40376 Perform electric boiler plant operations

Kaupae | Level	3
Whiwhinga | Credit	8
Whāinga | Purpose	This skill standard is intended for people working as boiler operators for the design, safe operation, maintenance and servicing of electric boilers. People credited with this skill standard are able to: describe the principles and procedures of electric boiler operation; and explain the function and purpose of electric boiler equipment and fittings. They are also able to: describe and operate feedwater plant for electric boiler equipment; and operate electrical boiler equipment. 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. Describe the principles of electric boiler operation.	a. Outline the principles of electricity in relation to the operation of an electric boiler.
	b. Identify the differences between induction steam boilers and electrode boilers in terms of design and operating principles.
	c. Describe site-specific high voltage supply in terms of design and operating principles.
2. Explain the function and purpose of electric boiler equipment and fittings.	a. Describe boilers in terms of site-specific design and operating principles.
	b. Identify the components of electric boiler equipment in terms of location and function.
	c. Explain boiler mountings in terms of their purpose.
	d. Describe boiler instrumentation in terms of boiler operations.
	e. Identify boiler gauge glass problems and describe solutions to these problems.
	f. Describe the boiler auxiliary equipment required for safe and efficient boiler operation.
	g. Describe emergency shutdown devices in terms of their use.

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
3. Describe feedwater plant for electric boiler equipment.	a. Describe boiler feedwater equipment in terms of operating principles and effect on boiler feedwater conductivity.
	b. Describe components of a boiler feedwater system in terms of their purpose, the inner and outer chambers and safety and maintenance of supply.
	c. Describe feedwater and circulation pump types in terms of start-up procedures.
	d. Describe boiler feedwater quality and tests in terms of the impact of out of specification test results on the electric boiler.
	e. Describe impurities in feedwater in terms of their source and effects on the boiler, feedwater system, condensate system, and steam quality.
	f. Describe feedwater treatment.
4. Operate feedwater plant for electric boiler equipment.	a. Carry out boiler water chemical treatment in accordance with organisational requirements.
	b. Take, analyse and record boiler water samples in accordance with organisational requirements.
	c. Take corrective actions to return boiler water to normal operating conditions and record actions in accordance with organisational requirements.
5. Describe operational procedures for electric boiler equipment.	a. Identify and describe data on the boiler visual display panel in terms of the boiler and auxiliary equipment operating status.
	b. Identify and describe inputs to the boiler alarms and trips in terms of their purpose and settings.
	c. Describe the operational steps and techniques used to optimise boiler efficiency in terms of responses to end user.
	d. Describe the boiler plant isolation process for the control of work.
	e. Describe the requirements for access to High Voltage (HV) terminal enclosure
	f. Describe problems related to an electric boilers process in terms of cause and effect.

Hua o te ako | Learning outcomes	**Paearu aromatawai** | Assessment criteria
6. Operate electrical boiler equipment.	a. Complete pre-start checks in accordance with organisational requirements.
	b. Start up the boiler plant and bring online in accordance with organisational requirements.
	c. Operate electric boiler equipment using safe work practices in accordance with organisational requirements.
	d. Carry out running checks and routine procedures in accordance with organisational requirements.
	e. Monitor boiler and auxiliary equipment, and document and interpret information in accordance with organisational requirements.
	f. Identify deviations from normal operating conditions and record in accordance with organisational requirements.
	g. Take corrective actions to return to normal operating conditions and record actions in accordance with organisational requirements.
	h. Stop the boiler plant, remove from service and record in accordance with organisational requirements.
	i. Describe boiler lay-up in terms of purpose and use.

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.
- evidence for all outcomes must be presented in accordance with organisational requirements.
- 1a: must include electrical resistance, electrical law (Ohms Law, Joules Law), resistance heating, electromagnetic induction.
- 4f: must include primary treatment, secondary treatment, and boiler feedwater.
- 5f: includes but is not limited to: over-pressure, low and high water levels, load fluctuations in end user lines, electrical faults, hydrogen generation, low conductivity, re-circulation issues.
- 6b: minimum of 3 examples of operator starting boiler.
- 6e: includes but is not limited to: personal safety, safety interlock system, documentation, authorisation.
- 6f: minimum of 3 examples of deviations from normal operating conditions.
- 6g: minimum of 3 examples of corrective actions taken.

Definition:

Organisational requirements – documented policies and procedures or other directions provided to staff for boiler start up, operation, and shut down. These may include: manufacturers' procedures; plant procedures; suppliers' instructions; site signage; legislative requirements; codes of practice; company health and safety plans; on site briefings; and supervisor's instructions.

Ngā momo whiwhinga | Grades available

Achieved

Ihirangi waitohu | Indicative content

Fundamentals of electrical principles, such as – electrical potential, voltage, conductors, electrical resistance (Ohms Law), electrical law, resistance heating (Joule's law), electrical insulators, electromagnetic induction.

Electric boiler and fittings, such as – electrical, compressed air, water and chemical supplies, steam distribution/end user availability, location and function of components, mountings and instrumentation of boiler equipment and auxiliary equipment, gauge glass functionality, fault identification and rectification.

Electric boiler equipment and operating principles, such as – electrodes, electrical current, heat generation, water level controls, temperature control, voltage control, conductivity controller, load and pressure control, material selection, HV distribution, duty of switchgear, site specific HV switchgear structure, safe practices associated with switchgear, isolation of HV switchgear.

Rauemi | Resources

Legislation and regulations relevant to this unit standard include but are not limited to:

- Health and Safety at Work Act 2015;
- Health and Safety at Work (Hazardous Substances) regulations 2017 (HSWA);
- Health and Safety in Employment (Pressure equipment, cranes and passenger ropeways) Regulations 1999;
- Resource Management Act 1991;

  and any subsequent amendments.

Pārongo Whakaū Kounga | Quality assurance information

Ngā rōpū whakatau-paerewa | Standard Setting Body	Hanga-Aro-Rau 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	N/A		
Rā arotake | Planned review date	31 December 2029		

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