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## Overview

This standard is about removing and replacing heavy goods and public service vehicle 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 those not replaced as part of normal routine, vehicle maintenance (servicing) activities.

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## 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, vehicle systems and the work area for safe working procedures

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 industry recognised repair methods

- P5.3 your workplace procedures

- P5.4 health, safety and environmental requirements

P6 work in a way which minimises the risk of:

- P6.1 damage to other vehicle systems, units and components

- P6.2 contact with leakage and hazardous substances

- P6.3 damage to your working environment

- P6.4 injury to self and others

P7 ensure replaced 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

P10 ensure the reassembled system performs to the vehicle operating specification and meets any legal requirements prior to return to the customer/driver

P11 ensure your records are accurate, complete and passed to the relevant person(s) within the agreed timescale in the format required

P12 complete all removal and replacement activities within the agreed timescale

P13 promptly report any anticipated 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 (e.g. UK and European Emission Standards) relating to the vehicle (including road safety requirements)

K2 the implications on an Operators Licence of not carrying out repairs and inspections correctly

K3 the legislation and workplace procedures relevant to

K3.1 health and safety

K3.2 the environment (including waste disposal)

K3.3 appropriate personal and vehicle protective equipment

K4 your workplace procedures for

K4.1 recording removal and replacement information

K4.2 the referral of problems

K4.3 reporting delays to the completion of work

K5 the importance of recording removal and replacement information

K6 the importance of working to agreed timescales and keeping others informed of progress

K7 the relationship between time and costs

K8 the importance of promptly reporting anticipated delays to the relevant person(s)

### **Use of technical information**

K9 how to find, interpret and use **sources of information** applicable to unit and component removal and replacement within **combustion engine systems**

K10 the importance of using the correct **sources of technical information**

K11 the purpose of and how to use identification codes

### **Electrical and electronic principles**

K12 vehicle earthing principles and methods

K13 electrical and electronic principles associated with vehicle **combustion engine systems**, including types of sensors, actuators, their application and operation

K14 types of circuit protection and why these are necessary

K15 electrical safety procedures

K16 how warning circuits work

K17 electric symbols, units and terms

K18 battery charging

K19 electrical/electronic control system principles

K20 the hazards associated with working on or near high voltage electrical vehicle components

### **Combustion engine system operation and construction**

K21 how **combustion engine systems** and their related **units and components** are constructed, dismantled and reassembled for the types of vehicle on which you work

K22 how **combustion engine systems** and their related **units and components** operate for the types of vehicle on which you work

## **Equipment**

K23 how to prepare, check and use all the removal and replacement **equipment** required

## **Combustion engine unit and component removal and replacement**

K24 how to remove and replace **combustion engine system** mechanical and electrical **units and components** for the types of vehicle on which you work

K25 how to select and fit gaskets, sealants, fittings and fasteners

K26 how to test and evaluate the performance of replacement combustion engine **units and components** and the reassembled system against the vehicle operating specifications and any legal requirements

K27 the relationship between **testing methods** and the combustion engine **units and components** replaced – the use of appropriate test methods

K28 the properties of jointing materials and when and where they should be used

K29 the manufacturer's specification for the type and quality of combustion engine **units and components** to be used

K30 how to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances

K31 the importance of inspecting the vehicle following any repairs

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## Scope/range

1. **\*\*Equipment\*\*** is, for example:

- 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 emission systems
- 4.4. fuel and ignition systems
- 4.5. engine electrical and electronic systems
- 4.6. lubrication systems

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## 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.

### **Heavy goods and public service vehicles**

These are medium and large goods vehicles, buses and coaches of 3500kgs gross vehicle mass (GVM) and above.

### **Sensory testing methods**

These may include looking, listening, smelling and touching for heat.

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