IMIAEMEI06
Diagnose and rectify motor vehicle electrical unit and component faults

Overview

This standard is about identifying and rectifying electrical faults occurring within a variety of electrical systems.

Performance criteria

You must be able to:

P1 select and use appropriate personal and vehicle protection equipment when undertaking electrical testing procedures and carrying out rectification activities

P2 support the identification of electrical faults, by reviewing vehicle:

- P2.1 technical data
- P2.2 diagnostic test procedures

P3 prepare, connect and test all the required electrical and electronic testing equipment following manufacturers' instructions prior to use

P4 use electrical and electronic testing techniques which are relevant to the symptoms presented

P5 collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of electrical system faults

P6 identify and record any system deviation from acceptable limits

P7 make cost effective, accurate recommendations for rectification based upon your analysis of the diagnostic information gained

P8 use all tools and equipment required for your diagnostic and rectification activities, correctly and safely throughout

P9 carry out all diagnostic and rectification activities following:

- P9.1 9.1 manufacturers' instructions
- P9.2 9.2 recognised researched repair methods
- P9.3 9.3 health and safety requirements

P10 work in a way which minimises the risk of:

- P10.1 damage to other vehicle systems, units and components
- P10.2 contact with leakage, hazardous substances and high voltage systems
- P10.3 damage to your working environment
- P10.4 injury to yourself and others

P11 ensure all repaired and replaced electrical components and units conform to the vehicle operating specification and any legal requirements

P12 adjust components and units correctly to ensure that they operate to meet system requirement, when necessary

P13 confirm the rectified electrical system performs to the vehicle operating specification and any legal requirements prior to handover to the customer

P14 ensure your records are accurate, complete and promptly passed to the relevant person(s) in the format required

P15 complete all diagnostic and rectification activities within the agreed timescale

P16 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 current health and safety legislation and workplace procedures relevant to workshop practices and personal and vehicle protection when diagnosing and rectifying complex electrical faults

K2 legal requirements relating to vehicle electrical systems (including road safety and refrigerant handling requirements)

K3 your workplace procedures for:

- K3.1 recording fault location and correction activities
- K3.2 reporting the results of tests
- K3.3 the referral of problems
- K3.4 reporting delays to the completion of work

K4 the importance of working to recognised diagnostic procedures and processes and obtaining the correct information for diagnostic activities to proceed

K5 the importance of documenting diagnostic and rectification information

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

K7 the relationship between time, costs and profitability

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

You need to know and understand:

Electrical and electronic principles

K9 electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism, electromagnetic induction, electromagnetic compatibility (EMC), digital and fibre optics principles

K10 electrical symbols, units and terms

K11 electrical safety procedures

K12 how electrical and electronic units and components are constructed, dismantled and reassembled

K13 how electrical and electronic units and components operate, including electrical component function, electrical inputs, outputs, voltage/current variation and oscillioscope patterns

K14 the interaction between electrical, electronic and mechanical components within the systems defined

K15 how electrical systems interlink and interact, including multiplexing

K16 the operation of the electrical and electronic systems for electric, hybrid transmission systems including alternative fuel vehicles (including regenerative braking systems)

You need to know and understand:

Use of electrical testing and repair equipment

K17 how to prepare and test the accuracy of diagnostic testing equipment

K18 how to select and use electrical and electronic testing and rectify equipment to correctly and safely diagnose and repair electrical faults

You need to know and understand:

Electrical faults, their diagnosis and rectification

K19 the types and causes of electrical system, component and unit faults

K20 electrical component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action

K21 how to find, interpret and use sources of information on electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements

K22 how to carry out systematic diagnostic testing of electrical and electronic systems using appropriate electrical testing techniques

K23 how to select the most appropriate diagnostic testing method for the symptoms presented

K24 how to evaluate test results and compare these with vehicle technical data in order to identify the location and the cause of vehicle electrical system faults

K25 how to rectify electrical and electronic system faults

K26 how to make suitable adjustments to components and units

K27 how to confirm the repaired electrical system operates to the manufacturer`s specification and any legal requirements

K28 how to make cost effective recommendations for rectification

Scope/range

1. Electrical faults can occur within the following systems:

1.1. infotainment
1.2. comfort and convenience
1.3. safety systems
1.4. networking systems
1.5. body electric systems

2. Electrical and electronic testing equipment includes:

2.1. volt meters
2.2. ammeters
2.3. ohmmeters
2.4. multimeters
2.5. battery testing equipment
2.6. dedicated and computer based diagnostic equipment
2.7. oscilloscopes

3. Tools and equipment include:

3.1. hand tools
3.2. special purpose tools
3.3. general workshop equipment

4. Diagnostic Testing is defined as:

4.1. verify the fault
4.2. collect further information
4.3. evaluate the evidence
4.4. carry out further tests in a logical sequence
4.5. rectify the problem
4.6. check all systems

5. Electrical and electronic testing techniques include:

5.1. voltage, resistance and current measuring
5.2. frequency measuring
5.3. visual
5.4. dedicated and computer based testing

Additional information	*This section contains examples and explanations of some of the terms used but does not form part of the standard.*
Glossary	**Rectification activities** are defined as: A suitable repair or replacement that rectifies the fault(s) identified from the diagnostic activities carried out

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