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| Title | **Maintain engine** |
| Level | **2** | **Credits** | **13** |

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| Purpose | 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. |

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| Classification ISCED | 0716 Motor vehicles, ships and aircraft |

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| Available grade | Competent / Not yet competent |

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| Modification history | N/A |

| **Unit of Competency** | **Performance Criteria** | **Knowledge & Understanding**  | **Tools & Equipment** |
| --- | --- | --- | --- |
| D1 Diagnose engine problems of vehicle  | You will be able to:P1: Arrange tools and equipment required to diagnose problems of engine P2. Follow the instructions of repair manual to diagnose problems of engineP3. Inspect the followings in engine of vehicle according to repair manual:* Abnormal noises
* Engine combustion
* Ignition
* Oil leakages
* Vacuum and pressure leakages
* Water leakages
* Over heat
* Drive belts
* Fuel system

P4. Follow safety precautions at workplace  | You will be able to:K1. Explain the usage of tools and equipment for diagnosing engine problemsK2. Read and interpret repair manualK3. Describe the function of engine components K4. Explain the types of engineK5. Explain the safety precautions regarding personal health and workplace | 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 | You will be able to:P1: Arrange tools and equipment required to service engine gaskets P2. Follow the instructions of repair manual to service engine gasketsP3. Inspect the following gaskets of engine according to repair manual:* Head gasket
* In take manifold gasket
* Exhaust manifold gasket
* Tappet cover gasket
* Oil pan gasket
* Water pump gasket

P4. Follow safety precautions at workplace   | You will be able to: K1. Explain the usage of tools and equipment for servicing engine gasketsK2. Read and interpret repair manualK3. Describe the function of gasketsK4. Explain the types of gasketsK5. Explain the safety precautions regarding personal health and workplace | spanners., socket set, torque wrench, T handles, screw drivers, scrappers, nose plier, repair manual, PPE |
| D3 Service engine seals of vehicle (rear main) | You will be able to:P1: Arrange tools and equipment required to service engine seals of vehicle P2. Follow the instructions of repair manual to service engine seals of vehicle P3. Inspect the following seals of engine according to repair manual:* Main oil seal
* Crank shaft seal
* Cam shaft seal
* Distributor shaft seal
* Valve seal
* Oil pump seal
* VVTI valve seal
* Injector seal

P4. Follow safety precautions at workplace  | You will be able to:K1. Explain the usage of tools and equipment for servicing engine gasketsK2. Explain the usage of special service tools (SSTs) for removing and fixing sealsK3. Read and interpret repair manualK4. Describe the function of oil sealsK5. Outline the specifications of oil seals K6. Explain the safety precautions regarding personal health and workplace | SSTs, screw drivers, spanners, T handles, socket sets, plastic hammer, repair manual, torque wrench, PPE |
| D4 Service engine cooling system (e.g.water pump, radiator, coolant flush) of vehicle  | You will be able to:P1: Arrange tools and equipment required to Service engine cooling systemP2. Follow the instructions of repair manual to Service engine cooling systemP3. Inspect the level and quality of the coolant according to repair manualP4. Inspect the following components of the cooling system of vehicle according to repair manual: * 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

P5. Follow safety precautions at workplace  | You will be able to:K1. Explain the usage of tools and equipment for servicing engine cooling systemK2. Explain the usage of special service tools (SSTs) for cooling systemK3. Read and interpret repair manualK4. Describe the properties of radiator coolant K5. Describe the properties of radiator hosesK6. Describe the function of radiator pressure capK8. Explain the safety precautions regarding personal health and workplace | SSTs, spanners, pliers, repair manual, screw drivers, thermometer, scanner, PPE |
| D5. Service engine lubrication system (e.g., oil pump) of vehicle  | You will be able to:P1: Arrange tools and equipment required to Service engine lubrication systemP2. Follow the instructions of repair manual to Service engine lubrication systemP3. Inspect the level and quality of lubricants used in vehicle, according to repair manualP4. Inspect the following components of the lubricating system of vehicle according to repair manual:* Oil pump
* Oil galleries
* Oil filter
* Oil pressure switch
* Oil pan
* Oil pump stainer
* Engine oil

P5. Follow safety precautions at workplace  | You will be able to:K1. Explain the usage of tools and equipment for servicing engine lubrication systemK2. Explain the usage of special service tools (SSTs) for engine lubrication systemK3. Read and interpret repair manualK4. Describe the properties of engine oilK5. Describe the function of oil and oil filterK6. Describe the working principle of oil pressure switch K7. Describe the types and functions of oil pump K8. Explain the safety precautions regarding personal health and workplace | SSTs, spanners, socket set, torque wrench, funnel, repair manual, PPE |
| D6 Service valve train components of vehicle  | You will be able to: P1: Arrange tools and equipment required to Service valve train componentsP2. Follow the instructions of repair manual to Service valve train componentsP3. Inspect the following components of the valve train components according to repair manual:* 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

P5. Follow safety precautions at workplace  | You will be able to: K1. Explain the usage of tools and equipment for servicing valve train componentsK2. Explain the usage of special service tools (SSTs) for servicing valve train componentsK3. Read and interpret repair manualK4. Describe the function of VVTI/VTec K5. Explain how to check valve seatsK6. Explain how to check valve clearance K7. Explain the function of cam sensorK8. Explain the safety precautions regarding personal health and workplace | Spanner set, screw drivers, socket set, filler gauge, SSTs, repair manual, plier, bench vice, PPE |
| D7 Service Engine Block Components of vehicle  | You will be able to: P1: Arrange tools and equipment required to Service engine block componentsP2. Follow the instructions of repair manual to Service engine block components P3. Inspect the following components of the engine block components according to repair manual:* Piston
* Connecting rods
* Main shell bearings
* Big ends bearings
* Thrust washers
* Crank shaft
* Crank shaft sensor
* Crank shaft pulser
* Block sleeves
* Rod bush

P5. Follow safety precautions at workplace | You will be able to:K1. Explain the usage of tools and equipment for servicing engine block componentsK2. Explain the usage of special service tools (SSTs) for servicing engine block componentsK3. Read and interpret repair manual K4. Identify the noises of main bearings, connecting rods and piston pins K6. Explain the function of crank shaft sensor and crank shaft pulser K7. Explain the role of piston and piston ringsK8. Explain the role of block sleevesK9. Explain the safety precautions regarding personal health and workplace | SSTs, ring compressor, torque wrench, screw drivers, repair manual, socket set, plastic hammer, PPEs |