

First Publication
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FOREWORD

The TVET Quality Council, BQPCA, is pleased to present the National Competency Standards (NCS) for Autotronics 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:

Experts Involved in Validation of NCS			
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PACKAGING OF QUALIFICATIONS



Overview of the NCS

Unit Title	Elements of Competence
1. Service Automotive Electrical Systems	<ol style="list-style-type: none"> 1. Service battery and charging systems 2. Service starting systems 3. Repair lighting and auxiliary systems
2. Service Engine Management Systems	<ol style="list-style-type: none"> 1. Use diagnostic tools and equipment 2. Inspect sensors and actuators 3. Verify system performance
3. Service Automotive Electronic Control and Safety Systems	<ol style="list-style-type: none"> 1. Service electronic control units (ECUs) 2. Inspect CAN and LIN 3. Service safety and comfort systems 4. Service Engine Immobilizer and Key Programming Systems
4. Install and Maintain Automotive Accessories	<ol style="list-style-type: none"> 1. Install audio and infotainment systems 2. Install vehicle security systems 3. Maintain documentation and housekeeping
5. Service Advanced Driver Assistance Systems (ADAS)	<ol style="list-style-type: none"> 1. Identify and inspect ADAS components 2. Diagnose basic ADAS faults 3. Assist in calibration and replacement

UNIT TITLE	Service Automotive Electrical Systems
DESCRIPTOR	This unit contains competencies required to service automotive electrical systems including battery, starting, charging, lighting, and auxiliary circuits using appropriate tools and safe work practices under supervision.
CODE	7412-U1-L3
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Service battery and charging systems	1.1 Select and use PPEs 1.2 Test Battery condition using approved tools and equipment. 1.3 Measure charging voltage and compared to specifications. 1.4 Clean and secure the terminals safely. 1.5 Test alternator output and identify faults. 1.6 Handle used batteries according to environmental regulations.
2. Service starting systems	2.1 Apply Electrical isolation procedures 2.2 Test starter motor operation. 2.3 Conduct Voltage drop tests. 2.4 Inspect Wiring connections. 2.5 Repair or replace faulty starter components. 2.6 Verify system performance after repair.

<p>3. Repair lighting and auxiliary systems</p>	<p>3.1 Interpret Wiring diagrams correctly.</p> <p>3.2 Inspect and replace Fuses and relays.</p> <p>3.3 Test Lighting circuits</p> <p>3.4 Repair Wiring faults using approved methods.</p> <p>3.5 Replace Auxiliary components according to specifications.</p> <p>3.6 Dispose Waste materials properly.</p>
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RANGE STATEMENT

PPEs may include but not limited to:

- | | |
|--|---|
| <ul style="list-style-type: none"> • Safety boot • Hand gloves | <ul style="list-style-type: none"> • Goggles • Work dress |
|--|---|

Tools and Equipment may include but not limited to:

- | | |
|---|---|
| <ul style="list-style-type: none"> • Hand tool set • Multimeter • Hydrometer | <ul style="list-style-type: none"> • Diagnostic Scan tool • Battery Tester • Refractometer |
|---|---|

Critical Aspects

- Follow Safety at workplace
- Follow standard procedure for all the tasks
- Apply Electrical isolation procedures

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety regulations • Basic first Aid • Basic electrical principles (voltage, current, resistance, Ohm's Law) • Battery construction and charging principles • Starting and charging system operation • Ignition system • Read and interpret wiring diagrams • Static electricity and ESD precautions • Safe handling of batteries and electrical systems • Environmental regulations for battery disposal 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Time Management • Innovation

UNIT TITLE	Service Engine Management Systems
DESCRIPTOR	This unit contains competencies required to service electronically controlled engine management systems using diagnostic tools, testing sensors and actuators, and verifying system performance in accordance with manufacturer procedures.
CODE	7412-U2-L3
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Use diagnostic tools and equipment	1.1 Select and use PPEs . 1.2 Select and use tools and equipment safely. 1.3 Connect OBD-II scanner correctly. 1.4 Retrieve and interpret Fault codes. 1.5 Monitor and record Live data. 1.6 Perform Multimeter testing accurately.
2. Inspect sensors and actuators	2.1 Test Sensor outputs against specifications. 2.2 Verify Actuator operation. 2.3 Check Wiring continuity safely. 2.4 Identify Faulty components. 2.5 Install replacement components. 2.6 Apply Electrostatic Discharge precautions when handling electronic parts.
3. Verify system performance	3.1 Clear Fault codes. 3.2 Test Engine performance safely. 3.3 Check Warning indicators.

	<p>3.4 Assist in Conducting Test drive following safety procedures.</p> <p>3.5 Confirm Repair against the original complaint.</p> <p>3.6 Complete Service documentation accurately</p>
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RANGE STATEMENT

PPEs may include but not limited to:

- | | |
|--|---|
| <ul style="list-style-type: none"> • Safety boot • Hand gloves | <ul style="list-style-type: none"> • Goggles • Work dress |
|--|---|

Tools and Equipment may include but not limited to:
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|---|--|
| <ul style="list-style-type: none"> • Hand tool set • Multimeter • Engine Dynamometer | <ul style="list-style-type: none"> • Diagnostic Scan tool • Oscilloscope |
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Sensors may include but not limited to:
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- | | |
|---|--|
| <ul style="list-style-type: none"> • MAP • TPS • CKP | <ul style="list-style-type: none"> • MAF • O2 • CMP |
|---|--|

Critical Aspects

- | |
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| <ul style="list-style-type: none"> • Follow Safety at workplace • Follow standard procedure for all the tasks • Apply Electrostatic Discharge precautions when handling electronic parts. |
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UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety regulations • Basic first Aid • Engine management system operation • Types of sensors (MAP, MAF, TPS, O2, CKP, CMP) • Actuators (injectors, ignition coils, solenoids) • OBD-II system basics • Basic emission control principles • Electrical testing techniques • Static electricity and ESD precautions 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Time Management • Innovation

UNIT TITLE	Service Automotive Electronic Control and Safety Systems
DESCRIPTOR	This unit contains competencies required to service electronic control modules, communication networks, and vehicle safety systems such as ABS and SRS while applying electrical safety and handling precautions.
CODE	7412-U3-L3
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Service Electronic Control Units (ECUs)	1.1 Select and use PPEs . 1.2 Select and use tools and equipment safely. 1.3 Identify ECU location. 1.4 Disconnect Battery before servicing. 1.5 Inspect connectors for damage. 1.6 Perform ECU reset procedures. 1.7 Install replacement ECU correctly. 1.8 Apply static discharge precautions.
2. Inspect Communication Area Networks (CAN) and Local Interconnect Network (LIN)	2.1 Interpret Basic CAN and LIN layout. 2.2 Identify Communication faults using scan tool. 2.3 Test Network wiring integrity. 2.4 Repair Faulty connectors. 2.5 Verify Communication functionality. 2.6 Follow Workplace safety procedures.
3. Service safety and comfort systems	3.1 Diagnose Airbag (SRS) and ABS warning lights.

	<p>3.2 Apply Electrical isolation before servicing.</p> <p>3.3 Inspect and test ABS sensors.</p> <p>3.4 Service Power window and central locking systems.</p> <p>3.5 Replace Faulty components safely.</p> <p>3.6 Verify System operation after repair.</p>
<p>4. Service Engine Immobilizer and Key Programming Systems</p>	<p>4.1 Identify the function and components of the engine immobilizer system.</p> <p>4.2 Verify communication between the transponder key and immobilizer system.</p> <p>4.3 Connect and operate diagnostic tools to retrieve immobilizer-related fault codes.</p> <p>4.4 Inspect and identify faults in keys, immobilizer units, and associated wiring.</p> <p>4.5 Perform key programming procedures using diagnostic equipment under supervision.</p> <p>4.6 Program replacement keys according to manufacturer procedures.</p> <p>4.7 Apply security precautions to prevent unauthorized access during programming.</p> <p>4.8 Test and confirm system functionality after programming or repair.</p>

RANGE STATEMENT	
PPEs may include but not limited to:	
<ul style="list-style-type: none"> • Safety boot • Hand gloves 	<ul style="list-style-type: none"> • Goggles • Work dress

Tools and Equipment may include but not limited to:

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| <ul style="list-style-type: none"> • Hand tool set • Multimeter • Oscilloscope • Key set (Transponder, chips) | <ul style="list-style-type: none"> • Diagnostic Scan tool • Basic CAN-bus system • Key Programming device |
|---|--|

Critical Aspects

- Follow Safety at workplace
- Follow standard procedure for all the tasks
- Interpret Basic CAN and LIN layout.

UNDERPINNING KNOWLEDGE

- Ethics and Integrity
- Occupational Health and Safety regulations
- Basic first Aid
- Basic CAN and LIN communication principles
- ECU functions and data flow
- ABS and SRS operating principles
- Working principle of Engine Immobilizer
- Electrical safety when working with airbags
- Static electricity and ESD precautions
- Principles of engine immobilizer

UNDERPINNING SKILLS

- Team Work
- Communication
- Problem Solving
- Interpersonal Relationship
- Time Management
- Innovation

- | | |
|---|--|
| <ul style="list-style-type: none">• Transponder key technology• Basic key programming procedures• Vehicle security protocols and anti-theft systems• Interaction between ECU, BCM, and immobilizer | |
|---|--|

UNIT TITLE	Install and Maintain Automotive Accessories
DESCRIPTOR	This unit contains competencies required to install and maintain automotive accessories including audio, infotainment systems and security following standard electrical and safety procedures.
CODE	7412-U4-L3
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Install audio and infotainment systems	1.1 Select and use PPEs . 1.2 Select and use tools and equipment safely. 1.3 Interpret Wiring diagrams before installation. 1.4 Install audio and infotainment system 1.5 Install GPS 1.6 Make Power supply connections safely. 1.7 Mount the Components securely. 1.8 Configure System settings. 1.9 Test and verify Functionality.
2. Install vehicle security systems	2.1 Follow Installation instructions accurately. 2.2 Connect Alarm wiring securely. 2.3 Position the Sensors correctly. 2.4 Program Remote functions. 2.5 Test and verify system operation
3. Maintain documentation and housekeeping	3.1 Complete Job cards accurately. 3.2 Record Fault reports clearly. 3.3 Document Replaced parts. 3.4 Clean and store tools.

	3.5 Dispose Waste according to regulations. 3.6 Maintain Workplace cleanliness.
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RANGE STATEMENT	
PPEs may include but not limited to:	
<ul style="list-style-type: none"> • Safety boot • Hand gloves 	<ul style="list-style-type: none"> • Goggles • Work dress
Tools and Equipment may include but not limited to:	
<ul style="list-style-type: none"> • Hand tool set • Multimeter 	<ul style="list-style-type: none"> • Diagnostic Scan tool
Critical Aspects	
<ul style="list-style-type: none"> • Follow Safety at workplace • Follow standard procedure for all the tasks • Configure System settings. 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety regulations • Basic first Aid • Basic automotive wiring principles • Audio/Video system components • Working principle of GPS system • Security system operation • Electrical load calculation basics 	<ul style="list-style-type: none"> • Team Work • Communication • Problem Solving • Interpersonal Relationship • Time Management • Innovation

UNIT TITLE	Service Advanced Driver Assistance Systems (ADAS)
DESCRIPTOR	This unit contains competencies required to identify, inspect, diagnose, and assist in the calibration and replacement of basic ADAS components under supervision.
CODE	7412-U5-L3
ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Identify and inspect ADAS components	1.1 Identify ADAS system types and functions. 1.2 Identify Sensor locations correctly. 1.3 Interpret Service information. 1.4 Inspect Sensors and mounting points. 1.5 Check Wiring and connectors. 1.6 Apply Safety precautions.
2. Diagnose basic ADAS faults	2.1. Connect Scan tool correctly. 2.2. Retrieve and interpret ADAS fault codes. 2.3. Monitor Live sensor data. 2.4. Perform Basic electrical tests safely. 2.5. Identify Fault source
3. Assist in calibration and replacement	3.1. Perform Pre-calibration checks. 3.2. Set up Calibration equipment correctly. 3.3. Perform Static or dynamic calibration under supervision. 3.4. Replace Faulty sensors/modules safely. 3.5. Re-scan System after repair. 3.6. Complete Post-service safety checks.

RANGE STATEMENT	
PPEs may include but not limited to:	
<ul style="list-style-type: none"> • Safety boot • Hand gloves 	<ul style="list-style-type: none"> • Goggles • Work dress
Tools and Equipment may include but not limited to:	
<ul style="list-style-type: none"> • Hand tool set • Multimeter • Still camera aiming tools 	<ul style="list-style-type: none"> • Diagnostic Scan tool • Milli wave radar aiming • Time of Flight (ToF) camera aiming
Critical Aspects	
<ul style="list-style-type: none"> • Follow Safety at workplace • Follow standard procedure for all the tasks • Diagnose basic ADAS faults 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • Occupational Health and Safety regulations • Basic first Aid • Basic ADAS system principles • Types and functions of ADAS sensors • Importance of calibration accuracy • Pre-conditions for calibration (alignment, tyre pressure) 	<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> མཁམ་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> འགྲིང་རིམ་ཤོང་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</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>that require 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.

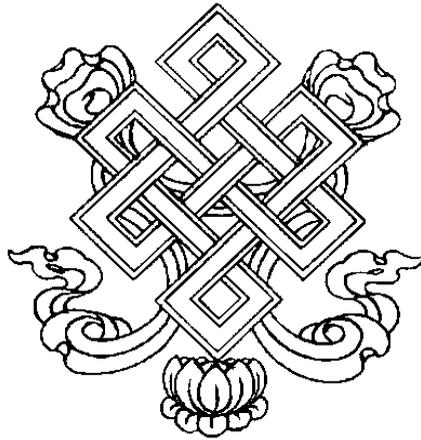
Coding the individual national competency standards

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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