

Installing aircraft mechanical fasteners

Overview

This standard covers a broad range of basic competences you need to install aircraft 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 installation activities by obtaining all the necessary information, documentation, tools and equipment required, and to plan how you intend to carry out the required installation 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 installed will include devices such as hollow and solid rivets, threaded fasteners, anchor nuts, pins and other locking devices. You will need to use a range of different techniques to prepare, install and check that the mechanical fasteners are installed to the required specification.

During, and on completion of, the installation operations, you will be expected to check the quality of the workpiece, using measuring equipment appropriate to the aspects being checked and tolerances to be achieved. You will need to be able to recognise installation 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 installation 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 installation 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 installation of the aircraft mechanical fasteners, safely. You will understand the fastener installation process, 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 using aircraft mechanical fastener installation techniques, 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.

Specific Standard Requirements

In order to prove your ability to combine different aircraft fastener installation operations, at least one of the assemblies produced must be of a significant nature, and must contain a minimum of **four** types of the fasteners listed in scope 2.

Performance criteria

You must be able to:

1. work safely at all times, complying with health and safety legislation, regulations, directives and other relevant guidelines
2. plan the installation of the mechanical fasteners before you start the activity
3. obtain the appropriate tools and equipment for the installation operations, and check that they are in a safe and usable condition
4. assemble and secure the components, using the correct fastening devices and joining techniques
5. install aircraft mechanical fasteners
6. measure and check that all dimensional and geometrical aspects of the component are to the specification
7. check that the installation is complete, and that all components are free from damage
8. 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
9. leave the work area in a safe and tidy condition on completion of the fitting activities

Knowledge and understanding

You need to know and understand:

1. the health and safety requirements, and safe working practices and procedures required for the installation of the aircraft mechanical fasteners
2. the importance of wearing appropriate protective clothing and equipment (PPE), and keeping the work area safe and tidy
3. the hazards associated with installing aircraft mechanical fasteners, 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
4. the procedure for obtaining the required drawings, job instructions and other related specifications
5. the importance of working to the installation instructions and appropriate specifications
6. 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
7. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
8. the process for the control of materials, and the need for component control and quarantine
9. how to identify the mechanical fasteners to be used; material identification systems; codes used and grain flow indicators
10. why you must obtain design approval before removing and replacing faulty fasteners
11. the purpose and use of joint sealing agents and anti-electrolysis barriers, and the precautions to be taken when using them
12. regulations concerning electrical bonding and anti-electrolysis barriers
13. the various types and range of screwed fasteners used on aircraft fittings, and the methods of installing them
14. the types and applications of aircraft rivets, and the advantages of hollow rivets over solid rivets
15. the reasons for using screw fastenings rather than rivets
16. the purpose and use of a countersink cage
17. the various locking devices used with fastenings

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18. the purpose and use of locating dowels, gripping pins and gauges, when carrying out fastening operations
19. the procedures to be adopted when removing rivets and other fasteners
20. the term `quilting', its occurrence and avoidance
21. bolt break-offs, and where they occur
22. 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
23. types of gauges used to measure angles, depths, countersinks and torque
24. how and why tools are calibrated, and how to check that the tools you are using are within calibration dates
25. how to conduct any necessary checks to ensure the accuracy and quality of the installations produced
26. the problems that can occur with the installation of the mechanical fasteners, and how these can be overcome
27. when to act on your own initiative and when to seek help and advice from others
28. 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 machines, removing and returning drills, cleaning the equipment and removing and disposing of waste)

Scope/range related to performance criteria

1.

Carry out **all** of the following activities during the installation of the mechanical fasteners:

- 1.1 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations
- 1.2 check that all measuring equipment is within calibration date
- 1.3 ensure that all power tool cables, extension leads or air supply hoses are in a serviceable condition and tested
- 1.4 return all tools and equipment to the correct location on completion of the installation activities

2.

Install a range of mechanical fasteners, to include **all** of the following:

- 2.1 hollow rivets
- 2.2 solid rivets
- 2.3 threaded fasteners
- 2.4 quick release fasteners

Plus **two** more from the following:

5. collared fasteners
6. split pins
7. pin clips
8. wire locks
9. anchor nuts
10. rivet nuts
11. nappy pins
12. pip pins
13. other specific locking devices

1.

Use **both** of the following types of equipment:

- 1.1 riveting guns (appropriate to rivet type)
- 1.2 gripping pins and location dowels

Plus **two** more from the following:

3. gauges for intrusions
4. redline templates
5. clamps
6. drills and tools with attachments

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7. jigs

1.

Use **all** of the following installation methods and techniques:

- 1.1 countersinking
- 1.2 solid riveting (single and double handed)
- 1.3 through-hole
- 1.4 milling rivets
- 1.5 wire locking
- 1.6 blind riveting

2.

Make **three** types of connection from:

- 2.1 wet assembly
- 2.2 panels
- 2.3 structures
- 2.4 dry assembly
- 2.5 skins
- 2.6 repairs

3.

Use **four** of the following to carry out appropriate checks during, and on completion of, the installation activities:

- 3.1 rules
- 3.2 feeler gauges
- 3.3 squares
- 3.4 bore/hole gauges
- 3.5 callipers
- 3.6 radius/profile gauges
- 3.7 protractors
- 3.8 dial test indicators (DTI)
- 3.9 micrometers
- 3.10 torque wrenches/gauges
- 3.11 Verniers
- 3.12 rivet intrusion gauges
- 3.13 slip gauges

4.

Install aircraft mechanical fasteners to comply with **all** of the following requirements:

- 4.1 all components are correctly assembled and aligned, in accordance with the specification
- 4.2 overall dimensions are within specification tolerances
- 4.3 assemblies meet appropriate geometric tolerances (such as square, straight, angles free from twists)
- 4.4 where appropriate, pitches of rivets/fasteners meet specification requirements

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4.5 completed assemblies have secure and firm joints, and are clean and free from burrs/flash, deformation or cracking

Behaviours

Additional Information

You will be able to apply the appropriate behaviours required in the workplace to meet the job profile and overall company objectives, such as:

- strong work ethic
- positive attitude
- team player
- dependability
- responsibility
- honesty
- integrity
- motivation
- commitment

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