Title	**Demonstrate knowledge of the equipment and systems used for steam generation in boilers**		
Level	**3**	**Credits**	**8**

Purpose	This unit standard is intended for people working as boiler operators in an energy and chemical plant. People credited with this unit standard are able to: demonstrate knowledge of steam generation equipment and fittings; describe combustion air equipment; describe steam generation fuel systems and burner equipment; and demonstrate knowledge of feedwater equipment and lay-up, in boilers.

Classification	Energy and Chemical Plant > Operation of Energy and Chemical Plant

Available grade	Achieved

Guidance Information

1 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);
- Resource Management Act 1991;

and any subsequent amendments.

2 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.

3 For the purposes of assessment:

- evidence for the practical components of this unit standard must be supplied from the workplace.
- evidence for all outcomes must be presented in accordance with organisational requirements.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of steam generation equipment and fittings in boilers.

Performance criteria

1.1 Identify and describe boilers in terms of design and operating principles.

Range boilers include but are not limited to – water tube, shell or fire tube, combination fire tube-water tube, once-through coil, condensing.

1.2 Describe the components of steam generating equipment in terms of function.

Range components include but are not limited to – economiser, air heater, superheater, steam drum internals, flue stream equipment.

1.3 Identify and describe boiler mountings in terms of their purpose.

Range boiler mountings include but are not limited to – safety valves, feed check valve, blowdown valve, air vent, main stop valve, access doors.

1.4 Describe boiler instrumentation in terms of boiler operations.

Range instrumentation includes but is not limited to – pressure gauge, gauge glasses, operational controls, safety controls.

1.5 Identify boiler gauge glass problems and describe solutions to these problems.

Range problems include but are not limited to – leakage, blockage, breakage, false readings.

Outcome 2

Describe combustion air equipment in boilers.

Performance criteria

2.1 Describe equipment used to provide combustion air to boilers in terms of its mechanical and operating principles.

Range equipment includes but is not limited to – fans, dampers, registers, air heaters.

2.2 Describe equipment used to control combustion in terms of its operating principles.

Range combustion control equipment includes but is not limited to – primary air, secondary air, forced draught, induced draught, balanced draught.

Outcome 3

Describe steam generation fuel systems and burner equipment in boilers.

Performance criteria

3.1 Describe fuels used for steam generation in terms of their handling characteristics, use, and requirements for complete combustion.

Range fuels include but are not limited to – gas, liquid, solid, site specific fuels.

3.2 Describe fuel systems and fuel safety systems in terms of function.

Range fuel systems include but are not limited to – solid, liquid, gas.

3.3 Describe burner equipment and configuration in terms of mechanical operating principles.

Outcome 4

Demonstrate knowledge of feedwater equipment and lay-up in boilers.

Performance criteria

4.1 Describe equipment in terms of operating principles and effect on boiler feedwater quality.

Range equipment includes but is not limited to – primary treatment, secondary treatment, boiler feedwater.

4.2 Identify and describe components of a boiler feedwater system in terms of their purpose, and safety and maintenance of supply.

Range components include but are not limited to – boiler feedwater storage, tank deaerator, pump, feed check valve, isolating valves, pipework.

4.3 Identify and describe feedwater pump type in terms of start-up procedures.

4.4 Describe blowdown equipment in terms of type and function.

Range blowdown equipment includes but is not limited to – bottom blowdown, automatic continuous, blowdown control.

4.5 Describe condensate monitoring and diversion equipment in terms of purpose, economic and operating problems and function.

4.6 Identify and describe boiler feedwater tests in terms of the impact of out of specification test results on the boiler.

Range tests include but are not limited to – hardness, total dissolved solids, pH, alkalinity, scale inhibitor reserve, oxygen scavenger reserve,

4.7 Describe impurities in feedwater in terms of their source and effects on the boiler, feedwater system, condensate system, and steam quality.

Range impurities include but are not limited to – dissolved solids, dissolved gases, suspended solids.

4.8 Describe wet and dry boiler lay-up in terms of purpose and use.

Replacement information	This unit standard was replaced by skill standard 40380.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 June 2005	31 December 2014
Rollover and Revision	2	25 July 2006	31 December 2014
Review	3	22 May 2009	31 December 2016
Review	4	24 October 2014	31 December 2022
Review	5	27 February 2020	31 December 2026
Review	6	27 March 2025	31 December 2026

Consent and Moderation Requirements (CMR) reference	0079

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.