



# COMPETENCY STANDARD

## Boiler Operation and Maintenance

Level: 2

(Light Engineering Sector)

Competency Standard Code: CS-LE-BOM-L2-EN-V1



National Skills Development Authority  
Chief Advosor's Office  
Government of the People's Republic of Bangladesh



## Copyright

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This Competency Standard for Boiler Operation and Maintenance is a document for the development of curricula, teaching and learning materials, and assessment tools. It also serves as the document for providing training consistent with the requirements of industry in order to meet the qualification of individuals who graduated through the established standard via competency-based assessment for a relevant job.

This document has been validated by NSDA in association with Light Engineering Sector, industry representatives, academia, related specialist, trainer and related employee.

Public and private institutions may use the information contained in this standard for activities benefitting Bangladesh.

## Introduction

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The NSDA aims to enhance an individual's employability by certifying completeness with skills. NSDA works to expand the skilling capacity of identified public and private training providers qualitatively and quantitatively. It also aims to establish and operationalize a responsive skills ecosystem and delivery mechanism through a combination of well-defined set of mechanisms and necessary technical supports.

Key priority economic growth sectors identified by the government have been targeted by NSDA to improve current job skills along with existing workforce to ensure required skills to industry standards. Training providers are encouraged and supported to work with industry to address identified skills and knowledge to enable industry growth and increased employment through the provision of market responsive inclusive skills training program. "**Boiler Operation and Maintenance**" is selected as one of the priority occupations of Construction Sector. This standard is developed to adopt a demand driven approach to training with effective inputs from Industry Skills Councils (ISC's), employer associations and employers.

To support this effort, technical assistance has been provided by GIZ through its Skills Development for Sustainable Energy Solutions (Skills4SE) project, which focuses on strengthening the training ecosystem for grid connected renewable energy and energy efficiency. Skills4SE works closely with NSDA, training institutions, and industry stakeholders to enhance CS & CAD, develop curricula, and provide capacity-building support for trainers and assessors in line with industry demands. Additionally, GIZ is going to support the piloting of training programs to ensure effective implementation and industry alignment.

Generally, a competency standard informs curriculum, learning materials, assessment and certification of trainees enrolled in Skills Training. Trainees who successfully pass the assessment will receive a qualification in the Bangladesh National Qualification Framework (BNQF) and will be listed on the NSDA's online portal.

This competency standard is developed to improve skills and knowledge in accordance with the job roles, duties and tasks of the occupation and ensure that the required skills and knowledge are aligned to industry requirements. A series of stakeholder consultations, workshops were held to develop this document.

The document also details the format, sequencing, wording and layout of the Competency Standard for an occupation which is comprised of Units of Competence and its corresponding Elements.

## Overview

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A competency standard is a written specification of the knowledge, skills and attitudes required for the performance of an occupation, trade or job corresponding to the industry standard of performance required in the workplace.

The purpose of a competency standards is to:

- provide a consistent and reliable set of components for training, recognising and assessing people's skills, and may also have optional support materials
- enable industry recognised qualifications to be awarded through direct assessment of workplace competencies
- encourage the development and delivery of flexible training which suits individual and industry requirements
- encourage learning and assessment in a work-related environment which leads to verifiable workplace outcomes

Competency standards are developed by a working group comprised of representative from NSDA, Key Institutions, ISC, and industry experts to identify the competencies required of an occupation in Light Engineering Sector.

Competency standards describe the skills, knowledge and attitude needed to perform effectively in the workplace. CS acknowledge that people can achieve technical and vocational competency in many ways by emphasizing what the learner can do, not how or where they learned to do it.

With competency standards, training and assessment may be conducted at the workplace or at training institute or any combination of these.

Competency standards consist of a number of units of competency. A unit of competency describes a distinct work activity that would normally be undertaken by one person in accordance with industry standards.

Units of competency are documented in a standard format that comprises of:

- unit title
- nominal duration
- unit code
- unit descriptor
- elements and performance criteria
- variables and range statement
- curricular content guide
- assessment evidence guides

Together, all the parts of a unit of competency:

- describe a work activity
- guide the assessor to determine whether the candidate is competent or not yet competent

The ensuing sections of this document comprise of a description of the relevant occupation, trade or job with all the key components of a unit of competency, including:

- a chart with an overview of all Units of Competency for the relevant occupation, trade or job including the Unit Codes and the Unit of Competency titles and corresponding Elements
- the Competency Standard that includes the Unit of Competency, Unit Descriptor, Elements and Performance Criteria, Range of Variables, Curricular Content Guide and Assessment Evidence Guide.

## Competency Standards for National Skill Certificate, Level-2 in Boiler Operation and Maintenance in Light Engineering Sector

### Level Descriptors of NSQF (BNQF 1-6)

Level & Job classification	Knowledge Domain	Skills Domain	Responsibility Domain
6-Mid-Level Manager/ Sub Assistant Engineer	Comprehensive actual and theoretical knowledge within a specific work or study area with an awareness of the validity and limits of that knowledge, able to analyse, compare, relate and evaluate.	Specialised and wider range of cognitive and practical skills required to provide leadership in the development of creative solutions to defined problems. Communicate professional issues and solutions to the team and to external partners/users.	Work under broad guidance and self-motivation to execute strategic and operational plan/s. Lead lower-level management. Diagnose and resolve problems within and among work groups.
5-Supervisor	Broad knowledge of the underlying, concepts, principles, and processes in a specific work or study area, able to scrutinize and break information into parts by identifying motives or causes.	Broad range of cognitive and practical skills required to generate solutions to specific problems in one or more work or study areas. Communicate practice-related problems and possible solutions to external partners.	Work under guidance of management and self-direction to resolve specific issues. Lead and take responsibility for the work and actions of group/team members. Bridge between management.
4-Highly Skilled Worker	Broader knowledge of the underlying, concepts, principles, and processes in a specific work or study area, able to solve problems to new situations by comparing and applying acquired knowledge.	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying the full range of methods, tools, materials and information. Communicate using technical terminology and IT technology with partners and users as per workplace requirements.	Work under minimal supervision in specific contexts in response to workplace requirements. Resolve technical issues in response to workplace requirements and lead/guide a team/ group.
3-Skilled Worker	Moderately broad knowledge in a specific work or study area, able to perceive ideas and abstract from drawing and design according to workplace requirements.	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools. Communicate with his team and limited external partners upholding the values, nature and culture of the workplace	Work or study under supervision with considerable autonomy. Participate in teams and responsible for group coordination.
2-Semi Skilled Worker	Basic understanding of underpinning knowledge in a specific work or study area, able to interpret and apply common occupational terms and instructions.	Skills required to carry out simple tasks, communicate with his team in the workplace presenting and discussing results of his work with required clarity.	Work or study under supervision in a structured context with limited scope of manipulation
1 –Basic Skilled Worker	Elementary understanding of ability to interpret the underpinning knowledge in a specific study area, able to interpret common occupational terms and instructions.	Specific Basic skills required to carry out simple tasks. Interpret occupational terms and present the results of own work within guided work environment/ under supervision.	Work under direct supervision in a structured context with limited range of responsibilities.

## List of Abbreviations

CS	Competency Standard
ISC	Industry Skills Council
NSDA	National Skills Development Authority
BNQF	Bangladesh National Qualifications Framework
OSH	Occupational Safety and Health
PPE	Personal Protective Equipment
SCVC	Standards and Curriculum Validation Committee
STP	Skills Training Provider
SOP	Standard Operating Procedure
UoC	Unit of Competency
ISO	International Organization for Standardization
MSDS	Material Safety Data Sheet
OSH	Occupational Safety and Health
PPE	Personal Protective Equipment
SOP	Standard Operating Procedures



Approved by

40<sup>th</sup> Authority Meeting of NSDA

Held on 26 February 2025



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**Competency Standards for National Skill Certificate, Level- 2 in  
Boiler Operation and Maintenance in Light Engineering Sector**

**Course Structure**

<b>SL No</b>	<b>Unit code and Title</b>		<b>UOC Level</b>	<b>Nominal (hours)</b>
<b>Generic Units of Competencies</b>				
1.	GU-02-L2-V1	Apply Occupational Safety and Health (OSH) Procedure in the Workplace	2	15
2.	GU-08-L2-V1	Work in a Team Environment	2	20
3.	GU-12-L2-V1	Communicate in the Workplace	2	20
<b>Sub Total</b>				<b>55</b>
<b>Sector Specific Units of Competencies</b>				
4.	SU-LE-01-L2-V1	Work Effectively within Light Engineering Sector	2	15
<b>Occupation Specific Units of Competencies</b>				
5.	OU-LE-BOM-01-L2-V1	Interpret Basics of Boiler	2	30
6.	OU-LE-BOM-02-L2-V1	Interpret Basic Safety and Legislation	2	20
7.	OU-LE-BOM-03-L2-V1	Carryout Boiler Startup Activities	2	100
8.	OU-LE-BOM-04-L2-V1	Carryout Routine Operation and maintenance of Boiler	2	80
9.	OU-LE-BOM-05-L2-V1	Carryout Boiler Shutdown Activities	2	60
<b>Sub Total</b>				<b>290</b>
<b>Total Duration</b>				<b>360</b>

## Units & Elements at Glance

### Generic Competencies

Code	Unit of competency	Elements of competency	Duration (hours)
GU02L2V1	Apply Occupational Safety and Health (OSH) procedure In the Workplace	<ol style="list-style-type: none"> <li>1. Identify OSH policies and procedures</li> <li>2. Follow OSH procedure</li> <li>3. Report hazards and risks</li> <li>4. Respond to emergencies</li> <li>5. Maintain personal well-being</li> </ol>	15
GU08L2V1	Work in a Team Environment	<ol style="list-style-type: none"> <li>1. Define team role and scope</li> <li>2. Identify individual role and responsibility</li> <li>3. Participate in team discussions</li> <li>4. Work as a team member</li> </ol>	20
GU12L2V1	Communicate in the Workplace	<ol style="list-style-type: none"> <li>1. Receive verbal instructions.</li> <li>2. Interpret verbal and written information/ instruction</li> <li>3. Convey instructions using verbal and written forms of communication</li> <li>4. Complete written documentation</li> <li>5. Participate in work place meetings and discussions</li> </ol>	20
<b>Total hours</b>			<b>55</b>

## Sector specific competencies

<b>Code</b>	<b>Unit of competency</b>	<b>Elements of competency</b>	<b>Duration (hours)</b>
SU-LE-01-L2-V1	Work Effectively within Light Engineering Sector	<ol style="list-style-type: none"><li>1. Identify the organizational structure</li><li>2. Interpret processes and procedures</li><li>3. Identify workplace requirements</li><li>4. Organize own workload</li></ol>	15
<b>Total hours</b>			<b>15</b>

## Occupation specific competencies

Code	Unit of competency	Elements of competency	Duration (hours)
OU-LE-BOM-01-L2-V1	Interpret Basics of Boiler	1.1 Interpret boiler 1.2 Identify boiler mountings and accessories 1.3 Identify boiler control panel board 1.4 Interpret water treatment plant 1.5 Interpret feed pump and dozing	30
OU-LE-BOM-02-L2-V1	Interpret Basic Safety and Legislation	2.1 Interpret safety for boiler operation 2.2 Interpret boiler related rules and regulation	20
OU-LE-BOM-03-L2-V1	Carryout Boiler Startup Activities	3.1 Prepare for works 3.2 Carryout boiler pre-starting activities 3.3 Start gas fired boiler 3.4 Start liquid fuel fired boiler	100
OU-LE-BOM-04-L2-V1	Carryout Routine Operation and Maintenance of Boiler	4.1. Hand over and take over shift duties 4.2. Monitor operation 4.3. Check fuel 4.4. Check water 4.5. Routine maintenance	80
OU-LE-BOM-05-L2-V1	Carryout Boiler Shutdown Activities	5.1. Prepare for works 5.2. Demonstrate stop operation of boiler 5.3. Take further action for stopping oil fired boiler 5.4. Take further action for stopping gas fired boiler 5.5. Respond to the emergency situation 5.6. Shut down for maintenance 5.7. Recheck shut down activities	60
<b>Total Hours</b>			<b>290</b>

# **Generic Units of Competencies**

<b>Unit Code and Title</b>	<b>GU-02-L2-V1: Apply Occupational Safety and Health (OSH) Procedure in the Workplace</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to apply occupational safety and health (OSH) procedure in the workplace. It specifically includes the task of identifying OSH policies and procedures, following OSH procedure, reporting hazards and risks, responding to emergencies and maintaining personal well-being.
<b>Nominal Hours</b>	<b>15 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold &amp; Underlined</u></b> terms are elaborated in the Range of Variables
1. Identify OSH policies and procedures	1.1. <b><u>OSH policies</u></b> and <b><u>safe operating procedures</u></b> are accessed and stated 1.2. <b><u>Safety signs and symbols</u></b> are identified and followed 1.3. Emergency response, evacuation procedures and other contingency measures are determined according to workplace requirements
2. Follow OSH procedure	2.1 <b><u>Personal protective equipment (PPE)</u></b> is selected and collected as required 2.2 Personal protective equipment (PPE) is correctly used in accordance with organization OSH procedures and practices 2.3 A clear and tidy workplace is maintained as per workplace standard 2.4 PPE is maintained to keep them operational and compliant with OSH regulations
3. Report hazards and risks	3.1 <b><u>Hazards</u></b> and risks are identified, assessed and controlled 3.2 Incidents arising from hazards and risks are reported to designated authority
4. Respond to emergencies	4.1 Alarms and warning devices are responded 4.2 Workplace <b><u>emergency procedures</u></b> are followed 4.3 <b><u>Contingency measures</u></b> during workplace accidents, fire and other emergencies are recognized and followed in accordance with organization procedures 4.4 First aid procedures are applied during emergency situations
5. Maintain personal well-being	5.1 OSH policies and procedures are adhered to OSH awareness programs are participated in as per workplace guidelines and procedures.

	<p>5.2 Corrective actions are implemented to correct unsafe condition in the workplace</p> <p>5.3 <b><u>“Fit to work” records</u></b> are updated and maintained according to workplace requirements</p>
<b>Range of Variables</b>	
<b>Variables</b>	<b>Range</b> (may include but not limited to):
1. OSH policies	<p>1.1. Bangladesh standards for OSH</p> <p>1.2. Fire Safety Rules and Regulations</p> <p>1.3. Code of Practice</p> <p>1.4. Industry Guidelines</p>
2. Safe operating procedures	<p>2.1 Orientation on emergency exits, fire extinguishers, fire escape, etc.</p> <p>2.2 Emergency procedures</p> <p>2.3 First Aid procedures</p> <p>2.4 Tagging procedures</p> <p>2.5 Use of PPE</p> <p>2.6 Safety procedures for hazardous substances</p>
3. Safety signs and symbols	<p>3.1 Direction signs (exit, emergency exit, etc.)</p> <p>3.2 First aid signs</p> <p>3.3 Danger Tags</p> <p>3.4 Hazard signs</p> <p>3.5 Safety tags</p> <p>3.6 Warning signs</p>
4. Personal Protective Equipment (PPE)	<p>4.1 Gas Mask</p> <p>4.2 Gloves</p> <p>4.3 Safety boots</p> <p>4.4 Face mask</p> <p>4.5 Overalls</p> <p>4.6 Goggles and safety glasses</p> <p>4.7 Sun block</p> <p>4.8 Chemical/Gas detectors</p>
5. Hazards	<p>5.1 Chemical hazards</p> <p>5.2 Biological hazards</p> <p>5.3 Physical Hazards</p> <p>5.4 Mechanical and Electrical Hazard</p> <p>5.5 Mental hazard</p> <p>5.6 Ergonomic hazard</p>
6. Emergency procedures	<p>6.1 Fire fighting</p> <p>6.2 Earthquake</p> <p>6.3 Medical and first aid</p> <p>6.4 Evacuation</p>

7. Contingency measures	7.1 Evacuation 7.2 Isolation 7.1 Decontamination
8. "Fit to Work" records	8.1 Medical Certificate every year 8.2 Accident reports, if any 8.3 Eye vision certificate
<b>Evidence Guide</b>	
The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 stated OSH policies and safe operating procedures 1.2 followed safety signs and symbols 1.3 used personal protective equipment (PPE) 1.4 maintained workplace clear and tidy 1.5 assessed and Controlled hazards 1.6 followed emergency procedures 1.7 followed contingency measures 1.8 implemented corrective actions
2. Underpinning knowledge	2.1 Define OSH 2.2 OSH Workplace Policies and Procedures 2.3 Work safety procedures 2.4 Emergency procedures 2.5 Hazard control procedure 2.6 Different types of hazards 2.7 PPE and there uses 2.8 Personal hygiene practices 2.9 OSH awareness
3. Underpinning skills	3.1 Accessing OSH policies 3.2 Using of PPE 3.3 Handling cleaning tools and equipment 3.4 Writing report 3.5 Responding to emergency procedures
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 Workplace

	<p>5.2 Equipment and outfits appropriate in applying safety measures</p> <p>5.3 Tools, equipment, materials and documentation required</p> <p>5.4 OSH Policies and Procedures</p>
6. Methods of assessment	<p>Competency should be assessed by:</p> <p>6.1 Written test</p> <p>6.2 Demonstration</p> <p>6.3 Oral questioning</p>
7. Context of assessment	<p>7.1 Competency assessment must be done in NSDA accredited assessment centre</p> <p>7.2 Assessment should be done by a NSDA certified/nominated assessor</p>
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

<b>Unit Code and Title</b>	<b>GU-08-L2-V1: Work in a Team Environment</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to work in a team environment. It specifically includes the task of defining team role and scope, identifying individual role and responsibility, participating in team discussions and working as a team member.
<b>Nominal Hours</b>	<b>20 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold &amp; Underlined</u></b> terms are elaborated in the Range of Variables
1. Define team role and scope	1.1. Role and objectives of the team are defined 1.2. Team structure, responsibilities and reporting relations are identified from team discussions and other external sources
2. Identify individual role and responsibility	2.1 Individual roles and responsibilities of <b><u>team members</u></b> are identified 2.2 Reporting relationships among team members are defined and clarified 2.3 Reporting relationships external to the team are defined and clarified
3. Participate in team discussions	3.1 Ideas related to team plans are contributed 3.2 Recommendations for improving team work are put forward
4. Work as a team member	4.1 Effective forms of communication are used to interact with team members 4.2 Communication channels are followed 4.3 OHS practices are followed
<b>Range of Variables</b>	
<b>Variables</b>	<b>Range</b> (may include but not limited to):
1. Team Members	1.1 Coach/mentor 1.2 Supervisor/Manager 1.3 Peers/Colleagues 1.4 Employee representative
<b>Evidence Guide</b>	
The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	Assessment required evidence that the candidate: 1.1 demonstrated knowledge in working in a team environment. 1.2 satisfied the requirements mentioned in the

	1.3 Performance Criteria and Range of Variables
2. Underpinning knowledge	2.1 Team structure, role and responsibility 2.2 Individual members' roles and responsibilities 2.3 Communication flow and reporting structures 2.4 Team planning 2.5 Interpersonal communication skills 2.6 Team meeting procedures 2.7 OHS practices
3. Underpinning skills	3.1 Identifying the role and responsibility of the team 3.2 Identifying roles and responsibilities of individual members 3.3 Participating in team discussions 3.4 Working as a team member
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 workplace (actual or simulated) 5.2 Pens 5.3 Telephone 5.4 Computer 5.5 Writing materials 5.6 Online communication
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

### **Accreditation Requirements**

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<b>Unit Code and Title</b>	<b>GU-12-L2-V1: Communicate in the Workplace</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to communicate in the workplace. It specifically includes the task of receiving verbal instructions, interpreting verbal and written information/ instruction, conveying instructions using verbal and written forms of communication, completing written documentation and participating in workplace meetings and discussions.
<b>Nominal Hours</b>	<b>20 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold &amp; Underlined</u></b> terms are elaborated in the Range of Variables
1. Receive verbal instructions.	1.1 Instructions are accessed and interpreted 1.2 Questions are asked to clarify understanding or gain more information. 1.3 Information/instruction is recorded.
2. Interpret verbal and written information/ instruction	2.1 <b><u>Written instructions</u></b> are interpreted. 2.2 Work <b><u>signage's</u></b> are properly responded. 2.3 Routine written instructions are followed in sequence. 2.4 Feedback is given to workplace supervisor.
3. Convey instructions using verbal and written forms of communication	3.1 Relevant <b><u>communication</u></b> methods are used to transmit instructions. 3.2 Appropriate non-verbal communication is used. 3.3 Channels of communication are identified and followed 3.4 Communication <b><u>tools and equipment</u></b> are operated and faults are identified and reported. 3.5 Information is conveyed using appropriate <b><u>forms</u></b> .
4. Complete written documentation	4.1 All required <b><u>documentation</u></b> is completed 4.2 Workplace data are recorded 4.3 Written information/instruction is passed to personnel.
5. Participate in work place meetings and discussions	5.1 Meetings are attended regularly and on time. 5.2 Meeting inputs are consistent with the meeting purpose and established protocols. 5.3 Opinions are expressed without interruption. 5.4 Meeting outputs are processed and implemented.
<b>Range of Variables</b>	
<b>Variables</b>	<b>Range</b> (may include but not limited to):
1. Written instructions	1.1 Supervisor's/manager's instructions 1.2 Memoranda 1.3 Rules and regulations

	<ul style="list-style-type: none"> <li>1.4 Signage</li> <li>1.5 Approved work plan</li> <li>1.6 External communications</li> </ul>
2. Signage	<ul style="list-style-type: none"> <li>2.1. On-site direction signs</li> <li>2.2. Common site warnings</li> <li>2.3. Location signs</li> <li>2.4. Traffic signs</li> </ul>
3. Communication	<ul style="list-style-type: none"> <li>3.1 Verbal instructions</li> <li>3.2 Written instructions</li> <li>3.3 Online communication</li> </ul>
4. Tools and machinery	<ul style="list-style-type: none"> <li>4.1 workplace (actual or simulated)</li> <li>4.2 Telephone</li> <li>4.3 Mobile phone</li> <li>4.4 Fax machines</li> <li>4.5 Two-way radio</li> <li>4.6 Computers</li> <li>4.7 Forms</li> <li>4.8 Memo</li> </ul>
5. Forms	<ul style="list-style-type: none"> <li>5.1 Memorandum</li> <li>5.2 Requisitioning form</li> <li>5.3 Personnel form</li> <li>5.4 Safety report form</li> </ul>
6. Documentation	<ul style="list-style-type: none"> <li>6.1 Reports (Monthly, Quarterly, Half-Yearly, Annual)</li> <li>6.2 Plans (Strategic Plan, Operational Plan, Monthly Schedule)</li> <li>6.3 Monitoring and Evaluation Report</li> <li>6.4 Minutes of Meetings</li> </ul>
<b>Evidence Guide</b>	
The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency	
1. Critical aspects of competency	<p>Assessment required evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 demonstrated knowledge of workplace procedures in receiving, interpreting and conveying verbal &amp; written communication.</li> <li>1.2 satisfied the requirements mentioned in the Performance Criteria and Range of Variables.</li> </ul>
2. Underpinning knowledge	<ul style="list-style-type: none"> <li>2.1 Workplace Communication Policies, Standards and Procedures</li> <li>2.2 Verbal and non-verbal communication</li> <li>2.3 Modes of communication</li> <li>2.4 Communication equipment: types, uses and faults</li> <li>2.5 Channels of communication</li> </ul>

3. Underpinning skills	3.1 Receiving verbal instructions. 3.2 Interpreting verbal and written information/ instruction 3.3 Conveying instructions using verbal and written forms 3.4 of communication 3.5 Completing written documentation 3.6 Participating in workplace meetings and discussions
4. Required attitude	4.1 Commitment to occupational health and safety 4.2 Sincere and honest to duties 4.3 Promptness in carrying out activities 4.4 Environmental concerns 4.5 Eagerness to learn 4.6 Tidiness and timeliness 4.7 Respect of peers and seniors in workplace 4.8 Communicate with peers and seniors in workplace
5. Resource implications	5.1 workplace (actual or simulated) 5.2 Pens 5.3 Telephone 5.4 Computer 5.5 Writing materials 5.6 Online communication
6. Methods of assessment	Competency should be assessed by: 6.1 Written test 6.2 Demonstration 6.3 Oral questioning
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor

**Accreditation Requirements**

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under NSQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

## **Sector Specific Units of Competencies**

<b>Unit Code and Title</b>	<b>SU-LE-01-L2-V1: Work in the Light Engineering Sector</b>
<b>Unit Descriptor</b>	This unit covers the skills, knowledge and attitude required in working in the Light Engineering sector. It includes describe the organizational structure within the Light Engineering sector, identify processes and procedures, identify tools, equipment and materials, identify workplace practices, and organize own workload, and practice OHS.
<b>Nominal Hours</b>	<b>15 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold and Underlined</u></b> terms are elaborated in the Range of Variables.
1. Describe the organizational structure within the sector	1.1 Scope, nature and major fields of the Light Engineering sector are determined 1.2 The profile of the Light Engineering sector in relation to Bangladesh <b><u>employment conditions</u></b> is determined 1.3 Trends and technologies relevant to the sector are explained 1.4 Relevant policies and guidelines are identified and interpreted 1.5 <b><u>Instructions</u></b> as to procedures in achieving quality are obtained, understood and clarified
2. Identify processes and procedures	2.1 Light Engineering processes are identified, described and explained 2.2 Work activities are correctly identified 2.3 Adjustments are interpreted
3. Identify tools, equipment and materials	3.1 Appropriate manuals are accessed to ensure up-to-date specifications of tools, materials and equipment 3.2 Light Engineering <b><u>tools, materials and equipment</u></b> are identified 3.3 Substitutes are identified in case of non-availability
4. Identify workplace requirements	4.1 <b><u>Workplace requirements</u></b> are identified and clarified. 4.2 Roles and responsibilities of all personnel are described 4.3 Workplace's practices are identified 4.4 <b><u>Problem-solving strategies</u></b> are used to address bottlenecks, inconsistencies and other concerns
5. Organize own workload	5.1 Own work activities are planned and progress of work is communicated to relevant staff 5.2 Work activities are completed 5.3 Difficulties and bottlenecks are identified, and solutions are put forwarded 5.4 Own work is monitored against workplace standards and areas for improvement identified and acted upon

6. Practice OSH	6.1. Relevant OSH practices are identified 6.2. Relevant OSH practices are interpreted and implemented
<b>Range of Variables</b>	
<b>Variables</b>	<b>Range (may include but not limited to):</b>
1. Employment conditions	1.1 Code of Practice 1.2 Salary/Wage System 1.3 Labor Practices 1.4 Anti-Discrimination Policy 1.5 Gender Issues 1.6 Collective Bargaining and Other Practices 1.7 Awards 1.8 Procedures for Handling Disputes 1.9 Innovations in the Sector
2. Instructions	2.1 Specifications and requirements 2.2 Standard operating procedures 2.3 Manuals of Instruction 2.4 Operations Manual 2.5 Environmental Guidelines 2.6 Gender and Develop Guidelines
3. Manuals	3.1 Manual of Instructions 3.2 Manual of Specifications 3.3 Repair Manual 3.4 Quality Manual 3.5 Maintenance Procedure and Troubleshooting
4. Workplace requirements	1.1 Goals and objectives 1.2 Strategic and Operational Plans 1.3 Systems and Processes 1.4 Monitoring and Evaluation 1.5 Reports and Documentation
5. Tools, equipment and materials	Refers to all tools, equipment and materials appropriate for any of the Light Engineering fields
6. Problem-solving strategies	6.1. Asking questions 6.2. Feedback and Feed forward system 6.3. Reference to Standard Operating Procedures 6.4. Accessing Information 6.5. Reviews 6.6. Brainstorming
7. OHS	7.1 Reporting hazards, risks and emergencies 7.2 Arrangement of workplaces 7.3 Standard Operating Procedure 7.4 Workplace environment and safety

	<p>7.5 Safe storage of tools and equipment</p> <p>7.6 Use of PPE</p>
<p><b>Evidence Guide</b></p> <p>The evidence must be authentic, valid, sufficient, reliable, consistent and recent and meet the requirements of the current version of the Unit of Competency.</p>	
1. Critical aspects of competency	<p>Assessment required evidence that the candidate:</p> <p>1.1 demonstrated knowledge in working in the Light Engineering sector</p> <p>1.2 satisfying all the requirements mentioned in the Performance Criteria and Range of Variables</p>
2. Underpinning knowledge	<p>2.1 Scope and Major Divisions of the Light Engineering Sector</p> <p>2.2 Relevant Policies and Guidelines in the Light Engineering Sector</p> <p>2.3 Manuals used in the Light Engineering Sector</p> <p>2.4 Relevant Terminologies and Acronyms</p> <p>2.5 Types and Uses of Light Engineering Tools and Materials.</p> <p>2.6 Workplace Practices</p> <p>2.7 Occupational Health and Safety Practices</p> <p>2.8 Recording and Reporting practices</p>
3. Underpinning skills	<p>3.1 Describing the organization structure</p> <p>3.2 Identifying Light Engineering processes and procedures</p> <p>3.3 Identifying tools, equipment and materials</p> <p>3.4 Identifying workplace practices</p> <p>3.5 Organizing own workload</p> <p>3.6 Practicing OHS</p>
4. Underpinning attitudes	<p>4.1 Commitment to occupational health and safety</p> <p>4.2 Environmental concerns</p> <p>4.3 Eagerness to learn</p> <p>4.4 Tidiness and timeliness</p> <p>4.5 Respect for rights of peers and seniors in workplace</p>
5. Resource implications	<p>5.1. Pens</p> <p>5.2. Telephone</p> <p>5.3. Computer</p> <p>5.4. Writing materials</p> <p>5.5. Online communication</p>
6. Methods of assessment	<p>6.1 Demonstration</p> <p>6.2 Oral questioning</p> <p>6.3 Written test</p> <p>6.4 Portfolio</p>

7. Context of assessment	<p>7.1 Competency assessment must be done in NSDA accredited assessment centre</p> <p>7.2 Assessment should be done by a NSDA certified/nominated assessor</p>
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**Accreditation Requirements**

Training Providers must be accredited by NSDA, the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of national skills qualification. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.

# **Occupation Specific Units of Competencies**

<b>Unit Code and Title</b>	<b>OU-LE-BOM-01-L2-V1: Interpret Basics of Boiler</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to interpret basics of boiler. It includes interpreting boiler, identifying boiler mountings and accessories, boiler control panel board, water treatment plant and interpreting feed pump and dozing
<b>Nominal Hours</b>	<b>30 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold &amp; underlined</u></b> terms are elaborated in the Range of Variables
1. Interpret boiler	<ul style="list-style-type: none"> <li>1.1 Boiler and <b><u>application of boiler</u></b> are interpreted;</li> <li>1.2 Function of boiler is interpreted.</li> <li>1.3 Types of boiler are interpreted;</li> <li>1.4 Types of boiler burner are identified</li> <li>1.5 Burner controller is identified</li> <li>1.6 Solid fuel burning system is identified.</li> <li>1.7 Economizer is interpreted.</li> <li>1.8 Causes and remedies of tearing of pressure parts are interpreted;</li> <li>1.9 Safety precaution of boiler operation is stated.</li> </ul>
2. Identify boiler mountings and accessories	<ul style="list-style-type: none"> <li>2.1 <b><u>Boiler mountings</u></b> are listed.</li> <li>2.2 Usages of boiler mounting in boiler operation is interpreted.</li> <li>2.3 <b><u>Boiler accessories</u></b> and <b><u>auxiliary equipment</u></b> are listed.</li> <li>2.4 Function of boiler accessories and auxiliaries is interpreted.</li> <li>2.5 Application of accessories in boiler operation is interpreted.</li> </ul>
3. Identify boiler control panel board	<ul style="list-style-type: none"> <li>3.1 Boiler control panel board is identified.</li> <li>3.2 <b><u>Electric components of boiler</u></b> is listed.</li> <li>3.3 Electric components of boiler is interpreted.</li> </ul>
4. Interpret water treatment plant	<ul style="list-style-type: none"> <li>4.1 <b><u>Sources of water</u></b> are identified.</li> <li>4.2 Water impurity particles are interpreted.</li> <li>4.3 Water treatment process is stated.</li> <li>4.4 <b><u>Water parameter</u></b> standard value is listed.</li> <li>4.5 <b><u>Water treatment equipment</u></b> are identified.</li> <li>4.6 Water sample is collected.</li> <li>4.7 Water parameters are measured as per standard.</li> <li>4.8 Measured water parameters are reported as per SOP.</li> </ul>
5. Interpret feed pump and dozing	<ul style="list-style-type: none"> <li>5.1 Principle of feed pump is interpreted.</li> <li>5.2 Function of feed pump is interpreted.</li> <li>5.3 Function of dozing is interpreted.</li> </ul>

<b>Range of Variables</b>	
<b>Variable</b>	<b>Range (may include but not limited to):</b>
1. Application of boiler	1.1 Pharmaceutical 1.2 Textile and Garment 1.3 Food industries 1.4 Auto-rice 1.5 Chemical and fertilizer 1.6 Power station 1.7 Pulp and Paper Industries 1.8 Leather Industries 1.9 Multistoried buildings 1.10 Feed Mills
2. Boiler mountings	2.1. Safety valve 2.2. Manhole 2.3. Mudhole / handhole 2.4. Main steam stop valve 2.5. Feedwater check valve (non-return valve) 2.6. Steam pressure gauge 2.7. Water level indicator (gauge glass) 2.8. Water level controller 2.9. Blowdown valve 2.10. Blowdown controller 2.11. Air cock (air vent valve) 2.12. Fusible plug
3. Boiler accessories	3.1 Feed water pump and strainer 3.2 Combustion safety door 3.3 Force Draft (FD) fan 3.4 Induced Draft (ID) fan 3.5 Surface blow down cock 3.6 Ground/bottom blowdown cock 3.7 Boiler flue gas stack 3.8 Ferrule 3.9 Steam trap / steam separator / steam doom 3.10 Steam pressure switch 3.11 Modulating valve
4. Boiler auxiliary equipment	4.1 Economizer 4.2 Air preheater 4.3 Water preheater 4.4 Superheater 4.5 Condensate recovery system 4.6 Blowdown vessel 4.7 Deaerator

	4.8 Damper
	4.9 Feedwater tank
5. Electric components of boiler	5.1 Main circuit breaker 5.2 Current transformer 5.3 Potential transformer 5.4 Main power switch 5.5 Volt meter 5.6 Ammeter 5.7 Indicator lamp 5.8 Push button switch 5.9 Selector switch 5.10 Display panel / monitor / Human Machine Interface (HMI) 5.11 Magnetic contactor 5.12 Relay 5.13 Thermal overload relay 5.14 Timer 5.15 Counter 5.16 Water level switch / transmitter 5.17 Burner controller / programme controller 5.18 Water level controller 5.19 Temperature meter 5.20 TDS meter 5.21 Transducer 5.22 PLC
6. Sources of water	6.1 Surface water 6.2 Ground water
7. Water parameter	7.1 TH (Total Hardness) 7.2 pH (Potential of hydrogen) 7.3 TDS (Total Dissolved Solid) 7.4 Dissolved oxygen 7.5 Conductivity 7.6 CL, Chloride ion 7.7 Dissolved iron 7.8 Silica content 7.9 Total Suspended Solid (TSS)
8. Water treatment equipment	8.1. Aeration 8.2. Softeners 8.3. DM (De-mineralization) plant 8.4. Iron removal plant 8.5. Filtration

**Evidence Guide**

The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.

1. Critical aspects of competency	<p>Assessment required evidences that the candidate:</p> <ol style="list-style-type: none"> <li>1.1 identified application of boiler</li> <li>1.2 identified gas and oil burner parts;</li> <li>1.3 identified solid fuel burning system;</li> <li>1.4 interpreted function of boiler mounting and accessories;</li> <li>1.5 identified boiler control panel and control system; and</li> <li>1.6 interpreted water treatment process..</li> <li>1.7 interpreted feed pump and dozing</li> </ol>
2. Underpinning knowledge	<ol style="list-style-type: none"> <li>2.1 Define boiler and it types</li> <li>2.2 Types of boiler burner</li> <li>2.3 Feed pump and injector</li> <li>2.4 Boiler related component — electrical, mechanical, and automatic control system.</li> <li>2.5 Identification of Boiler component</li> <li>2.6 Boiler mounting, boiler accessories and auxiliary equipment.</li> <li>2.7 Boiler's electric equipment</li> <li>2.8 Water treatment process</li> <li>2.9 feed pump and dozing</li> <li>2.10 Usage of gas regulator valve</li> <li>2.11 Particle of water             <ol style="list-style-type: none"> <li>2.11.1 Iron</li> <li>2.11.2 Magnesium</li> <li>2.11.3 Calcium</li> <li>2.11.4 Potassium</li> <li>2.11.5 Silica</li> <li>2.11.6 Calcium bi-carbonate</li> <li>2.11.7 Magnesium bi-carbonate</li> <li>2.11.8 Sulfate</li> <li>2.11.9 Calcium magnesium sulfate</li> <li>2.11.10 Dissolved gases</li> </ol> </li> <li>2.12 Raw water, softener water, demineralized water feed water and blow down water standard parameter</li> <li>2.13 Ammeter, voltmeter, ohmmeter, watt meter, multimeter</li> <li>2.14 Measurement unit</li> <li>2.15 KG/ cm<sup>2</sup> , KPA, Bar, PSI, N /mm<sup>2</sup></li> <li>2.16 phase voltage</li> <li>2.17 PLC/ Microcontroller</li> </ol>

3. Underpinning skills	3.1 Identifying boiler and its type of boiler 3.2 Identifying gas and oil burner parts. 3.3 Identifying boiler mounting, boiler accessories and auxiliary equipment 3.4 Listing water parameter standard value. 3.5 Interpreting feed pump and dozing
4. Required attitudes	4.1 Commitment to occupational safety and health. 4.2 Promptness in carrying out activities. 4.3 Sincere and honest to duties. 4.4 Eagerness to learn. 4.5 Tidiness and timeliness. 4.6 Environmental concerns. 4.7 Respect for rights of peers and seniors at workplace. 4.8 Communication with peers and seniors at workplace.
5. Resources implication	The following resources must be provided: 5.1 Workplace (actual or simulated) 5.2 Tools, equipment and physical facilities appropriate to perform activities. 5.3 Relevant drawings, manuals, codes, standards and reference materials.
6. Methods of assessment	Methods of assessment may include but not limited to: 6.1 written test 6.2 demonstration 6.3 oral questioning 6.4 Portfolio
7. Context for assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

<b>Unit Code and Title</b>	<b>OU-LE-BOM-02-L2-V1: Interpret Basic Safety and Legislation</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to Interpret basic safety and legislation. It includes interpreting safety for boiler operation and boiler related rules and regulation.
<b>Nominal Hours</b>	<b>20 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold &amp; underlined</u></b> terms are elaborated in the Range of Variables
1. Interpret safety for boiler operation	1.1 <b><u>Personal Protective Equipment (PPE)</u></b> is identified. 1.2 Safety precaution for starting boiler is interpreted. 1.3 Boiler running safety precaution is interpreted. 1.4 Boiler related fire safety is interpreted. 1.5 Boiler related chemical hazards are interpreted. 1.6 <b><u>Emergency situation</u></b> in boiler operation is interpreted
2. Interpret boiler related rules and regulation	2.1 Boiler rules is identified. 2.2 Boiler operator licensing process is interpreted 2.3 Boiler registration and renew related rules and regulation are interpreted. 2.4 Boiler repairing related rules and regulation are interpreted; 2.5 Emission control process and relevant laws are interpreted;
<b>Range of Variables</b>	
<b>Variable</b>	<b>Range</b> (may include but not limited to):
1. Personal Protective Equipment (PPE)	1.1 Safety shoes 1.2 Apron 1.3 Hand gloves 1.4 Helmet 1.5 Mask 1.6 Safety glass 1.7 Ear plug
2. Emergency situation	2.1 Steam pipe main line leakage 2.2 Blowdown valve leakage 2.3 Water level sensor problem 2.4 Feed water delivery pipe line leakage 2.5 Non return valve non functioning 2.6 Feed water suction strainer jam

	<ul style="list-style-type: none"> <li>2.7 Safety valve problem</li> <li>2.8 Flue gas exhaust system</li> <li>2.9 Fuel line leakage</li> <li>2.10 Air pressure sensor blocked</li> <li>2.11 Gauge glass drain line blocked</li> </ul>
<p><b>Evidence Guide</b></p> <p>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.</p>	
1. Critical aspect of competency	<p>Assessment required evidences that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 identified safety precautions</li> <li>1.2 identified hazards</li> <li>1.3 identified emergency situation;</li> <li>1.4 identified boiler registration related rules and regulation.</li> </ul>
2. Underpinning knowledge	<ul style="list-style-type: none"> <li>2.1 Safety law</li> <li>2.2 Boiler running safety precaution.</li> <li>2.3 Cause of accident</li> <li>2.4 Safety precaution for starting boiler.</li> <li>2.5 Boiler registration and renew related rules and regulation.</li> <li>2.6 Fire safety process of boiler</li> </ul>
3. Underpinning skills	<ul style="list-style-type: none"> <li>3.1 Identifying boiler registration and renew related rules and regulation.</li> <li>3.2 Interpreting safety precaution.</li> <li>3.3 Interpreting boiler operator licensing process</li> <li>3.4 Interpreted emergency situations of boiler operation</li> </ul>
4. Required attitudes	<ul style="list-style-type: none"> <li>4.1 Commitment to occupational safety and health.</li> <li>4.2 Promptness in carrying out activities.</li> <li>4.3 Sincere and honest to duties.</li> <li>4.4 Eagerness to learn</li> <li>4.5 Tidiness and timeliness</li> <li>4.6 Environmental concerns</li> <li>4.7 Respect for rights of peers and seniors at workplace.</li> <li>4.8 Communicate with peers and seniors at workplace.</li> </ul>
5. Resource implication	<p>The following resources must be available:</p> <ul style="list-style-type: none"> <li>5.1 Workplace (actual or simulated)</li> <li>5.2 Tools, equipment and physical facilities appropriate to perform activities.</li> <li>5.3 Relevant drawings, manuals, codes, standards and reference materials.</li> </ul>
6. Methods of assessment	<p>Methods of assessment may include but not limited to:</p> <ul style="list-style-type: none"> <li>6.1 written test</li> <li>6.2 demonstration</li> </ul>

	6.3 oral questioning 6.4 Portfolio
7. Context of assessment	7.1 Competency assessment must be done in NSDA accredited assessment centre 7.2 Assessment should be done by a NSDA certified/nominated assessor
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

<b>Unit Code and Title</b>	<b>OU-LE-BOM-03-L2-V1: Carryout Boiler Startup Activities</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to carry out boiler startup activities. It includes preparing for work, carrying out boiler pre-starting activities starting gas fired boiler, fuel fired boiler.
<b>Nominal Hours</b>	<b>100 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold &amp; underlined</u></b> terms are elaborated in the Range of Variables
1. Prepare for works	<p>1.1 <b><u>Personal Protective Equipment (PPE)</u></b> is used;</p> <p>1.2 Hazards are identified and mitigated as per workplace procedure.</p> <p>1.3 Log book is received and information are checked before starting boiler.</p> <p>1.4 Main circuit breaker is turned on and three phase power supply is ensured;</p> <p>1.5 Softener <b><u>water parameter</u></b> is checked using appropriate <b><u>testing kits and devices</u></b>.</p> <p>1.6 Softener water is regenerated using <b><u>regeneration chemical</u></b> as per prescribe ratio;</p>
2. Carryout boiler pre-starting activities	<p>2.1 Feed water temperature is checked and recorded as per SOP.</p> <p>2.2 Feed tank water level is checked.</p> <p>2.3 Air vent valve position is checked.</p> <p>2.4 Blowdown valve is checked.</p> <p>2.5 Suction and delivery valve (feed water line) is checked.</p> <p>2.6 Water level in boiler is checked.</p> <p>2.7 Fuel/energy availability is checked and quality is inspected.</p> <p>2.8 Air blower is turned on.</p> <p>2.9 Steam header and outlet valve is checked to make it liquid free;</p> <p>2.10 Compressed air valve is turned ON and pressure is checked.</p> <p>2.11 Boiler main power is turned ON.</p> <p>2.12 Faulty signal is checked and informed as per SOP.</p>
3. Start gas fired boiler	<p>3.1 Safety system for running condition is ensured.</p> <p>3.2 Gas burner switch is turned on.</p> <p>3.3 Purging in combustion area is observed.</p> <p>3.4 Ignition and pilot solenoid valve is set in auto mode as per SOP.</p> <p>3.5 Indication of opening of main solenoid valve is ensured.</p> <p>3.6 Pilot ignition turned off and main solenoid valve turned on is observed and recorded.</p> <p>3.7 Low load (10-20%) is maintained in the initial stages of boiler startup operation.</p>

	<p>3.8 Boiler inside flame condition is visually observed through looking glass.</p> <p>3.9 Boiler starting procedure is monitored in panel board.</p> <p>3.10 Main steam stop valve is opened after achieving required pressure.</p> <p>3.11 Exhaust gas temperature is observed and recorded.</p>
4. Start liquid fuel fired boiler	<p>4.1 Burner switch is turned on</p> <p>4.2 Purging in combustion area is observed.</p> <p>4.3 Liquid fuel supply is monitored.</p> <p>4.4 Ignition and pilot solenoid valve is set in auto/manual mode according to the requirement</p> <p>4.5 Indication of opening of main solenoid valve is monitored.</p> <p>4.6 Fuel supply inside the burner is ensured;</p> <p>4.7 Pilot ignition is turned off and main solenoid valve turned on is observed and recorded.</p> <p>4.8 Low load (10-20%) is maintained in the initial stages of boiler startup operation.</p> <p>4.9 Boiler inside flame condition is visually observed through looking glass.</p> <p>4.10 Boiler starting procedure is monitored in panel board.</p> <p>4.11 Main steam stop valve is opened after achieving required steam pressure.</p>
<b>Range of Variables</b>	
<b>Variable</b>	<b>Range (may include but not limited to):</b>
1. Personal Protective Equipment (PPE)	<p>1.1 Safety shoes</p> <p>1.2 Hand gloves</p> <p>1.3 Helmet</p> <p>1.4 Mask</p> <p>1.5 Safety glass</p> <p>1.6 Ear plug</p> <p>1.7 Apron</p>
2. Water parameter	<p>2.1 TH (Total Hardness)</p> <p>2.2 pH (Potential of hydrogen)</p> <p>2.3 TDS (total dissolved solid)</p> <p>2.4 CL (Chloride ion)</p> <p>2.5 Dissolved oxygen</p> <p>2.6 Conductivity</p> <p>2.7 Iron test</p> <p>2.8 Silica content</p> <p>2.9 Total Suspended Solid (TSS)</p>

3. Testing kits and devices	<ul style="list-style-type: none"> <li>3.1 pH meter</li> <li>3.2 TDS meter</li> <li>3.3 Conductivity meter</li> <li>3.4 Hardness tester</li> <li>3.5 DO meter</li> </ul>
4. Regeneration chemical	<ul style="list-style-type: none"> <li>4.1 Softener - Sodium chloride (NaCl/salt)</li> <li>4.2 DM plant - hydrochloric acid / sulphuric acid (HCL / H<sub>2</sub>SO<sub>4</sub>)</li> </ul>
<p><b>Evidence Guide</b></p> <p>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.</p>	
1. Critical aspect of competency	<p>Assessment required evidences that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 checked water parameters;</li> <li>1.2 regenerated softener water using regeneration chemical;</li> <li>1.3 carried-out boiler pre-starting activities;</li> <li>1.4 started gas fired boiler</li> <li>1.5 started liquid fuel fired boiler</li> </ul>
2. Underpinning knowledge	<ul style="list-style-type: none"> <li>2.1 Soft water parameter.</li> <li>2.2 Softener regeneration process.</li> <li>2.3 Boiler pre starting activities</li> <li>2.4 Starting procedure of gas fired boiler</li> <li>2.5 Starting procedure of liquid fluid fired boiler</li> </ul>
3. Underpinning skills	<ul style="list-style-type: none"> <li>3.1 Checking softener water parameter.</li> <li>3.2 Regenerating softener water.</li> <li>3.3 Filling feed tank with soft water.</li> <li>3.4 Opening air vent valve</li> <li>3.5 Checking water level in boiler.</li> <li>3.6 Monitoring gas pressure</li> <li>3.7 Observing boiler inside flame condition.</li> </ul>
4. Required attitudes	<ul style="list-style-type: none"> <li>4.1 Commitment to occupational safety and health.</li> <li>4.2 Promptness in carrying out activities.</li> <li>4.3 Sincere and honest to duties.</li> <li>4.4 Eagerness to learn.</li> <li>4.5 Tidiness and timeliness.</li> <li>4.6 Environmental concerns.</li> <li>4.7 Respect for rights of peers and seniors at workplace.</li> <li>4.8 Communicate with peers and seniors at workplace.</li> </ul>

5. Resource implication	<p>The following resources must be available:</p> <p>5.1 Workplace (actual or simulated)</p> <p>5.2 Tools, equipment and physical facilities appropriate to perform activities.</p> <p>5.3 Relevant drawings, manuals, codes, standards and reference materials.</p>
6. Methods of assessment	<p>Methods of assessment may include but not limited to:</p> <p>6.1 written test</p> <p>6.2 demonstration</p> <p>6.3 oral questioning</p> <p>6.4 Portfolio</p>
7. Context of assessment	<p>7.1 Competency assessment must be done in NSDA accredited assessment centre</p> <p>7.2 Assessment should be done by a NSDA certified/nominated assessor</p>
<p><b>Accreditation Requirements</b></p> <p>Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA.</p>	

<b>Unit Code and Title</b>	<b>OU-LE-BOM-04-L2-V1: Carryout Routine Operation and Maintenance of Boiler</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to carry out routine operation and maintenance of boiler. It includes handing over and taking over shift, monitoring operation, checking fuel and water and maintaining routine.
<b>Nominal Hours</b>	<b>80 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold &amp; underlined</u></b> terms are elaborated in the Range of Variables
1. Hand over and take over shift duties	<p>1.1 Safe work practices are observed and <b><u>Personal Protective Equipment (PPE)</u></b> is used</p> <p>1.2 Hand over and take over <b><u>documents</u></b> are prepared;</p> <p>1.3 Boiler and its surrounding conditions are checked.</p> <p>1.4 Water level of feed water tank is checked.</p> <p>1.5 <b><u>Sources of fuel/energy</u></b> are identified.</p> <p>1.6 Boiler operation related information in log book and log sheet is checked and received / handed over;</p>
2. Monitor operation	<p>2.1 Water level and feedwater line are observed</p> <p>2.2 <b><u>Boiler operation</u></b> is monitored.</p> <p>2.3 Boiler pressure and temperature are measured;</p> <p>2.4 Inlet and outlet flue gas temperature is observed and recorded.</p> <p>2.5 Furnace temperature reading is recorded in log book every hour.</p> <p>2.6 <b><u>Chemical solution</u></b> is dosed using dosing pump as per prescribe recommendation.</p> <p>2.7 Panel board is monitored and <b><u>data</u></b> is recorded in log book as per workplace procedure.</p> <p>2.8 Safety precaution is maintained in every aspect of work.</p>
3. Check fuel	<p>3.1 Sufficient fuel is reserved for boiler operation as per organization procedure.</p> <p>3.2 <b><u>Fuel parameter</u></b> is checked as per boiler fuel type and recorded in log book.</p> <p>3.3 Bypass fuel sources are used if any problem occurred in fuel supply.</p>
4. Check water	<p>4.1 Water storage availability is checked.</p> <p>4.2 <b><u>Water parameter</u></b> of boiler and feed water is checked using <b><u>testing kits and devices</u></b> as per schedule.</p> <p>4.3 <b><u>Water treatment</u></b> is performed as per requirement.</p> <p>4.4 Blowdown is carried out as per schedule.</p> <p>4.5 Water level is checked as per schedule.</p>

	4.6 Information is recorded in log book after every check;
5. Maintain routine	5.1 Heating surface cleaning is carried-out; 5.2 Gauge glass is cleaned; 5.3 Hydraulic test is carried-out; 5.4 Steam test is carried-out; 5.5 Regular cleaning and maintenance is carried-out;
<b>Range of Variables</b>	
<b>Variable</b>	<b>Range (may include but not limited to):</b>
1. Personal protective equipment (PPE)	1.1 Safety shoes 1.2 Apron 1.3 Hand gloves 1.4 Helmet 1.5 Mask 1.6 Safety glass 1.7 Ear plug
2. Documents	2.1 Log sheet 2.2 Log book
3. Sources of fuel/ energy	3.1 Gas 3.2 Oil 3.3 Solid fuel 3.4 Electricity 3.5 Generator flue gas
4. Boiler operation	4.1 Fuel quantity 4.2 Gauge glass 4.3 Pressure gauge (steam, water and fuel) 4.4 Flue gas temperature 4.5 Feed water and steam temperature 4.6 Steam flow record 4.7 Water quality record
5. Chemical solution	5.1 pH control chemical 5.2 Corrosion inhibitor 5.3 Scale inhibitor 5.4 Steam line corrosion inhibitor
6. Data	6.1 Voltage 6.2 Flow 6.2.1 Fuel 6.2.2 Air 6.2.3 Gas 6.2.4 Steam 6.2.5 Water 6.3 Pressure

	6.3.1 Steam 6.3.2 Fuel 6.3.3 Feed water 6.4 Temperature 6.4.1 Furnace 6.4.2 Steam 6.4.3 Flue gas 6.4.4 Stack / chimney 6.4.5 Panel 6.4.6 Economizer inlet and outlet 6.4.7 Feed water 6.4.8 Air pre heater inlet and outlet 6.4.9 Oil 6.5 Level transmitter 6.5.1 Water 6.5.2 Fuel
7. Fuel parameter	7.1 Gas regulator inlet pressure 7.2 Gas regulator outlet pressure 7.3 Oil level and temperature 7.4 Quantity of solid fuel 7.5 Number of phases, voltage rating and frequency
8. Water parameter	8.1 TH (Total Hardness) 8.2 pH (Potential of hydrogen) 8.3 TDS (Total dissolved solid) 8.4 Iron (Fe) 8.5 Dissolved oxygen 8.6 Conductivity
9. Testing kits and devices	9.1 pH meter 9.2 TDS meter 9.3 Conductivity meter 9.4 Hardness tester 9.5 DO meter 9.6 Iron test kit
10. Water treatment	10.1 Back wash 10.2 Regeneration (anion and cation resin)
<p><b>Evidence Guide</b>          The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.</p>	

1. Critical aspect of competency	<p>Assessment requires evidence that the candidate:</p> <ul style="list-style-type: none"> <li>1.1 handed over and taken over shift duties</li> <li>1.2 monitored operation</li> <li>1.3 checked fuel;</li> <li>1.4 checked water;</li> <li>1.5 maintained routine</li> </ul>
2. Underpinning knowledge	<ul style="list-style-type: none"> <li>2.1 Duty hand over and take over procedure</li> <li>2.2 Boiler operation monitoring procedure</li> <li>2.3 Fuel and water checking technique</li> <li>2.4 Technique of routine maintain</li> </ul>
3. Underpinning skills	<ul style="list-style-type: none"> <li>3.1 Handing over and taken over duties</li> <li>3.2 Monitoring operation</li> <li>3.3 Checking fuel and water</li> <li>3.4 Maintaining routine</li> </ul>
4. Required attitudes	<ul style="list-style-type: none"> <li>4.1 Commitment to occupational safety and health.</li> <li>4.2 Promptness in carrying out activities.</li> <li>4.3 Sincere and honest to duties.</li> <li>4.4 Eagerness to learn.</li> <li>4.5 Tidiness and timeliness.</li> <li>4.6 Environmental concerns.</li> <li>4.7 Respect for rights of peers and seniors at workplace.</li> <li>4.8 Communicate with peers and seniors at workplace.</li> </ul>
5. Resource implication	<p>The following resources must be available:</p> <ul style="list-style-type: none"> <li>5.1 Workplace (actual or simulated)</li> <li>5.2 Tools, equipment and physical facilities appropriate to perform activities.</li> <li>5.3 Relevant drawings, manuals, codes, standards and reference materials..</li> </ul>
6. Methods of assessment	<p>Methods of assessment may include but not limited to:</p> <ul style="list-style-type: none"> <li>6.1 written test</li> <li>6.2 demonstration</li> <li>6.3 oral questioning</li> <li>6.4 portfolio</li> </ul>
7. Context of assessment	<ul style="list-style-type: none"> <li>7.1 Competency assessment must be done in NSDA accredited assessment centre</li> <li>7.2 Assessment should be done by a NSDA certified/nominated assessor</li> </ul>

**Accreditation Requirements**

Training Providers must be accredited by National Skills Development Authority (NSDA), the National Quality Assurance Body, or a body with delegated authority for quality assurance to conduct training and assessment against this unit of competency for credit towards the award of qualification under BNQF. Accredited providers assessing against this unit of competency must meet the quality assurance requirements set by NSDA

<b>Unit Code and Title</b>	<b>OU-LE-BOM-05-L2-V1: Carryout Boiler Shutdown Activities</b>
<b>Unit Descriptor</b>	This unit covers the knowledge, skills and attitudes required to carry out boiler shut down activities. It includes preparing for work, stopping gas and oil boiler operation for short time, taking further action for stopping oil fired boiler, responding to the emergency situation, shutting down for maintenance and rechecking shut down activities.
<b>Nominal Hours</b>	<b>60 Hours</b>
<b>Elements of Competency</b>	<b>Performance Criteria</b> <b><u>Bold &amp; underlined</u></b> terms are elaborated in the Range of Variables
1. Prepare for works	1.1 Safe work practices observed and <b><u>Personal Protective Equipment (PPE)</u></b> are used; 1.2 Hazards are identified and mitigated as per workplace procedure.
2. Demonstrate shutdown operation of boiler	2.1 Burner position is set at low; 2.2 Burner switch is turned off; 2.3 Gauge glass and water level is checked; 2.4 Main steam stop valve is turned off; 2.5 Blowdown is performed to reduce sludge; 2.6 Boiler water level is ensured after blowdown 2.7 Softener plant is shutdown; 2.8 FD and ID fan are turned off; 2.9 Panel board main breaker is turned off;
3. Take further action for shutdown liquid fuel fired boiler	3.1 Liquid fuel reserve tank valve is stopped. 3.2 Liquid fuel reserve tank heater is turned off. 3.3 Liquid fuel service tank heater is turned off 3.4 Circulation pump is turned off
4. Take further action for shutdown gas fired boiler	4.1 Main gas valve is stopped; 4.2 By-pass valve is stopped; 4.3 Vaporization plant is stopped.
5. Respond to the emergency situation	5.1 Panel board is observed. 5.2 <b><u>Emergency breakdown</u></b> situation is identified. 5.3 Boiler operation is shutdown as per SOP.
6. Shut down for maintenance	6.1 Boiler is shutdown. 6.2 Air vent valve is opened. 6.3 Blowdown valve is opened partially. 6.4 Boiler is cooled down slowly and exhaust blower is turned on.

7. Recheck shut down activities	<p><b>6.1.</b> Components and parts are rechecked according to the <b><u>check list</u></b>.</p> <p>6.2. Information is recorded in log book.</p>
<b>Range of Variables</b>	
<b>Variable</b>	<b>Range</b> (may include but not limited to):
1. Personal Protective Equipment (PPE)	<ul style="list-style-type: none"> <li>1.1 Safety shoes</li> <li>1.2 Boiler Suit</li> <li>1.3 Heat resistant hand gloves</li> <li>1.4 Helmet</li> <li>1.5 Mask</li> <li>1.6 Safety glass</li> <li>1.7 Ear plug</li> <li>1.8 Gas cartridge</li> <li>1.9 Breathing apparatus</li> </ul>
2. Emergency break down	<ul style="list-style-type: none"> <li>2.1 Steam pipe main line leakage (within boiler room)</li> <li>2.2 Blowdown valve leakage</li> <li>2.3 Shortage of feed water</li> <li>2.4 Feedwater delivery pipe line leakage</li> <li>2.5 Fire drum is damaged</li> <li>2.6 Safety valve problem</li> <li>2.7 Boiler body/ tube leakage</li> </ul>
3. Check list.	<ul style="list-style-type: none"> <li>3.1 Power supply of panel board</li> <li>3.2 Softener plant</li> <li>3.3 Gas line valve</li> <li>3.4 Dosing pump</li> <li>3.5 Feed pump suction/ delivery valve</li> <li>3.6 Feed water tank steam valve</li> <li>3.7 Main steam valve</li> <li>3.8 Softener valve</li> <li>3.9 Oil reserve tank valve</li> <li>3.10 Oil reserve tank heater</li> <li>3.11 Oil service tank heater</li> <li>3.12 LPG supply valve</li> <li>3.13 Circulation fuel pump</li> <li>3.14 Blowdown valve</li> </ul>
<p><b>Evidence Guide</b></p> <p>The evidence must be authentic, valid, sufficient, reliable, consistent, recent and meet all requirements of current version of the Unit of Competency.</p>	

1. Critical aspect of competency	<p>Assessment required evidences that the candidate:</p> <p>1.1 demonstrated stop operation of boiler;  1.2 taken further action for stopping oil fired and gas fired boiler;  1.3 responded to the emergency situation;  1.4 shut down for maintenance.</p>
2. Underpinning knowledge	<p>2.1 Stopping operation activities of boiler.  2.2 Further activities to be taken after stopping boiler  2.3 Response of emergency situation  2.4 Safety precaution.  2.5 Check list for shut down.</p>
3. Underpinning skills	<p>3.1 Performing gauge glass and water control checking.  3.2 Shutting down softener plant  3.3 Turning off panel board circuit breaker.  3.4 Stopping oil reserve tank valve  3.5 Turning off LP solenoid valve.  3.6 Opening air vent valve.  3.7 Cooling down boiler slowly by refilling water.  3.8 Rechecking components and parts</p>
4. Required attitudes	<p>4.1 Commitment to occupational safety and health.  4.2 Promptness in carrying out activities.  4.3 Sincere and honest to duties.  4.4 Eagerness to learn.  4.5 Tidiness and timeliness.  4.6 Environmental concerns.  4.7 Respect for rights of peers and seniors at workplace.  4.8 Communicate with peers and seniors at workplace.</p>
5. Resource implication	<p>The following resources must be available:</p> <p>5.1 Workplace (actual or simulated)  5.2 Tools, equipment and physical facilities appropriate to perform activities.  5.3 Relevant drawings, manuals, codes, standards and reference materials.</p>
6. Methods of assessment	<p>Methods of assessment may include but not limited to:</p> <p>6.1 written test  6.2 demonstration  6.3 oral questioning  6.4 portfolio</p>
7. Context of assessment	<p>7.1 Competency assessment must be done in NSDA accredited assessment centre  7.2 Assessment should be done by a NSDA certified/nominated assessor</p>

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## Development of Competency Standard

The Competency Standards for National Skills Certificate in Boiler Operation and Maintenance, Level-2 is developed by NSDA with assistance of GIZ on 05-06 and 11-13 February 2025.

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