
Overview

This standard is about removing and replacing units and components previously identified as faulty or damaged or where the customer has requested replacements. 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.

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, check and use all the **equipment** required following manufacturers' instructions
- P4 prepare the vehicle systems and work area for safe working procedures, as appropriate to the vehicle
- 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
 - P6.2 damage to other vehicle units and components
 - P6.3 contact with leakage
 - P6.4 contact with hazardous substances
- P7 ensure replacement electrical auxiliary 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 (including road safety and refrigerant handling, fuel storage, high voltage or other 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 importance of documenting removal and replacement information
- K4 the importance of working to agreed timescales and keeping others informed of 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

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

Electrical auxiliary system operation and construction

- K10 how **electrical units and components** are constructed, removed and replaced for the classification of vehicle worked upon
- K11 how **electrical units and components** operate for the classification of vehicle worked upon

Equipment

- K12 how to prepare, check and use all the removal and replacement **equipment** required

Electrical and electronic principles

- K13 vehicle earthing principles and earthing methods

- K14 electrical and electronic principles associated with electrical 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 how lighting, warning, charging and starter circuits work
- K18 electric symbols, units and terms
- K19 electrical/electronic control system principles
- K20 the hazards associated with working on or near high energy electrical vehicle components

Electrical units and component removal and replacement

- K21 how to remove and replace **electrical units and components** for the classification of vehicle worked upon
- K22 how to test and evaluate the performance of replacement **electrical units and components** and the reassembled system against the vehicle operating specifications and any legal requirements
- K23 the relationship between **testing methods** and the **electrical units and components** replaced – the use of appropriate test methods
- K24 the manufacturer's specification for the type and quality of **electrical units and components** to be used
- K25 how to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances

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. Electrical units and components are**
 - 3.1. lighting systems
 - 3.2. wiper systems
 - 3.3. security and alarm systems
 - 3.4. comfort and convenience systems (including infotainment and communications)
 - 3.5. electric window systems
 - 3.6. monitoring and instrumentation systems
 - 3.7. engine starting systems
 - 3.8. battery charging 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 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.

Comfort and convenience systems

Examples are infotainment and communications, heated seats, electrically adjusted seats, heated screens, electric mirrors, heating, climate control and air conditioning.

Units and components

Any unit or component from the electrical systems defined in the Scoping Statement above.

Vehicles

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

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