



**NATIONAL COMPETENCY STANDARDS  
FOR  
ELECTRIC VEHICLE TECHNICIAN  
(CERTIFICATE 3)**

**AUTOMOBILE SECTOR**

**TECHNICAL & VOCATIONAL EDUCATION AND TRAINING QUALITY COUNCIL  
BHUTAN QUALIFICATIONS AND PROFESSIONALS CERTIFICATION AUTHORITY  
THIMPHU, BHUTAN  
April 2025**



## **FOREWORD**

The TVET Quality Council, BQPCA, is pleased to present the National Competency Standards (NCS) for Electric Vehicle Technician, Certificate 3, 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 Standards for EV Technician:

Experts Involved in Validation of NCS for EV Technician			
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Experts involved in development of NCS for EV Technician			
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## **PACKAGING OF QUALIFICATIONS**

**CERTIFICATE 3**



**Carryout Servicing of EV AC System and EV Charging System  
(7412-U2-L3)**

**Carryout Servicing of EV Drive Battery, EV Control Module and EV  
Traction Motor (7412-U1-L3)**



**ENTRY**

## OVERVIEW OF THE NCS FOR EV TECHNICIAN

Unit Title	Element of Competence
1. Carryout servicing of EV Drive Battery, EV Control Module and EV Traction Motor	<ul style="list-style-type: none"><li>1.1. Prepare to service EV Drive Battery, EV Control Module and EV Traction Motor</li><li>1.2. Service EV Drive Battery</li><li>1.3. Service EV Control Module</li><li>1.4. Service EV Traction Motor system</li></ul>
2. Carryout servicing of EV AC System and EV Charging System	<ul style="list-style-type: none"><li>2.1. Prepare to service EV HVAC Electrical System and EV Charging System</li><li>2.2. Service EV AC Electrical System</li><li>2.3. Service EV Charging System</li></ul>

<b>UNIT TITLE</b>	<b>Carryout servicing of EV Drive Battery, EV Control Module and EV Traction Motor</b>
<b>DESCRIPTOR</b>	This unit covers the competencies required to to prepare, diagnose and service EV Drive Battery, EV Control Module and EV Traction Motor.
<b>CODE</b>	<b>7412-U1-L3</b>
<b>ELEMENTS OF COMPETENCE</b>	<b>PERFORMANCE CRITERIA</b>
1. Prepare to service EV Drive Battery, EV Control Module and EV Traction Motor	1.1 Select and use <b>PPEs</b> as per the job requirement following standard procedure. 1.2 Select <b>Tools and Equipment</b> as per the job requirement following standard procedure. 1.3 Select <b>Materials</b> as per the job requirement following standard procedure. 1.4 Set up work area following standard procedure 1.5 Access manufacturers service manual
2. Service EV Drive Battery	2.1. Use diagnostic scan tool to detect EV Drive Battery Pack faults following standard procedure. 2.2. Check battery voltage following standard procedure. 2.3. Remove service plug from the battery following standard procedure. 2.4. Ensure zero residual voltage following manufacturers service manual.

	<p>2.5. Replace/repair EV Drive Battery Pack following manufacturers service manual following standard procedure.</p> <p>2.6. Test EV Drive battery Pack following standard procedure.</p>
3. Service EV Control Module	<p>3.1. Use Diagnostic scan tool to detect EV Control Module faults following manufacturers service manual</p> <p>3.2. Replace Cooling system following manufacturers service manual</p> <p>3.3. Replace inverter following manufacturers service manual</p> <p>3.4. Replace DC/DC converter manufacturers service manual</p> <p>3.5. Service Electronic Parking System and electronic control brake unit manufacturers service manual</p> <p>3.6. Test EV Control Module following standard procedure.</p>
4. Service EV Traction Motor	<p>4.1. Use diagnostic scan tool to detect EV Traction Motor faults following manufacturers service manual</p> <p>4.2. Replace EV Traction Motor following manufacturers service manual</p> <p>4.3. Calibrate resolver offset following manufacturers service manual</p> <p>4.4. Service Reduction Gear following manufacturers service manual</p>



	<p>4.5. Replace Park Lock actuator following manufacturers service manual</p> <p>4.6. Test the EV Traction Motor and Reduction Gear following manufacturers service manual</p>
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RANGE STATEMENT	
<b>PPEs</b> may include but not limited to:	
<ul style="list-style-type: none"> <li>• Safety boot</li> <li>• Hand gloves</li> <li>• Class 0/00 gloves</li> </ul>	<ul style="list-style-type: none"> <li>• Goggles</li> <li>• Work dress</li> <li>• Rubber Mat</li> </ul>
<b>Tools and Equipment</b> may include but not limited to:	
<ul style="list-style-type: none"> <li>• Hand tool set</li> <li>• Multimeter</li> <li>• Crimping tools</li> <li>• Transmission Jack</li> <li>• Battery pallet</li> <li>• HV Insulated Hand Tools</li> </ul>	<ul style="list-style-type: none"> <li>• Mega ohm tester</li> <li>• Diagnostic Scan tool</li> <li>• Gear Oil Gun</li> <li>• 2 Pole Tester</li> <li>• Air Seal Tester</li> <li>• Battery Scissor Lift</li> </ul>
<b>Materials</b> may include but not limited to:	
<ul style="list-style-type: none"> <li>• Coolant</li> <li>• Insulation tape</li> <li>• Gear Oil (ATF)</li> <li>• Gasket or Sealant</li> <li>• Terminal</li> </ul>	<ul style="list-style-type: none"> <li>• Heat shrink tube</li> <li>• Wiring harness</li> <li>• Noise Reduction Earth Brush</li> <li>• Oil Seal</li> </ul>

***Critical Aspects***

- Follow Safety at workplace
- Detect fault using Diagnostic scan tool
- Isolate the battery voltage and depower the residual voltage

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"><li>• Ethics and Integrity</li><li>• Occupational Health and Safety regulations</li><li>• Basic first Aid</li><li>• Functioning, construction &amp; types of EV control system</li><li>• Functioning and construction of EV Cooling system</li><li>• Construction and Working of Electronic Parking System</li><li>• Types of EV Traction Motors</li><li>• Construction and working of Traction Motors</li><li>• Construction and working of Reduction Gear</li><li>• Types &amp; Specifications of EV Batteries</li><li>• Working of EV Batteries</li><li>• Function of BMS</li><li>• Battery deterioration mechanism</li><li>• Battery Faults</li><li>• Safe Disposal of Battery</li></ul>	<ul style="list-style-type: none"><li>• Team Work</li><li>• Communication</li><li>• Problem Solving</li><li>• Interpersonal Relationship</li><li>• Creativity</li><li>• Time Management</li><li>• Innovation</li></ul>

<b>UNIT TITLE</b>	<b>Service EV AC System and EV Charging System</b>
<b>DESCRIPTOR</b>	This unit covers the competencies required to to prepare, diagnose and service EV HVAC System and EV Charging System.
<b>CODE</b>	<b>7412-U2-L3</b>
<b>ELEMENTS OF COMPETENCE</b>	<b>PERFORMANCE CRITERIA</b>
1. Prepare to service EV AC System and EV Charging system	1.1. Select and use <b>PPEs</b> as per the job requirement following standard procedure. 1.2. Select <b>Tools and Equipment</b> as per the job requirement following standard procedure. 1.3. Set up work area following standard procedure 1.4. Access manufacturers service manual following standard procedure.
2. Service EV AC system	2.1. Use diagnostic scan tool to detect EV AC Electrical System faults following manufacturers service manual 2.2. Replace electric compressor and electric compressor inverter following manufacturers service manual 2.3. Replace PTC Heater following manufacturers service manual 2.4. Perform refrigerant recovery and recharging following manufacturers service manual.

3. Service EV Charging system	3.1. Use diagnostic scan tool to detect EV Charging System faults following manufacturers service manual 3.2. Replace On-Board Charger following manufacturers service manual 3.3. Update charging software following manufacturers manual 3.4. Test EV Charging System manufacturers service manual
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## RANGE STATEMENT

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

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Safety boot</li> <li>• Hand gloves</li> <li>• Class 0/00 Gloves</li> </ul> | <ul style="list-style-type: none"> <li>• Goggles</li> <li>• Work dress</li> </ul> |
|---|---|

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

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Hand tool set</li> <li>• Multimeter</li> </ul> | <ul style="list-style-type: none"> <li>• Mega ohm tester</li> <li>• Scan tool</li> </ul> |
|---|--|

## Critical Aspects

- Follow Safety at workplace
- Use diagnostic scan tool to detect EV Charging System faults
- Isolate the battery voltage and depower the residual voltage

## UNDERPINNING KNOWLEDGE

## UNDERPINNING SKILLS

<ul style="list-style-type: none"> <li>• Ethics and Integrity</li> <li>• Occupational Health and Safety regulations</li> <li>• Basic first Aid</li> <li>• Construction and working of EV Charging system.</li> <li>• Types of EV Charging system</li> <li>• Regenerative charging system</li> <li>• Working of Power Relay</li> <li>• Construction and Working of DC/DC converter.</li> <li>• Construction and working of EV AC System</li> <li>• Environment Hazards of Refrigerants.</li> </ul>	<ul style="list-style-type: none"> <li>• Team Work</li> <li>• Communication</li> <li>• Problem Solving</li> <li>• Interpersonal Relationship</li> <li>• Creativity</li> <li>• Time Management</li> <li>• Innovation</li> </ul>
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## **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་ཤོང་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> འབྲིང་རིམ་གོང་མ།
2		Bhutan Certificate for Secondary Education	Certificate 2		<i>Dringrim Barma</i> འབྲིང་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:

<b>Level</b>	<b><i>Knowledge</i></b>	<b><i>Skills</i></b>	<b><i>Values</i></b>	<b><i>Application</i></b>
	<b><i>Knowledge that is:</i></b>	<b><i>Demonstrate skills that involve:</i></b>	<b><i>Demonstrate values that involve:</i></b>	<b><i>Applied in contexts that involve:</i></b>
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.

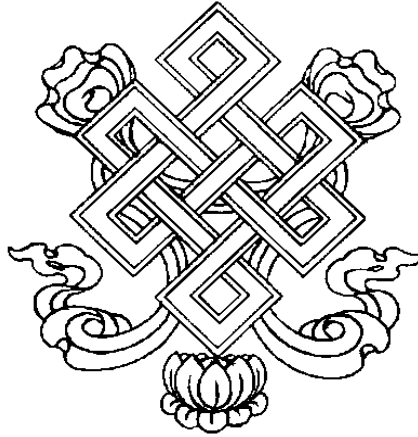
### **Coding the individual national competency standards**

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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