



**NATIONAL COMPETENCY STANDARDS
FOR
BOILER OPERATOR
(NC2)**

**Department of Occupational Standards
Ministry of Labour and Human Resources
Thimphu Bhutan
(January 2018)**



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FOREWORD

The Department of Occupational Standards of the Ministry of Labour and Human Resources is pleased to present National Competency Standards (NCSs) for Boiler Operator. The standards represent the fruits of hard work and invaluable experiences gained by the department since its establishment in the latter half of 2003. The main aim of developing NCS is to set up a well-defined nationally recognized Vocational Qualifications System that will help set a benchmark for the Technical Vocational Education and Training (TVET) System in our country aligned to international best practices.

NCS is one of the base pillars in the Bhutan Vocational Qualifications Framework (BVQF) and is the first step in its implementation. The NCS are developed and revised to ensure that employees or vocational graduates possess and acquire the desired competencies required by industries and employers. In order to ensure this close match in supply and demand of competencies, NCS have been developed and revised in close consultation and partnership with industry experts and validated by the Technical Advisory Committees of the concerned economic sectors.

A vocational education and training system based on NCS shall ensure that delivered training is of a high quality and relevant to the needs of the labour market. As a result, future TVET graduates will be better equipped to meet the need and expectations of industries and employers. This positive impact on the employability of TVET graduates will enhance the reputation of vocational education and training and make it attractive to school leavers.

I gratefully acknowledge collaboration and the valuable contributions made by experts from industries during the consultation and validation processes of the standards. I look forward for continued engagement and participation of the industry and employers in the development of a quality assured demand driven TVET system and to build competent and productive national workforce that will contribute to the continued socio-economic progress of our country.

Director
Department of Occupational Standards
Ministry of Labour and Human Resource

Acknowledgement

NATIONAL COMPETENCY STANDARDS FOR BOILER OPERATOR

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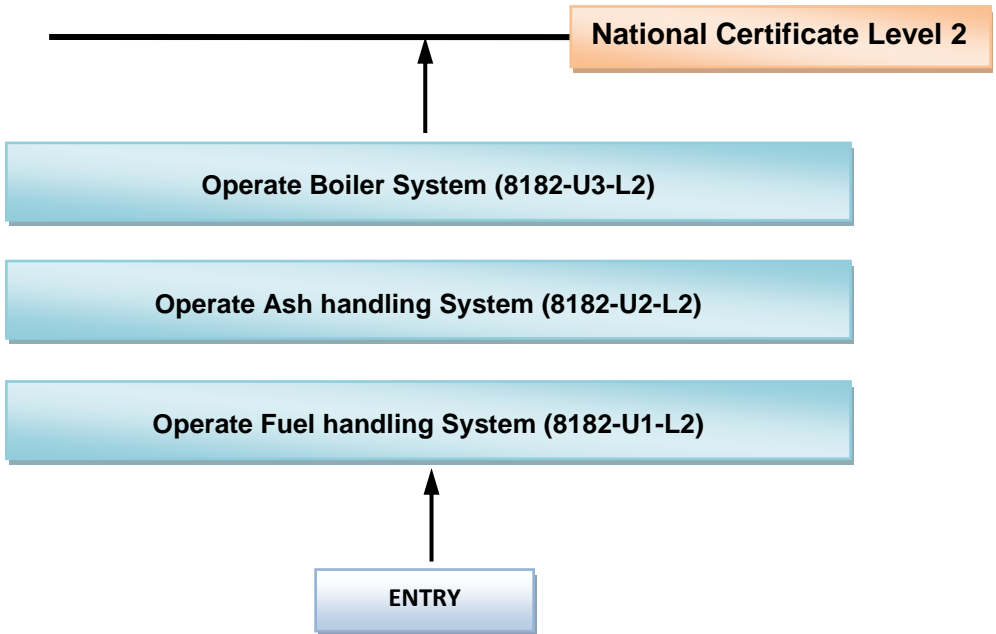
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Packaging of Qualifications for Boiler Operator

The National Competency Standards for the Boiler Operator comprises of three units of competencies which are clustered into following levels of qualifications.



Overview of the National Competency Standards

UNIT TITLE	ELEMENTS OF COMPETENCE
1. Operate fuel handling system	1. Operate feed section 2. Operate crushing unit
2. Operate Ash handling system	1. Operate Cyclone Max system 2. Operate bag filter System
3. Operate boiler system	1. Perform boiler lit up 2. Operate shell system

UNIT TITLE: Operate fuel handling System

DESCRIPTOR : This unit covers the competencies required to operate feed section and crushing unit following standard operating procedures.

CODE : 8182-U1-L2

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Operate feed section	1.1 Select and use PPE (Personal Protective Equipment) as per the job requirement following standard procedures. 1.2 Select and use required tools and equipment following standard procedures. 1.3 Operate sliding system as per the standard procedures 1.4 Monitor coal silo / fuel level as per the standard procedures.
2. Operate Crushing unit	2.1 Operate sliding gate as per the standard procedures. 2.2 Monitor screen vibrator as per the standard procedures 2.3 Monitor product bucket elevator as per the standard procedures 2.4 Monitor coal bunker as per the standard procedures 2.5 Monitor crusher unit as per the standard procedures.

RANGE STATEMENT	
Tools and equipment may include but not limited to:	
<ul style="list-style-type: none"> • Hammer • Adjustable wrench 	<ul style="list-style-type: none"> • Hand tool set • Pipe wrench
Performance of this unit is expected to be carried out to the following standards	
<ul style="list-style-type: none"> • Occupational Health and Safety regulations 	<ul style="list-style-type: none"> • Manufacturer's specifications and Manuals
Critical Aspects:	
<ul style="list-style-type: none"> • Follow occupational health and safety procedures. • Monitor screen vibrator as per the standard procedures 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and safety regulations • Basic first aid • Types and quality of coal • Types of boiler fuels • Coal handling system 	<ul style="list-style-type: none"> • Team work • Communication skills • Problem solving • Negotiation • Time management

UNIT TITLE: Operate Ash handling system

DESCRIPTOR : This unit covers the competencies required to operate cyclone max system and operate bag filter system. This unit is applicable to boilers, where the fuel used are coal and wood.

CODE : 8182-U2-L2

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Operate Cyclone Max system	1.1 Select and use PPE (Personal Protective Equipment) as per the job requirement following standard procedure 1.2 Select and use required tools and equipment following standard procedures. 1.3 Operate gate valve as per the standard procedures 1.4 Monitor pressure seal as per the standard procedures 1.5 Monitor air pressure to the required level as per the standard procedures 1.6 Monitor vessel pressure as per the standard procedures 1.7 Monitor pipelines as per the standard procedures

<p>2. Operate bag filter system</p>	<p>2.1 Maintain air header as per the standard procedures</p> <p>2.2 Operate dampers as per the job requirement following standard procedures</p> <p>2.3 Monitor air pressure to the required level as per the standard procedures</p> <p>2.4 Monitor inlet temperature as per the standard procedures</p> <p>2.5 Monitor mano meter water column (MMWC) as per job requirement following standard procedures.</p>
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<p>RANGE STATEMENT</p>	
<p>Performance of this unit is expected to be carried out to the following standards</p>	
<ul style="list-style-type: none"> • Occupational Health and Safety regulations 	<ul style="list-style-type: none"> • Manufacturer's specifications
<p>Critical Aspects:</p>	
<ul style="list-style-type: none"> • Follow occupational health and safety procedures. • Monitor air pressure to the required level as per the standard procedures 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none">• Ethics and Integrity• Occupational Health and safety regulations• Basic first aid• Pollution control• Ash handling system	<ul style="list-style-type: none">• Team work• Communication skills• Problem solving• Negotiation• Time management

UNIT TITLE: Operate boiler system

DESCRIPTOR : This unit covers the competencies required to perform boiler lit up and operate shell system following standard operating procedures.

CODE : 8182-U3-L2

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Perform boiler lit up	1.1 Select and use PPE(Personal Protective Equipment) as per the job requirement following standard procedure 1.2 Select and use required tools and equipment following standard procedures. 1.3 Operate compressor as per the standard procedures 1.4 Operate PLC as per the job requirement following standard procedures 1.5 Monitor boiler water level as per the standard procedures 1.6 Operate air vent as per the standard procedures 1.7 Operate drain valve as per the standard procedures 1.8 Prepare bed materials as per the standard procedures 1.9 Monitor coal feeder as per the temperature and pressure requirement following standard procedures 1.10 Operate coal feeder as per the job

	<p>requirement following standard procedures</p> <p>1.11 Operate dampers (inlet and outlet) as per the job requirement following standard procedures.</p> <p>1.12 Operate fans as per the standard procedures</p>
2. Operate shell system	<p>2.1 Perform water treatment as per the job requirement following standard procedures</p> <p>2.2 Maintain water level as per standard procedures</p> <p>2.3 Maintain steam pressure as per the standard procedures</p> <p>2.4 Release steam as per the standard procedures</p> <p>2.5 Monitor safety valves as per the standard procedures</p>

RANGE STATEMENT	
Fans may include but not limited to:	
<ul style="list-style-type: none"> • Induced draught fan • Forced draught fan 	<ul style="list-style-type: none"> • Booster fan
Performance of this unit is expected to be carried out to the following standards	
<ul style="list-style-type: none"> • Occupational Health and Safety regulations 	<ul style="list-style-type: none"> • Manufacturer's specifications

Critical Aspects:

- Follow occupational health and safety procedures.
- Maintain water level as per standard procedures
- Maintain steam pressure as per the standard procedures
- Monitor safety valves as per the standard procedures
- Perform water treatment as per the job requirement following standard procedures

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none">• Ethics and Integrity• Occupational Health and safety regulations• Basic first aid• Mechanical safety• Instrument safety• Specifications• Boiler troubleshooting procedures• PLC• Working principle of boiler operations• Types of boiler• Boiler capacity testing by hydraulic test	<ul style="list-style-type: none">• Team work• Communication skills• Problem solving• Negotiation• Time management

Annexure

1.1 National Competency Standards (NCS)

The National Competency Standards specify the skill, knowledge and attitudes applied to a particular occupation. Standards also specify the standards or criteria of performance of a competent worker and the various contexts in which work may take place. Standards provide explicit advice to assessors regarding the skill and knowledge to be demonstrated by candidates seeking formal recognition either following training or through work experience.

1.2 Purpose of National Competency Standards

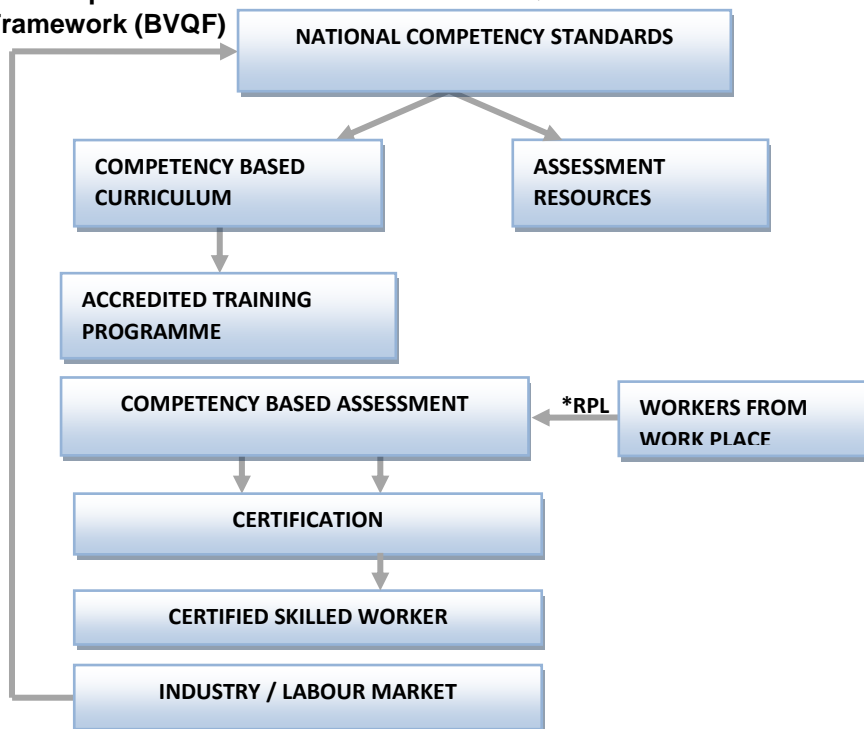
National Competency Standards serve a number of purposes including:

- Providing advice to curriculum developers about the competencies to be included in curriculum.
- Providing specifications to assessment resource developers about the competencies within an occupation to be demonstrated by candidates.
- Providing advice to industry/employers about job functions, which in turn can be used for the development of job descriptions, performance appraisal systems and work flow analysis.

1.3 Bhutan Vocational Qualifications Framework (BVQF)

Bhutan Vocational Qualifications Framework is an agreed system of Assessing, Certifying and Monitoring nationally recognized qualifications for all learning in the TVET sector against national competency standards, in training institutions, in the workplace, in schools or anywhere where learning takes place.

1.4 Components of the Bhutan Vocational Qualifications Framework (BVQF)



* RPL = Recognition of Prior Learning

1.5 BVQF Levels

The Bhutan Vocational Qualifications Framework has three levels classified based on the competency of the skilled workers. The three levels are:

- National Certificate Level 3 (NC III)
- National Certificate Level 2 (NC II)
- National Certificate Level 1 (NC I)

BVQF Level Descriptors

The qualification levels are decided based on level descriptors. The detail of the qualification level descriptor is as follows:

National Certificate Level 1

Carry out processes that:	Learning demand:	Responsibilities which are applied:
<ul style="list-style-type: none">• Are narrow in range.• Are established and familiar.• Offer a clear choice of routine responses.• Involve some prioritizing of tasks from known solutions.	<ul style="list-style-type: none">• Basic operational knowledge and skill.• Utilization of basic available information.• Known solutions to familiar problems.• Little generation of new ideas.	<ul style="list-style-type: none">• In directed activity.• Under general supervision and quality control.• With some responsibility for quantity and quality.• With no responsibility for guiding others.

National Certificate Level 2

Carry out processes that:	Learning demand:	Responsibilities which are applied:
<ul style="list-style-type: none"> • Require a range of well-developed skills. • Offer a significant choice of procedures requiring prioritization. • Are employed within a range of familiar context. 	<ul style="list-style-type: none"> • Some relevant theoretical knowledge. • Interpretation of available information. • Discretion and judgments. • A range of known responses to familiar problems 	<ul style="list-style-type: none"> • In directed activity with some autonomy. • Under general supervision and quality checking. • With significant responsibility for the quantity and quality of output. • With some possible responsibility for the output of others.

National Certificate Level 3

Carry out processes that:	Learning demand:	Responsibilities which are applied:
<ul style="list-style-type: none"> • Requires a wide range of technical or scholastic skills. • Offer a considerable choice of 	<ul style="list-style-type: none"> • A broad knowledge base which incorporates some theoretical concepts. • Analytical 	<ul style="list-style-type: none"> • In self-directed activity. • Under broad guidance and evaluation. • With complete responsibility for quantity and

<p>procedures requiring prioritization to achieve optimum outcomes.</p> <ul style="list-style-type: none"> • Are employed in a variety of familiar and unfamiliar contexts. 	<p>interpretation of information.</p> <ul style="list-style-type: none"> • Informed judgment. • A range of sometimes innovative responses to concrete but often unfamiliar problems. 	<p>quality of output.</p> <ul style="list-style-type: none"> • With possible responsibility for the output of others.
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1.6 PURPOSE

This qualification is designed for people interested in a career as a Boiler Operator at the Certificate level. It comprises of three units that cover the essential knowledge and skills required for people working as a Boiler Operator.

It provides industry specific skills and demands a level of performance that will enable new recruits to the industry to be immediately productive.

1.7 CODING USED FOR NATIONAL COMPETENCY STANDARDS

The coding and classification system developed in Bhutan is logical, easy to use, and also aligned with international best practises. The Bhutanese coding and classification system is based on the International Standard Classification of Occupations, 2008 (ISCO-08) developed by the International Labour Organisation (ILO).

The coding of the National competency standards forms the basis of the identification code for the Vocational Education and Training Management Information System (VET – MIS)

both in terms of economic sector identification and that of the individual standard.

Coding the individual national competency standards

Coding the individual skills standard has a multiple purpose:

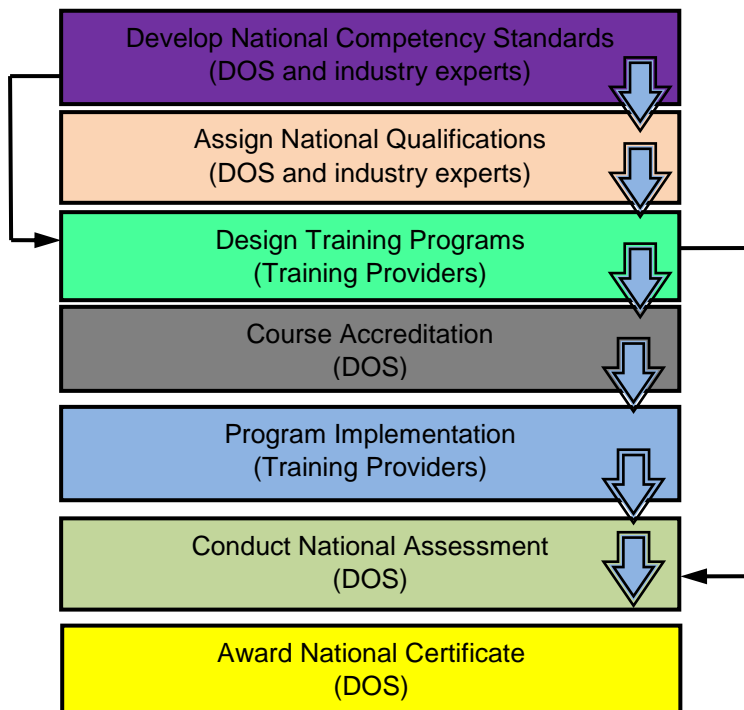
- to identify the level,
- to identify to which module the standard belongs,
- to identify in which order the standard is clustered within that module.

A job can include a number of competencies described in the national competency standards.

However, in order to follow a logical order, only national competency standards related to each other and following a logical sequence in terms of training delivery, from the simple to the complex, are clustered into a module. Some standards are so complex that they need to stand alone.

To illustrate with an example, the ILO assigns the code 8182 to the occupation of Boiler Operators and related trades. Therefore, in the Bhutan's context, the occupation Boiler Operator has been assigned the code 8182 in the National Coding System. The first unit is assigned the code U1. Levels are assigned the code L and follow a logical progression from the National Certificate Level 1 (NC I) to the National Certificate Level 3 (NC III). Therefore the National Certificate Level 1 is assigned the code L1.

Implementation and operational procedures for National Competency Standards (NCS)



MoLHR – Ministry of Labour and Human Resources
DOS – Department of Occupational Standards

1.8 ASSESSMENT GUIDE

Form of assessments

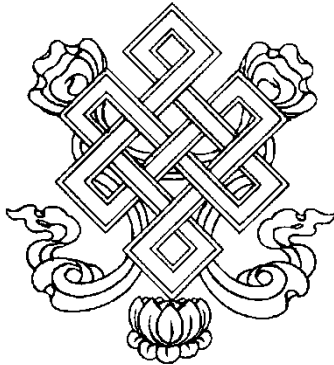
- Continuous assessment together with collected evidence of performance will be used.
- Evidence of the performance shall be based on practical demonstration.
- Knowledge can be assessed through diagrams, in writing or orally (viva-voce).

Assessment context

- Competency may be assessed in the actual work place or in a simulated workplace setting.

Assessment condition

- The candidate shall have access to all required tools, equipments, materials and documents.
- Candidate must complete the assessment in industry accepted time frame.



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