SEMAE3046

Installing flying control surfaces and systems

Overview

This standard identifies the competences you need to install fixed or rotary wing aircraft flying control surfaces and systems, in accordance with approved procedures. It includes the installation of flying control system components, such as control columns, rudder pedals, throttle boxes, flap selectors, air brake selectors, trim wheels, auxiliary controls, auto pilot systems, gradient boxes, torque tubes, cables and pulleys, turnbuckles, connecting rods, dampers, (Automatic Flying Control System) AFCS series and parallel actuators, mixers, levers, pivots, locks and stops. The flying control surface will include units associated with air brakes, flaps, ailerons, rudders, elevators, trim tabs, main rotor blades, tail rotor blades and stabilisers.

You will be required to select the appropriate tools and equipment to use, based on the operations to be performed and components to be installed and to check that they are in a safe and usable condition. In carrying out the installation operations, you will be required to follow laid-down procedures and specific installation techniques, in order to install the various components and systems. The installation activities will include making all necessary checks and adjustments to ensure that components are correctly orientated, positioned and aligned, have the correct symmetry and control surface travel, are correctly rigged and that they function as per the specification.

Your responsibilities will require you to comply with organisational policy and procedures for the installation activities undertaken and to report any problems with these activities that you cannot personally resolve, or that are outside your permitted authority, to the relevant people. You must ensure that all tools, equipment and materials used in the installation are correctly accounted for on completion of the activities and must complete all necessary job/task documentation accurately and legibly. 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 the installation techniques and procedures used. You will understand the flying control system being installed and its function, and will know about the equipment, relevant components, alignment, adjustment and rigging methods, in adequate depth to provide a sound basis for carrying out the installation activities to the required specification.

You will understand the safety precautions required when working on the aircraft flying control system and with its associated tools and equipment. 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 all relevant drawings and specifications for the installation being carried out
3. use the correct tools and equipment for the installation operations and check that they are in a safe and usable condition
4. install, position and secure the equipment and components in accordance with the specification
5. ensure that all necessary connections to the equipment are complete
6. deal promptly and effectively with problems within your control and report those that cannot be solved
7. check that the installation is complete and that all components are free from damage
8. complete the relevant documentation, in accordance with organisational requirements
9. leave the aircraft and the work area in a safe and appropriate condition, free from foreign object debris on completion of the activities

Knowledge and understanding

You need to know and understand:

1. the specific safety practices and procedures that you need to observe when working with control surfaces/systems (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)
2. the hazards associated with installing flying control surfaces and systems and with the tools and equipment used and how to minimise them and reduce any risks
3. the health and safety requirements of the work area where you are carrying out the activities and the responsibility these requirements place on you
4. the protective equipment that you need to use for both personal protection (PPE) and protection of the aircraft
5. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS, ISO or BSEN standards) in relation to work undertaken
6. how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing
7. how to carry out currency/issue checks on the specifications you are working with
8. the components to be installed and their function within the particular control surfaces/systems
9. the various mechanical fasteners that will be used and their method of installation (such as open and blind rivets, threaded fasteners, special securing devices)
10. the importance of using the specified fasteners for the particular installation and why you must not substitute others
11. why securing devices need to be locked and labelled and the different methods that are used
12. the torque loading requirements of the fasteners and what to do if these loadings are exceeded or not achieved
13. the quality control procedures to be followed during the installation operations
14. procedures for ensuring that you have the correct tools, equipment, components and fasteners for the activities
15. the techniques used to position, align, adjust and secure the components to the aircraft without damage
16. methods of lifting, handling and supporting the components/equipment during

the installation activities

17.

the use of seals, sealant, adhesives and anti-electrolysis barriers and the precautions to be taken

18.

why electrical bonding is critical and why it must be both mechanically and electrically secure

19. the procedure for the safe disposal of waste materials

20. the purpose of symmetry and rigging checks; how they are carried out; how to locate the rigging points and faces; and the use of incidence boards

21. how to conduct any necessary checks to ensure the system integrity, functionality, accuracy and quality of the installation

22. how to recognise installation defects (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination)

23. the importance of ensuring that the completed installation is free from dirt, swarf and foreign object damage and of ensuring that any exposed components or pipe ends are correctly covered/protected

24. the tools and equipment used in the installation activities and their calibration/care and control procedures

25. why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities

26. the problems that can occur with the installation operations and how these can be overcome

27. the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation

28. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

Scope/range related to performance criteria

1.

Carry out all of the following during the installation activities:

1.1 obtain and use the appropriate documentation (such as job instructions, installation drawings, planning and quality control documentation, aircraft standards and specifications)
1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.3 provide and maintain a safe working environment for the installation activities
1.4 obtain the correct tools and equipment for the activity and check that they are in a safe, tested and usable condition and within current calibration date
1.5 follow safe practice/approved installation techniques and procedures at all times
1.6 return all tools and equipment to the correct location on completion of the installation activities
1.7 dispose of waste materials in accordance with approved procedures

2.

Either: Install a range of flying control components for fixed wing aircraft, to include four of the following:

2.1 rudder pedals
2.2 flap selectors
2.3 track arms
2.4 flap motors
2.5 flap track beams
2.6 flap track fairings
2.7 hydraulic components/systems
2.8 drive shafts (leading edge or trailing edge)
2.9 gradient boxes
2.10 torque tubes
2.11 turnbuckles
2.12 control columns
2.13 air brake selectors
2.14 slat brakes
2.15 connecting rods
2.16 control sticks
2.17 levers
2.18 mixer units
2.19 trim wheels
2.20 auto pilot systems
2.21 locks and stops
2.22 bell cranks

2.23 AFCS series and parallel actuators
2.24 auxiliary controls
2.25 throttle boxes
2.26 cables and pulleys
2.27 pedals
2.28 other specific flying control component

Or: Install a range of flying control components for rotary wing components, to include four of the following:

29. gradient boxes
30. torque tubes
31. turnbuckles
32. cables and pulleys
33. connecting rods
34. control sticks
35. levers
36. mixer units
37. locks and stops
38. bell cranks
39. AFCS series and parallel actuators
40. pedals
41. other specific flying control component

1.

Either: Install a range of flying control surfaces for fixed wing aircraft, to include three from the following:

1.1 air brakes
1.2 flaps
1.3 ailerons
1.4 elevators
1.5 trim tabs
1.6 rudders
1.7 spoilers
1.8 tail plane
1.9 canards
1.10 slats
1.11 wing tips
1.12 foreplanes
1.13 flaperons
1.14 tailerons
1.15 other specific flying control surface

Or: Install a range of flying control surfaces for rotary wing aircraft, to include two items

from the following:

16. main rotor blades
17. stabilisers
18. tail rotor blades
19. trim tabs
20. other specific flying control surface

1.

Use installation methods and techniques which include four of the following:

1.1 positioning and aligning components
1.2 setting control surface travel
1.3 setting rigging
1.4 checking and setting symmetry
1.5 electrical bonding of components
1.6 making functional checks

2.

Make three of the following types of connections:

2.1 quick release fasteners
2.2 locking devices
2.3 torque load bolts
2.4 threaded fasteners
2.5 electrical connections
2.6 pipe connections

3.

Produce installations in compliance with one of the following standards:

3.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
3.2 Ministry of Defence (MOD)
3.3 Military Aviation Authority (MAA)
3.4 Aerospace Quality Management Standards (AS)
3.5 Federal Aviation Authority (FAA)
3.6 BS, ISO or BSEN standards and procedures
3.7 customer standards and requirements
3.8 company standards and procedures
3.9 manufacturer standards and procedures

4.

Complete the relevant paperwork, to include one from the following and pass it to the appropriate people:

4.1 build records
4.2 log cards
4.3 job cards
4.4 aircraft flight log
4.5 other specific recording method

Behaviours

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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