40378 Recognise the function and design of pipework and fittings used in an energy and chemical plant

Kaupae | Level	3
Whiwhinga | Credit	5
Whāinga | Purpose	This skill 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 skill standard are able to: explain pipework; and describe pipe fittings used in an energy and chemical plant; and explain flow as it relates to pipework used in an energy and chemical plant. This skill standard can be used in the New Zealand Energy and Chemical qualifications at Level 3 and above.

Hua o te ako me Paearu aromatawai | Learning outcomes and assessment criteria

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
1. Explain pipework used in an energy and chemical plant.	a. Identify pipework materials in terms of their composition.
	b. Explain the application of different pipework materials in terms of product type and conditions.
	c. Explain the principle of expansion and contraction of pipework in terms of the basic mechanics.
	d. Outline methods used to accommodate pipework movement in terms of their application.
	e. Explain mechanisms for pipework failure in terms of their effect.

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
2. Describe pipe fittings used in an energy and chemical plant.	a. Identify traps and strainers in terms of type and design.
	b. Describe traps and strainers in terms of operation.
	c. Identify pipe connections and gaskets in terms of type and design.
	d. Describe pipe connections and gaskets in terms of application.
	e. Outline methods of insulating pipework in terms of purpose and application.
3. Explain flow as it relates to pipework used in an energy and chemical plant.	a. Explain the principles of flow in terms of their effect on pipework.
	b. Explain factors affecting flow in terms of their effect on pipework.
	c. Describe fluid hammer, its causes and prevention methods.
	d. Explain consequences of fluid hammer on plant and equipment in terms of the effect on pipework and connected equipment.

Pārongo aromatawai me te taumata paearu | Assessment information and grade criteria

Assessment specifications:

- 1a: evidence of five (5) types is required. Materials may include but are not limited to – carbon steel, alloy steels, non-ferrous metals, plastics, concrete.
- 1b: evidence of two (2) required. Conditions may include but are not limited to – temperature, pressure, pH, location.
- 1d: evidence of two (2) required. Methods may include but are not limited to – U bend, circle bend, slip plate, bellows, spring hanger.
- 1e: effect includes but is not limited to – corrosion, erosion.
- 2a – 2e: evidence of three (3) of each required.
- 3a: must include but is not limited to: turbulent flow, streamline flow, Bernoulli’s principle.
- 3b: evidence of four (4) is required. Factors may include but are not limited to – temperature, density, pressure head, cross-sectional area of pipe, pipe material, bends, fittings, viscosity of fluid.
- 3d: evidence of two (2) required.

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.

Ngā momo whiwhinga | Grades available

Achieved

Ihirangi waitohu | Indicative content

None

Rauemi | Resources

Legislation 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 (HSWA);
- Resource Management Act 1991;

  and any subsequent amendments.

Pārongo Whakaū Kounga | Quality assurance information

Ngā rōpū whakatau-paerewa | Standard Setting Body	Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council
Whakaritenga Rārangi Paetae Aromatawai | DASS classification	Manufacturing > Energy and Chemical Plant > Operation of Energy and Chemical Plant
Ko te tohutoro ki ngā Whakaritenga i te Whakamanatanga me te Whakaōritenga | CMR	0079

Hātepe | Process	**Putanga** | Version	**Rā whakaputa** | Review Date	**Rā whakamutunga mō te aromatawai** | Last date for assessment
Rēhitatanga | Registration	1	27 March 2025	N/A
Kōrero whakakapinga | Replacement information	This skill standard replaced unit standard 21459.		
Rā arotake | Planned review date	31 December 2029		

Please contact Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council at qualifications@hangaarorau.nz to suggest changes to the content of this skill standard.