SEMPEO2-69 - SQA Unit Code H2C8 04
Joining Public Service Vehicle Components by Mechanical Processes

Overview

This standard covers a broad range of basic competences you need to join public service vehicle components using mechanical fasteners which will prepare you for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

You will be expected to prepare for the joining activities by obtaining all the necessary information, documentation, tools and equipment required, and to plan how you intend to carry out the required joining activities and the sequence of operations you intend to use. You will be expected to select the appropriate equipment to use, based on the types of fastener to be installed and the accuracy required.

The mechanical fasteners to be used include hollow rivets, snap fasteners, threaded fasteners, self tapping screws and other devices. You will need to use a range of different techniques to prepare, join and check that the mechanical fasteners are installed to the required specification.

During, and on completion of, the joining operations, you will be expected to check the quality of the join, by visual means and by using a torque wrench or other torque devices where applicable. You will need to be able to recognise installation and joining defects, to take appropriate action to remedy any faults that occur and to ensure that the finished installation meets the drawing requirements. On completion of the joining activities, you will be expected to return all tools and equipment used to the correct locations, and to leave the work area in a safe and tidy condition.

Your responsibilities will require you to comply with health and safety requirements and organisational policy and procedures for the installation activities undertaken. You will need to take account of any potential difficulties or problems that may arise with the joining activities, and to seek appropriate help and advice in determining and implementing a suitable solution. You will work under a high level of supervision, whilst taking responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide an understanding of your work, and will enable you to apply appropriate techniques, for the joining of public service vehicle components safely. You will understand the different types of fastener used and its application, and will know about the equipment, materials and consumables, to the required 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 joining public service vehicle components and when using hand and power tools. You will be required to demonstrate safe working practices throughout, and will understand the responsibility you owe to yourself and others in the workplace.

SEMPEO2-69 - SQA Unit Code H2C8 04
Joining Public Service Vehicle Components by Mechanical Processes

Performance criteria

You must be able to:

P1. Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines
P2. Plan the activity before starting the joining process
P3. Obtain the appropriate tools and equipment for the joining operations, and check that they are in a safe and usable condition
P4. Secure the components, using the correct fastening devices and joining techniques
P5. Check that all dimensional and geometrical aspects of the assembly are to the specification
P6. Check that the join is complete, and that all components are free from damage
P7. Deal promptly and effectively with problems within your control, and seek help and guidance from the relevant people if you have problems that you cannot resolve
P8. Leave the work area in a safe and tidy condition on completion of the joining activities

SEMPEO2-69 - SQA Unit Code H2C8 04
Joining Public Service Vehicle Components by Mechanical Processes

Knowledge and understanding

You need to know and understand:

K1. The health and safety requirements, and safe working practices and procedures required for the joining activity
K2. The importance of wearing appropriate protective clothing and equipment (PPE), and keeping the work area safe and tidy
K3. The hazards associated with joining components, and with the tools and equipment used (such as use of power tools, trailing leads or hoses, damaged or badly maintained tools and equipment), and how they can be minimised
K4. The procedure for obtaining the required drawings, job instructions and other related specifications
K5. The importance of working to the joining instructions and appropriate specifications
K6. How to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken
K7. How to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
K8. The process for the control of materials, and the need for component control
K9. How to identify the mechanical fasteners to be used; material identification systems and codes used
K10. The importance of using the correct tools and equipment when joining components
K11. The implications to the fastener and component if incorrect tools and equipment are used
K12. The importance of using the specified components and joining devices for the assembly, and why you must not use substitutes
K13. Where appropriate, the application of sealants and adhesives within the assembly activities, and the precautions that must be taken when working with them
K14. The various types, range and applications of fasteners used and the methods of installing them including any preparation requirements
K15. The advantages and disadvantages of the different forms and types of mechanical join
K16. The procedures to be adopted when removing rivets and other fasteners
K17. How to check that riveting guns, power tools and attachments are in a safe and usable condition, and the action to be taken in the event of identifying defective equipment
K18. The methods used to check the security and torque of joined components
K19. The importance of ensuring that fasteners are tightened to the correct torque
K20. The safety implications for not tightening fasters to the correct specification

K21. How and why tools are calibrated, and how to check that the tools used are using are within calibration dates
K22. How to conduct any necessary checks to ensure the accuracy and quality of the join produced
K23. The problems that can occur with the installation of the mechanical fasteners, and how these can be overcome
K24. When to act on your own initiative and when to seek help and advice from others
K25. The importance of leaving the work area in a safe and clean condition on completion of the activities (such as removing and storing power leads, isolating equipment, removing and returning drills, cleaning the equipment and removing and disposing of waste)

SEMPEO2-69 - SQA Unit Code H2C8 04
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Additional Information

Scope/range related to performance criteria

You must be able to:

1 Carry out **all** of all of the following activities during the joining activity:

1.1 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations and procedures
1.2 obtain and use the appropriate documentation (such as job instructions and drawings)
1.3 maintain a safe working environment at all times
1.4 join components in the correct order and sequence using the correct fastening device
1.5 ensure any faces to be joined are clean and prepared correctly
1.6 return all tools and equipment to the correct location on completion of the joining activities
1.7 dispose of waste materials in accordance with approved procedures

2 Join components and assemblies using **all** of the following:

2.1. hollow rivets
2.2. snap fit fasteners
2.3. threaded fasteners
2.4. bonding

Plus **three** more from the following:

2.5 nutserts
2.6 drive lock rivets
2.7 self tapping screws
2.8 spring washers
2.9 locking nuts
2.10 other joining/locking devices

3 Use **all** of the following types of equipment:

3.1 riveting guns (appropriate to rivet type)
3.2 hand drills (air and electric)
3.3 hand tools applicable to the type of fastener

Plus **five** of the following during the joining activity:

3.4 drill bits (appropriate to the material)
3.5 clamps
3.6 screw bits (appropriate to the type of fastener)
3.7 templates

3.8 countersinks
3.9 jigs and fixtures

4 Use **three** of the following methods and techniques in the joining process:

4.1 countersinking
4.2 tapping internal threads
4.3 drilling holes to depth
4.4 drilling holes through components
4.5 dies for external threads
4.6 reaming

5 Use fasteners to join components for **all** of the following:

5.1 sub assemblies
5.2 structural components
5.3 panels/skins

6 Join components in **three** of the following positions

6.1 horizontal
6.2 vertical
6.3 overhead
6.4 difficult access/confined spaces

7 Use three of the following to carry out checks during, and on completion of, the joining activities:

7.1 rules/tapes
7.2 squares/straight edge
7.3 customer specific gauges
7.4 templates
7.5 torque wrench/gauges

8 Joined components comply with **all** of the following requirements as appropriate to the joining method:

8.1 all components are correctly joined and aligned, in accordance with the specification
8.2 bolted and screwed joints are tightened to the correct torque
8.3 riveted joints are free from excessive material deformation and surface marks
8.4 bonded joints are secure, free from contamination and excess adhesive/sealants
8.5 overall dimensions are within specification tolerances
8.6 completed assemblies have secure and firm joints, and are clean and free from burrs/flash, deformation or cracking

SEMPEO2-69 - SQA Unit Code H2C8 04
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Developed by	SEMTA
Version number	1
Date approved	December 2011
Indicative review date	December 2016
Validity	Current
Status	Original
Originating organisation	SEMTA
Original URN	69
Relevant occupations	Engineering and manufacturing technologies; Engineering;
Suite	Performing Engineering Operations Suite 2
Key words	engineering, engineering operations, public service vehicle manufacturing, mechanical, processes, joining, assemblies, components, fasteners