SEMAUT3015

Diagnosing and rectifying faults in vehicle electrical and electronic systems

Overview

This standard identifies the competences needed to carry out fault diagnosis of vehicle electrical and electronic equipment, in accordance with approved procedures. You will be required to diagnose faults on a range of vehicle electrical equipment, which will include safety devices, control systems, motors, lighting, navigational and other components. You will be expected to use a variety of fault diagnosis methods and techniques, and to utilise a number of diagnostic aids and equipment. From the evidence gained, you will be expected to identify the faults and their probable causes, and to carry out appropriate actions to remedy problems.

Your responsibilities will require you to comply with organisational policy and procedures for the fault diagnostic activities undertaken, and to report any problems with these activities that you cannot resolve, or that are outside your permitted authority, to the relevant people. You will be expected to work with a minimum of supervision, taking personal responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide a good understanding of your work, and will provide an informed approach to applying fault diagnosis techniques and procedures. You will understand the various fault diagnosis methods and techniques, and their application. You will also know how to apply and interpret information obtained from diagnostic aids and equipment, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when carrying out the fault diagnostic activities. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
2. review and use all relevant information on the symptoms and problems associated with the equipment
3. investigate and establish the most likely causes of the faults
4. locate faults using appropriate diagnostic technique, aids and tools
5. complete the fault diagnosis within the agreed time and inform the appropriate people when this cannot be achieved
6. use the evidence gained to draw valid conclusions about the nature and probable cause of the fault
7. rectify faults using appropriate methods and techniques
8. ensure that work records are completed, stored securely and available to others as per organisational requirements
9. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out activities (such as any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the hazards associated with the activities, and how to minimise them and reduce any risks
3. the health and safety requirements of the work area and activities and the responsibility they place on you
4. the personal protective equipment and clothing (PPE) to be worn during the activities
5. the procedures for obtaining the various types of drawing, job instructions and specifications that are used during the vehicle electrical fault diagnosis, and how to interpret them correctly
6. how to evaluate the various types of information available for fault diagnosis
7. the procedures to be followed to investigate faults and how to deal with intermittent conditions
8. how to use computer-aided fault diagnostic equipment and various other aids and reports available for fault diagnosis
9. how to use the different fault-diagnostic methods,techniques and equipment, and their application for different conditions
10. the functionality of vehicle components, hardware and software and their interrelations with other components and assemblies
11. how to analyse and evaluate possible characteristics and causes of specific faults/problems
12. how to relate previous reports/records of similar fault conditions
13. how to use test equipment, how to calibrate it, and how to check that it is free from damage and defect
14. the preparations to be undertaken on the vehicle equipment, prior to repair
15. the repair methods, techniques and procedures to be used, and the importance of adhering to these procedures
16. the importance of using the specified components and materials for the repair, and why you must not use substitutes
17. the quality control procedures to be followed during the repair operations

18. how to conduct any necessary checks to ensure the accuracy and quality of the repair
19. how to recognise defects (such as dry joints, ineffective fasteners, foreign object damage)
20. the documentation to be completed for the fault diagnostic and repair activities undertaken
21. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve
22. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1.

Carry out all of the following activities:

1.1 obtain and use the appropriate documentation (such as job instructions, assembly drawings, planning and quality control documentation)
1.2 adhere to procedures or systems in place for risk assessment, hazardous substances, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.3 obtain the correct tools and equipment for the activities and check they are in a safe, tested and usable condition, and within current calibration dates
1.4 follow safe practice/approved diagnostic and rectification techniques and procedures at all times
1.5 return all tools and equipment to the correct location on completion of the diagnostic activities
1.6 leave the work area and equipment in a safe and appropriate condition on completion of the activities

2.

Carry out fault diagnosis of vehicle electrical systems, to include six of the following:

2.1 safety systems
2.2 heating and ventilating systems
2.3 navigational systems
2.4 control systems
2.5 motors (such as wiper, starter)
2.6 power-up systems
2.7 lighting systems
2.8 audio/entertainment systems
2.9 braking systems
2.10 ignition systems
2.11 fuel management systems
2.12 ignition cut-outs
2.13 wheel torque instrumentation (prototype)
2.14 engine calibration tools (prototype)
2.15 exhaust emission control systems

3.

Use a range of fault-diagnostic techniques, to include two of the following:

3.1 emergent problem sequencing
3.2 signal injection and sampling
3.3 input/output technique
3.4 half-split technique
3.5 six point technique
3.6 computer-aided diagnostics

3.7 function/performance diagnostics
3.8 equipment self-diagnostics

4.

Use a variety of diagnostic aids and equipment, to include four of the following:

4.1 manufacturers' manuals
4.2 algorithms
4.3 functional system checks
4.4 probability charts/reports
4.5 audible recognition
4.6 visual recognition
4.7 multimeters
4.8 voltage testers
4.9 continuity testers
4.10 ammeters
4.11 computer-aided diagnostic equipment

5.

Apply fault-diagnostic techniques to all the following type of conditions:

5.1 breakdown
5.2 computer indicated fault
5.3 performance check

6.

Carry out fault rectification, involving two of the following:

6.1 component replacement
6.2 component repair
6.3 wire/loom repair

7.

Check diagnostic activities comply with one of the following standards:

7.1 company standards and procedures
7.2 equipment manufacturer's specifications
7.3 customer standards and requirements
7.4 specific system requirements

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