Title	**Demonstrate knowledge of pipework and fittings used in an energy and chemical plant**		
Level	**3**	**Credits**	**5**

Purpose	This unit standard is intended for people working as boiler operators and energy and chemical process operators in an energy or chemical plant. People credited with this unit standard are able to demonstrate knowledge of: pipework; and pipe fittings used in an energy and chemical plant; and flow as it relates to pipework used 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.
Plant – the operational unit, equipment and/or workplace at which the person is working.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of pipework used in an energy and chemical plant.

Performance criteria

1.1 Describe pipework materials in terms of their chemical makeup.

Range materials may include but are not limited to – carbon steel, alloy steels, non-ferrous metals, plastics, concrete, vitrified clay; evidence of one example of each type is required.

1.2 Describe the application of different pipework materials in terms of product type and conditions.

Range conditions may include but are not limited to – temperature, pressure, pH, location;
evidence of two is required.

1.3 Describe the principle of expansion and contraction of pipework in terms of the basic mechanics.

1.4 Describe methods used to accommodate pipework movement in terms of their application.

Range methods may include but are not limited to – U bend, circle bend, slip plate, bellows, spring hanger;
evidence of two is required.

1.5 Describe mechanisms for pipework failure in terms of their effect.

Range effect includes but is not limited to – corrosion, erosion.

Outcome 2

Demonstrate knowledge of pipe fittings used in an energy and chemical plant.

Performance criteria

2.1 Identify and describe traps in terms of type, design, and operation.

Range evidence of three types of traps is required.

2.2 Identify and describe strainers in terms of operation and design.

Range evidence of three types of strainer is required.

2.3 Identify and describe pipe connections in terms of type and application.

Range evidence of three types of connection is required.

2.4 Identify and describe gaskets in terms of type and application.

Range evidence of three types of gasket is required.

2.5 Identify and describe methods of insulating pipework in terms of purpose and application.

Range evidence of three purposes is required.

Outcome 3

Demonstrate knowledge of flow as it relates to pipework used in an energy and chemical plant.

Performance criteria

3.1 Describe the principles of flow in terms of their effect on pipework.

Range flow includes but is not limited to – turbulent flow, streamline flow, Bernoulli's principle.

3.2 Describe factors affecting flow in terms of their effect on pipework.

Range factors may include but are not limited to – temperature, density, pressure head, cross-sectional area of pipe, pipe material, bends, fittings, viscosity of fluid;
evidence of four factors affecting flow is required.

3.3 Describe causes of fluid hammer in terms of prevention.

Range evidence of two causes is required.

3.4 Describe consequences of fluid hammer on plant and equipment in terms of the effect on pipework.

Range evidence of two consequences is required.

Replacement information	This unit standard was replaced by skill standard 40378.

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
Revision	3	26 March 2007	31 December 2014
Review	4	22 May 2009	31 December 2016
Review	5	24 October 2014	31 December 2022
Review	6	27 February 2020	31 December 2026
Review	7	27 March 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.