Title	**Describe and operate pumps in an energy and chemical plant**		
Level	**4**	**Credits**	**8**

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: pumps used in an energy and chemical plant; and the operation of pumps in an energy and chemical plant. They are also able to operate pumps in an energy and chemical plant.

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

Available grade	Achieved

Guidance Information

1 Legislation relevant to this unit standard includes but is not limited to:
- Health and Safety at Work Act 2015;
- Hazardous Substances and New Organisms Act 1996;
- 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

Outcome1

Describe pumps used in an energy and chemical plant.

Performance criteria

1.1 Describe pumps in terms of operating and design concepts, and types.

Range pumps include but are not limited to – single stage centrifugal, multistage centrifugal, axial flow, reciprocating, positive displacement.

1.2 Describe components of pumps in terms of their purpose.

Range components include but are not limited to – coupling, casing, shaft, impeller, bearings, mechanical seals, non-mechanical seals, instrumentation.

1.3 Describe functions of pumps in terms of fluid and process operations, the pump duty and properties of the material being pumped.

Range pumps include but are not limited to – single stage centrifugal, multistage centrifugal, axial flow, reciprocating, positive displacement.

1.4 Describe pump systems in terms of their design concepts.

Range design concepts include but are not limited to – net positive suction head, static head, non-return valve location, duty/standby set up, minimum flow provision, staging, pulsation dampers, lubrication system, cooling system.

Outcome 2

Describe the operation of pumps in an energy and chemical plant.

Performance criteria

2.1 Describe pump operational deviations in terms of their causes.

Range operational deviations include but are not limited to – cavitation, vibration, suction pressure variations, discharge pressure variations, overheating, overloading.

2.2 Describe control and protection systems in terms of their purpose.

Range evidence of two control and three protection systems is required.

Outcome 3

Operate pumps in an energy and chemical plant.

Range evidence of two positive displacement and two centrifugal pumps is required.

Performance criteria

3.1 Identify the location of pumps in accordance with the site-specific identification coding system and organisational requirements.

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

3.3 Start up and shut down pumps in accordance with organisational requirements.

3.4 Carry out plant checks on pumps in accordance with organisational requirements.

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 40444.

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.