



**NATIONAL COMPETENCY STANDARDS
FOR
EXCAVATOR OPERATOR
(CERTIFICATE 2)**

**TVET QUALITY COUNCIL
BHUTAN QUALIFICATIONS AND PROFESSIONALS
CERTIFICATION AUTHORITY
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FOREWORD

The TVET Quality Council, BQPCA is pleased to present the National Competency Standards (NCS) for Excavator Operator, BQF Certificate 2, which is developed in consultation with the field experts and trainers. The main objective of developing National Competency Standards is to set up a well-defined nationally recognized TVET Qualifications that will help in setting a benchmark for the TVET Qualifications in our country aligned to the international best practices.

The standards are developed to ensure that the TVET trainees possess the desired Skills, Knowledge and Attitude required by the industries. In order to ensure the relevancy of the competencies, the standards are developed in close consultation and partnership with industry experts and trainers from training institutes.

A training system based on National Competency Standards shall ensure that the training is relevant to the needs of the labour market. As a result, future TVET trainees will be better skilled to meet the needs and expectations of industries and employers. Such a positive impact on the employability of TVET graduates will enhance the reputation of the TVET system and make it attractive to the youths.

While acknowledging the existing level of cooperation and collaboration, the Council earnestly requests employers and training providers to extend the fullest support and cooperation in development and implementation of the National Competency Standards. The ultimate objective is to build a competent and productive national workforce that will contribute to the socio-economic development of our country. We gratefully acknowledge the valuable contributions made by experts from industries and trainers during the consultation and validation processes of the NCS development. We further look forward to improved industry engagement and active participation of trainers in the development of a quality-assured demand driven TVET system.

**Director
BQPCA**

ACKNOWLEDGEMENT

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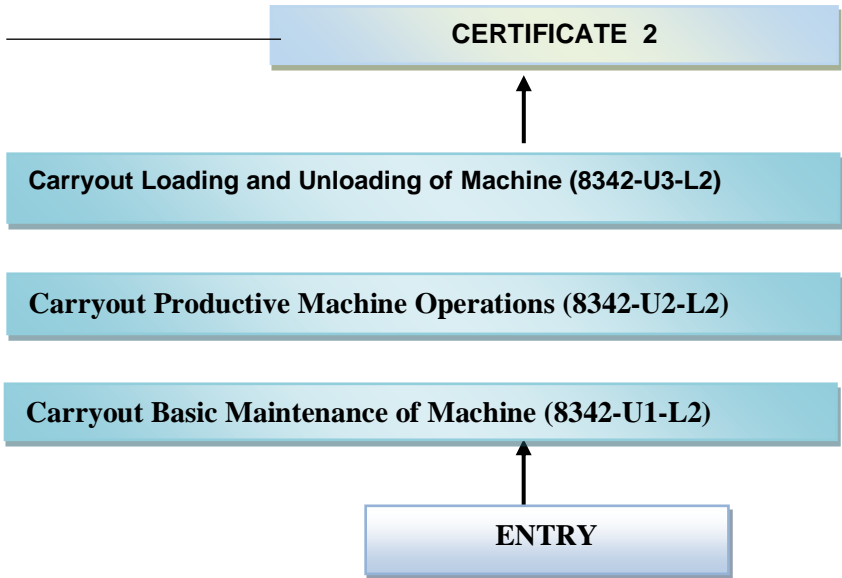
Subject Experts Involved During the Revision of NCS for Excavator Operator

SN	Name	Designation	Working Agency
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4	Chencho Dorji	Excavator Operator	Freelancer
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6	Ugyen Penjor	Excavator Operator	Lhawang Yugel Company
7	Yeshi Wangdi	Excavator Operator	Gangri Construction
8	Om Raj Gurung	Excavator Operator	Freelance
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PACKAGING OF QUALIFICATIONS



Unit Title	Element of Competence
1. Carryout Basic Maintenance of Machine	1.1 Prepare for Maintenance Work 1.2 Perform Periodic Maintenance 1.3 Perform Minor Maintenance
2. Carryout Productive Machine Operations	2.1 Perform pre-operation Checks 2.2 Perform Machine Operation Checks 2.3 Perform Productive Machine Operation 2.4 Perform Post-operation Procedures
3. Carryout Loading and Unloading of Machine	3.1 Prepare for Loading and Unloading 3.2 Perform Loading of Machine 3.3 Perform Unloading of Machine

UNIT TITLE	Carryout Basic Maintenance of Machine
DESCRIPTOR	This unit covers the competencies required to carry out basic maintenance of machines as per the job requirement following standard procedures
CODE	8342-U1-L2
CREDIT	3
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Prepare for Basic Maintenance Work	<p>1.1 Identify tools and equipment as per the job requirement following standard procedures</p> <p>1.2 Identify maintenance work to be carried out following standard procedures</p> <p>1.3 Check the condition of Personal Protective Equipment (PPE) following standard procedures</p> <p>1.4 Identify materials as per the job requirement following standard procedures</p>
2. Perform Periodic Maintenance	<p>2.1 Use PPEs as per the job requirement following standard procedures</p> <p>2.2 Change engine oil following standard procedures</p> <p>2.3 Change gear oil for machine components following standard procedures</p>

	<p>2.4 Change hydraulic oil following standard procedures</p> <p>2.5 Change the coolant following standard procedures</p> <p>2.6 Change fuel filter following standard procedures</p> <p>2.7 Change/service air filter following standard procedures</p> <p>2.8 Maintain record of periodic maintenance following standard procedures</p>
<p>3. Perform Minor Maintenance</p>	<p>3.1 Grease the machine parts as per the job requirement following standard procedures</p> <p>3.2 Tight the nuts and bolts as per the job requirement following standard procedures</p> <p>3.3 Change the hydraulic hoses as per the job requirement following standard procedures</p> <p>3.4 Perform basic electrical maintenance works as per the job requirement</p> <p>3.5 Perform basic maintenance of undercarriage works as per the job requirement following standard procedures</p> <p>3.6 Change excavator attachments as per the job requirement following standard procedures</p>

RANGE STATEMENT	
Tools and equipment may include but not limited to:	
<ul style="list-style-type: none"> • Ring Spanner Set • DE Spanner Set • Socket Set • SST(Special Service Tool) • Pipe Wrench 	<ul style="list-style-type: none"> • Screw Driver Set • Hammer • Grease Gun • Adjustable Wrench • Align Key
Personal Protective Equipment (PPE) may include but not limited to:	
<ul style="list-style-type: none"> • Helmet • Goggles • Safety Shoes 	<ul style="list-style-type: none"> • Gloves • Safety Wears • Mask
Maintenance works may include but not limited to:	
<ul style="list-style-type: none"> • Engine Oil Change • Gear Oil Change 	<ul style="list-style-type: none"> • Hydraulic Oil Change • Coolant Change
Machine components may include but not limited to:	
<ul style="list-style-type: none"> • Swing Motor 	<ul style="list-style-type: none"> • Travel Motor
Materials may include but not limited to:	
<ul style="list-style-type: none"> • Engine Oil • Gear Oil • Hydraulic Oil • Coolant 	<ul style="list-style-type: none"> • Nitrogen Gas • Markin Cloth • Spare Parts • Machine Parts
Electrical Maintenance works may include but not limited to:	
<ul style="list-style-type: none"> • Clean Battery Terminal • Replace Battery Relays • Check Electrolyte Level 	<ul style="list-style-type: none"> • Replace Battery • Replace Fuse

Undercarriage work may include but not limited to:	
<ul style="list-style-type: none"> • Check travel Motor Oil 	<ul style="list-style-type: none"> • Adjust Track Chain
Excavator attachments may include but not limited to:	
<ul style="list-style-type: none"> • Bucket • Crusher Bucket 	<ul style="list-style-type: none"> • Rock Breaker • Coupler
Critical Aspects	
<ul style="list-style-type: none"> • Follow Occupational health and safety procedures • Perform periodic maintenance as per the standard procedures 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health & Safety • First Aid • Personal protective equipment • Types of tools and equipment • Manufacturer's specifications • Cooling System • Hydraulic System • Lubrication System • Basic Working Principle of Engine • Relevant Environment Rules and Regulations • Types of maintenance • Basic Electrical System • Components of Excavator • Monitor Panel 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Creativity • Time Management

UNIT TITLE	Carryout Productive Machine Operation
DESCRIPTOR	This unit covers the competencies required to carry out productive machine operation as per the job requirement following standard procedures
CODE	8342-U2-L2
CREDIT	2
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Perform Pre - operation Checks	<p>1.1 Use PPE following standard procedures</p> <p>1.2 Conduct walk-around inspection following standard procedures</p> <p>1.3 Check the levels of oils & lubricants and top up as per the job requirement following standard procedures</p> <p>1.4 Check for leakages and damages and take remedial actions as per the job requirement following standard procedures</p>
2. Perform Machine Operation Checks	<p>2.1 Start the machine following standard procedures</p> <p>2.2 Check for leakages of fluids and lubricant and take remedial actions following standard procedures</p> <p>2.3 Check the functionality of excavator controls following standard procedures</p>

	<p>2.4 Perform chain shifting following standard procedures</p> <p>2.5 Adjust the track chain tension as per the job requirement following standard procedures</p>
<p>3. Perform Productive Machine Operation</p>	<p>3.1 Use PPE following standard procedures</p> <p>3.2 Receive work instruction from the site supervisor/client following standard procedures</p> <p>3.3 Perform work site inspection following standard procedures</p> <p>3.4 March the machine as per the job requirement</p> <p>3.5 Perform excavation works as per the job requirement following standard procedures</p> <p>3.6 Perform lifting operation as per the job requirement following standard procedures</p> <p>3.7 Perform material loading operation as per the job requirement following standard procedures</p> <p>3.8 Perform rock breaking operation as per the job requirement following standard procedures</p> <p>3.9 Perform river crossing operation following standard procedures</p>

	<p>3.10 Perform stump removal operation following standard procedures</p> <p>3.11 Respond efficiently to <i>unexpected situations</i> following standard procedures</p>
4. Perform Post-operation Procedures	<p>4.1 Park the machine safely following standard procedures</p> <p>4.2 Shut down the machine following standard procedures</p> <p>4.3 Maintain daily logbook following standard procedures</p>

RANGE STATEMENT	
Excavator controls may include but not limited to:	
<ul style="list-style-type: none"> • Buckets • Dipper Stick • Machine March 	<ul style="list-style-type: none"> • Chain • Swing System • Boom
Oils & lubricants may include but not limited to:	
<ul style="list-style-type: none"> • Engine Oil • Hydraulic Oil • Distilled Water 	<ul style="list-style-type: none"> • Gear Oil • Coolant
Excavation work may include but not limited to:	
<ul style="list-style-type: none"> • Trenching • Back filling • Sloping 	<ul style="list-style-type: none"> • Formation Cutting • Back Cutting • Levelling

Unexpected situations may include but not limited to:	
<ul style="list-style-type: none"> • Landslide • Falling Boulders • Accident 	<ul style="list-style-type: none"> • Machine Breakdown • Loose Soil
Critical Aspects	
<ul style="list-style-type: none"> • Follow occupational health and safety procedures • Perform productive operation of machines following standard procedures 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety Regulations • First Aid • PPEs • Operational Manual • Basic working principles of hydraulic system and its components • Reading of monitor panel • Excavator safety procedures and practices (hazard signs) • Traffic Signs and Symbols • Excavator Hand Signal • Road safety rules and regulations • Relevant environment rules and regulations 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Creativity • Time Management

UNIT TITLE	Perform Loading and Unloading of Machine
DESCRIPTOR	This unit covers the competencies required to perform loading and unloading of machine as per the job requirement following standard procedures
CODE	8342-U3-L2
CREDIT	0.4
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Prepare for Loading and Unloading	1.1 Use PPE following standard procedures 1.2 Check the loading capacity and the condition of trailer as per the job requirement 1.3 Prepare the loading ramp as per the job requirement following standard procedures 1.4 Ensure the trailer is <i>positioned securely</i> as per the job requirement following standard procedures
2. Perform Loading of Machine	2.1 Position the machines for loading following standard procedures 2.2 Load the machine following standard procedures 2.3 Position arms and bucket properly in accordance with safe working procedures

	<p>2.4 Secure the machine after loading as per the job requirements following standard procedures</p> <p>2.5 Use safety tag following standard procedures</p> <p>2.6 Respond efficiently to <i>unexpected situations</i> following standard procedures</p>
<p>3. Perform Unloading of Machines</p>	<p>3.1 Position the trailer for unloading following standard procedures</p> <p>3.2 Prepare the machine for unloading as per the job requirements following standard procedures</p> <p>3.3 Position the machine for unloading in accordance with safe working procedures</p> <p>3.4 Unload the machine following standard procedures</p>

RANGE STATEMENT	
Positioned securely may include but not limited to:	
<ul style="list-style-type: none"> • Level Ground • Apply Hand Brake 	<ul style="list-style-type: none"> • Block the Wheels • Engage Gear
Unexpected situations may include but not limited to:	
<ul style="list-style-type: none"> • Overhead Wires and Cables • Narrow Road 	<ul style="list-style-type: none"> • Gate

Critical Aspects
<ul style="list-style-type: none"> • Follow occupational health and safety procedures • Perform loading and unloading of machines following standard procedures

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety (OHS) Regulations • First Aid • Hand signal • Suitable weather for loading and unloading of machines • Loading and Unloading procedures • Loading capacity of trailers • Relevant rope-knot making 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Creativity • 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 the 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 Qualifications Framework (BQF)

Bhutan Qualifications Framework is an integrated national framework that outlines all types of qualification in Bhutan. As an established and nationally accepted instrument, the BQF has been benchmarked against international practices in terms of standards. The BQF aims to recognize all forms of learning systems, including formal, non-formal, and informal learning. It

acknowledges technological advancements and recognizes contemporary modes of delivery. It covers a broad range of education systems including the TVET education.

1.4 Implementation of TVET Qualifications



* RPL = Recognition of Prior Learning

1.5 TVET Qualifications Levels

TVET Qualifications has six levels as per the BQF. The six levels are:

- Applied Degree: Level 6
- Advanced Diploma: Level 5
- Diploma: Level 4
- Certificate 3
- Certificate 2
- Certificate 1

1.6. Level Descriptors

The TVET Qualification levels are set based on the level descriptors, as defined in the BQF. The detail of the qualification level descriptor is as follow:

Certificate 1

Skills	Knowledge:	Application
<ul style="list-style-type: none"> ● Applying operational literacy, numeracy skills required to carry out simple tasks ● Applying simple solutions to solve simple and straightforward everyday issues ● Communicating using everyday expressions and simple phrases 	<ul style="list-style-type: none"> ● Foundational, every day and general: ● 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"> ● Highly structured tasks with close support and supervision ● Minimal discretion and judgement ● Readiness to work together and share knowledge with others

Certificate level 2

Skills	Knowledge	Application
<ul style="list-style-type: none"> ● Applying standard processes relevant to carry out known tasks ● Applying a set of known solutions to solve simple and straightforward issues 	<ul style="list-style-type: none"> ● Basic, factual and conceptual ● Some relevant theoretical knowledge ● Interpretation of available information 	<ul style="list-style-type: none"> ● Structured and stable tasks ● General support and supervision that require some

<ul style="list-style-type: none"> Using simple and direct exchange of information on familiar and routine matters 	<ul style="list-style-type: none"> Discretion and judgments A range of known responses to familiar problems 	<p>discretion and judgement</p> <ul style="list-style-type: none"> Collaboration with others to achieve goals
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Certificate 3

Skills	Knowledge:	Application:
<ul style="list-style-type: none"> Applying a range of standard processes to known but varied tasks Selecting and applying a range of solutions to familiar and unfamiliar problems 	<ul style="list-style-type: none"> Theoretical with some technical and operational processes: 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"> Stable tasks with some aspects of change General guidance and supervision that require discretion and judgement Adapting to own behaviours to work with others

Diploma

Skills:	Knowledge	Application
<ul style="list-style-type: none"> ● Selecting and applying a range of standard processes relevant to varied and sometimes unpredictable tasks ● Selecting and applying a range of solutions involving formulation of solutions to resolve complex issues ● Demonstrating a high level of proficiency in English and Dzongkha 	<ul style="list-style-type: none"> ● Broad theoretical, technical and operational ● Specialist knowledge with depth in more than one area ● Analysis reformatting and evaluation of a wide range of information ● Formulation of appropriate responses to resolve both concrete and abstract problems 	<ul style="list-style-type: none"> ● Stable tasks with predictable changes ● Broad guidance with some selfdirection that require sound judgement ● Taking some responsibility for planning and coordination with others

1.6 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 practices. 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.

1.7. 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.

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

