SEMAUT3014

Assembling electrical and electronic equipment to vehicles

Overview

This standard identifies the competences needed to assemble and fit various items of electrical and electronic equipment into vehicles, in accordance with approved procedures. You will be required to assemble a range of electrical and electronic equipment, including audio, safety, and control systems, using a variety of assembly methods and techniques. You will also be expected to use a range of tools and specialised equipment associated with the assembly methods, and to check that the assembly has been completed to the level of accuracy and quality required by the specification.

Your responsibilities will require you to comply with organisational policy and procedures for the assembly activities undertaken, and to report any problems with the process 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 procedures appropriate to the fitting and assembly of electrical/electronic equipment and devices to the vehicle. You will understand the assembly methods and techniques used, and their application, and will know about the tooling and ancillary equipment, consumables and the function of the electrical/electronic components, 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 assembly 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. follow the relevant instructions, assembly drawings and any other specifications
3. ensure that the specified components are available and that they are in a usable condition
4. assemble the components in their correct positions using the correct methods and techniques
5. secure the components using the specified connectors and securing devices
6. check the completed assembly to ensure that all operations have been completed and the finished assembly meets the required specifications
7. deal promptly and effectively with problems within your control and report those that cannot be solved
8. ensure that 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 the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you
3. the hazards associated with the activities, and how to minimise them and reduce risks
4. the personal protective equipment and clothing (PPE) to be worn during the activities
5. the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps)
6. the procedures for obtaining the various types of drawing, job instructions and specifications that are used during the assembly and fitting of electrical components, and how to interpret them correctly
7. how to identify the components to be used; component identification systems (codes and component orientation indicators)
8. the assembly methods and procedures to be used, and the importance of adhering to these procedures
9. how the components are to be aligned and positioned prior to securing, and the tools and equipment to be used
10. the various joining, fastening and connecting devices that will be used, and their methods of construction, assembly and installation
11. the functions of the various electrical components, hardware and software
12. how software can potentially affect hardware operations
13. the use of torque wrenches and the importance of ensuring fasteners are adjusted to the required settings
14. the types and rating of wires/cables and fuses, and their functions and application
15. the principles, conventions and wiring regulations associated with electrical measurement and assembly
16. the consumables, tools and equipment that are used for assembling and fitting wiring looms to vehicles

17. the importance of using the specified fasteners for the assembly and why you must not use substitutes
18. how to deal with components or fastening devices that are incorrectly assembled, damaged or have other faults
19. the quality control procedures to be followed during the assembly operations
20. how to conduct any necessary checks to ensure the accuracy and quality of the assembly produced
21. how to recognise defects (incorrect assembly, ineffective fasteners, component damage)
22. the importance of ensuring that the completed assembly is free from left-over items and foreign objects
23. the methods and equipment used to transport, handle and lift the components into position and how to check that the equipment is within its current certification dates
24. the preparations to be undertaken on the components and fixing points, prior to fitting the components into the vehicle
25. how to check that the tools and equipment to be used are correctly calibrated and are in a safe, tested and serviceable condition
26. the importance of ensuring that all tools are used correctly and within their permitted operating range
27. problems with the assembly operations and the importance of informing appropriate people of non-conformances
28. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve
29. 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 during the assembly activities:

1.1 obtain and use the appropriate documentation (such as job instructions, assembly drawings, quality control documentation)
1.2 adhere to procedures or systems in place for risk assessment, hazardous substances, personal protective equipment and other safety regulations and procedures to realise a safe system of work
1.3 check that all cables, extension leads or air supply hoses are in a safe, tested and serviceable condition
1.4 check that all tools and equipment to be used are within current calibration/certification dates
1.5 ensure that sub-assemblies and components used are free from damage, foreign objects, dirt or other contamination
1.6 use safe and approved techniques to assemble the electrical and electronic equipment to the vehicles
1.7 return all tools and equipment to the correct location on completion of the assembly activities
1.8 leave the work area in a safe and appropriate condition on completion of the activities

2.

Assemble five of the following electrical and electronic devices to the vehicle, and terminate to the loom:

2.1 audio equipment
2.2 entertainment equipment
2.3 navigational equipment
2.4 safety systems
2.5 control systems
2.6 power-up systems
2.7 motors
2.8 charging points
2.9 Wi-Fi systems
2.10 entertainment systems
2.11 actual vehicle location (AVL) systems
2.12 other specific equipment

3.

Terminate eight electrical and electronic devices to the loom, as appropriate:

3.1 fuses/fuse box
3.2 fuel management system
3.3 lighting system
3.4 actuators
3.5 sensors

3.6 braking system sensors/actuators
3.7 circuit boards
3.8 battery
3.9 circuit protection
3.10 heating and ventilation system

4.

Use a variety of assembly methods and techniques, to include five of the following:

4.1 threaded fastening
4.2 drive/interference fits
4.3 soldering
4.4 clip/spring fastening
4.5 adhesive
4.6 cable termination
4.7 multi-connection
4.8 screened cable fitment
4.9 plugs and sockets

5.

Assemble and connect components to vehicles, using three of the following:

5.1 jig
5.2 fixture
5.3 cutting device
5.4 wire/cable stripping device
5.5 measuring device
5.6 test meter
5.7 continuity tester
5.8 soldering equipment
5.9 computer-aided fault diagnostic device

6.

Check that assemblies comply with all of the following quality and accuracy standards:

6.1 loom cables are correctly connected to the device and free from kinks
6.2 pins in multi-connectors are correctly orientated and secure
6.3 all equipment is correctly terminated and securely mounted
6.4 all components are correctly installed and comply to specifications

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