Overview

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

You must be able to:

1. select and wear appropriate personal protective equipment and use vehicle coverings when using electrical testing techniques and carrying out rectification activities
2. support the identification of electrical faults, by reviewing vehicle:
   2.1 technical data
   2.2 diagnostic test procedures
3. prepare, connect and test all the required electrical and electronic testing equipment following manufacturers' instructions prior to use
4. use electrical and electronic testing techniques which are relevant to the symptoms presented
5. collect sufficient diagnostic information in a systematic way to enable an accurate diagnosis of electrical system faults
6. identify and record any system deviation from acceptable limits
7. make cost effective, accurate recommendations for rectification based upon your analysis of the diagnostic information gained
8. use all tools and equipment required for your diagnostic and rectification activities, correctly and safely throughout
9. carry out all diagnostic & rectification activities following:
   9.1 manufacturers' instructions
   9.2 recognised researched repair methods
   9.3 health and safety requirements
10. work in a way that minimises the risk of:
    10.1 damage to other vehicle systems
    10.2 damage to other components and units
    10.3 contact with leakages
    10.4 contact with hazardous substances
    10.5 injury to yourself and others
11. ensure all repaired and replaced electrical components and units conform to the vehicle operating specification and any legal requirements
12. adjust components and units correctly to ensure that they operate to meet system requirement, when necessary
13. ensure the rectified electrical system performs to the vehicle operating specification and any legal requirements prior to handover to the customer
14. ensure your records are accurate, complete and passed to the relevant person(s) promptly in the format required
15. complete all diagnostic and rectification activities within the agreed timescale
16. report any anticipated delays in completion to the relevant person(s)
Diagnose and rectify motor vehicle electrical unit and component faults promptly
Knowledge and understanding

You need to know and understand:

1. 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
2. legal requirements relating to the vehicle electrics (including road safety and refrigerant handling requirements)
3. your workplace procedures for:
   3.1 recording fault location and correction activities
   3.2 reporting the results of tests
   3.3 the referral of problems
   3.4 reporting delays to the completion of work
4. the importance of working to recognised diagnostic procedures and processes and obtaining the correct information for diagnostic activities to proceed
5. the importance of documenting diagnostic and rectification information
6. the importance of working to agreed timescales and keeping others informed of progress
7. the relationship between time, costs and profitability
8. the importance of reporting anticipated delays to the relevant person(s) promptly
9. electrical and electronic principles, including Ohms Law, voltage, power, current (AC/DC) resistance, magnetism, electromagnetism and electromagnetic induction, digital and fibre optics principles
10. electrical symbols, units and terms
11. electrical safety procedures
12. how electrical and electronic units and components are constructed, dismantled and reassembled
13. how electrical and electronic units and components operate, including electrical component function, electrical inputs, outputs, voltage/current variation and patterns
14. the interaction between electrical, electronic and mechanical components within the systems defined
15. how electrical systems interlink and interact, including multiplexing
16. the operation of the electrical and electronic systems for electric, hybrid and alternative fuel vehicles (including regenerative braking systems)
17. how to prepare and test the accuracy of diagnostic testing equipment
18. how to use electrical and electronic testing equipment to correctly and safely diagnose electrical faults
19. the types and causes of electrical system, component and unit faults and
failures
20. electrical component and unit replacement procedures, the circumstances which will necessitate replacement and other possible courses of action
21. how to find, interpret and use sources of information on electrical operating specifications, diagnostic test procedures, repair procedures and legal requirements
22. how to carry out systematic diagnostic testing of electrical and electronic systems using electrical testing techniques
23. how to select the most appropriate diagnostic testing method for the symptoms presented
24. how to interpret test results and vehicle data in order to identify the location and cause of vehicle system faults
25. how to rectify electrical and electronic faults
26. how to make suitable adjustments to components and units
27. how to make cost effective recommendations for rectification
Diagnose and rectify motor vehicle electrical unit and component faults

**Scope/range**

1. Electrical faults can occur within the following systems:
   a. Infotainment
   b. Comfort and Convenience
   c. Supplementary Restraint Systems (SRS)
   d. Networking Systems
   e. Body Electric Systems

2. Electrical and electronic testing equipment includes:
   a. volt meters,
   b. ammeters,
   c. ohmmeters
   d. multimeters
   e. battery testing equipment
   f. dedicated and computer based diagnostic equipment
   g. oscilloscopes

3. Tools and equipment include:
   a. hand tools
   b. special purpose tools
   c. general workshop equipment

4. Diagnostic Testing is defined as:
   a. verify the fault
   b. collect further information
   c. evaluate the evidence
   d. carry out further tests in a logical sequence
   e. rectify the problem
   f. check all systems

5. Electrical and electronic testing techniques include:
   a. voltage, resistance and current measuring
   b. frequency measuring
   c. visual
   d. dedicated and computer based testing
Glossary

Rectification activities are defined as:
A suitable repair or replacement of a component(s) that rectifies the fault(s) identified from the diagnostic activities carried out
Diagnose and rectify motor vehicle electrical unit and component faults

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