Requirements (CMR) reference	0003

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