40458 Operate a steam turbine in an energy and chemical plant

Kaupae | Level	4
Whiwhinga | Credit	20
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: steam turbine design types and operating principles; steam turbine steam flow, control systems and supervisory protection; and operational procedures for a steam turbine, in an energy and chemical plant. They are also able to operate a steam turbine in an energy and chemical plant. This skill standard can be used in the New Zealand Energy and Chemical qualifications at levels 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 steam turbine design types and operating principles used in an energy and chemical plant.	a. Describe steam turbines in terms of design types and operating principles.
	b. Describe components of steam turbines in terms of design concepts.
2. Describe steam turbine steam flow, control systems and supervisory protection used in an energy and chemical plant.	a. Describe steam turbine steam flow and control systems in terms of their purpose and operating principles.
	b. Identify and describe supervisory devices used to monitor steam turbine conditions in terms of their purpose.
	c. Describe equipment protection systems for a steam turbine in terms of their purpose and operating principles.
	d. Identify control systems for selected steam turbine equipment and describe their auxiliary systems in terms of operation.

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
3. Describe operational procedures for a steam turbine in an energy and chemical plant.	a. Describe start-up procedures in accordance with organisational procedures.
	b. Describe shutdown procedures in accordance with organisational procedures.
	c. Describe emergency shutdown procedures in accordance with organisational procedures.
	d. Identify deviations from normal operating parameters that can occur in a steam turbine and describe the operational steps and techniques used to respond to each deviation in accordance with organisational procedures.
	e. Identify equipment malfunctions that can occur in a steam turbine and describe the operational steps and techniques used to respond to each equipment malfunction in accordance with organisational procedures.
	f. Describe methods of water ingress management into a steam turbine in terms of their signs and effects in accordance with organisational procedures.
4. Operate a steam turbine in an energy and chemical plant.	a. Start up and shutdown a steam turbine plant in accordance with organisational procedures.
	b. Operate a steam turbine in accordance with organisational procedures.
	c. Carry out monitoring procedures in accordance with organisational procedures.
	d. Complete all plant documentation related to process and equipment operation in accordance with organisational procedures.
	e. Carry out steam turbine operational testing and record findings in accordance with organisational procedures.

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

Assessment specifications:

- evidence for the practical components of this skill standard must be supplied from the workplace.
- 1a: types of steam turbine include but are not limited to – impulse, reaction, axial, radial, induction, tandem, reheat, condensing, back pressure.
- 1b: components include but are not limited to – pedestal, casing, steam admission valves, steam-chest, nozzles, rotor, blades, root, diaphragms shrouding, gland sealing, bearings, couplings, barring gear, gear box, turbine drains.
- 2a: steam flow and control systems include but are not limited to – mechanical governor, hydraulic governor, electronic governor, emergency trip mechanism.
- 2b: conditions include but are not limited to – vibration, axial displacement and differential expansion, sliding feet, thrust, critical speeds, balance.
- 2c: protection systems include but are not limited to – trip systems, vibration monitors, overpressure control, electrical and mechanical overspeed.
- 2d: control systems include but are not limited to – flow, temperature, speed, back pressure, pressure, level.
- 3d: deviations include but are not limited to – speed, temperature, pressure, vibration.
- 3e: evidence of four (4) equipment malfunctions is required which may include but are not limited to – thermal stress, uneven heating, loss of vacuum, turbine supervisory deviations.

Definitions:

Energy or 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.

Ngā momo whiwhinga | Grades available

Achieved

Ihirangi waitohu | Indicative content

None

Rauemi | Resources

Legislation relevant to this skill 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.

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 32061.		
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.