
Overview

This standard is about removing and replacing units and components where dismantling and re-assembly of combustion engine systems is required. It is also about evaluating the performance of replaced units and components. The units and components concerned are not those replaced as part of normal routine, vehicle maintenance (servicing) activities.

Performance criteria

- You must be able to:
- P1 use suitable personal and vehicle protective equipment throughout all removal and replacement activities
 - P2 support your removal and replacement activities by reviewing
 - P2.1 vehicle technical data
 - P2.2 removal and replacement procedures
 - P2.3 legal requirements
 - P3 prepare the vehicle systems and work area for safe working procedures as appropriate to the vehicle
 - P4 prepare, check and use all the **equipment** required following manufacturers' instructions
 - P5 carry out all removal and replacement activities following;
 - P5.1 manufacturers' instructions
 - P5.2 recognised repair methods
 - P5.3 health, safety and environmental requirements
 - P5.4 your workplace procedures
 - P6 work in a way which minimises the risk of:
 - P6.1 damage to other vehicle systems
 - P6.2 damage to other vehicle **units and components**
 - P6.3 contact with leakage
 - P6.4 contact with hazardous substances
 - P6.5 damage to your working environment
 - P7 ensure replacement combustion engine **units and components** conform to the vehicle operating specification and any legal requirements
 - P8 promptly record and report any additional faults you notice during the course of your work
 - P9 use suitable **testing methods** to evaluate the performance of the reassembled system accurately
 - P10 ensure the reassembled system performs to the vehicle operating specification and meets any legal requirements prior to return to the customer
 - P11 ensure your records are accurate, complete and passed to the relevant person(s) within the agreed timescale and in the format required

P12 complete all removal and replacement activities within the agreed timescale

P13 promptly report any expected delays in completion to the relevant person(s)

Knowledge and understanding

You need to know and understand:

Legislative and organisational requirements and procedures

- K1 the legal requirements relating to the vehicle
- K2 the legislation and workplace procedures relevant to:
 - K2.1 health and safety
 - K2.2 the environment (including waste disposal)
 - K2.3 appropriate personal and vehicle protective equipment
- K3 the importance of documenting removal and replacement information
- K4 the importance of working to agreed timescales and keeping others informed progress
- K5 the relationship between time and costs
- K6 the importance of promptly reporting anticipated delays to the relevant person(s)

Use of technical information

You need to know and understand:

- K7 how to find, interpret and use sources of information applicable to **units and component** removal and replacement within **combustion engine systems**
- K8 the importance of using the correct sources of technical information
- K9 the purpose of and how to use identification codes

Electrical principles

You need to know and understand:

- K10 vehicle earthing principles and earthing methods
- K11 principles associated with vehicle **combustion engine systems**, including types of sensors, actuators, their application and operation
- K12 types of circuit protection and why these are necessary
- K13 electrical safety procedures
- K14 how warning circuits work
- K15 electric symbols, units and terms
- K16 battery charging
- K17 electrical/electronic control system principles
- K18 the hazards associated with working on or near high energy electrical vehicle components

Combustion engine system operation and construction

K19 how **combustion engine systems** and their related **units and components** are constructed, dismantled and reassembled for the classification of vehicle worked upon

K20 how **combustion engine systems** and their related **units and components** operate for the classification of vehicle worked upon

You need to know and understand:

Equipment

K21 how to prepare, check and use all the removal and replacement **equipment** required

Combustion engine unit and component removal and replacement

K22 how to remove and replace engine system mechanical and electrical unit components for the classification of vehicle worked upon

K23 how to select and fit gaskets, sealants, fittings and fasteners

K24 how to test and evaluate the performance of replacement engine **units and components** and the reassembled system against the vehicle operating specifications and any legal requirements

K25 the relationship between **testing methods** and the engine **units and components** replaced – the use of appropriate test methods

K26 the properties of jointing materials and when and where they should be used

K27 the manufacturer's specification for the type and quality of engine **units and components** to be used

K28 how to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances

You need to know and understand:

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Scope/range

- 1. Equipment is**
 - 1.1. hand tools
 - 1.2. special workshop tools
 - 1.3. general workshop equipment
 - 1.4. electrical testing equipment

- 2. Testing methods are:**
 - 2.1. sensory
 - 2.2. functional
 - 2.3. measurement

- 3. Units and components are**
 - 3.1. mechanical
 - 3.2. electrical

- 4. Combustion engine systems are**
 - 4.1. engine mechanical systems
 - 4.2. cooling, heating and ventilation systems
 - 4.3. air supply and exhaust systems
 - 4.4. fuel and ignition systems
 - 4.5. engine electrical systems
 - 4.6. lubrication systems

**Additional
Information****Glossary**

This section contains examples and explanations of some of the terms used but does not form part of the standard.

Agreed timescales

Examples include: manufacturer's recommended work times, job times set by your company or a job time agreed with a specific customer.

Alternative fuel

This is defined as any type of fuel that may be used to power an internal combustion engine, examples would include LPG, bio ethanol etc.

Vehicles

These can be any of the following types of light vehicle: SI, CI, Hybrid, Electric or Alternative fuel vehicles.

Units and components

Any units or component from the engine system as defined in the Scope/Range above.

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