



**NATIONAL COMPETENCY STANDARDS
FOR
CONTROL ROOM OPERATOR
(CEMENT PLANT)
(NC2)**

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



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First Publication 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 Control Room Operator (cement plant). 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 : 09/02/2017

Endorsement date: 09/02/2017

Date of review: 09/02/2020 (Max. 3 years)

The National Competency Standard (NCS) for Control Room Operator has been developed with the involvement of control room operators (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:

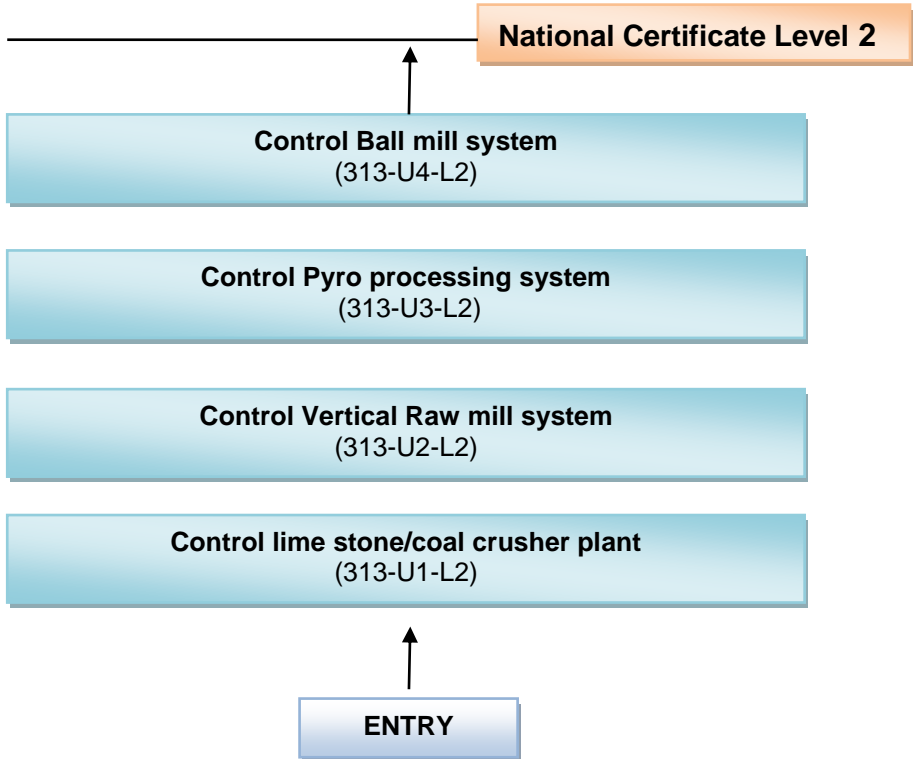
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Packaging of Qualifications for Control Room Operator (Cement Plant)

The National Competency Standards for Control Room Operator comprises of four units which are clustered into following levels of qualifications.



Overview of Unit Competencies

UNIT TITLE	ELEMENTS OF COMPETENCE
Control lime stone /coal crusher plant	<ol style="list-style-type: none"> 1. Control hopper 2. Control conveyor system 3. Control stackers
Control Vertical raw mill system	<ol style="list-style-type: none"> 1. Control re-claimer 2. Control raw materials(RM) hopper 3. Control raw mill
Control pyro processing system	<ol style="list-style-type: none"> 1. Control pre-heater 2. Monitor kiln 3. Control cooler system 4. Control deepen conveyor
Control ball mill system	<ol style="list-style-type: none"> 1. Control cement mill hopper 2. Control cement mill

UNIT TITLE : Control lime stone/coal crusher plant

DESCRIPTOR: This unit covers the competencies required to control hopper, conveyor system and stackers.

CODE: 313-U1-L2

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Control hopper	1.1 Monitor the functioning of <i>hopper equipment</i> and take necessary action following standard procedures. 1.2 Control (level & capacity) of material fillings as per the specification following standard procedures. 1.3 Operate dust control equipment as per the job requirement following standard procedures.
2. Control conveyor system	2.1 Monitor the functioning of <i>conveyor equipment</i> and take necessary action following standard procedures. 2.2 Control conveyor load as per the specification following standard procedures. 2.3 Operate dust control equipment as per the job requirement following standard procedures. 2.4 Maintain records as per the job requirement following standard procedures.
3. Control stackers	3.1 Monitor the functioning of <i>stacker equipment</i> and take necessary action following standard procedures. 3.2 Control start/stop of the stackers as per the job requirement following standard procedures. 3.3 Control (load & speed) box feeder as per specification following standard procedures.

RANGE STATEMENT	
Hopper equipment may include but not limited to:	
<ul style="list-style-type: none"> • Sensors 	<ul style="list-style-type: none"> • Valves
Conveyor equipment may include but not limited to:	
<ul style="list-style-type: none"> • Detector • Separator • Sensors 	<ul style="list-style-type: none"> • Pull chord • Belt sway • Motor
Stackers equipment may include but not limited to:	
<ul style="list-style-type: none"> • Detector • Sensors • Pull chord 	<ul style="list-style-type: none"> • Belt sway • Motor
Performance of this unit is expected to be carried out to the following standards:	
<ul style="list-style-type: none"> • Occupation Health and safety(OHS) regulations 	<ul style="list-style-type: none"> • Any other relevant rules and regulations
Critical Aspect	
<ul style="list-style-type: none"> • Demonstrate compliance with safety regulations applicable to work operations at all times. • Monitor and control the parameters of box feeder and stackers as per the specification 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Basic First aid treatments • Function of equipment • Interpretation of signals, sign and symbols • Establishment procedures 	<ul style="list-style-type: none"> • Team work • Communication skills • Work planning • Interpretation skills • Negotiation • Problem solving • Alertness

UNIT TITLE: Control vertical raw mill system

DESCRIPTOR: This unit covers the competencies required to control re-claimer, raw material hopper and raw mill.

CODE: 313-U2-L2

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Control re-claimer	1.1 Monitor the functioning of re-claimer equipment and take necessary action following standard procedures. 1.2 Control start/stop of the re-claimer as per the job requirement following standard procedures.
2. Control raw material (RM) hopper	2.1 Monitor the functioning of raw material hopper equipment and take necessary action following standard procedures. 2.2 Control (level & capacity) of raw material fillings as per the specification following standard procedures. 2.3 Operate dust control equipment as per the job requirement following standard procedures.
3. Control raw mill	3.1 Monitor the functioning of raw mill equipment and take necessary action following standard procedures. 3.2 Enter material composition ratios as per the job requirement following standard procedures. 3.3 Run other system in sequence following standard procedures. 3.4 Run main drive following standard procedures. 3.5 Monitor/control feed rate and flow rate as per

	<p>the specification following standard procedures.</p> <p>3.6 Monitor/control the material output as per the specification following standard procedures.</p> <p>3.7 Monitor/control temperatures and pressure as per the specification following standard procedures.</p> <p>3.8 Monitor raw meal silo level as per the specification following standard procedures.</p>
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RANGE STATEMENT	
Re-claimer equipment may include but not limited to:	
<ul style="list-style-type: none"> • Sensors • Pull chord • Belt sway 	<ul style="list-style-type: none"> • Belt weight • Motor
Hopper equipment may include but not limited to:	
<ul style="list-style-type: none"> • Sensor 	<ul style="list-style-type: none"> • Load cell
Raw materials may include but not limited to:	
<ul style="list-style-type: none"> • Lime stone • Sweetener 	<ul style="list-style-type: none"> • Phylite • Iron ore
Mill equipment may include but not limited to:	
<ul style="list-style-type: none"> • Sensors • Motor 	<ul style="list-style-type: none"> • Detectors • Separators
Other system may include but not limited to:	
<ul style="list-style-type: none"> • Lubrication system • Hydraulic system • Raw Mill transportation system 	<ul style="list-style-type: none"> • Classifier group • External re-circulation • Raw Mill fan group
Performance of this unit is expected to be carried out to the following standards:	
<ul style="list-style-type: none"> • Occupation Health and 	<ul style="list-style-type: none"> •

safety(OHS) regulations •	
Critical Aspect	
<ul style="list-style-type: none"> • Demonstrate compliance with safety regulations applicable to work operations at all times. • Monitor vertical raw mill system equipment and filling parameters of material fillings. 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Basic First aid treatments • Function of equipment • Interpretation of signals, sign and symbols • Establishment procedures 	<ul style="list-style-type: none"> • Team work • Communication skills • Work planning • Creativity • Interpretation skills • Negotiation • Problem solving • Alertness

UNIT TITLE : **Control pyro processing system**

DESCRIPTOR : This unit covers the competencies required to control pre-heater, monitor kiln, control cooler system and control deepen conveyor.

CODE : **313-U3-L2**

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Control pre-heater	1.1 Monitor/control the functioning of pre-heater equipment and take necessary action following standard procedures. 1.2 Maintain pre-heater temperature and pressure as per the specification following standard procedures.
2. Control kiln	2.1 Monitor/control the functioning kiln equipment and take necessary action following standard procedures. 2.2 Maintain kiln shell temperature/radiation as per the specification following standard procedures. 2.3 Maintain kiln RPM as per the specification following standard procedures. 2.4 Maintain kiln inlet temperature, burning zone temperature and kiln thermal loading as per the specification following standard procedures.
3. Control cooler system	3.1 Monitor /control the functioning of cooler equipment and take necessary action following standard procedures. 3.2 Maintain cooler system temperature and pressure as per the specification following standard procedures.

RANGE STATEMENT	
Pre-heater equipment may include but not limited to:	
<ul style="list-style-type: none"> • Sensors 	<ul style="list-style-type: none"> • Transmitter
Kiln equipment may include but not limited to:	
<ul style="list-style-type: none"> • Sensors • Motors 	<ul style="list-style-type: none"> • Gear box • Bearings
Cooler equipment may include but not limited to:	
<ul style="list-style-type: none"> • Fan • Sensors • Motors 	<ul style="list-style-type: none"> • Gear box • Bearing • Transmitter
Performance of this unit is expected to be carried out to the following standards:	
<ul style="list-style-type: none"> • Occupation Health and safety(OHS) regulations 	<ul style="list-style-type: none"> •
Critical Aspect	
<ul style="list-style-type: none"> • Demonstrate compliance with safety regulations applicable to work operations at all times. • Monitor pyro processing system equipment and maintain system parameters. 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Basic First aid treatments • Function of pyro processing equipment • Interpretation of signals, sign and symbols • Establishment procedures • Basic knowledge on combustion 	<ul style="list-style-type: none"> • Team work • Communication skills • Work planning • Alertness • Interpretation skills • Negotiation • Problem solving

UNIT TITLE: Control ball mill system

DESCRIPTOR: This unit covers the competencies required to control cement mill hopper and cement mill.

CODE: 313-U4-L2

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Control cement mill system	1.1 Monitor the functioning of cement mill hopper equipment and take necessary action following standard procedures. 1.2 Control (level & capacity) of raw material fillings as per the specification following standard procedures. 1.3 Operate dust control equipment as per the job requirement following standard procedures.
2. Control cement mill	2.1 Monitor the functioning of cement mill equipment and take necessary action following standard procedures. 2.2 Enter material composition setting as per the job requirement following standard procedures. 2.3 Run other system if necessary in sequence following standard procedures. 2.4 Run main drive following standard procedures. 2.5 Monitor/control feed rate and flow rate as per the specification following standard procedures. 2.6 Monitor/control the material output as per the specification following standard procedures.

	<p>2.7 Monitor/control temperatures and pressures as per the specification following standard procedures.</p> <p>2.8 Monitor cement silo level as per the specification following standard procedures.</p>
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RANGE STATEMENT	
Hopper equipment may include but not limited to:	
<ul style="list-style-type: none"> <li style="width: 50%;">• Sensors <li style="width: 50%;">• Load cell 	
Control may include but not limited to:	
<ul style="list-style-type: none"> • Level and capacity 	
Raw materials may include but not limited to:	
<ul style="list-style-type: none"> <li style="width: 50%;">• Clincker <li style="width: 50%;">• Fly ash <li style="width: 50%;">• Gypsum <li style="width: 50%;">• Slag 	
Mill equipment may include but not limited to;	
<ul style="list-style-type: none"> <li style="width: 50%;">• Sensors <li style="width: 50%;">• Motor 	
Other system may include but not limited to:	
<ul style="list-style-type: none"> <li style="width: 50%;">• Lubrication system <li style="width: 50%;">• Re-circulation <li style="width: 50%;">• CM transportation system <li style="width: 50%;">• Mill cent fan group <li style="width: 50%;">• Separator group 	
Performance of this unit is expected to be carried out to the following standards:	
<ul style="list-style-type: none"> • Occupation Health and safety(OHS) regulations 	<ul style="list-style-type: none"> •
Critical Aspect	
<ul style="list-style-type: none"> • Demonstrate compliance with safety regulations applicable to work operations at all times. • Monitor the ball mill system equipment and to maintain the parameters 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Basic First aid treatments • Function of ball mill system equipment • Interpretation of signals, sign and symbols • Establishment procedures 	<ul style="list-style-type: none"> • Team work • Communication skills • Work planning • Creativity • Interpretation skills • Negotiation • Problem solving • Basic reading and writing • Alertness

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

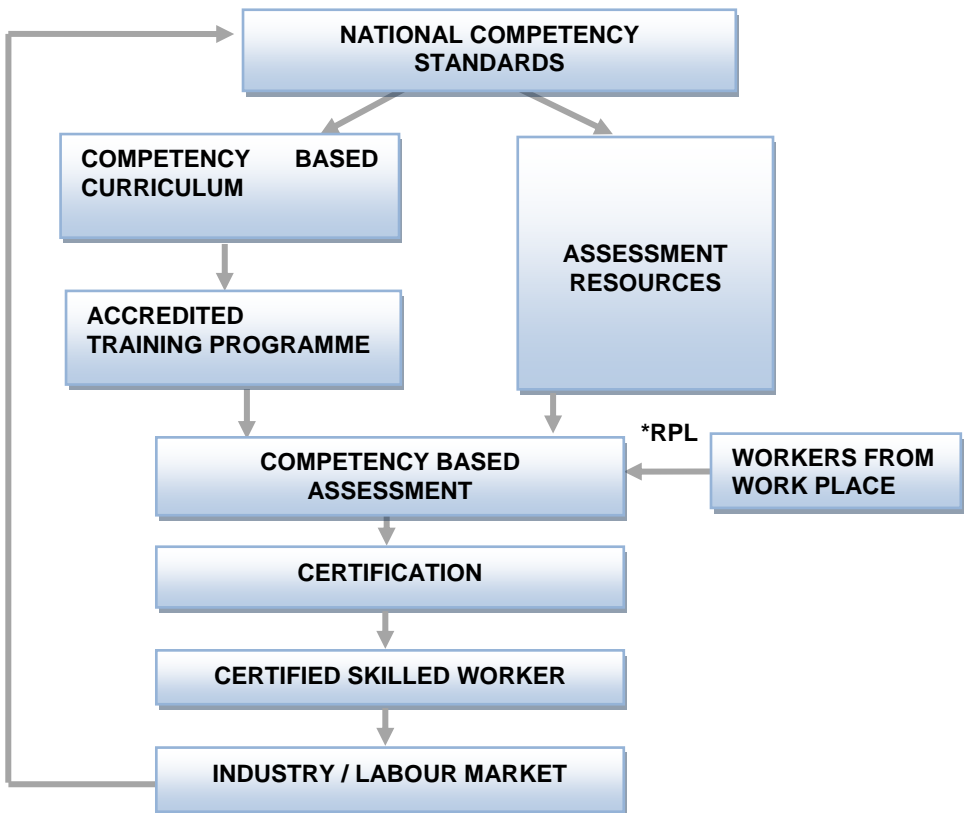
National Competency Standards serve a number of purposes including:

- 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)

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 (Craftsman)

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 (Master craftsman)

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 procedures requiring prioritization to achieve optimum outcomes. • Are employed in a variety of familiar and unfamiliar contexts. 	<ul style="list-style-type: none"> • A broad knowledge base which incorporates some theoretical concepts. • Analytical interpretation of information. • Informed judgment. • A range of sometimes innovative responses to concrete but often unfamiliar problems. 	<ul style="list-style-type: none"> • In self-directed activity. • Under broad guidance and evaluation. • With complete responsibility for quantity and quality of output. • With possible responsibility for the output of others.

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:

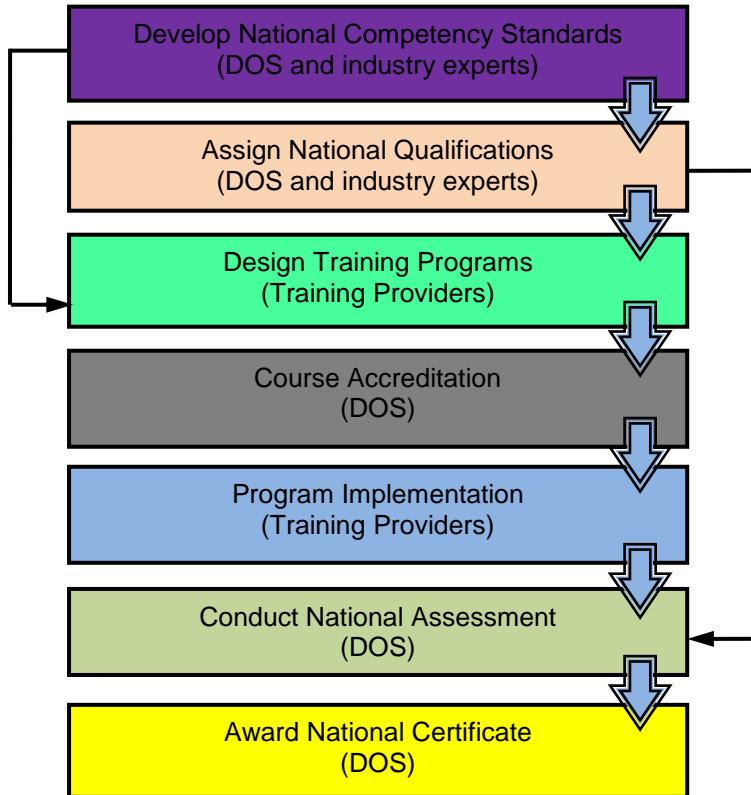
- to identify the level,
- to identify to which module the standard belongs,
- to identify in which order the standard is clustered within that module.

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 313 to the occupation process control technicians. Therefore, in Bhutan's context, the occupation control room operator (cement plant) has been assigned the code 313 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 313-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

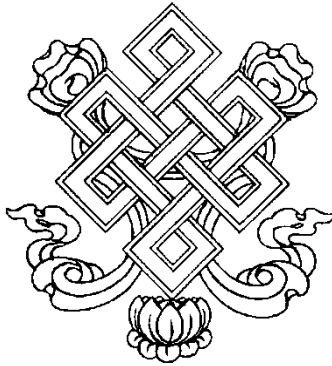
- Continuous assessment together with collected evidence of performance will be used.
- Evidence of the performance shall be based on practical demonstration.
- Knowledge can be assessed through diagrams, in writing or orally (viva-voce).

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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