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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 engine  P3. 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 problems  K2. Read and interpret repair manual  K3. Describe the function of engine components  K4. Explain the types of engine  K5. 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 gaskets  P3. 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 gaskets  K2. Read and interpret repair manual  K3. Describe the function of gaskets  K4. Explain the types of gaskets  K5. 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 gaskets  K2. Explain the usage of special service tools (SSTs) for removing and fixing seals  K3. Read and interpret repair manual  K4. Describe the function of oil seals  K5. 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 system  P2. Follow the instructions of repair manual to Service engine  cooling system  P3. Inspect the level and quality of the coolant according to repair manual  P4. 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 system  K2. Explain the usage of special service tools (SSTs) for cooling system  K3. Read and interpret repair manual  K4. Describe the properties of radiator coolant  K5. Describe the properties of radiator hoses  K6. Describe the function of radiator pressure cap  K8. 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 system  P2. Follow the instructions of repair manual to Service engine lubrication system  P3. Inspect the level and quality of lubricants used in vehicle, according to repair manual  P4. 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 system  K2. Explain the usage of special service tools (SSTs) for engine lubrication system  K3. Read and interpret repair manual  K4. Describe the properties of engine oil  K5. Describe the function of oil and oil filter  K6. 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 components  P2. Follow the instructions of repair manual to Service valve train components  P3. 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 components  K2. Explain the usage of special service tools (SSTs) for servicing valve train components  K3. Read and interpret repair manual  K4. Describe the function of VVTI/VTec  K5. Explain how to check valve seats  K6. Explain how to check valve clearance  K7. Explain the function of cam sensor  K8. 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 components  P2. 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 components  K2. Explain the usage of special service tools (SSTs) for servicing engine block components  K3. 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 rings  K8. Explain the role of block sleeves  K9. Explain the safety precautions regarding personal health and workplace | SSTs, ring compressor, torque wrench, screw drivers, repair manual, socket set, plastic hammer, PPEs |