

AUTOMOBILE MECHANICS

Competency Standards

National Vocational
Certificate Level 2

Version 1 - July 2015

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Authors

Mr. Arslan Ahmed (Freelance Consultant)

Responsible

Director General Skills Standard and Curricula, National Vocational and Technical Training Commission
National Deputy Head, TVET Reform Support Programme, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Overview: This Competency Standard identifies the competencies required to complete documentation requirement, at workplace by Automobile Mechanic, in accordance with the organization’s approved guidelines and procedures. You will be expected to verify customer complaint and complete work estimate at all times, at workplace. Your underpinning knowledge regarding completion of documentation requirement will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
A1. Verify customer complaint	<p>You will be able to:</p> <p>P1. Record customer complaint as per organizational procedure</p> <p>P2. Conduct root cause analysis to investigate customer complaint</p> <p>P3. Perform test drive to isolate the problem</p> <p>P4. Arrange tools and equipment required for diagnosing</p> <p>P5. Follow safety precautions at workplace</p> <p>P6. Finalize the customer concern regarding complaint as per organizational procedure</p>	<p>You will be able to:</p> <p>K1. Define job/repair order</p> <p>K2. Organizational reporting procedures</p> <p>K3. Explain how to conduct root cause analysis</p> <p>K4. Describe the functions of vehicle systems</p> <p>K5. Describe the usage of tools and equipment for diagnosing</p> <p>K6. Explain the safety precautions regarding personal health and workplace</p>	Testers, scanners, sound detectors, Digital multi-meters, analyzers, gauges, job card/repair order

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
A2. Prepare Work estimate	<p>You will be able to:</p> <p>P1. Prepare a cost estimate form based on diagnose result including:</p> <ul style="list-style-type: none"> • Labour cost • Parts cost • Sublet cost <p>P2. Prepare time estimate form based on diagnose result</p>	<p>You will be able to:</p> <p>K1. Explain the functions of different components of vehicle</p> <p>K2. Describe the types of inventory system</p> <p>K3. Define flat rate time (FRT)</p> <p>K4. Explain the usage of repair manual</p> <p>K5. Explain market trends in pricing of labour and parts</p>	<p>Repair manual, Flat rate time (FRT). Estimation forms,</p>

Title B: Perform Preventive Maintenance

Overview: This Competency Standard identifies the competencies required to perform preventive maintenance, at workplace by Automobile Mechanic, in accordance with the organization's approved guidelines and procedures. You will be expected to Verify vehicle specific maintenance schedule, Conduct under vehicle inspection, Inspect all lubricants of the vehicle and conduct road test at all times, at workplace. Your underpinning knowledge regarding preventive maintenance will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
B1. Verify vehicle specific maintenance schedule	You will be able to: P1. Record time period/ millage of vehicle for maintenance schedule P2. Implement the maintenance schedule as per requirement	You will be able to: K1. Explain the periodic maintenance schedule and its importance	Repair manual
B2. Conduct under vehicle inspection (e.g., exhaust system, fluid leaks)	You will be able to: P1. Arrange tools and equipment required for vehicle inspection P2. Follow organizational guidelines for inspection of vehicle P3. Follow safety precautions at workplace	You will be able to: K1. Explain the usage of tools and equipment for vehicle inspection K2. Read and interpret repair manual K3. Explain the safety precautions regarding personal health and workplace	Lifts, jacks, spanners, wrenches, hammers, socket set, screw driver, plier, filter spanner, special service tool (SST), PPEs
B3. Inspect all lubricants of the vehicle	You will be able to: P1. Record the time period/millage of vehicle for lubricant maintenance schedule	You will be able to: K1. Describe the usage of lubricants used in vehicle	Spanners, socket set, oil filler gun, oil transfer equipment, funnel, repair manual
			Page 6

	<p>P2 Inspect the following lubricants according to repair manual :</p> <ul style="list-style-type: none"> • Transmission fluid • Brake/clutch fluid • Engine oil • Power steering fluid • Suspension fluid • Differential fluid <p>P3. Follow safety precautions at workplace</p>	<p>K2. Explain the levels and grading of lubricants</p> <p>K3. Identify the bad effects of lubricants on human health and environment e.g: brake fluid, used engine oil</p> <p>K4. Explain the storage and disposal of lubricants</p> <p>K5. Read and interpret repair manual</p>	
B4. Conduct road test of vehicle	<p>You will be able to:</p> <p>P1. Follow the organizational policy regarding road test</p> <p>P2. Verify the followings on road test following organizational guidelines:</p> <ul style="list-style-type: none"> • Function of gauges • Drivability performance • Tracking performance • Braking performance • Noises • Vibrations • Engine performance <p>P3. Follow safety precautions while driving</p>	<p>You will be able to:</p> <p>K1. Explain organizational rules, regulations and policies regarding road test</p> <p>K2. Describe organizational standard operating procedures (SOPs)</p> <p>K3. Explain the function of gauges</p> <p>K4. Explain how to check the performance of vehicle</p> <p>K5. Identify different types of noises and vibrations</p> <p>K6. Explain local driving laws</p>	<p>Scanner, seat covers protector, steering wheel cover, hand brake cover, gear lever cover, floor matts, driving license</p>

Title C: Maintain Brake System

Overview: This Competency Standard identifies the competencies required to maintain brake system of vehicle, at workplace by Automobile Mechanic, in accordance with the organization's approved guidelines and procedures. You will be expected to perform inspection and diagnoses of brakes, rebuild/replace brake Master cylinder, rebuild/replace wheel cylinders of vehicle, rebuild/replace calipers of vehicle, service parking brake system of vehicle, bleed brake system of vehicle, diagnose fault codes of ABS/TCS/VSA, service ABS/TCS/VSA systems of vehicle and road test vehicle to verify repair, at workplace. Your underpinning knowledge regarding maintenance of brake systems of a vehicle will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
<p>C1 Perform inspection & diagnosis of brakes</p>	<p>You will be able to:</p> <p>P1. Carry out a road test to diagnose faults in brake system</p> <p>P2. Inspect the followings on road test:</p> <ul style="list-style-type: none"> • Vibration on brake paddle • Abnormal Noise • Brake grip • Anti-lock brake system (ABS) • Left right pulling • Brake performance <p>P3. Arrange tools and equipment required for brake inspection</p> <p>P3. Inspect the followings at workplace according to repair manual:</p>	<p>You will be able to:</p> <p>K1. Explain organizational rules, regulations and policies regarding road test</p> <p>K2. Describe organizational standard operating procedures (SOPs)</p> <p>K3. Explain braking system of vehicle</p> <p>K4. Explain ABS system</p> <p>K5. Read and interpret repair manual</p> <p>K6. Explain the application and importance of measuring tools</p> <p>K7. Describe the procedure to check the run out of disc plate</p>	<p>Scanner, SSTs, repair manual, vernier caliper, dial indicator gauge, wheel spanner, spanner set, socket set, PPEs</p>
			<p>Page 8</p>

	<ul style="list-style-type: none"> ● Brake oil ● Disc pad and brake shoe thickness ● Disc plate/brake drum surfaces ● Brake calipers ● ABS/VSS (vehicle speed sensor) sensors ● Brake master cylinder ● Wheel cylinders ● Hand brake cables ● Brake booster <p>P4. Follow safety precautions while driving and at workplace</p>	<p>K8. Explain how to check the ABS sensors and modulator through scanner</p> <p>K9. Explain local driving laws</p> <p>K10. Explain the safety precautions regarding personal health and workplace</p>	
C2 Rebuild/ replace brake master Cylinder of vehicle	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to rebuild/replace brake master cylinder</p> <p>P2. Follow the instructions of repair manual to rebuild/replace brake master cylinder</p> <p>P3. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for rebuild/replace brake master cylinder</p> <p>K2. Read and interpret repair manual</p> <p>K3. List the adverse effects of brake fluid on human health, vehicle body and workplace</p>	SSTs, spanners, repair manual, bleeding kit, bench vice, personal protective equipment (PPE)
C3 Rebuild/ replace wheel cylinders of vehicle	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to rebuild/replace wheel cylinder</p> <p>P2. Follow the instructions of repair manual to rebuild/replace wheel cylinder</p> <p>P3. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for rebuild/replace wheel cylinder</p> <p>K2. Read and interpret repair manual</p> <p>K3. Explain the safety precautions regarding personal health and workplace</p>	Jacks, safety stand, technician stretcher, spanners, socket set, SSTs, bleeding kit, repair manual, personal protective equipment (PPE)
C4. Rebuild/replace	<p>You will be able to:</p>	<p>You will be able to:</p>	Jacks, safety stand, spanners, socket set, SSTs,

Calipers of vehicle	<p>P1: Arrange tools and equipment required to rebuild/replace calipers</p> <p>P2. Follow the instructions of repair manual to rebuild/replace calipers</p> <p>P3. Follow safety precautions at workplace</p>	<p>K1. Explain the usage of tools and equipment for rebuild/replace calipers</p> <p>K2. Read and interpret repair manual</p> <p>K3. Explain the safety precautions regarding personal health and workplace</p>	bleeding kit, back winding tool, bench vice, repair manual, personal protective equipment (PPE)
C5 Service parking brake system of vehicle	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to service parking brake system</p> <p>P2. Follow the instructions of repair manual to service parking brake system</p> <p>P3. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing parking brake system</p> <p>K2. Read and interpret repair manual</p> <p>K3. Identify the types of parking brake system</p> <p>K4. Explain the safety precautions regarding personal health and workplace</p>	Jack, safety stand, Screw driver, spanners, amery paper, Personal protective equipment (PPE)
C6 Bleed brake system of vehicle	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to bleed brake system</p> <p>P2. Follow the instructions of repair manual to bleed brake system</p> <p>P3. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing parking brake system</p> <p>K2. Read and interpret repair manual</p> <p>K3. Describe the methods of bleeding brake system</p> <p>K4. Explain the grading of brake fluid</p> <p>K5. Explain the safety precautions regarding personal health and workplace</p>	Bleeding kit, scanners, SSTs, spanners, personal protective equipment (PPE), repair manual
C7. Diagnose fault	<p>You will be able to:</p>	<p>You will be able to:</p>	Scanners, spanners, electric wiring diagram (EWD),

<p>codes of ABS/TCS/VSA</p>	<p>P1: Arrange tools and equipment required to diagnose ABS fault codes</p> <p>P2. Follow the instructions of repair manual to diagnose ABS/TCS (traction control system)/VSA (vehicle stability assist) fault codes</p> <p>P3. Follow the Electric wiring diagram (EWD) for electrical diagnoses of ABS system</p> <p>P4. Follow safety precautions at workplace</p>	<p>K1. Explain the usage of tools and equipment for diagnosing faults in ABS</p> <p>K2. Read and interpret EWD</p> <p>K3. Read and interpret repair manual</p> <p>K4. Explain the safety precautions regarding personal health and workplace</p>	<p>repair manual, multi-meter, test lamp, cutter plier, screw driver, PPE</p>
<p>C8 Service ABS/TCS/VSA systems of vehicle</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to service ABS/TCS/VSA</p> <p>P2. Follow the instructions of repair manual to service ABS/TCS/VSA</p> <p>P3. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment to service ABS/TCS/VSA</p> <p>K2. Read and interpret EWD</p> <p>K3. Read and interpret repair manual</p> <p>K4. Explain the safety precautions regarding personal health and workplace</p>	<p>Scanners, spanners, EWD, repair manual, multi-meter, insulation tape, test lamp, cutter plier, screw driver, PPE</p>
<p>C9. Conduct Road test of vehicle to verify repair</p>	<p>You will be able to:</p> <p>P1. Follow the organizational policy regarding road test</p> <p>P2. Verify the followings on road test according to organizational guidelines:</p> <ul style="list-style-type: none"> • Function of ABS • Drivability performance • Tracking performance 	<p>You will be able to:</p> <p>K1. Explain organizational rules, regulations and policies regarding road test</p> <p>K2. Describe organizational standard operating procedures (SOPs)</p> <p>K3. Explain the function of brake system</p>	<p>Scanner, seat covers protector, steering wheel cover, hand brake cover, gear lever cover, floor matts, driving license</p>

	<ul style="list-style-type: none">• Braking performance• Parking brake performance• Noises• Vibrations <p>P3. Follow safety precautions while driving</p>	<p>K4. Explain how to check the brake performance of vehicle</p> <p>K6. Explain local driving laws</p>	
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Title D. Maintain Engine

Overview: This Competency Standard identifies the competencies required to maintain engine of vehicle, at workplace by Automobile Mechanic, in accordance with the organization's approved guidelines and procedures. You will be expected to diagnose engine problems of vehicle, Service engine gasket of vehicle, Service engine seals of vehicle, service engine cooling system of vehicle, service engine lubrication system of vehicle, service valve train components of vehicle and service engine block components of vehicle, at workplace. Your underpinning knowledge regarding maintenance of engine of vehicle will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
D1 Diagnose engine problems of vehicle	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to diagnose problems of engine</p> <p>P2. Follow the instructions of repair manual to diagnose problems of engine</p> <p>P3. Inspect the followings in engine of vehicle according to repair manual:</p> <ul style="list-style-type: none"> • Abnormal noises • Engine combustion • Ignition • Oil leakages • Vacuum and pressure leakages • Water leakages • Over heat • Drive belts • Fuel system <p>P4. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for diagnosing engine problems</p> <p>K2. Read and interpret repair manual</p> <p>K3. Describe the function of engine components</p> <p>K4. Explain the types of engine</p> <p>K5. Explain the safety precautions regarding personal health and workplace</p>	Spanners, socket set, pliers, screw drivers, compression gauge, fuel pressure gauge, filler gauge, oil pressure gauge, scanner, off-car injector simulator, repair manual, PPE
D2. Service engine gaskets (e.g., head, manifold) of vehicle	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to service engine gaskets</p> <p>P2. Follow the instructions of repair manual to</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing engine gaskets</p> <p>K2. Read and interpret repair manual</p>	spanners., socket set, torque wrench, T handles, screw drivers, scrappers, nose plier, repair manual, PPE

	<p>service engine gaskets</p> <p>P3. Inspect the following gaskets of engine according to repair manual:</p> <ul style="list-style-type: none"> • Head gasket • In take manifold gasket • Exhaust manifold gasket • Tappet cover gasket • Oil pan gasket • Water pump gasket <p>P4. Follow safety precautions at workplace</p>	<p>K3. Describe the function of gaskets</p> <p>K4. Explain the types of gaskets</p> <p>K5. Explain the safety precautions regarding personal health and workplace</p>	
<p>D3 Service engine seals of vehicle (rear main)</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to service engine seals of vehicle</p> <p>P2. Follow the instructions of repair manual to service engine seals of vehicle</p> <p>P3. Inspect the following seals of engine according to repair manual:</p> <ul style="list-style-type: none"> • Main oil seal • Crank shaft seal • Cam shaft seal • Distributor shaft seal • Valve seal • Oil pump seal • VVTI valve seal • Injector seal <p>P4. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing engine gaskets</p> <p>K2. Explain the usage of special service tools (SSTs) for removing and fixing seals</p> <p>K3. Read and interpret repair manual</p> <p>K4. Describe the function of oil seals</p> <p>K5. Outline the specifications of oil seals</p> <p>K6. Explain the safety precautions regarding personal health and workplace</p>	<p>SSTs, screw drivers, spanners, T handles, socket sets, plastic hammer, repair manual, torque wrench, PPE</p>

<p>D4 Service engine cooling system (e.g. water pump, radiator, coolant flush) of vehicle</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to Service engine cooling system</p> <p>P2. Follow the instructions of repair manual to Service engine cooling system</p> <p>P3. Inspect the level and quality of the coolant according to repair manual</p> <p>P4. Inspect the following components of the cooling system of vehicle according to repair manual:</p> <ul style="list-style-type: none"> ● Radiator ● Hose pipes ● Water pump ● Water jacket ● Thermostat valve ● Radiator fan ● Radiator pressure cap ● Radiator reservoir ● Radiator coolant ● Automatic fan switch ● Temperature sensor ● Drive belts ● Hose pipes clamp <p>P5. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing engine cooling system</p> <p>K2. Explain the usage of special service tools (SSTs) for cooling system</p> <p>K3. Read and interpret repair manual</p> <p>K4. Describe the properties of radiator coolant</p> <p>K5. Describe the properties of radiator hoses</p> <p>K6. Describe the function of radiator pressure cap</p> <p>K8. Explain the safety precautions regarding personal health and workplace</p>	<p>SSTs, spanners, pliers, repair manual, screw drivers, thermometer, scanner, PPE</p>
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<p>D5. Service engine lubrication system (e.g., oil pump) of vehicle</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to Service engine lubrication system</p> <p>P2. Follow the instructions of repair manual to Service engine lubrication system</p> <p>P3. Inspect the level and quality of lubricants used in vehicle, according to repair manual</p> <p>P4. Inspect the following components of the lubricating system of vehicle according to repair manual:</p> <ul style="list-style-type: none"> • Oil pump • Oil galleries • Oil filter • Oil pressure switch • Oil pan • Oil pump stainer • Engine oil <p>P5. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing engine lubrication system</p> <p>K2. Explain the usage of special service tools (SSTs) for engine lubrication system</p> <p>K3. Read and interpret repair manual</p> <p>K4. Describe the properties of engine oil</p> <p>K5. Describe the function of oil and oil filter</p> <p>K6. Describe the working principle of oil pressure switch</p> <p>K7. Describe the types and functions of oil pump</p> <p>K8. Explain the safety precautions regarding personal health and workplace</p>	<p>SSTs, spanners, socket set, torque wrench, funnel, repair manual, PPE</p>
<p>D6 Service valve train components of vehicle</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to Service valve train components</p> <p>P2. Follow the instructions of repair manual to Service valve train components</p> <p>P3. Inspect the following components of the valve train components according to repair manual:</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing valve train components</p> <p>K2. Explain the usage of special service tools (SSTs) for servicing valve train components</p> <p>K3. Read and interpret repair manual</p>	<p>Spanner set, screw drivers, socket set, filler gauge, SSTs, repair manual, plier, bench vice, PPE</p>

	<ul style="list-style-type: none"> • In take valve • Exhaust valve • Valve guide • Valve spring • Retainer washer • Rocker arm • Rocker arm shaft • Cam shaft • VVTI / VTec solenoid valves • Cam shaft position sensor <p>P5. Follow safety precautions at workplace</p>	<p>K4. Describe the function of VVTI/VTec</p> <p>K5. Explain how to check valve seats</p> <p>K6. Explain how to check valve clearance</p> <p>K7. Explain the function of cam sensor</p> <p>K8. Explain the safety precautions regarding personal health and workplace</p>	
<p>D7 Service Engine Block Components of vehicle</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to Service engine block components</p> <p>P2. Follow the instructions of repair manual to Service engine block components</p> <p>P3. Inspect the following components of the engine block components according to repair manual:</p> <ul style="list-style-type: none"> • Piston • Connecting rods • Main shell bearings • Big ends bearings • Thrust washers • Crank shaft • Crank shaft sensor • Crank shaft pulser • Block sleeves 	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing engine block components</p> <p>K2. Explain the usage of special service tools (SSTs) for servicing engine block components</p> <p>K3. Read and interpret repair manual</p> <p>K4. Identify the noises of main bearings, connecting rods and piston pins</p> <p>K6. Explain the function of crank shaft sensor and crank shaft pulser</p> <p>K7. Explain the role of piston and piston rings</p> <p>K8. Explain the role of block sleeves</p> <p>K9. Explain the safety precautions regarding personal health and workplace</p>	<p>SSTs, ring compressor, torque wrench, screw drivers, repair manual, socket set, plastic hammer, PPEs</p>

	<ul style="list-style-type: none">• Rod bush <p>P5. Follow safety precautions at workplace</p>		
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TITLE E. Maintain Fuel System

Overview: This Competency Standard identifies the competencies required to maintain fuel system of vehicle, at workplace by Automobile Mechanic, in accordance with the organization's approved guidelines and procedures. You will be expected to diagnose fuel system problems of vehicle and service fuel metering system of vehicle ,at workplace. Your underpinning knowledge regarding maintenance of fuel system of a vehicle will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
<p>E1. Diagnose fuel system problems of vehicle</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to diagnose fuel system problems</p> <p>P2. Follow the instructions of repair manual to diagnose fuel system problems</p> <p>P3. Inspect the following components of fuel system according to repair manual:</p> <ul style="list-style-type: none"> • Fuel pump • Fuel pump motor • Fuel pressure regulator • Fuel damper • Fuel injectors • Supply lines • Fuel filter • Fuel gauge • Fuel injector gallery • O rings <p>P4. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for diagnose fuel system</p> <p>K2. Explain the usage of special service tools (SSTs) for fuel system</p> <p>K3. Read and interpret repair manual</p> <p>K4. Describe the properties of gasoline</p> <p>K6. Describe the function of fuel pump motor</p> <p>K6. Describe the function of fuel filter</p> <p>K6. Describe the function of fuel damper</p> <p>K6. Describe the function of fuel pressure regulator</p> <p>K6. Describe the function of fuel injector</p> <p>K8. Explain the safety precautions regarding personal health and workplace</p>	<p>Repair manual, spanner, gauges, sockets set, pliers, SST ,lock pliers, scanner , off car injector simulator ,PPE</p>
<p>E2. Service fuel metering System (e.g. injectors, regulators, switching valve) of vehicle</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to service fuel metering system</p> <p>P2. Follow the instructions of repair manual to service fuel metering system</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing fuel metering system</p> <p>K2. Explain the usage of special service tools (SSTs) for servicing fuel metering system</p>	<p>SSTs, Scanner, multi meter, off car injector simulator, screw drivers, spanners, pliers, socket set, repair manual, star Allen keys, PPEs</p>

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
	<p>P3. Inspect the following components of fuel metering system according to repair manual:</p> <ul style="list-style-type: none"> ● Engine control module (ECM) ● Air flow sensor ● Heated oxygen sensor ● Map sensor ● In take air temperature sensor (IAT) ● Throttle position sensor ● Coolant temperature sensor ● In take air control valve (IACV) <p>P4. Follow safety precautions at workplace</p>	<p>K3. Read and interpret repair manual</p> <p>K4. Explain the functions of electronic fuel injection system (EFI)</p> <p>K5. Explain the function of all sensors of fuel metering system</p> <p>K6. Explain the function of ECM and injector in fuel metering system</p> <p>K7. Explain the safety precautions regarding personal health and workplace</p>	

TITLE F: Perform Ignition System Service

Overview: This Competency Standard identifies the competencies required to perform service of ignition system of vehicle, at workplace by Automobile Mechanic, in accordance with the organization's approved guidelines and procedures. You will be expected to diagnose ignition system problems of vehicle, service distributor and C.B point of ignition system and Service spark plugs & wires of vehicle, service emission

control system of vehicle and perform ignition road test of vehicle ,at workplace. Your underpinning knowledge regarding service of ignition system of a vehicle will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
F-1 Diagnose ignition system problems (e.g., scan tool, scope) of vehicle	You will be able to: P1: Arrange tools and equipment required to diagnose ignition system problems P2. Follow the instructions of repair manual to diagnose ignition system problems P3. Inspect the following components of ignition system according to repair manual: <ul style="list-style-type: none"> ● Ignition switch ● Ignition coil ● Spark plug wires ● Spark plug ● Battery ● Distributor ● Contact breaker point (CB) ● Resistance ● Condenser ● Crank sensor ● Cam sensor ● Electronic control module (ECM) P4. Follow safety precautions at workplace	You will be able to: K1. Explain the usage of tools and equipment for diagnosing ignition system problems K2. Explain the usage of special service tools (SSTs) for diagnosing ignition system problems K3. Read and interpret repair manual K4. describe the electronic ignition system K5. Describe the distributor ignition system K5. Explain the function of sensors and actuators of ignition system K6. Explain the function of ECM in ignition system K7. Explain the safety precautions regarding personal health and workplace	Scanner, repair manual, multi meter, oscilloscope, lamp tester, spanners, socket set, T handles, magnetic stick, hydro meter, PPE

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
F-2 Service Distributor and C.B point of ignition system	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to service distributor and C.B point</p> <p>P2. Follow the instructions of repair manual to service distributor and C.B point</p> <p>P3. Inspect the following components of distributor according to repair manual:</p> <ul style="list-style-type: none"> • Contact breaker (C.B) point • Condenser • Router • Distributor cap • Router shaft • Advance plate • Governor weights • Advance vacuum mechanism <p>P4. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing distributor and C.B point</p> <p>K2. Explain the usage of ignition timing gun</p> <p>K3. Read and interpret repair manual</p> <p>K4. Explain the dwell angle of C.B point</p> <p>K5. Explain the sequence of firing order</p> <p>K6. Explain the safety precautions regarding personal health and workplace</p>	<p>Repair manual, ignition timing gun, spanner, filler gauge, star Allen keys, analyser, screw drivers, plier, PPE</p>
F3 Service spark plugs & wires of vehicle	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to service spark plugs and wires</p> <p>P2. Follow the instructions of repair manual to service spark plugs and wires</p> <p>P3. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing spark plugs and wires</p> <p>K2. Explain the usage of multi meter</p> <p>K3. Read and interpret repair manual</p> <p>K4. Identify the types and range of spark plugs</p> <p>K5. Describe the clearance of spark plugs</p> <p>K6. Explain the resistance of spark plug wires</p> <p>K7. Explain the safety precautions regarding personal health and workplace</p>	<p>Multi meter, filler gauge, socket set, plug cleaner, T handles, repair manual, PPE</p>

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
F4. Service emission control System of vehicle	<p>You will be able to:</p> <p>P1. Arrange tools and equipment required to service emission control system</p> <p>P2. Follow the instructions of repair manual to service emission control system</p> <p>P3. Inspect the following components of distributor:</p> <ul style="list-style-type: none"> • Catalytic convertor • Charcoal canister • Purge valve • Positive crankcase ventilation valve (PCV) • Fuel tank • Fuel tank lid • Exhaust gases recirculation valve (EGR) • Heated oxygen sensors (H2OS) <p>P4. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing emission control system</p> <p>K2. Explain the usage of special service tools (SSTs) for servicing emission control system</p> <p>K3. Read and interpret repair manual</p> <p>K4. Explain the emission control system</p> <p>K5. Describe the function of catalytic convertor</p> <p>K6. Describe the function of exhaust gases recirculation valve (EGR)</p> <p>K7. Explain the safety precautions regarding personal health and workplace</p>	SSTs, Scanner, repair manual, exhaust gas analyzer, back pressure tester, spanners, socket set, screw drivers, vacuum tester, PPE
F5. Perform ignition road test of vehicle	<p>You will be able to:</p> <p>P1. Follow the organizational policy regarding road test</p> <p>P2. Verify the followings on road test according to organizational guidelines:</p> <ul style="list-style-type: none"> • Pick up • Juttring • Drivability <p>P3. Follow safety precautions while driving</p>	<p>You will be able to:</p> <p>K1. Explain organizational rules, regulations and policies regarding road test</p> <p>K2. Describe organizational standard operating procedures (SOPs)</p> <p>K3. Explain the method of checking performance of vehicle</p> <p>K4. Explain local driving laws</p>	Scanner, seat covers protector, steering wheel cover, hand brake cover, gear lever cover, floor matts, driving license

Title G. Maintain Suspension/Steering Systems

Overview: This Competency Standard identifies the competencies required to perform service of ignition system of vehicle, at workplace by Automobile Mechanic, in accordance with the organization’s approved guidelines and procedures. You will be expected to diagnose ignition system problems of vehicle, service distributor and C.B point of ignition system and Service spark plugs & wires of vehicle, service emission control system of vehicle and perform ignition road test of vehicle ,at workplace. Your underpinning knowledge regarding service of ignition system of a vehicle will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
<p>G1. Diagnose steering and/or suspension problems of vehicle</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to diagnose steering/suspension problems</p> <p>P2. Follow the instructions of repair manual to diagnose steering/suspension problems</p> <p>P3. Inspect the following components of steering/suspension system according to repair manual:</p> <ul style="list-style-type: none"> ● Steering rack ● Steering box ● Steering column ● Intermediate shaft (cross) ● Electronic control unit (ECU) of power steering ● Electric power motor (EPS) ● Power steering pump ● Shock absorbers ● Lower control arms ● Upper control arms ● Ball joints ● Rack end set ● Tie rod end set ● Stabilizer bar ● Z links 	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for diagnosing steering/suspension problems</p> <p>K2. Explain the usage of special service tools (SSTs) for diagnosing steering/suspension problems</p> <p>K3. Read and interpret repair manual</p> <p>K4. describe the types of steering</p> <p>K5. Describe the function of scanner for electric power steering</p> <p>K6. Describe the function of power steering pump</p> <p>K6. Describe the role of stabilizer bar</p> <p>K7. Describe the geometry of suspension system of vehicle</p> <p>K8. Describe the function of shock absorber</p> <p>K9. Describe the turning radius of steering system</p> <p>K10. Describe the function of leaf spring</p>	<p>Jack, safety stand, Wheel aligner, wheel balancer, hammers, ball joint opener, tire lever, wheel spanner, spanner set, SSTs, air pressure gauge, sockets, screw drivers, lift, PPE</p>

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
	<ul style="list-style-type: none"> • Coil springs • Leaf springs • Shock mounting P4. Follow safety precautions at workplace	K11. Explain the safety precautions regarding personal health and workplace	

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
<p>G2. Service suspension components of vehicle</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to service suspension components</p> <p>P2. Follow the instructions of repair manual to service suspension components</p> <p>P3. Service the following components of suspension system according to repair manual:</p> <ul style="list-style-type: none"> ● Hub knuckle ● Wheel hub ● hub stud ● Springs ● Shock absorber ● Sway bar ● Z link ● Control arm ● Ball joints <p>P4. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing suspension components</p> <p>K2. Explain the usage of special service tools (SSTs) for service suspension components</p> <p>K3. Read and interpret repair manual</p> <p>K4. Explain the types of suspension system</p> <p>K5. Describe the function of bushes</p> <p>K6. Describe the function of wheel hub bearing</p> <p>K7. Identify the noises of wheel bearings</p> <p>K8. Describe the types and function of shock absorber</p> <p>K9. Describe the types and function of springs</p> <p>K10. Describe the function stabilizer bar</p> <p>K11. Describe the function of ball joints and control arms</p> <p>K12. Explain the safety precautions regarding personal health and workplace</p>	<p>Jack, safety stand, hammers, ball joint opener, tire lever, wheel spanner, spanner set, scanner, SSTs, sockets, screw drivers, lift, bench vice, PPE</p>
<p>G3. Service steering system of vehicle</p>	<p>You will be able to:</p> <p>P1: Arrange tools and equipment required to service steering system of vehicle</p> <p>P2. Follow the instructions of repair manual to service</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing steering system of vehicle</p> <p>K2. Explain the usage of special service tools (SSTs) for</p>	<p>Jack, safety stand, Wheel aligner, wheel balancer, hammers, wheel spanner, spanner</p>

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
	<p>steering system of vehicle</p> <p>P3. Service the following components of steering system according to repair manual:</p> <ul style="list-style-type: none"> ● Steering rack ● Steering box ● Steering column ● Intermediate shaft (cross) ● Electronic control unit (ECU) of power steering ● Electric power steering (EPS) ● Power steering pump <p>P3. Follow safety precautions at workplace</p>	<p>servicing steering system of vehicle</p> <p>K3. Read and interpret repair manual</p> <p>K4. describe the types of steering</p> <p>K5. Describe the function of scanner for electric power steering</p> <p>K6. Describe the function of power steering pump</p> <p>K7. Describe the geometry of steering system of vehicle</p> <p>K8. Describe the turning radius of steering system</p> <p>K9. Describe the importance of power steering fluid</p> <p>K10. Explain the safety precautions regarding personal health and workplace</p>	<p>set, SSTs, air pressure gauge, sockets, screw drivers, lift, PPE</p>

Title H. Maintain Drive line systems

Overview: This Competency Standard identifies the competencies required to maintain drive line systems by automobile mechanic in accordance with the organization’s approved guidelines and procedures. You will be expected to Service manual clutch systems and automatic transmissions of vehicle, at workplace. Your underpinning knowledge regarding maintenance of drive line systems will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
<p>H1. Service manual clutch systems of vehicle</p>	<p>You will be able to:</p> <p>P1. Arrange tools and equipment required to service manual clutch system of vehicle</p> <p>P2. Follow the instructions of repair manual to service manual clutch system of vehicle</p> <p>P3. Service the following components of manual clutch system according to repair manual:</p> <ul style="list-style-type: none"> ● Clutch master cylinder (CMC) ● Clutch plate ● Pressure plate ● Clutch release bearing ● Clutch release fork ● Fly wheel ● Clutch cable ● Gear shifting lever and linkage ● Vehicle speed sensor ● Synchronizer ● Differential ● Drive shafts ● Gear oil ● Gear box seals <p>P3. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing manual clutch system of vehicle</p> <p>K2. Explain the usage of special service tools (SSTs) for servicing manual clutch system of vehicle</p> <p>K3. Read and interpret repair manual</p> <p>K4. Describe the function of clutch master cylinder and clutch wire</p> <p>K6. Describe the mechanism of clutch set</p> <p>K7. Describe the function of clutch bearing</p> <p>K8. Describe the function of differential</p> <p>K9. Describe the grading of fluid used in clutch system</p> <p>K10. Explain how to check the efficiency of clutch plate</p> <p>K11. Explain the safety precautions regarding personal health & workplace</p>	<p>Jack, safety stand, lift, spanner set, socket set, oil gun, SSTs, repair manual, screw drivers, hammers, lock pliers, PPE</p>

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
H2. Service automatic Transmission of vehicle	<p>You will be able to:</p> <p>P1. Arrange tools and equipment required to service automatic transmission of vehicle</p> <p>P2. Follow the instructions of repair manual to service automatic transmission of vehicle</p> <p>P3. Service the following components of automatic transmission according to repair manual:</p> <ul style="list-style-type: none"> • Torque convertor • Gear shifting lever and linkage • Vehicle speed sensor • Gear shifting Solonide valve • Differential • Valve body • Drive shafts • Automatic transmission fluid (ATF) • Gear box seals • Continuous variable transmission (CVT) • Electronic transmission (ECT) <p>P3. Follow safety precautions at workplace</p>	<p>You will be able to:</p> <p>K1. Explain the usage of tools and equipment for servicing automatic transmission of vehicle</p> <p>K2. Explain the usage of special service tools (SSTs) for servicing automatic transmission of vehicle</p> <p>K3. Read and interpret repair manual</p> <p>K4. Describe the function of torque convertor</p> <p>K5. Describe the function of gear shifting lever and linkages</p> <p>K6. Describe the function of solenoid valves</p> <p>K7. Describe the grading of fluid used in automatic transmission</p> <p>K8. Describe the function of differential</p> <p>K9. Explain how to conduct stall speed test</p> <p>K10. Explain how to check the fluid level of automatic transmission</p> <p>K11. Describe the function of Continuous variable transmission (CVT)</p> <p>K12. Describe the function of electronic control transmission (ECT)</p>	<p>Jack, safety stand, lift, scanner, spanner set, socket set, fluid filler gun, SSTs, repair manual, screw drivers, stall speed test gauge, hammers, lock pliers, PPE</p>

Unit of Competency	Performance Criteria	Knowledge & Understanding	Tools & Equipment
		K11. Explain the safety precautions regarding personal health and workplace	

TITLE I: Apply Safety Precautions and Guidelines at Workplace

Overview: This Competency Standard identifies the competencies required to apply occupational health and safety procedures at workplace by auto electrician in accordance with the organization’s approved guidelines and procedures. You will be expected to identify hazards in workplace, comply health and safety precautions, use of personal protective equipment and practicing safe work habits at workplace at all times. Your underpinning knowledge regarding occupational health and safety procedures will be sufficient to provide you the basis for your work.

Unit of Competency	Performance Criteria	Knowledge and Understanding	Tools & Equipment
I1. Identify hazards in workplace environment	<p><i>You must be able to:</i></p> <p>P1. Read and interpret work processes and procedures correctly to identify risk of hazards at workplace.</p> <p>P2. Recognize processes, tools, equipment and consumable materials that have the potential to cause harm.</p> <p>P3. Identify any potential hazards and take appropriate action to minimize the risk.</p>	<p><i>You must know and understand:</i></p> <p>K1. Define Health and safety precautions of the company.</p> <p>K2. Explain Techniques and methods to identify the risks of hazards at workplace.</p> <p>K3. Carefully dealing with hazards to avoid any accident or injury.</p> <p>K4. Describe safety reporting procedures and documentation.</p>	Health and safety manual.
I2. Comply with Occupational Health and Safety Precautions	<p><i>You must be able to:</i></p> <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><i>You must know and understand:</i></p> <p>K1. Define Organizational health and safety procedures.</p> <p>K2. Precaution Health and safety risks that can arise as a result of accidents.</p> <p>K3. Precaution of hazards that are most likely to cause harm to health and safety.</p> <p>K4. Explain the procedure of implementing 5s</p>	Safety shoes, Safety gloves, Safety goggles, Safety helmet, Fire extinguisher, Smoke alarm, First aid box, Wheel chair, stretcher

Unit of Competency	Performance Criteria	Knowledge and Understanding	Tools & Equipment
13. Apply Personal Protective and Safety Equipment	<p><i>You must be able to:</i></p> <p>P1. Select personal protective equipment in terms of type and quantity according to work orders.</p> <p>P2. Wear, adjust, and maintain personal protective equipment to ensure correct fit and optimum protection in compliance with company procedures.</p> <p>P3. Ensure personal protective equipment is cleaned and stored in proper place.</p>	<p><i>You must know and understand:</i></p> <p>K1. Explain Importance of using Personal Protective Equipment.</p> <p>K2. Define Types of PPE.</p> <p>K3. Identify Protective clothing and equipment (PPE) to be worn and where it can be obtained.</p> <p>K4. Explain the Safe maintenance of PPEs.</p>	Safety shoes, Safety gloves, Safety goggles, Safety helmet, face mask
14. Practice safe work habits to ensure safety at workplace	<p><i>You must be able to:</i></p> <p>P1. Wear required clothing (not loose or torn), confine long hair, and remove jewelry in accordance with company procedures.</p> <p>P2. Apply work procedures and approaches that ensure personal safety as well as others safety.</p> <p>P3. Demonstrate good housekeeping in the workplace by cleaning up spills or leaks.</p> <p>P4. Keep work area clean and clear of obstructions, and storing tools or equipment, so that the potential for accident or injury is prevented.</p> <p>P5. Ensure tools or equipment are in place and available in proper place as per company procedures.</p>	<p><i>You must know and understand:</i></p> <p>K1. Explain Importance of safety at work and its implications.</p> <p>K2. Describe Work safety procedures and guidelines.</p> <p>K3. Explain Specific company procedures regarding workplace safety.</p> <p>K4. Explain procedure for cleaning and storing of tools and equipment at workplace.</p>	Fire extinguisher, Tool box/bins, Safety covers, First aid box, Safety equipment

List of Tools, Equipment and Machinery

- Testers
- Scanners
- Sound detectors
- Digital multi-meters
- Analyzers
- Gauges
- Job card/repair order
- Repair manual
- Flat rate time (FRT)
- Estimation forms
- Lifts
- Jacks
- Safety stand
- Spanners set
- Wrenches
- Hammers
- Socket set
- Screw driver
- Plier
- Filter spanner
- Special service tools (SSTs)
- Oil filler gun,
- Oil transfer equipment,
- Funnel
- Seat covers protector,
- Steering wheel cover,
- Hand brake cover,
- Gear lever cover,
- Floor matts,
- Driving license
- Vernier caliper

- Dial indicator gauge
- Wheel spanner
- Bleeding kit
- Bench vice
- Technician stretcher
- Bleeding kit
- Back winding tool
- Amery paper
- Electric Wiring Diagram (EWD)
- Multi-meter,
- Test lamp,
- Cutter plier
- Insulation tape
- Compression gauge,
- Fuel pressure gauge,
- Filler gauge,
- Oil pressure gauge
- Off-car injector simulator
- torque wrench,
- T handles
- Scrappers,
- nose plier
- Plastic hammer
- Thermometer
- Ring Compressor
- compression gauge
- Star Allen Keys
- Oscilloscope
- Lamp tester
- Magnetic stick
- Hydro meter
- Ignition timing gun
- Analyser

- Plug cleaner
- Exhaust gas analyzer,
- Back pressure tester
- Vacuum tester
- Wheel aligner
- wheel balancer
- hammers
- Ball joint opener
- Tire lever
- wheel spanner
- oil gun
- fluid filler gun
- stall speed test gauge
- lock pliers
- Safety shoes
- Safety gloves
- Safety goggles
- Face mask
- Safety helmet
- Fire extinguisher
- Smoke alarm
- First aid box


National Vocational and Technical Training Commission (NAVTTTC)

 5th Floor Evacuee Trust Complex Sector F-5/1, Islamabad.

 +92 51 9044 04

 +92 51 9044 04

 info@navttc.org

 www.navttc.org