

**NATIONAL COMPETENCY STANDARDS FOR
AUTOMOBILE ELECTRICIAN
(Level-2 &3)**

TABLE OF CONTENTS

INTRODUCTION.....	3
PURPOSE OF THE QUALIFICATION	3
DATE OF VALIDATION	3
CODE OF QUALIFICATION	4
ENTRY REQUIREMENTS	4
QUALIFICATIONS DEVELOPMENT COMMITTEE.....	5
QUALIFICATIONS VALIDATION COMMITTEE.....	6
REGULATIONS FOR THE QUALIFICATION AND SCHEDULE OF UNITS.....	6
SUMMARY OF COMPETENCY STANDARDS.....	7
Packaging of Qualifications	8
Demonstrate Communication Skills.....	9
Maintain Safe Work Environment.....	11
Repair Electrical Systems of Vehicle.....	13
Repair Instrument Panel.....	16
Repair HVAC System of the Vehicle	17
Repair Chassis Electrical Circuits	19
Repair Comfort and Safety Features/ Systems of the Vehicle	21
Repair Fuel and Emission Control System.....	24
LIST OF TOOLS AND EQUIPMENT.....	26

INTRODUCTION

An Automobile Electrician is a tradesman who specializes in the electric systems contained within automotive vehicles. This person is an expert on all of the electrical systems in a vehicle. Repair of headlights, diagnostic lights, alarm system, circuit board, alternator and starter motor all fall under the Auto Electrician's domain of expertise. The job of an Automobile Electrician is perfect for those who love to work with their hands. This is a job that involves constant activity, so it is perfect for someone who dreads the idea of sitting at a desk all day. Automobile Electrician is hired by car manufacturers, car dealers and auto repair shops.

Automobile industry is dynamic and ever changing as complex technological advancements are taking place in this sector. Therefore, industry expectations for skilled workforce are also dynamic which can only be managed through setting relevant competency standards in collaboration with the leading industries. Being cognizant of this fact, National Vocational & Technical Training Commission (NAVTTTC) developed competency standards for Automobile Electrician under National Vocational Qualifications Framework (NVQF). These competency standards have been developed by a Qualifications Development Committee (QDC) and validated by the Qualifications Validation Committee (QVC) having representation from the leading auto sector companies of the country.

PURPOSE OF THE QUALIFICATION

The purpose of these qualifications is to set high professional standards for automobile industry. The specific objectives of developing these qualifications are as under:

- Improve the professional competence of the trainees
- Provide opportunities for recognition of skills attained through non-formal or informal pathways
- Improve the quality and effectiveness of training and assessment
- Enable the existing workforce to capacitate themselves in new technologies and methods

DATE OF VALIDATION

These national qualifications have been validated by the Qualifications Validation Committee (QVC) on 13th & 14th February 2018 and they will remain in currency until 13th February 2021.

CODE OF QUALIFICATION

Qualification Title	Code
National Vocational Certificate Level-2 in Automobile Technology (Auto Electrician)	0716MSA04
National Vocational Certificate Level-3 in Automobile Technology (Auto Electrician)	0716MSA05

ENTRY REQUIREMENTS

The entry requirement to National Vocational Certificate Level-2 in Automobile Technology (Auto Electrician) is Middle or Matric. For National Vocational Certificate Level-3 in Automobile Technology (Auto Electrician), the entry requirement is award of National Vocational Certificate Level-2 in Automobile Technology (Auto Electrician).

QUALIFICATIONS DEVELOPMENT COMMITTEE

The Qualifications Development Committee consisted of following members:

S.No.	Name & Designation	Designation/Organization
1.	Ijaz Hamid	Chief Instructor (Auto & Diesel) PTEVTA
2.	Syed Salman Nasir Ali Shah	Deputy Manager PTEVTA
3.	Mehwish Aisha Ahsan	CBT Expert/Assessor Freelance Consultant
4.	Adeel Ahmad	Assistant Manager (Tech) Lahore Transport Company, Lahore
5.	Muhammad Zahid	Senior Technician Bosh Car Service, Lahore
6.	Abdul Basit	Technical Advisor Toyota Garden Motors, Lahore
7.	Shahzad Ahmad	Diagnostic Technician Royal Motors, Johar Town, Lahore.
8.	Muhammad Nasir Khan	Forman (Electrical) Toyota Garden Motors, Lahore
9.	Zahid Mahmood	Auto Electrician Suzuki Khalid Motors Co. Lahore
10.	Muhammad Aslam	Technical Advisor (Electrical) Toyota Township Motors, Lahore
11.	Mian Atique	CEO Rehman Auto Engineers
12.	Zeeshan Ahmad	AM After Sale Suzuki Khalid Motors Co. Lahore
13.	Khawar Hussain	AM Service Toyota Garden Motors, Lahore
14.	Abdul Waheed	CEO Honda Johar Town, Lahore

QUALIFICATIONS VALIDATION COMMITTEE

The Qualifications Validation Committee consisted of following members:

S.No.	Name & Designation	Organization
1.	Ijaz Hamid	Chief Instructor Auto & Diesel GCT, Railway Road, Lahore PTEVTA
2.	Tanvir Abbas	Senior Instructor Auto & Diesel GCT, Railway Road, Lahore PTEVTA
3.	Aamir Javed	Service Manager Suzuki Khalid Motors, Lahore
4.	Atif Mahmood	Service Manager Suzuki Mini Motors, Lahore
5.	Atif Iqbal	Area Manager (QC) Pak Suzuki Motors, Lahore
6.	Muhammad Adnan Siddique	Service Manager JDM, Dubai
7.	Muhammad Rizwan Minhas	Technical Advisor Suzuki Township Motors, Lahore
8.	Faisal Qayyum	Service Advisor Suzuki Township Motors, Lahore
9.	Azhar Minhas	GM The Garage, Johar Town, Lahore
10.	Abdul Waheed	CEO Honda, Johar Town, Lahore

REGULATIONS FOR THE QUALIFICATION AND SCHEDULE OF UNITS

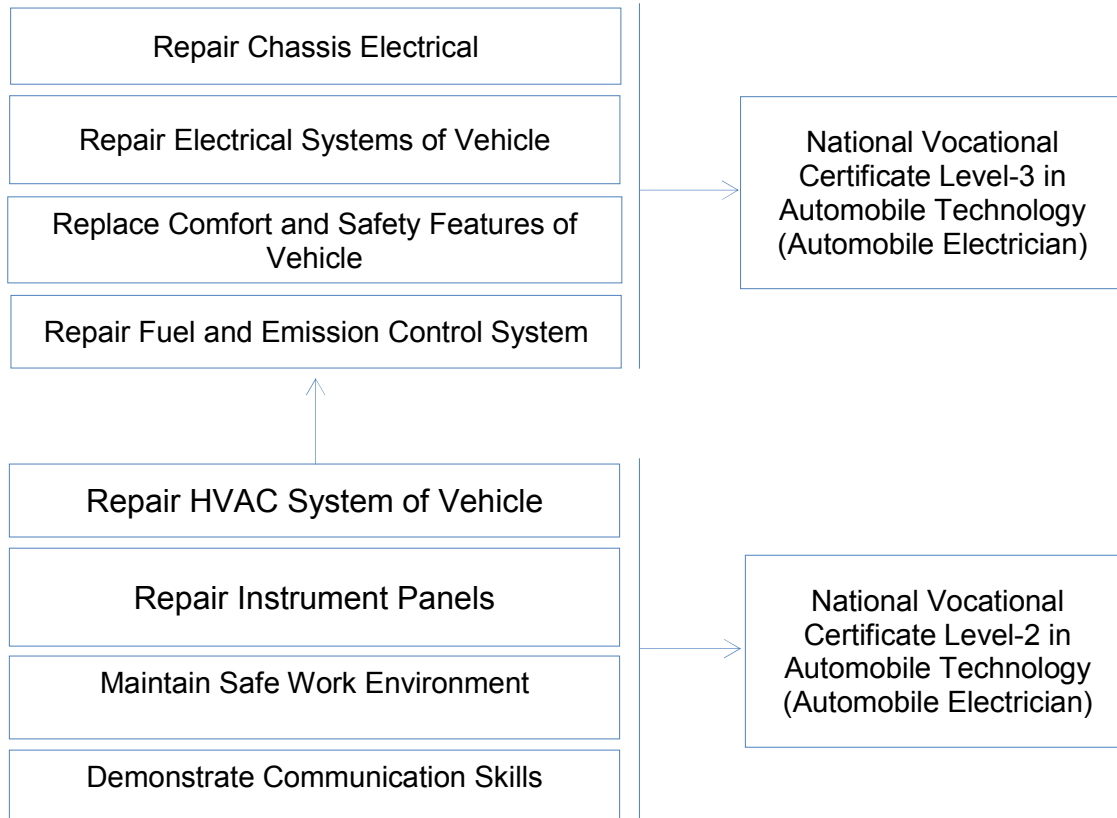
Not Applicable

SUMMARY OF COMPETENCY STANDARDS

Code	Competency Standards	Level	Credits	Category
Missing	Demonstrate Communication Skills	2	3	Generic
Missing	Maintain Safe Work Environment	2	3	Generic
Missing	Repair Electrical Systems of Vehicle	3	40	Technical
Missing	Repair Instrument Panels	2	18	Technical
Missing	Repair HVAC of Vehicle	2	18	Technical
Missing	Repair Chassis Electrical	3	42	Technical
Missing	Replace Comfort and Safety Features of Vehicle	3	40	Technical
Missing	Repair Fuel and Emission Control System	3	20	Technical

Packaging of Qualifications

The national vocational qualifications are packaged as per following:



Code:

Demonstrate Communication Skills

Overview

This Competency Standard identifies the competencies required to apply communication skills at work place in accordance with the organization's guidelines and procedures. You are expected to work in a team to achieve common organizational goals and avoid conflicts. This competency standard will also enable you to use basic computer skills to communicate effectively and prepare work related documents.

Competency Units	Performance Criteria
1. Work in Team	<p>P1. Treat team members with respect and maintain positive relationships to achieve common organizational goals</p> <p>P2. Listen instructions carefully and strictly follow them</p> <p>P3. Provide work related information to team members and identify interrelated work activities to avoid confusion</p> <p>P4. Adopt communication skills appropriate to work activities and company procedures</p> <p>P5. Identify problems and resolve them through discussion and mutual agreement</p>
2. Deal with Clients	<p>P1. Collect and confirm work requirements from clients using appropriate communication procedures</p> <p>P2. Provide clear information to clients about work requirements including costs and time needed to accomplish the task</p> <p>P3. Negotiate with clients regarding wages, time, labour requirements etc.</p>
3. Demonstrate Basic IT Skills	<p>P1. Create folders and files and learn major commands of operating system/windows</p> <p>P2. Type text and use major commands such as printing, editing, creating tables, header, footer, footnotes, table of contents and page number etc.</p> <p>P3. Prepare the document as per work specifications and client's requirement</p> <p>P4. Generate reports for clients as required using appropriate computer applications</p> <p>P5. Use internet for sending/receiving emails and connecting through social or other media</p>

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Principles of effective and interactive communication
- 7 C's of communication and their importance
- Cultural and organizational practices for effective communication
- Effective negotiation skills
- Role of team members and functionality of work teams
- Team dynamics and stages of team development
- Conflict resolution strategies
- Negotiation techniques
- Basic architecture of computer system
- Input / output devices of computer and their functions
- Basic computer skills using MS Word, MS Excel, use of internet, sending and receiving emails etc.
- Preparing documents and work related reports

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Communicate effectively with colleagues and clients
- Develop a job completion report for the work using computer technology

Code:

Maintain Safe Work Environment

Overview

This Competency Standard identifies the competencies required to apply occupational safety and health at workplace in accordance with the organization's approved guidelines and procedures. You will be expected to identify and use Personal Protective Equipment (PPE) according to the job requirement and potential hazards at workplace. The underpinning knowledge regarding OSH will be sufficient to provide the basis for your work.

Competency Units	Performance Criteria
1. Identify Hazards at Workplace	<p>P1. Read and interpret work processes and procedures correctly to identify risk of hazards at workplace</p> <p>P2. Recognize engineering processes, tools, equipment and consumable materials that have the potential to cause harm</p> <p>Identify any potential hazards and take appropriate action to minimize the risk</p>
2. Observe Occupational Safety and Health (OSH)	<p>P1. Work safely at all times, complying with health and safety precautions, regulations and other relevant guidelines</p> <p>P2. Identify health and safety hazards in the workplace, so that the potential for personal injury, damage to equipment or the workplace is prevented, and corrective action is taken.</p> <p>P3. Deal with problems which are within your control, and report those that cannot be resolved to safety officer</p> <p>P4. Wear, adjust and maintain Personal Protective Equipment to ensure correct fit and optimum protection in compliance with company procedures</p> <p>P5. Keep work area clean and clear of obstructions, and storing tools or equipment, so that the potential for accident or injury is prevented</p>

Knowledge & Understanding

The candidate must be able to demonstrate underpinning knowledge and understanding required to carry out the tasks covered in this competency standard. This includes the knowledge of:

- Types of hazards that are most likely to cause harm to health and safety
- Health and safety precautions
- Health and safety signs and symbols

- Techniques and methods to identify the risks of hazards at workplace
- Dealing with hazards to avoid any accident or injury
- Following 5S and Kaizen Activities
- Safety reporting procedures and documentation
- Use of Personal Protective Equipment
- First Aid treatment methods including methods of resuscitation
- Fire-fighting methods
- Safe methods of handling heavy loads

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify possible hazards at workplace
- Use correct Personal Protective Equipment (PPE) for the assigned job

List of Tools and Equipment

S.No.	Items
1.	Health and safety manual
2.	Fire Extinguisher
3.	Safety Equipment, Safety Shoes, Safety Gloves, Safety Goggles, Safety Helmet and Ear Plugs
4.	Smoke detecting alarm
5.	First Aid box

Code:

Repair Electrical Systems of Vehicle

Overview

This competency standard is designed to provide skills and knowledge to repair Electrical Systems of Vehicle, in accordance with the manufacturer's Manual. You will be able to diagnose faults related to Electrical System of Vehicle and repair faulty part/s according to set standards.

Competency Units	Performance Criteria
1. Perform Battery Maintenance	<p>P1. Inspect the Battery to find any leakage or damages</p> <p>P2. Perform Volt Meter Test with appropriate tool and diagnose faults in voltages, if any</p> <p>P3. Perform Hydrometer Test to check gravity of battery and diagnose faults, if any</p> <p>P4. Perform Load Test to check the load performance of battery and diagnose faults, if any</p> <p>P5. Check the battery indicator(magic eye) for the condition of battery electrolyte and diagnose faults, if any</p> <p>P6. Refill the battery with electrolyte according to standard level</p> <p>P7. Clean the corroded terminals and poles according to set standard</p> <p>P8. Charge the battery with charger according to set standards</p> <p>P9. Replace the battery in case of damage or irreparable leakage</p>
2. Repair Charging System	<p>P1. Inspect the charging system light, abnormal noise, and conditions of drive belt to diagnose faults, if any</p> <p>P2. Check amperes with Digital Multi Meter (DMM) and compare it with set standards and diagnose faults, if any</p> <p>P3. Inspect physically and repair/replace wiring harness of charging system in case of any fault</p> <p>P4. Adjust or replace Drive Belt according to manufacturer specifications</p> <p>P5. Replace faulty Alternator according to set standards</p>

<p>3. Repair Ignition System</p>	<p>P1. Check and replace Ignition Switch, Ignition Coil and Resistor to ensure specified function in case of any fault</p> <p>P2. Check high tension cables for damage insulation, continuity/resistance and replace faulty cables if required</p> <p>P3. Check electric power source and charging system of the vehicle for specified functionality and diagnose faults, if any</p> <p>P4. Replace or clean and adjust spark plugs according to set standards</p> <p>P5. Replace faulty fuses with correct ratings</p> <p>P6. Check Distributor, Distributor Cap and Router and replace faulty part/s, if any</p> <p>P7. Check Ignition System Sensors and replace faulty Sensor, if required</p>
<p>4. Repair Starting System</p>	<p>P1. Check battery condition with appropriate tools and diagnose faults, if any</p> <p>P2. Check starter motor for loose, corroded or broken connections or grinding noise during start, if any</p> <p>P3. Check solenoid relay and fuses with appropriate tools and replace faulty parts, if any</p> <p>P4. Check slipping/damage teeth of pinion and fly wheel and replace faulty part/s, if any</p> <p>P5. Replace/repair faulty Starter Motor, if required</p>
<p>5. Repair Lighting System</p>	<p>P1. Check the headlights at high/low beam, tail lights and replace faulty parts, if any</p> <p>P2. Check reverse lights and reverse gear switch and replace in case of any fault</p> <p>P3. Check fog lights and replace in case of any fault</p> <p>P4. Check roof and reading lights and replace in case of any fault</p> <p>P5. Check break switch to verify flow of power supply and replace faulty part/s, if any</p> <p>P6. Check turn signals (indicators) to verify flow of power supply and replace faulty part/s, if any</p> <p>P7. Check parking/instrument panel light bulbs and replace in case of any fault</p> <p>P8. Check combination switch and replace damaged/faulty parts, if any</p>

	P9. Check all relays and fuses of lighting system and replace faulty parts, if any
6. Repair Engine Cooling Fan & Electrical Circuit	<p>P1. Carry out inspection of operation of cooling fan and repair the faults, if any</p> <p>P2. Carry out inspection of Water Temperature Gauge, and Sensor/Switch and replace faulty parts, if any</p> <p>P3. Carry out inspection of cooling fan relay, fuse, and replace faulty parts, if any</p> <p>P4. Carry out inspection of wiring harness and repair/replace faulty part/s, if any</p>

Knowledge & Understanding

This competency standard will provide knowledge related to:

- Manufacturer's Repair Manual
- Uses of Measuring Tools
- Use of Scanners
- Alternator with Voltage Regulator
- Wiring Harness and Wiring Circuit Diagram (EWD)
- Spark Plug
- Different Types of Batteries (including Hybrid Batteries)
- Use of Tools and Equipment
- Different Types of Ignition System
- Types of Sensors
- Electronic Control Module (ECM)
- Ignition Timing Light
- C.B Point and Condenser

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Service the battery according to SOPs

Code:

Repair Instrument Panel

Overview

This competency standard is designed to provide skills and knowledge related to repairing of Instrument Panel of Vehicle by Auto Electrician, in accordance with the Manufacturer's Manual. You will be able to repair faulty part/s of Instrument Panel according to set standards.

Competency Units	Performance Criteria
1. Replace Gauges	P1. Check instrument panel visually to find any abnormality in gauges P2. Verify the abnormal current flow or bad connection of gauges with the help of Scanners and Multimeter P3. Repair/replace wiring harness or faulty parts, if any
2. Replace Sensors	P1. Check Instrument Panel visually to find any abnormality in sensors P2. Verify the abnormal current flow or bad connection of sensors with the help of scanners and Multimeter P3. Repair/replace wiring harness or faulty parts, if any

Knowledge & Understanding

This competency standard will provide knowledge related to:

- Understanding of Manufacturer Repair Manual
- Different Types Gauges used in Instrument Panel
- The operating principles of Electronic Gauges
- Different Types of Sensors, location and working principles
- The differences between types of displays: Light Emitting Diode (LED), Liquid Crystal Display (LCD) and Vacuum Fluorescent Display (VFD)

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify and fix Instrumental Panel faults as per set standards

Code:

Repair HVAC System of the Vehicle

Overview

This competency standard is designed to provide skills and knowledge to repair HVAC system of vehicle by Auto Electrician, in accordance with the manufacturer's Manual. You will be able to perform inspection and diagnose faults of HVAC system of the vehicle.

Competency Units	Performance Criteria
1. Repair Heating in HVAC System	<p>P1. Check hoses connection and water circulation in HVAC heating system and repair any loose connection or replace damaged parts</p> <p>P2. Check for any leakage or blockage and replace faulty parts, if any</p> <p>P3. Check dumper and repair faulty parts to ensure stable operation of heating core</p> <p>P4. Carry out inspection of blower motor and replace in case of any fault/s or irregularity</p>
2. Repair Air Conditioning System	<p>P1. Inspect switches, relays, fuses and wiring circuit and repair/replace faulty part/s, if any</p> <p>P2. Inspect Air Conditioning System visually and replace manually damaged or leaking part/s, if any</p> <p>P3. Use the AC Recycling Machine to check the refrigerant pressure in system and refill it with new refrigerant as per set standards</p> <p>P4. Detect any abnormal noise from compressor and replace faulty part/s, if any</p> <p>P5. Monitor Air Flow in the system and repair/replace clogged or damaged part/s, if any</p>
3. Repair Ventilation System	<p>P1. Inspect switches, fuse and wiring circuit and repair/replace faulty part/s, if any.</p> <p>P2. Inspect air flow in different modes of Ventilation System and repair/replace in case of any fault</p>

Knowledge & Understanding

This competency standard will provide knowledge related to:

- Understanding of Manufacturer Repair Manual
- Wiring Harness and Wiring Circuit Diagram (EWD)

- Heat Transfer Method
- Measuring Tools and Equipment
- Occupational Health & Safety (OHS)Precautions

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Diagnose faults in HVAC and replace/ repair faulty part/s confirming the smooth functioning of the vehicle

Code:

Repair Chassis Electrical Circuits

Overview

This competency standard is designed to provide skills and knowledge to repair electrical systems at chases of vehicle by Auto Electrician, in accordance with the manufacturer's Manual. You will be able to perform inspection and diagnose faults of Electrical Circuits used in chassis of vehicle and perform road test to verify a performance of the vehicle.

Competency Units	Performance Criteria
1. Repair Electronic Brake System (ABS)	<p>P1. Identify faults of Electronic Brake System using Scanner</p> <p>P2. Inspect continuity of electricity in wire harness and diagnose faults, if any</p> <p>P3. Identify faulty components of Brake System (sensors, modulator etc.) to identify faults, if any</p> <p>P4. Check Brake Indicator Switches to identify faults. Repair/replace damaged wire harness according to set standards</p> <p>P5. Replace faulty components of Brake System (sensors, modulator etc.) according to SOPs</p> <p>P6. Perform road test to ensure the proper working of Electronic Brake System</p>
2. Repair Auto Transmission	<p>P1. Carry out road test at different speeds for smooth operations of torque converter and gear shifting according to manufacturer standard</p> <p>P2. Check electrical controls and Hydraulic Pressure of automatic transmission for faults if any</p> <p>P3. Check automatic transmission mounts for faults if any</p> <p>P4. Check automatic transmission solenoid by using electronic scanner and identify faults if any</p> <p>P5. Carryout vehicle road test of automatic transmission for engagement and disengagement, abnormal noise and vibrations if any</p>

<p>3. Repair Electronic Power Steering (EPS)</p>	<p>P1. Diagnose faults in EPS with the help of scanner and remove code, if any</p> <p>P2. Check and replace faulty fuse, relay and control module, if required</p> <p>P3. Check the motor of power steering (EPS) and replace faulty parts, if any</p> <p>P4. Check wiring harness to find cuts or damages and repair/replace, if required</p>
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Knowledge & Understanding

This competency standard will provide knowledge related to:

- Manufacturer Repair Manual
- Measuring Tools and Equipment
- Wiring Harness with Wiring Circuit Diagram
- Basics of Electronic Power Steering (EPS)
- Types and specification of tyres
- Types of Sensors and their use
- Basic Electrical/Electronic Terminology and principal
- Functions of Electronic Brake Force Distribution (EBD) System
- Functions and working of ABS System
- ABS air bleeding procedure
- Occupational Health & Safety (OHS) precautions

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Diagnose faults in chassis electrical and replace/ repair faulty part/s confirming the smooth functioning of the vehicle

Code:

Repair Comfort and Safety Features/ Systems of the Vehicle

Overview

This competency standard is designed to provide skills and knowledge to repair system for Comfort and Safety Features of Vehicle by Auto Electrician, in accordance with the manufacturer's Manual. You will be able to diagnose faults and perform repairing according to SOPs.

Competency Units	Performance Criteria
1. Repair Power Windows	<p>P1. Check the functionality of fuses, relays, switches and replace faulty parts, if any</p> <p>P2. Monitor Current flow with Digital Multimeter and repair damage/s, as per set standard</p> <p>P3. Check power window motor and observe any abnormal sound from doors and repair faulty parts if any</p> <p>P4. Check visually cable/gear driven regulators for any damage/s and replace faulty part/s, if any</p>
2. Repair Sun Roof	<p>P1. Inspect sunroof operation and diagnose the fault, if any</p> <p>P2. Observe any abnormal sound during opening/closing operation of Sun Roof and fix it according to manufacturer specifications</p> <p>P3. Check channel / track condition and service dirty parts, if any</p>
3. Repair Security and Immobilizer	<p>P1. Start the car to check for any failure</p> <p>P2. Find the failure with the help of Scanner and fix the problem according to set standards</p> <p>P3. Check the condition of receiver key and replace, if required</p>
4. Repair Center Locking System	<p>P1. Check the battery of remote with the help of Multimeter and replace faulty parts, if required</p> <p>P2. Check fuse module and wiring circuit current flow and repair faulty parts, if required</p> <p>P3. Observe any abnormal noise from door lock actuators, find the fault and fix it according to set</p>

	standards
5. Repair Supplemental Restraint System (SRS)	<p>P1. Check Supplemental Restraint System (SRS) using Scanner</p> <p>P2. Identify faulty components of Supplemental Restraint System (SRS) (Spiral Cable, Seatbelt, SRS unit, Control Module, Sensor etc.) and replace faulty parts, if any</p> <p>P3. Inspect continuity of electricity in wire harness and repair/replace faulty harness, if required</p>
6. Repair Cruise Control System	<p>P1. Check the Cruise Control System and diagnose fault with the help of Scanner, if any</p> <p>P2. Check continuity of Spiral Cable, Cruise Switch, Brake Light Switch, Fuse and Module with the help of Digital Multimeter (DMM) and replace faults if any</p> <p>P3. Check wiring harness circuit, and repair/replace faulty harness, if required</p>
7. Repair Wiper & Washer System	<p>P1. Blown Wiper system fuse. Check and replace fuse</p> <p>P2. Check loose wiper system, electrical/wiper motor connection and secure relevant connections</p> <p>P3. Check and tighten disengaged or loose wiper motor linkage or replace with new linkage fixings, if required</p> <p>P4. Check relay/wiper motor and multi switch; renew relay motor; replace to confirm fault; and renew relay, wiper motor, multi switch</p> <p>P5. Check the washer fluid reservoir for dirt / leakage and clean it well inside, if required</p> <p>P6. Look for cracks, leaks in the plastic or rubber hoses connected to the washer reservoir. Replace any faulty hoses, if any</p> <p>P7. Unclog dirt from nozzles, hoses or screens and service these using a long pin or fine wire to pick out or poke through clogged dirt, if required</p>
8. Repair Electrically Controlled Seats	<p>P1. Check operation of the seat in each direction of movement to verify the functionality of seats</p> <p>P2. Inspect the fuse, wiring and remove/replace faulty part/s, if any</p> <p>P3. Inspect the power seat switches and remove/replace the switch if faulty</p> <p>P4. Check motor condition to ensure that the motor is not clogged with debris and replace faulty part/s, if any</p>

9. Repair Horn	P1. Blow the horn to check the functionality P2. Check the fuse, relay and wiring circuit in case of no or low sound and replace faulty part/s, if any
10. Repair Power Mirrors	P1. Check movements of mirrors in different directions to inspect the functionality of power mirrors P2. Check fuse, circuit wiring and control switch and replace faulty part/s, if any P3. Check for any hard sound deadening in all four doors and replace faulty part/s, if any P4. Check the function of folding and replace non-functioning part/s, if any

Knowledge & Understanding

This competency standard will provide knowledge related to:

- Understanding of Manufacturer Repair Manual
- Tools and Equipment required to repair or replace comfort and safety features of vehicle
- Wiring Harness and Wiring Circuit Diagram (EWD)
- Types of power windows
- Immobilizer
- Immobilizer key coding method
- Center Locking System
- SRS
- Cruise Control System
- Wiper & Washer
- Electric Seats Control System
- Horn & Power Mirrors

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify and repair fault(s) in comfort and safety features of vehicle

Code:

Repair Fuel and Emission Control System

Overview

This competency standard is developed to provide skills and knowledge to repair the Fuel and Emission Control System in accordance with the manufacturer's Repair Manual. You will be able to diagnose and repair the Fuel and Emission Control System.

Unit of Competency	Performance Criteria
1. Repair Electronic Fuel Injection System (EFI)	<p>P1. Check EFI system with the help of scanner to diagnose faults, if any</p> <p>P2. Check Fuel Pump pressure with the help of fuel pressure tester to verify the appropriate functioning and replace the faulty Fuel Pump as per given standards</p> <p>P3. Check Fuel Injector Resistance with the help of multi-meter to ensure standard operation and replace the faulty Fuel Injector as per given standards</p> <p>P4. Replace clogged/ contaminated Fuel Filter, if any</p>
2. Repair Exhaust Gas Recirculation (EGR) System	<p>P1. Identify the type of EGR valve of your vehicle and remove fault, if any</p> <p>P2. Check Oxygen sensor with the help of scanner and replace in case of any fault</p> <p>P3. Check Wiring Harness and repair/ replace faulty wire as per set standards</p> <p>P4. Check and service EGR System in case of any contamination or clog as per set standards</p>
3. Replace Oxygen Sensors	<p>P1. Inspect Oxygen sensor visually to check for any misfire or damage</p> <p>P2. Diagnose Oxygen sensor with the Scanner to check for malfunction</p> <p>P3. Inspect Oxygen Sensor to ensure the clean emission of vehicle and replace in case of any fault</p> <p>P4. Inspect Oxygen Sensor to check for any sluggish or slightly corroded sulphate and perform cleaning, if Required</p> <p>P5. Check Wiring Harness of Oxygen Sensor and replace/ repair harness, if any</p>

Knowledge & Understanding

This competency standard will provide knowledge related to:

- Understanding of Manufacturer Repair Manual
- Tools and Equipment required to repair or replace comfort and safety features of vehicle
- Wiring Harness and Wiring Circuit Diagram (EWD)
- Use of Vehicle Scanner
- Use of Measuring Tools and Equipment

Critical Evidence(s) Required

The candidate needs to produce following critical evidence(s) in order to be competent in this competency standard:

- Identify the Fuel and Emission Control System faults and repair as per set standards

LIST OF TOOLS AND EQUIPMENT

Sr. No.	Description
1.	A/C Gas Manifold Gauge Set
2.	A/C Gas Recycling Machine
3.	A/C Gas Leakage Detector
4.	Allen Key Set
5.	Battery Tester
6.	Bench Vice
7.	Brake Efficiency Tester
8.	Brushes different types
9.	Cleaning Equipment with Detergent
10.	Coil Spring Compressor
11.	Computer Lead Box/ Diagnosis System/ Interface Box
12.	Condenser Tester
13.	DBMeter (Sound Tester)
14.	Dial Gauge with Magnetic Stand
15.	Drill Bits Set (Mason, Metal)
16.	Drill Machine
17.	Dual Techo Meter
18.	Dust Blower
19.	Electric Connector Remover
20.	Feeler Gauge
21.	Files Set for Contact Points Facing
22.	Fuel Pressure Gauge
23.	General Mechanic's Hand Tools
24.	Hammer: different size and types
25.	Hand Drilling Machine
26.	Heat Gun
27.	Hydrometer (Gravity Meter)
28.	Injector Cleaner
29.	Injector Tester
30.	Insulation Tape
31.	Insulation Tester
32.	Jack Hoist/ Stands
33.	Jack Telescopic with Weight Lifting Capacity 1.5 Tons
34.	Jack Trolley Type with Weight Lifting Capacity 5 Tons
35.	Lifting Equipment (Service Pit)
36.	Lock Pliers
37.	Magnifying Glass
38.	Magnetic Stick
39.	Marking Tools
40.	Masking Tape
41.	Measuring Precision Tools/ Instruments
42.	Measuring Tape

43.	Multi Scanner Tools for Vehicle
44.	Multimeter (AVO Meter)
45.	Oscilloscope
46.	Pedestal Drilling Machine
47.	Pliers Set
48.	Pullers: different types
49.	Safety Clothing, Equipment and Kit
50.	Scraper
51.	Screw Driver Kit
52.	Set of Spanner
53.	Soldering Gun
54.	Soldering Iron
55.	Soldering Wire and Paste
56.	Spark Plug Deep Sockets
57.	Spark Plug Tester
58.	Special Service Tools Recommended by the Manufacturer
59.	Star Key Set (Torx Key set)
60.	Stroboscope
61.	Sucker
62.	Temperature Gauge
63.	Testing Board
64.	Torque Wrench
65.	Tweezers Kit
66.	Wire Brush
67.	Wires of different Gauges
68.	Work Bench
69.	Wrenches Set