



**NATIONAL COMPETENCY STANDARDS
FOR
GAS INSULATED SUBSTATION TECHNICIAN
(CERTIFICATE 2)**

POWER SECTOR

**TECHNICAL & VOCATIONAL EDUCATION AND TRAINING QUALITY COUNCIL
BHUTAN QUALIFICATIONS AND PROFESSIONALS CERTIFICATION AUTHORITY
THIMPHU, BHUTAN
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FOREWORD

The TVET Quality Council, BQPCA, is pleased to present the National Competency Standards (NCS) for Gas Insulated Substation Technician, Certificate 2, developed in collaboration with industry experts and trainers. These standards establish a nationally recognized qualification aligned with international best practices, setting a benchmark for TVET qualifications in Bhutan.

The NCS ensures that trainees acquire the necessary skills, knowledge, and attitude required by industries. Developed through close consultation with experts, it enhances the relevance of training to labor market needs, equipping graduates to meet industry expectations and improving their employability. A strong and responsive TVET system will also make vocational education more attractive to youth.

The Council acknowledges the valuable contributions of industry experts and trainers in the development of these standards. We urge employers and training providers to continue their support in implementing the NCS, fostering a skilled and productive workforce that contributes to national socio-economic development. Moving forward, we look forward to enhanced industry engagement and collaborative efforts in building a quality-assured, demand-driven TVET system.

Director
BQPCA

ACKNOWLEDGEMENT

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The TVET Quality Council, Bhutan Qualifications and Professionals Certification Authority would like to express our deepest appreciation to the following industry and subject matter experts who have participated in development of the National Competency for GIS Technician:

Experts involved in development of the NCS			
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3	Tenzin	JE (E)	THP
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7	Singye Rinzin	Electrician	PHPA-I
8	Jimba Jimba	Electrician	PHPA-II
9	Tandin Dorji	AHRO	CO, DGPC
10	Rinzin Namgay	Engineer	TVET QC, BQPCA
11	Karma Loday	Facilitator	TVET QC, BQPCA

PACKAGING OF QUALIFICATIONS

CERTIFICATE 2



**Carryout Maintenance of Gas Insulated Substation
(3113-U2-L2)**

**Carryout Operation of Gas Insulated Substation
(3113-U1-L2)**



ENTRY

Overview of the NCS

Unit Title	Elements of Competence
1. Carryout Operation of Gas Insulated Substation	1. Plan to Carryout Operation of Gas Insulated Substation 2. Perform Operation of Gas Insulated Substation
2. Carryout Maintenance of Gas Insulated Substation	1. Plan to Carryout Maintenance of Gas Insulated Substation 2. Perform Maintenance of Gas Insulated Substation

UNIT TITLE	Carryout Operation of Gas Insulated Substation
DESCRIPTOR	This unit covers the competencies required to safely and effectively operate Gas Insulated Substation (GIS) equipment using Local Control Cubicle (LCC), SCADA, and field controls in compliance with operational procedures and safety regulations.
CODE	3113-U1-L2
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Plan to carryout operation of Gas Insulated Substation (GIS)	1.1 Select and use appropriate PPEs based on job requirements and safety standards. 1.2 Select, inspect, and prepare tools and equipment required for GIS operation. 1.3 Obtain permit-to-work (PTW) following organizational and electrical safety procedures. 1.4 Refer to operational manuals, single-line diagrams, SOPs, and checklists to confirm operational requirements. 1.5 Identify and verify GIS components and operational status before operation.

	<p>1.6 Ensure communication systems (control room, radio, SCADA link) are operational before commencing work.</p> <p>1.7 Confirm isolation and earthing procedures where applicable</p>
<p>2. Perform operation of Gas Insulated Substation</p>	<p>2.1 Carry out visual inspection of GIS modules, busbars, CBs, isolators, earthing switches, and auxiliary systems to identify any abnormalities.</p> <p>2.2 Check status indications (open/close, gas pressure, alarms) from Local Control Cubicle and Control Room.</p> <p>2.3 Coordinate switching operations with the control room following approved switching schedule and safety protocols.</p> <p>2.4 Operate GIS equipment from SCADA, following remote operation procedures and confirming status indications.</p> <p>2.5 Operate GIS locally from LCC panel, including CB, DS, ES operations as required.</p> <p>2.6 Follow interlock procedures to ensure safe switching and prevent misuse.</p> <p>2.7 Respond to alarms, warnings, and abnormal conditions promptly and safely.</p> <p>2.8 Complete operational records and log entries accurately after operation</p>

RANGE STATEMENT

PPEs may include but not limited to:

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Safety boot • Insulated gloves • Safety Belts • Ear Plug | <ul style="list-style-type: none"> • Goggles • Work dress • Safety Boots • Masks |
|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|

Tools and Equipment may include but not limited to:

- | | |
|------------------------------------------------------------|----------------------------------------------------------------|
| <ul style="list-style-type: none"> • Tester | <ul style="list-style-type: none"> • Multimeter |
|------------------------------------------------------------|----------------------------------------------------------------|

Critical Aspects

- Follow Safety at workplace
- Follow standard procedure for all the tasks
- Coordinate switching operations with the control room following approved switching schedule and safety protocols

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety regulations • Basic first Aid • Basic electrical • SCADA systems basics • LCC panel reading and interpretations • Basic Drawing and design • Functions of components of GIS 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Time Management • Innovation

<ul style="list-style-type: none"> • Instruments and functions • Properties and hazards of SF6 Gas • Steps in switching operations • Environmental law related to GIS 	
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UNIT TITLE	Carryout Maintenance of Gas Insulated Substation
DESCRIPTOR	This unit covers the competencies required to conduct routine, preventive, and corrective maintenance on GIS equipment, including inspection, troubleshooting, SF ₆ gas management, and component replacement in accordance with manufacturer guidelines and safety standards.
CODE	3113-U2-L2
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Plan to carry out maintenance of Gas Insulated Substation	1.1 Select and use appropriate PPE for electrical, gas, and confined-space hazards. 1.2 Select and check instruments, gas-handling equipment, tools and equipment required for maintenance. 1.3 Obtain permit-to-work, isolation clearances, and necessary lock-out/tag-out approvals. 1.4 Refer to maintenance manuals, SOPs, and technical drawings to prepare maintenance plans.

	<p>1.5 Prepare GIS equipment and area for maintenance, including grounding, signage, and safety barriers</p>
<p>2. Perform maintenance of Gas Insulated Substation</p>	<p>2.1 Perform fault troubleshooting using diagnostic tools, LCC data, SCADA information, and test instruments.</p> <p>2.2 Conduct SF₆ gas leakage tests using approved detectors and procedures.</p> <p>2.3 Handle SF₆ gas safely, including gas recovery, vacuuming, filtering and refilling as per environmental standards.</p> <p>2.4 Check SF₆ gas quality, including moisture content, purity, decomposition by-products, and pressure.</p> <p>2.5 Replace defective components, such as sensors, bushings, CTs, VT modules, drives, control components, or auxiliary systems.</p> <p>2.6 Conduct functionality and integrity tests, including electrical, mechanical, and interlock checks.</p> <p>2.7 Restore equipment to operational status, ensuring all safety locks and grounds are removed only after clearance.</p> <p>2.8 Maintain detailed maintenance records, including gas handling logs, fault reports, replaced components, and test results.</p>

RANGE STATEMENT

PPEs may include but not limited to:

- | | |
|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• Safety boot• Insulated gloves• Safety Belts• Ear Plug | <ul style="list-style-type: none">• Goggles• Work dress• Safety Boots• Masks |
|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|

Tools and Equipment may include but not limited to:

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• Tester• Hand tool set• Dust Blower• Compressor• IR Tester | <ul style="list-style-type: none">• Multimeter• Vacuum cleaner• Fire Extinguisher• Gas Handling Machine• Gas Analyzer |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Critical Aspects

- Follow Safety at workplace
- Follow standard procedure for all the tasks
- Refer to maintenance manuals, SOPs, and technical drawings to prepare maintenance plans.

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety regulations • Basic first Aid • 5S • Types of maintenance • Functions of components of GIS • Gas leakage testing methods • Routine inspection techniques • Control/protection circuit troubleshooting • Environmental law related to GIS 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Time Management • Innovation

ANNEXURE

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.

Purpose of National Competency Standards

National Competency Standards serve a number of purposes including:

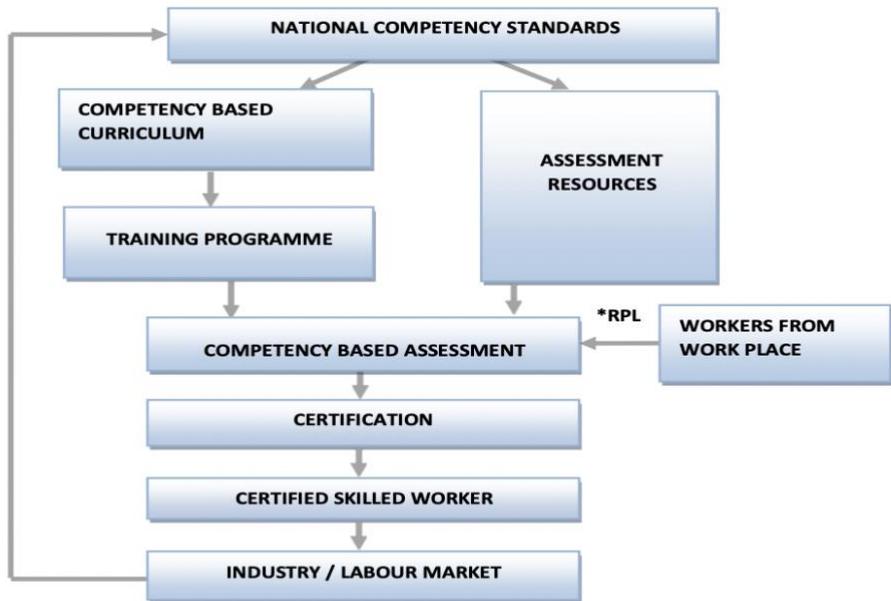
- Providing advice to curriculum developers about the competencies to be included in the curriculum.
- Providing specifications to assessment resource developers about the competencies within an occupation to be demonstrated by candidates.
- Providing advice to industry/employers about job functions,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

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.

Implementation of TVET Qualifications



* RPL = Recognition of Prior Learning

TVET Qualifications Levels

TVET Qualifications have seven levels as per the BQF as follows:

Bhutan Qualifications Framework 2023

Table 2: Qualification Types and Levels Based on Education Sector.

BQF Level	Community Education	School Education	TVET	Higher Education	Monastic Education
8				Doctoral Degree	<i>Khewang</i> མཁས་དབང།
7			Master's Degree Postgraduate Diploma Postgraduate Certificate	Master's Degree Postgraduate Diploma Postgraduate Certificate	<i>Tsugla Gongma</i> གཞུག་ལག་གོང་མ།
6			Applied Degree	Bachelor's Degree Bachelor's Degree (Honours) Graduate Diploma Graduate Certificate	<i>Tsugla Wogma</i> གཞུག་ལག་འོག་མ།
5			Advanced Diploma	Advanced Diploma	
4			Diploma	Diploma	
3		Bhutan Higher Secondary Education Certificate	Certificate 3		<i>Dringrim Gongma</i> འགྲིང་རིམ་གོང་མ།
2		Bhutan Certificate for Secondary Education	Certificate 2		<i>Dringrim Barma</i> འགྲིང་རིམ་བར་མ།
1	ALC		Certificate 1		

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:

Level	Knowledge	Skills	Values	Application
	Knowledge that is:	Demonstrate skills that involve:	Demonstrate values that involve:	Applied in contexts that involve:
4	Broad theoretical, technical and operational	<p>Selecting and applying a range of standard processes relevant to varied and sometimes unpredictable tasks</p> <p>Selecting and applying a range of solutions involving formulation of solutions to resolve complex issues</p> <p>Demonstrating a high level of proficiency in English and Dzongkha</p>	<p>Strong level of awareness of self and others; and an appreciation of belief system, role of social norms, and the importance of relationship building</p> <p>Application of ethical norms and legal rules in decision-making; and comprehending the correlation between values and behavior</p> <p>Commitment to own profession and quality of work</p>	<p>Stable tasks with predictable changes</p> <p>Broad guidance with some self-direction that requires sound judgement</p> <p>Taking some responsibility for planning and coordination with others</p>
3	Theoretical with some technical and operational processes	<p>Applying a range of standard processes to known but varied tasks</p> <p>Selecting and applying a range of solutions to familiar</p>	<p>Sound level of self-awareness and beliefs; and ability to apply social norms and</p>	<p>Stable tasks with some aspects of change</p> <p>General guidance and supervision that require</p>

		<p>and unfamiliar problems</p> <p>Communicating effectively and clearly, both oral and written, in both English and Dzongkha</p>	<p>build relationships</p> <p>Application of a set of ethical norms</p> <p>Commitment to own field of interest and apply self-management of learning and performance</p>	<p>discretion and judgement</p> <p>Adapting to own behaviour to work with others</p>
2	Basic, factual and conceptual	<p>Applying standard processes relevant to carry out known tasks</p> <p>Applying a set of known solutions to solve simple and straightforward issues</p> <p>Using simple and direct exchange of information on familiar and routine matters</p> <p>Developing basic proficiency in Dzongkha and English</p>	<p>Some level of self-awareness and beliefs, and appreciation of social norms; and significance of relationships</p> <p>Awareness of ethical norms, and openness to different activities</p> <p>Developing own knowledge and skills</p>	<p>Structured and stable tasks</p> <p>General support and Supervision that require some discretion and judgement</p> <p>Collaboration with others to achieve goals</p>
1	Foundational, every day and general	<p>Applying operational literacy, numeracy skills required to carry out simple tasks</p> <p>Applying simple solutions to solve simple and straightforward everyday issues</p>	<p>Basic awareness of self, beliefs, and social norms; and understand the significance of relationships</p> <p>Basic awareness of</p>	<p>Highly structured tasks with close support and supervision</p> <p>Minimal Discretion and judgement</p>

		Communicating using everyday expressions and simple phrases in Dzongkha and English	fundamental ethical norms, basic civil rights, and responsibilities Willingness to understand tasks and motivated to implement them successfully	Readiness to work together and share knowledge with others
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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 Technical & Vocational Education and Training Management Information System (TVET – MIS) both in terms of economic sector identification and that of the individual standard.

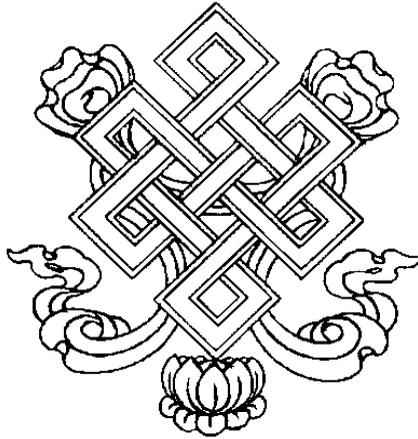
Coding the individual national competency standards

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.



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