

40455 Recognise the properties, selection, and use of engineering materials in an energy and chemical plant

Kaupae Level	4
Whiwhinga Credit	3
Whāinga Purpose	This skill 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 skill standard are able to: describe the properties of engineering materials, and the methods for determining chemical, physical, and mechanical properties of engineering materials; and explain how engineering materials are selected and applied; in an energy and chemical plant. This skill standard can be used in the New Zealand Energy and Chemical qualifications at Level 4 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. Describe the properties of engineering materials used in an energy and chemical plant.	a. Describe engineering materials in terms of their properties.
2. Describe the methods for determining chemical, physical, and mechanical properties of engineering materials.	a. Describe the chemical, physical and mechanical properties of engineering materials in accordance with recognised standards or systems.
	b. Describe methods used to determine the physical properties of engineering materials.
	c. Describe methods used to determine the mechanical properties of engineering materials.
	d. Describe methods used to determine the chemical properties of engineering materials.
3. Explain how engineering materials are selected and applied in an energy and chemical plant.	a. Describe common applications of engineering materials.
	b. Explain factors influencing the selection of engineering materials.

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

- evidence for this skill standard must be supplied from the workplace.
- evidence must be presented in accordance with organisational requirements.
- 1a: properties include but are not limited to – strength, ductility, density, thermal conductivity, electrical conductivity, hardness, environmental performance.
- Learning outcome 2: evidence of at least four (4) engineering materials is required.
- 2b: physical properties – density, melting temperature, glass transition temperature, modulus, conductivity, colour, magnetic.
- 2c: yield strength, ultimate tensile strength, percentage elongation, proof stress, reduction in area, impact strength, toughness, hardness, heat distortion temperature, creep resistance, fatigue resistance, flexural strength, viscoelasticity.
- Learning outcome 3: evidence of at least four (4) engineering materials is required.
- 3a: evidence of four (4) applications is required.
- 3b: includes but is not limited to – cost, availability, preparation time, appropriateness for job, ease of working, job specifications, mechanical properties, capability; and at least one (1) other factor.

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 and international standards applicable to engineering materials used in the plant.

Ngā momo whiwhinga | Grades available

Achieved

Ihirangi waitohu | Indicative content

None

Rauemi | Resources

Legislation, regulations, and the code of practice relevant to this skill standard include but are not limited to:

- Approved Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers (the Code), Published by the Occupational Safety and Health Service Department of Labour, 2004;
 - Health and Safety at Work Act 2015;
 - Health and Safety at Work (Hazardous Substances) Regulations 2017;
 - Hazardous Substances and New Organisms Act 1996
- 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	24 April 2025	N/A
Kōrero whakakapinga Replacement information	This skill standard replaced unit standard 32031.		
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.