Australian Government

MSABLIC002 License to operate an advanced boiler

Release: 2

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

MSABLIC002 License to operate an advanced boiler

Modification History

Release 2 - Content reinstated following Safe Work Australia approval. Editorial changes to clarify WHS Regulations
Release1 - New unit of competency, endorsed by NSSC. Content not available pending endorsement by Safe Work Australia, the national agency for Work Health and Safety (WHS) high risk work licensing purposes.

Unit Descriptor

This unit of competency covers the operation of an advanced boiler, including a standard boiler, which may have one or more of the following:

- multiple fuel sources
- pre-heater
- super-heater
- economiser.

Operation includes boiler start up, handover, monitoring, shut down and storage. Also covered are preparation for inspection procedures as specified in manufacturer recommendations, identification of maintenance requirements and relevant risk control measures.

Application of the Unit

The boilers covered by this unit are standard boilers and advanced boilers, including boilers defined in AS 2593:2004 Safety management and supervision systems and AS 3873:2001 Pressure equipment – Operation and maintenance and typically have a modulating combustion air supply and heat source.
This unit in its current form meets state and territory high risk work licensing requirements. Any alteration to the content or outcomes would not be acceptable to regulators for the purpose of licensing.

Licensing/Regulatory Information

This unit is based on the licensing requirements of Part 4.5 of the Model Work Health and Safety (WHS) Regulations, High Risk Work.

Pre-Requisites

Not applicable

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

1 Plan work	1.1	Potential workplace hazards and appropriate risk control measures are identified consistent with appropriate standards to ensure the safety of personnel and equipment
	1.2	Type of boiler, with associated equipment, is identified and boiler operations planned according to procedures
	1.3	Personal protective equipment is identified necessary for the work requirements
	1.4	Suitable communication methods are identified and confirmed with appropriate personnel
	1.5	Appropriate records are located and reviewed to prepare for boiler operation
2 Start up boiler	2.1	Risk prevention and control measures are applied to the work area according to procedures
	2.2	Communication equipment is selected and inspected for serviceability
	2.3	All necessary equipment is selected and inspected for operational effectiveness according to procedures, including establishing water level
	2.4	Boiler and associated equipment are visually checked for any damage or defects with any found reported and recorded according to procedures with appropriate action taken
	2.5	Boiler is vented to atmospheric pressure prior to start up

	2.6	Pre-start up checks are carried out on the boiler and the boiler and associated equipment brought online safely according to procedures
	2.7	Maintenance requirements and any visual faults are identified and reported according to procedures
	2.8	Start up following maintenance and/or repairs, and associated isolations are confirmed, completed, logged and the equipment made serviceable
3 Monitor boiler operation	3.1	Operating status of the boiler and associated equipment is diagnosed
	3.2	Operating log is maintained clearly and accurately according to procedures
	3.3	Boiler valves, fittings, pressure gauges, combustion management systems, air heaters, super-heaters and economisers (where fitted) are monitored according to procedures
	3.4	Boiler water level gauges are blown through both steam and water sides
	3.5	Standby plant and equipment are tested according to procedures
	3.6	Boiler water quality tests, where required, are conducted and results recorded according to procedures
	3.7	Boiler water chemicals, where required, are adjusted after tests, where appropriate, according to procedures with downstream users notified if necessary
	3.8	Automatic blowdown and, where required, boiler is blown down to adjust total dissolved solids (TDS) levels to recommendations
	3.9	Handover information regarding boiler and associated equipment status and operation is communicated clearly to relevant personnel according to procedures
	3.10	Any boiler emergency is responded to immediately in accordance with procedures
4 Shut down boiler	4.1	Boiler and associated equipment are shut down for inspection according to procedures
	4.2	Maintenance requirements and any visual faults are identified and reported according to procedures
	4.3	Where required, boiler and associated equipment are cleaned internally and externally to manufacturer recommendations and

		procedures
	4.4	Isolations associated with in-service maintenance are completed according to procedures
	4.5	Boiler operating log is completed for shut down
5 Store boiler in shut down mode	5.1	Storage time and condition of storage are identified, where required
	5.2	Boiler and associated equipment are stored in safe condition for access in accordance with manufacturer recommendations and procedures
	5.3	Stored boiler water and chemicals are tested, where required, and handled in accordance with procedures, where storage is for extended periods

Required Skills and Knowledge

Required skills include:

- complying with legislation, Australian Standards, organisational workplace standards, policies, relevant codes of practice, and required safe practices and procedures for planning work, starting and monitoring a boiler, and shutting down and storing an advanced boiler
- performing routine safety and operational procedures
- reading and interpreting maintenance records, operating logs and safety data sheets (SDS)
- communicating faults, malfunctions and workplace hazards accurately to appropriate personnel using suitable communication techniques
- accurately completing reports, operational records and maintenance information in relation to advanced boiler operation
- applying task instructions
- using relevant tools, equipment and personal protection clothing safely
- interpreting advanced boiler operation tables and figures
- applying advanced boiler testing techniques and adjusting boiler water quality
- verifying any problems and boiler faults, demonstrating appropriate response procedures
- applying appropriate risk assessment and risk management techniques
- demonstrating emergency operating procedures
- identifying all boiler energy sources required to be isolated and made safe for maintenance, inspection and repairs
- applying advanced boiler cleaning and storage techniques

Required knowledge includes:

- Commonwealth, state and territory work health and safety (WHS) legislation, standards, codes of practice and advisory standards relevant to boiler operation
- basic principles of heat transfer and thermodynamics in relation to boiler operations
- boiler and steam equipment operating principles and operating methods, including advanced
- types and characteristics of multiple fuel systems for advanced boilers
- types and characteristics of feedwater systems and treatment, including de-aerator
- type and use of equipment and fittings for operation and maintenance of boilers, including advanced
- function, purpose and operation of:
  - pre-heater
  - super-heater
  - economiser
  - air heater
  - feedwater heater
  - attemperator
  - super-heater safety valves

  - economiser relief valves
  - main steam stop valve
- standard and advanced boiler and auxiliary equipment characteristics and capabilities
- essential fittings required where more than one boiler is installed (e.g. battery of boilers)
- processes for confirming operational status of a boiler
- workplace communication techniques and procedures
- responsibilities for checking and testing advanced boilers, including advanced
- location and inspection procedures and techniques for inspection and explosion doors
- steam and boiler hazards for cold start and handover
- hierarchy of risk control
- use and application of personal protective equipment
- type and limitations of corrective action and/or adjustments that can be made in response to routine boiler operation problems and emergencies
- various harmful energy sources in boiler operation and the means to effectively isolate these energy sources and make them safe, with particular consideration to advanced boilers
- modes of standard and advanced boiler storage and procedures for storing boiler in open or closed condition
- SDS and safe chemical handling and storage methods for boiler operation and cleaning
- procedures for cleaning boilers internally and externally, including advanced
- procedures for recording, reporting and maintenance of workplace records and information

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	• Successful assessment of this unit meets the competency requirements of the Model WHS Regulations, Part 4.5 High Risk Work • State and territory WHS regulators have mandated use of the Assessment Instruments for this unit which have been endorsed by the national body responsible for WHS matters.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must ensure that candidates can competently and consistently: • comply with WHS licensing legislation • effectively communicate and work safely with others in the work area • effectively conduct hazard identification and risk assessment procedures • effectively demonstrate ability to identify harmful energy sources and the means to make them safe • effectively plan work, start up, monitor and shut down an advanced boiler according to procedures • effectively conduct advanced boiler diagnosis, testing and handover operation to other personnel.
Context of and specific resources for assessment	• Assessment of the safe and effective application of knowledge and skill to workplace tasks (performance) must be undertaken using the endorsed Assessment Instruments. • Assessment of performance must be undertaken either in the workplace or in a realistically simulated workplace setting. • Assessors must ensure that assessment in the workplace is organised to ensure that all the required equipment and materials and a suitable working area are made available to suit the assessment and the workplace. • Assessment must occur under standard and authorised work practices, safety requirements and environmental constraints. • Assessment is to comply with relevant appropriate standard requirements. • Applicants must have access to: • personal protective equipment for the purpose

	of the Performance Assessment • appropriate advanced boiler and associated equipment in safe condition • communication equipment (e.g. two way radios, mobile phones, landline telephones and computers, as applicable)
Method of assessment	• Assessment must be conducted using the national WHS endorsed Assessment Instruments. These Instruments provide advice on their application. The use of simulation in the assessment of this unit of competency may be acceptable in certain operational and safety circumstances. • Assessment should be conducted on a one-on-one basis with the assessor. • Assessment may be conducted in conjunction with the assessment of other units of competency. • Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge. • Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.
Guidance information for assessment	• Further information about endorsed Assessment Instruments may be obtained from state/territory WHS regulators.

Range Statement

Hazards	Hazards may include, but are not limited to:
	• asbestos lagging
	• chemical hazards
	• thermal hazards
	• manual handling hazards
	• machinery guard requirements
	• hot exposed steam pipe
	• leakage of steam
	• leakage of fuel
	• odour of gas
	• fumes from a liquid chemical spill
	• faulty/broken ladder or hand rail
	• working at heights
	• flammable liquids
	• fire and explosion
	• electrical hazards
	• work area:
	  • illumination
	  • excessive noise from machinery
	  • spillage of oil
	  • rubbish and combustibles
	  • obstruction

Risk control methods	Risk control methods refer to the systematic process of eliminating or reducing the risk to personnel and property through the application of controls. It includes the application of the hierarchy of control: 1) Elimination 2) Substitution 3) Isolation 4) Engineering controls 5) Administrative controls 6) Personal protective equipment
Appropriate standards	Appropriate standards may include, but are not limited to: • legislation • codes of practice • manufacturer specifications

	• Australian Standards • technical standards (International) • industry standards (where applicable)
Type of boiler	Type of boiler may include: • standard boilers • advanced boilers

Standard boiler	Standard boiler includes:
	• vessel or an arrangement of vessels and interconnecting parts, wherein water is heated above atmospheric pressure by the application of:
	  • fire
	  • the products of combustion
	  • electrical power
	  • similar means
	The boiler may have:
	• fixed and modulating combustion controls, fixed and modulated air supply, a single fuel source and will have:
	  • valves
	  • gauges
	  • fittings
	  • controls
	  • boiler setting and directly associated equipment

Advanced boiler	Advanced boiler includes:
	• vessel or an arrangement of vessels and interconnecting parts, wherein water is heated above atmospheric pressure by the application of:
	  • fire
	  • the products of combustion
	  • electrical power
	  • similar means
	The boiler may have one or more of the following features:
	• fixed and modulating combustion controls, fixed and modulated air supply, multiple fuel sources, pre-heaters, super-heaters, economisers and will have:
	  • valves
	  • gauges

	• fittings • controls • boiler setting and directly associated equipment
Procedures	Procedures may include, but are not limited to: • manufacturer guidelines (e.g. instructions, specifications or checklists) • industry operating procedures • workplace procedures (e.g. work instructions, operating procedures or checklists)
Equipment	Equipment may include, but is not limited to: • gas monitoring equipment • water testing equipment • fire-fighting equipment • workplace first aid equipment • work platform and associated gear, such as walkways
Communication methods	Communication methods may include, but are not limited to: • verbal and non-verbal language • written instructions • signage • hand signals • listening • questioning to confirm understanding • appropriate worksite protocols
Appropriate personnel	Appropriate personnel may include, but are not limited to: • production workers • maintenance workers • supervisors and managers • other boiler operators • suppliers • colleagues
Records	Records may include, but are not limited to: • operating log books • maintenance records • records of faults and potential faults • isolation procedures • safe operating procedures

	• daily operating inspections • repairs carried out according to manufacturer recommendations and operating procedures • workplace record keeping requirements • details of any daily or periodic maintenance work • details of yearly programmed or additional maintenance work

Risk control measures	Risk control measures may include, but are not limited to:
	• barricades and controls
	• machine guarding
	• fall prevention
	• pedestrian controls
	• adequate illumination
	• noise controls
	• signage
	• personal protective equipment:
	  • thermally insulated gloves
	  • hard hat protection
	  • ear protection (muffs or plugs)
	  • chemical resistant gloves and apron
	  • respiratory devices
	  • eye protection
	  • working protective gloves
	  • whole body fire-resistant clothing

Communication equipment	Communication equipment may include, but is not limited to: • two way radios • mobile phones • intercoms • landline telephones • pagers • satellite phones • computers
Pre-start up checks	Pre-start up checks may include, but are not limited to: • testing warning lamps or visual warning indicators • control panel checks • checks of feedwater supply system • fuel supply/heat source systems • operation and position of boiler valves

	• combustion air supply system • boiler water level • essential fittings and gauges • selection of personal protective equipment • inspection and location of inspection and explosion doors (where applicable) • identification of hazards and management of risks and maintenance problems • fire-fighting equipment • manufacturer recommendations and checklists • relevant records and logs
Associated equipment	Associated equipment may include, but is not limited to: • multiple fuel sources • pre-heater • super-heater • economiser Associated equipment may also include but is not limited to: • super-heater safety valves • economiser relief valves • air heater • feedwater heater • attemperator • main steam stop valve
Start up	Start up may include, but is not limited to: • purge boiler furnace • heat input • warm up reticulation system • venting the boiler of air • steam traps and steam line purge system operations • reticulation line pressure • steam usage and supply • super-heater • air heater • feedwater heater • economiser
Maintenance	Maintenance may include, but is not limited to: • leaking steam pipe • pressure gauge accuracy

	• exposed electrical wiring • defective illumination in the workplace • leaking fuel pump gland • leaks in high pressure feed line • leaking gauge glass mounting • leaking safety valve • isolation procedures, hardware and equipment
Faults	Faults may include, but are not limited to: • abnormal operating conditions • boiler tube failure • feedwater supply and/or other major auxiliary loss • wet steam • high dissolved oxygen • pH of water • high conductivity • actuator or valve mechanical or electrical fault/failure • instrument failure • steam leak • associated equipment failure

Diagnosed	Diagnosed may include, but is not limited to:
	• senses:
	  • audio
	  • smell
	  • touch
	  • visual
	• remote or local indicators and recorders
	• computers and alarms:
	  • visible
	  • audible

Operating log	Operating log may include, but is not limited to: • date and time of checking • each check, examination and results • printed and signed name of person who performed the checks • date and time of any lockout or equipment malfunction • results of tests on boiler or feedwater • changes in operation

Valves and fittings	Valves and fittings may include, but are not limited to: • safety valves • gauge glasses • main steam stop valve • feedwater stop valve • feed check valve • blow down valve • steam side/line drain valves • flame failure detection device • water level controller • boiler steam pressure gauge • economiser relief valve • super-heater safety valve
Monitored	Monitored may include, but is not limited to: • water supply system • checks of steam reticulation line pressure • usage and supply of steam • quality of steam • combustion/heat source system and management • feedwater system and condensate returns • fuel systems • combustion air supply • water level • boiler steam pressure • boiler and steam manifold valves • soot blowers • operation of control/safety devices, including control panels
Tested	Tested may include, but is not limited to: • response checks • standby plant 'cut in' tests • valve operating checks • hydrostatic tests • performance tests • alarm and protection tests
Tests	Tests may include, but are not limited to: • pH levels • conductivity • oxygen

	• TDS • hardness • other contaminants
Chemicals	Chemicals may include, but are not limited to: • oxygen scavenger • feedwater additives • other chemicals • hardness • condensate chemicals • pH buffers
Handover	Handover may include, but is not limited to: • previous load requirements • maintenance issues, including equipment isolated for maintenance • operational incidences • read operating log • general inspection of boiler to detect any defects • accept responsibility of boiler • noted equipment malfunctions • required equipment tests
Emergencies	Emergencies may include, but are not limited to: • tube failure • loss of water level • power failures • inadequate housekeeping • explosion • fire • bomb threat • terrorism • personal accidents • chemical spills • major steam leaks • major water leaks and flooding • natural disasters • oil spills Appropriate emergency responses may include, but are not limited to: • identification of emergency • isolation of heat source • selection and application of appropriate fire fighting

	equipment and personal protective equipment • notification of downstream users • operation of boiler only when safe to do so • notification of appropriate regulatory authorities, such as state, territory, federal and boiler manufacturer
Shut down	Shut down may include, but is not limited to: • checks of water level • cooling down process • valve settings • equipment isolation • boiler pressure/vacuum • fuel/heat source isolation in accordance with manufacturer recommendations • boiler post-purge
Storage mode	Storage mode may include, but is not limited to: wet and dry storing open or closed position

Unit Sector(s)

Machine and process operations (licensed)

Custom Content Section