Title	**Demonstrate knowledge of and operate refrigeration equipment in an energy and chemical plant**		
Level	**4**	**Credits**	**10**

Purpose	This unit standard is intended for people working as boiler operators and energy and chemical process operators in an energy and chemical plant. People credited with this unit standard are able to: describe refrigeration systems used in the energy and chemical industry; demonstrate knowledge of the operation of refrigeration equipment in an energy and chemical plant; and operate refrigeration equipment in an energy and chemical plant.

Classification	Energy and Chemical Plant > Operation of Energy and Chemical Plant

Available grade	Achieved

Guidance Information

1 Legislation and regulations relevant to this unit standard includes but is not limited to:
- Health and Safety at Work Act 2015;
- Health and Safety at Work (Hazardous Substances) Regulations 2017;
- Resource Management Act 1991;
and any subsequent amendments.

2 Definitions
Energy and chemical plant may be in – petrochemical, agri-nutrient, power generation, dairy processing, meat processing, and wood fibre manufacturing, or other plants that operate with a combination of high temperatures, pressures, steam and/or chemicals in gas, liquid or solid form.
Organisational requirements – documented policies and procedures. These may include: equipment manufacturers' procedures; plant procedures; suppliers' instructions; site signage; codes of practice; company health and safety plans; on site briefings; and supervisor's instructions. This includes all regulatory and legislative obligations that apply to the plant.
Plant – the operational unit, equipment and/or workplace at which the person is working.

3 For the purposes of assessment:
- evidence for the practical components of this unit standard must be supplied from the workplace.

Outcomes and performance criteria

Outcome 1

Describe refrigeration systems used in the energy and chemical industry.

Performance criteria

1.1 Describe refrigeration systems in terms of operating and design concepts.

Range refrigeration systems include but are not limited to – mechanical absorption, vapour compression.

1.2 Describe components of refrigeration systems in terms of purpose and operating concepts.

Range components include but are not limited to – drier, evaporator, condenser, oil separator, expansion valve, temperature regulating valve, slide loading valve, regulator, liquid receiver, compressors, safety devices.

1.3 Describe refrigerants used in terms of their potential hazards, use, chemical properties.

Range refrigerants include but are not limited to – ammonia, fluorocarbons, propane.

1.4 Describe refrigerant systems in terms of the safety requirements.

Range safety requirements include but are not limited to – safety data sheets, safety equipment, safety procedures.

1.5 Describe potential causes of operational problems in terms of the operational steps and techniques required to avoid them.

Range operational problems include but are not limited to – leakage, freeze up, liquid carry over, blocked strainers, non-condensable gas in system, water in system, high system pressure, over charge, under charge.

Outcome 2

Demonstrate knowledge of the operation of refrigeration equipment in an energy and chemical plant.

Performance criteria

2.1 Describe start-up procedures in accordance with organisational requirements.

2.2 Describe routine shut-down procedures in accordance with organisational requirements.

2.3 Describe emergency shut-down procedures in accordance with organisational requirements.

2.4 Identify and describe control and protection systems for the refrigeration equipment in terms of their purpose and in accordance with organisational requirements.

Range evidence of one control system and one protection system is required.

Outcome 3

Operate refrigeration equipment in an energy and chemical plant.

Performance criteria

3.1 Identify the location of the refrigeration equipment using the site drawing system in accordance with organisational requirements.

3.2 Operate refrigeration equipment using safe work practices in accordance with organisational requirements.

3.3 Carry out routine procedures and checks on refrigeration equipment in accordance with organisational requirements.

3.4 Identify and take corrective actions for refrigeration equipment process disruptions in accordance with organisational requirements.

Range process disruptions may include but are not limited to – process deviations, equipment malfunctions;
evidence of two different types of process disruption is required.

3.5 Complete all plant documentation related to the process and equipment operation in accordance with organisational requirements.

Replacement information	This unit standard was replaced by skill standard 40438.

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	27 June 2005	31 December 2014
Rollover and Revision	2	25 July 2006	31 December 2014
Review	3	22 May 2009	31 December 2016
Review	4	24 October 2014	31 December 2022
Review	5	27 February 2020	31 December 2026
Review	6	24 April 2025	31 December 2026

Consent and Moderation Requirements (CMR) reference	0079

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