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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 transmission and driveline systems is required, including those which incorporate electric and hybrid driveline systems. 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 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 your workplace procedures

P5.3 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 transmission and driveline **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 transmission and driveline 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 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 relating to the vehicle (including road safety requirements)

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

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 documenting 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 **transmission and driveline systems**

K10 the importance of using suitable sources of technical information

K11 the purpose of and how to use identification codes

### **Electrical and electronic principles**

K12 the hazards associated with working on or near high voltage electrical vehicle components

K13 vehicle earthing principles and methods

K14 electrical and electronic principles associated with **transmission and driveline systems**, including types of sensors and actuators, their application and operation

K15 types of circuit protection and why these are necessary

K16 electrical safety procedures

K17 electric symbols, units and terms

K18 electrical and electronic control system principles

### **Transmission and driveline system operation and construction**

K19 how heavy goods and public service vehicle **transmission and driveline systems** and their related **units and components** are constructed, removed and replaced

K20 how heavy goods and public service vehicle **transmission and driveline systems** and their related **units and components** operate

### **Equipment**

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

### **Transmission and driveline system unit and component removal and replacement**

K22 how to remove and replace heavy goods and public service vehicle **transmission and driveline system** mechanical, electrical, hydraulic and pneumatic **units and components**

K23 how to test and evaluate the performance of replacement **transmission and driveline system units and components** and the reassembled system against the vehicle operating specifications and any legal requirements

K24 how to select the appropriate **testing method** when checking **transmission and driveline systems** following replacement of **units and components** \*

**K25 when replacement \*units and components** must meet the original equipment specification (OES) for warranty or other requirements

K26 how to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances

K27 the importance of inspecting the vehicle following any repairs

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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
- 3.3. hydraulic and fluid
- 3.4. pneumatic

### 4. **Transmission and driveline systems** are:

- 4.1. gearbox and power take off
- 4.2. hubs and bearings
- 4.3. driveline shafts
- 4.4. clutch
- 4.5. final drive
- 4.6. electric and hybrid driveline 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.*

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*Agreed timescales*

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

*Functional testing*

***Examples include: dynamometer and transmission stall test.***

*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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