40467 Operate and monitor an advanced steam generation process

Kaupae | Level	5
Whiwhinga | Credit	20
Whāinga | Purpose	This skill standard is intended for experienced people working as boiler operators in a steam generation plant. People credited with this skill standard are able to: describe an advanced steam generation process, and air systems and fuel types used in an advanced steam generation process; explain scientific principles relating to steam generation, and describe an advanced steam generation process in an energy and chemical plant. They are also able to operate and monitor an advanced steam generation process in an energy and chemical plant. This skill standard can be used in the New Zealand Energy and Chemical qualifications at Level 5.

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

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
1. Describe an advanced steam generation process.	a. Identify and describe types of advanced steam generation processes in terms of use, and compare in relation to principles of operation, operating and capital cost, and fitness for purpose.
	b. Describe components of an advanced steam generation process in terms of purpose and design.
	c. Describe materials used for the construction of an advanced steam generation process in terms of operating conditions and product compatibility.
	d. Describe internal steam drum components in terms of purpose and design.
	e. Describe safety valves in terms of their design, application, and function.
	f. Describe auxiliary systems in terms of purpose and operating concepts.

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
2. Describe air systems and fuel types used in an advanced steam generation process.	a. Describe air systems for fired pressure equipment in terms of purpose, use, and impact on fire box pressure.
	b. Identify fuels used in fired pressure equipment and describe the chemical composition and chemical reaction for complete combustion.
	c. Describe solid fuel systems in terms of design and operation.
	d. Describe liquid fuel systems in terms of design and operation.
	e. Describe gas fuel systems in terms of design and operation.
3. Explain scientific principles relating to steam generation.	a. Explain types of steam and thermodynamic principles in terms of their effect on steam generation operations and in accordance with organisational requirements and the Code.
	b. Describe the theory of heat transfer in terms of the operation of pressure fired equipment and in accordance with organisational requirements and the Code.
	c. Explain problems related to an advanced steam generation process in terms of cause and effect and in accordance with organisational requirements and the Code.
	d. Describe storage methods for an advanced steam generation process in terms of long, medium, and short-term methods and in accordance with organisational requirements and the Code.

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
4. Describe an advanced steam generation process in an energy and chemical plant.	a. Describe process controls and protection systems for an advanced steam generation process in terms of their purpose and operation and in accordance with organisational requirements and the Code.
	b. Describe operations and tuning used to optimise fired pressure equipment efficiency in terms of operational factors and in accordance with organisational requirements and the Code.
	c. Describe the causes and effects of potential operational problems in terms of the operational steps and techniques required to correct them in accordance with organisational requirements and the Code.
	d. Identify and describe deviations from normal operating parameters that can occur in an advanced steam generation process in terms of the operational steps and techniques used to respond to each deviation and in accordance with organisational requirements and the Code.
	e. Describe emergency shutdown procedures in accordance with organisational requirements and the Code.
5. Operate and monitor an advanced steam generation process in an energy and chemical plant.	a. Monitor routine procedures for functional testing and plant checks in accordance with organisational requirements and the Code.
	b. Identify and record deviations from normal operating parameters in accordance with organisational requirements and the Code.
	c. Take and record corrective actions to return to normal operating parameters in accordance with organisational requirements and the Code.
	d. Identify and log equipment malfunctions in accordance with organisational requirements and the Code.
	e. Take and log corrective actions to return the equipment to standard condition in accordance with organisational requirements and the Code.

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

Assessment specifications:

- For the purposes of assessment evidence for the practical components of this skill standard must be supplied from the workplace.

Definitions:

Advanced steam generation process – steam generation process that due to its size, complexity, classification, or mode of operation, is deemed by the Controller, Inspection Body, and manufacturer to require advanced competencies for its operation.

Code – the current *Approved Code of Practice for the Design, Safe Operation, Maintenance and Servicing of Boilers*, Occupational Safety and Health Service, and other relevant associated code, https://worksafe.govt.nz/dmsdocument/1571-acop-the-design-safe-operation-maintenance-and-service-of-boilers.

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.

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 3037.		
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.