

Title	Demonstrate knowledge of the basic principles of steam generation and combustion relating to boiler operation		
Level	3	Credits	5

Purpose	<p>This unit standard is intended for people working as boiler operators.</p> <p>People credited with this unit standard are able to: demonstrate knowledge of: the basic principles of steam generation relating to boiler operation; and the principles of combustion, combustion process efficiency, and methods used to provide combustion air to boilers.</p>
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Classification	Energy and Chemical Plant > Operation of Energy and Chemical Plant
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Available grade	Achieved
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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 the basic principles of steam generation relating to boiler operation.

Performance criteria

- 1.1 Describe the properties of steam in terms of their effect on a boiler operation and downstream usage.
- Range properties include but are not limited to – dryness factor, superheat, specific heat, specific volume, latent heat, sensible heat, enthalpy.
- 1.2 Identify and describe the causes of water hammer in terms of the steps to avoid it.
- Range evidence of three steps is required.
- 1.3 Describe water circulation in a boiler in terms of the processes and factors that influence it.
- Range factors include but are not limited to – density, temperature; processes include but are not limited to – natural circulation (convection), forced circulation.
- 1.4 Interpret steam tables at specified temperature and pressure readings to identify saturation temperature, sensible and latent heat content, and specific volume.

Outcome 2

Demonstrate knowledge of the principles of combustion, combustion process efficiency, and methods used to provide combustion air to boilers.

Performance criteria

- 2.1 Describe the principles of combustion and heat transfer in terms of boiler operations.
- Range principles of combustion and heat transfer include but are not limited to – combustion theory, chemical reaction, radiation, convection, conduction, flue gas quality, economy of operation.
- 2.2 Describe the monitoring of flue gas parameters in terms of combustion process efficiency.
- Range parameters include but are not limited to – oxygen, carbon monoxide, carbon dioxide, opacity.

2.3 Describe methods used to provide combustion air to boilers in terms of operating principles.

Range methods include but are not limited to – forced draught, induced draught, balanced draught.

Replacement information	This unit standard, unit standard 21462, and unit standard 21463 replaced unit standard 4554, unit standard 4555, unit standard 16297, unit standard 16298, and unit standard 16299.
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Planned review date	31 December 2024
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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	N/A

Consent and Moderation Requirements (CMR) reference	0079
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact the Primary Industry Training Organisation standards@primaryito.ac.nz if you wish to suggest changes to the content of this unit standard.