



**NATIONAL COMPETENCY STANDARDS  
FOR  
LAB TECHNICIAN  
(Cement Plant)  
(NC2)**

**Department of Occupational Standards  
Ministry of Labour and Human Resources  
Thimphu Bhutan  
(2016)**



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## FOREWORD

The Department of Occupational Standards of the Ministry of Labour and Human Resources is pleased to present the National Competency Standards (NCSs) for Lab Technician. 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 Resources

## **Acknowledgement**

**Validation date** : 10/02/2017

**Endorsement date:** 10/02/2017

**Date of review:** 10/02/2020 (Max. 3 years)

The National Competency Standard (NCS) for Lab Technician has been developed with the involvement of Lab technicians (Subject experts) from the Dungsam Cement Corporation Limited (DCCL) and we remain deeply indebted for their hard work and contributions.

The content of the National Competency Standards has also been validated by the management of Dungsam Cement Corporation Limited:

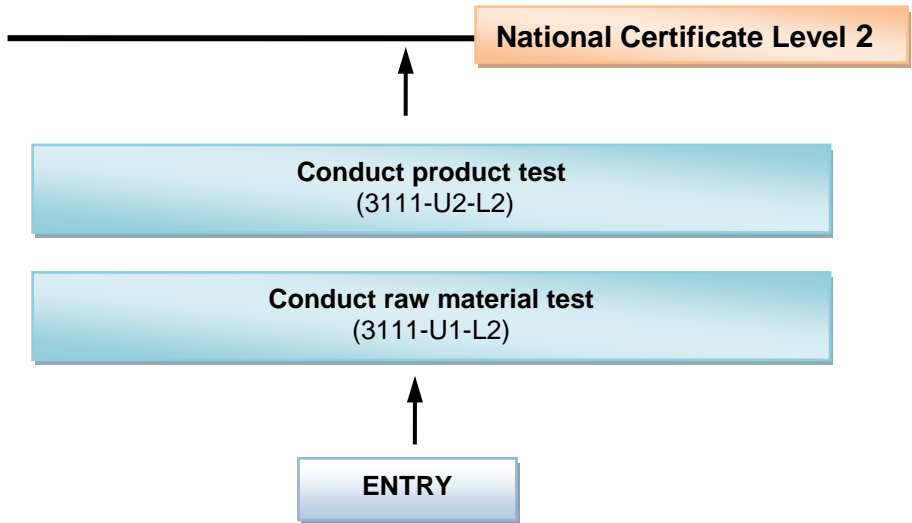
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## Packaging of Qualifications for Lab Technician

The National Competency Standards for Lab Technician comprises of two units which are clustered into following levels of qualifications.



## Overview of Unit Competencies

UNIT TITLE	ELEMENTS OF COMPETENCE
Conduct raw material test	<ol style="list-style-type: none"><li>1. Prepare for test</li><li>2. Conduct chemical test</li></ol>
Conduct product test	<ol style="list-style-type: none"><li>1. Prepare for test</li><li>2. Conduct chemical test</li></ol>



**UNIT TITLE :** Conduct raw material test

**DESCRIPTOR:** This unit covers the competencies required to prepare for raw material testing and conducting a chemical test on the raw materials.

**CODE:** 3111-U1-L2

<b>ELEMENTS OF COMPETENCE</b>	<b>PERFORMANCE CRITERIA</b>
1. Prepare for testing	1.1 Select and use <b>PPE</b> as per the job requirement following standard procedures. 1.2 Select and use <b>materials</b> as per the job requirement following standard procedures. 1.3 Select and use <b>tools and equipment</b> as per the requirement following standard procedures. 1.4 Collect the samples as per the job requirement following standard procedures. 1.5 Prepare the sample as per the job requirement following standard procedures.
2. Conduct chemical test	2.1 Conduct rapid analysis of raw materials as per the job requirement following standard procedures. 2.2 Conduct full analysis of raw materials as per the job requirement following standard procedure. 2.3 Analyse the test results and take necessary action as per the job requirement following standard procedure. 2.4 Record the test result following standard

	procedures.
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### RANGE STATEMENT

**Personal protective equipment (PPE) may include but not limited to:**

- Hand gloves
- Goggles
- Helmet
- Lab coat
- Mask
- Reflective jacket
- Safety shoes

**Materials may include but not limited to:**

- Sample
- Sample plastic
- Sample tray
- Diesel
- Singer oil
- Acids
- Gauging towel
- Grease
- Cloth piece

**Tools and equipment may include but not limited to:**

- Oven
- Moisture analyser
- Crusher
- Sieve
- Analytical balance
- Furnace

**Performance of this unit is expected to be carried out to the following standards:**

- |   |  |
|---|--|
| <ul style="list-style-type: none"><li>• Occupation Health and safety(OHS) regulations</li></ul> | <ul style="list-style-type: none"><li>• Any other relevant rules and regulations</li></ul> |
|---|--|

### **Critical Aspect**

Demonstrate compliance with safety regulations applicable to work operations at all times.

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none"> <li>• Basic First aid</li> <li>• Basic chemical properties of substances</li> <li>• Basic mathematic</li> <li>• Basic computer knowledge</li> <li>• Disposal method</li> <li>• Basic Calibration of equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Interpretation of result</li> <li>• Team work</li> <li>• Communication skills</li> <li>• Work planning</li> <li>• Creativity</li> </ul>

**UNIT TITLE:** Conduct product test

**DESCRIPTOR:** This unit covers the competencies required to prepare for product testing and conduct chemical test on the product.

**CODE:** 3111-U2-L2

<b>ELEMENTS OF COMPETENCE</b>	<b>PERFORMANCE CRITERIA</b>
1. Prepare for test	1.1 Select and use <b>PPE</b> as per the job requirement following standard procedures. 1.2 Select and use <b>materials</b> as per the job requirement following standard procedures. 1.3 Select and use <b>tools and equipment</b> as per the requirement following standard procedures. 1.4 Collect the product samples as per the job requirement following standard procedure. 1.5 Prepare the product sample as per the job requirement following standard procedure.
2. Conduct chemical test	2.1 Conduct rapid analysis of product materials as per the job requirement following standard procedures. 2.2 Conduct full analysis of product materials as per the job requirement following standard procedure. 2.3 Conduct in-process analysis as per the job requirement following standard procedures 2.4 Analyse the test results and take

	necessary action as per the job requirement following standard procedure.
2.5	Record the test result following standard procedures.

**RANGE STATEMENT**

**Personal protective equipment (PPE) may include but not limited to:**

- Hand gloves
- Goggles
- Helmet
- Mask
- Safety shoes
- Lab coat
- Reflective jacket

**Materials may include but not limited to:**

- Product sample
- Sample plastic
- Sample tray
- Gauging towel
- Grease
- Diesel
- Singer oil
- Cloth piece

**Tools and equipment may include but not limited to:**

- Oven
- Crusher
- Sieve
- Lab ball
- Analytical balance
- Vivat apparatus

**Testing materials may include but not limited to:**

- Setting mounds
- Mixing with snore sand

**Cube strength may include but not limited to:**

- Load bearing capacity

**Performance of this unit is expected to be carried out to the following standards:**

<ul style="list-style-type: none"> <li>• Occupation Health and safety(OHS) regulations</li> </ul>	<ul style="list-style-type: none"> <li>• Any other relevant rules and regulations</li> </ul>
---	--

<b>Critical Aspect</b>	
<ul style="list-style-type: none"> <li>• Demonstrate compliance with safety regulations applicable to work operations at all times.</li> <li>• Collect the product sample and analyzing the test results as per the job requirement following standard procedures.</li> </ul>	

<b>Underpinning Knowledge</b>	<b>Underpinning Skills</b>
<ul style="list-style-type: none"> <li>• Basic First aid</li> <li>• Basic chemical properties of substances</li> <li>• Basic mathematic</li> <li>• Basic computer knowledge</li> <li>• Disposal method</li> <li>• Basic calibration of equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Interpretation of result</li> <li>• Team work</li> <li>• Communication skills</li> <li>• Work planning</li> <li>• Creativity</li> </ul>

## **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**

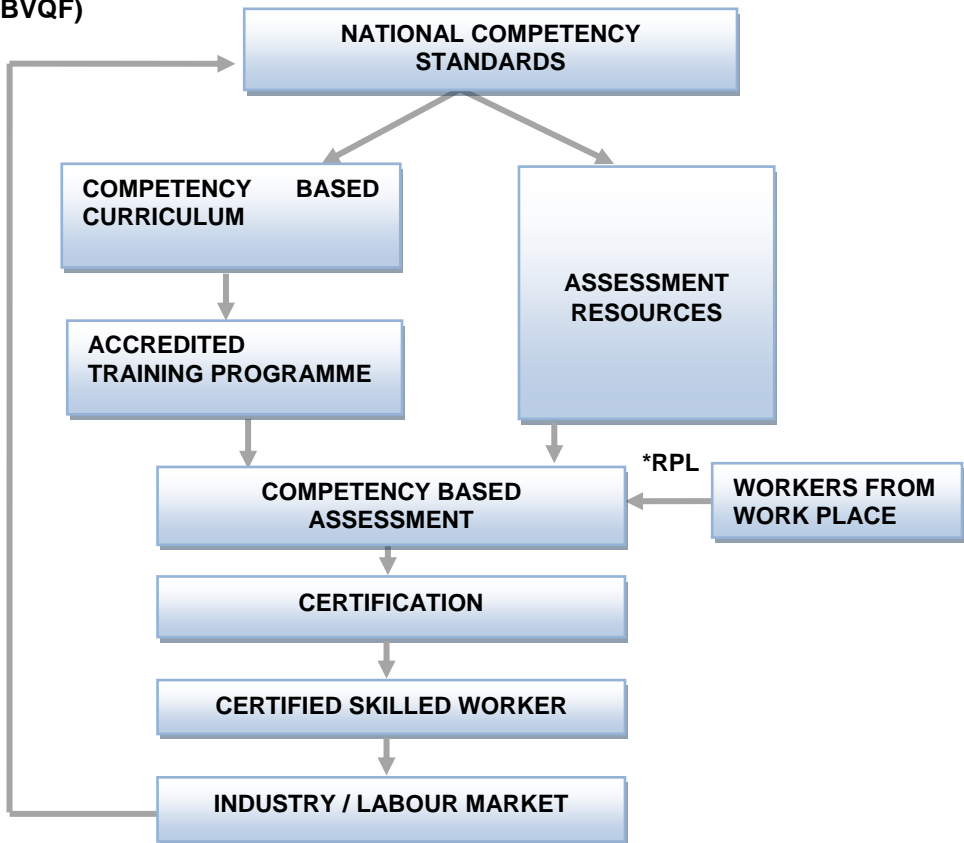
National Competency Standards serve a number of purposes including:

- 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.

#### Components of the Bhutan Vocational Qualifications Framework (BVQF)





**\* RPL = Recognition of Prior Learning**

**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)

**1.4 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 (Semi Skilled)**

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

## National Certificate Level 2 (Craftsman)

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

## National Certificate Level 3 (Master craftsman)

Carry out processes that:	Learning demand:	Responsibilities which are applied:
<ul style="list-style-type: none"> <li>• Requires a wide range of technical or scholastic skills.</li> <li>• Offer a considerable choice of procedures requiring prioritization to achieve optimum outcomes.</li> <li>• Are employed in a variety of familiar and unfamiliar contexts.</li> </ul>	<ul style="list-style-type: none"> <li>• A broad knowledge base which incorporates some theoretical concepts.</li> <li>• Analytical interpretation of information.</li> <li>• Informed judgment.</li> <li>• A range of sometimes innovative responses to concrete but often unfamiliar problems.</li> </ul>	<ul style="list-style-type: none"> <li>• In self-directed activity.</li> <li>• Under broad guidance and evaluation.</li> <li>• With complete responsibility for quantity and quality of output.</li> <li>• With possible responsibility for the output of others.</li> </ul>

## **1.5 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:

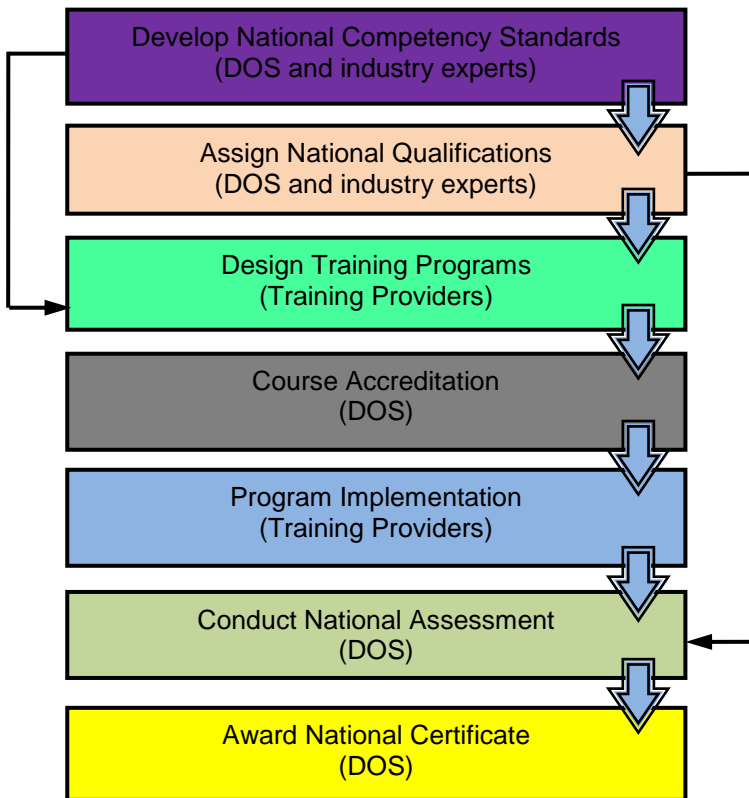
- to identify the level,
- to identify to which module the standard belongs,
- to identify in which order the standard is clustered within that module.

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 3111 to the chemical and lab related occupations. Therefore, in Bhutan's context, the occupation lab technician has been assigned the code 3111 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 first unit of level one is written as 3111-U1-L2.

# Implementation and operational procedures for National Competency Standards (NCS)



**Key:**

MoLHR – Ministry of Labour and Human Resources

DOS – Department of Occupational Standards

## **1.6 ASSESSMENT GUIDE**

### **Form of assessments**

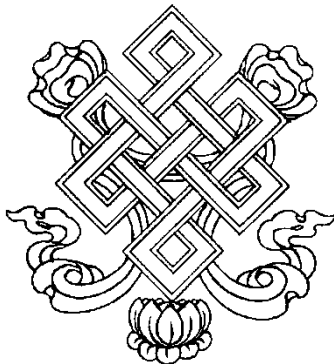
- Continuous assessment together with collected evidence of performance will be used.
- Evidence of the performance shall be based on practical demonstration.
- Knowledge can be assessed through diagrams, in writing or orally (viva-voce).

### **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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