SEMAE3151

Removing and replacing major assemblies of aircraft airframes

Overview

This standard identifies the competences you need to carry out the removal and replacement of major assemblies of aircraft airframes, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft, and includes a range of assemblies such as landing gear, flying control surfaces, main and tail rotor assemblies, tail pylon, transmission systems, cabin, cargo and weapon bay doors, and other aircraft specific equipment.

The removal and replacement activities will include making all necessary checks to support and chock pistons/moving parts, lifting and handling components, removing and replacing faulty equipment at component or unit level, setting and adjusting the completed system, and leaving the components in a safe condition and ready for testing.

Your responsibilities will require you to comply with organisational policy and procedures for the removal and replacement 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 are correctly accounted for on completion of the activities, and that all necessary job/task documentation is completed, 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 appropriate removal and replacement techniques and procedures to major components of the aircraft airframe. You will understand the removal and replacement methods and procedures and their application, along with the system maintenance requirements. You will know how the equipment functions, the common problems that can occur, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the removal and replacement activities and for ensuring that the equipment is replaced to the required standard. In addition, you will have sufficient knowledge of these components to ensure that they are fit for purpose and meet the specifications, thus providing a sound basis for carrying out the replacement.

You will understand the safety precautions required when removing and replacing

major airframe components, especially those for isolating the equipment and lifting and moving the components. You will be required to demonstrate safe working practices throughout and will understand your responsibility for taking the necessary safeguards to protect yourself and others in the workplace.

Notes To display competence in this standard, it is necessary to both remove and replace major components from aircraft airframes. You must remove components; however, you may fit a replacement component where the original was previously removed by another person.

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 aircraft manuals and publications to carry out the required work
3. establish and where appropriate, mark component orientation for re-assembly
4. ensure that any stored energy or substances are released safely and correctly
5. carry out the removal and replacement activities, within the limits of your personal authority
6. remove and replace the required components, using approved tools and techniques
7. take suitable precautions to prevent damage to components and the surrounding structure
8. complete the relevant documentation, in accordance with organisational requirements
9. label and store (in an appropriate location) components that require repair or overhaul
10. dispose of waste materials and scrap components in accordance with safe working practices and approved procedures
11. leave the aircraft in a safe and appropriate condition, free from foreign object debris and in a condition ready for testing

Knowledge and understanding

You need to know and understand:

1. the specific safety practices and procedures that you need to observe when working on major airframe components (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)
2. the importance of maintenance on and impact upon (extended twin operations procedures) ETOpS systems, legislation and local procedures
3. the hazards associated with removing and replacing major airframe components and with the tools and equipment used (such as the need to support the aircraft and/or its components, lifting and moving heavy and bulky components, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down maintenance procedures) and how to minimise them and reduce any risks
4. the requirements and importance of understanding and applying human factors as defined by the regulatory requirements and the potential impact if these are not adhered to
5. the protective equipment that you need to use for both personal protection (PPE) and protection of the aircraft
6. what constitutes a hazardous voltage and how to recognise victims of electric shock
7. how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)
8. how to extract and use information from aircraft maintenance manuals, history/maintenance reports, flight logs and other documents needed in the removal and replacement process
9. how to carry out currency/issue checks on the specifications you are working with
10. terminology used for major airframe components
11. the requirement to place the aircraft in to a specific position prior to the removal of major assemblies (such as on trestles)
12. the principles of how the major airframe components and equipment functions, its operating sequence, the working purpose of individual units/components and

how they interact
13. the techniques used to remove the major airframe components from the aircraft, without damage to the components or surrounding structure (such as release of pressures/force, draining of fluids, proof marking, extraction of components and the need to protect the circuit integrity by fitting blanking plugs, and ensuring that exposed components are correctly covered/protected)
14. the various mechanical fasteners to be removed and replaced, and their method of removal and replacement (such as threaded fasteners, special securing devices)
15. the various types of electrical connector that are used, methods of unlocking, orientation indicators and locating and locking in of the connections
16. the importance of applying electrostatic discharge (ESD) procedures when working on sensitive equipment or devices
17. methods of lifting, handling and supporting the components/equipment during the removal and replacement activities
18. methods of checking that components are fit for purpose and how to identify defects and wear characteristics
19. the need to correctly label and store components that require repair or overhaul and to check that replacement components have the correct part/identification markings
20. how to replace and reconnect the major airframe components onto the aircraft (such as the use of gaskets/seals and jointing/sealing compounds; ensuring correct orientation, position and alignment; tightening securing devices to the required torque; replacing locking and securing devices; eliminating stress on pipework/connections; ensuring that pipework and cables are correctly supported at suitable intervals; carrying out visual checks of all components)
21. how to make adjustments to components/assemblies to ensure that they function correctly (such as setting working clearance, setting travel)
22. why electrical bonding is critical and why it must be both mechanically and electrically secure
23. why securing devices need to be tightened to the correct torque, locked and labelled, and the different methods that are used
24. how to check that tools and equipment are free from damage or defect, are in a safe, tested and usable condition, and are configured correctly for the intended purpose
25. the need to control and account for all tools and equipment used during the removal and replacement activity

26.
how to use lifting and handling equipment in the maintenance activity
27.
the problems that can occur with the removal/replacing operations and how these can be overcome
28.
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
29. the procedure for the safe disposal of waste materials, scrap components, oils and fluids
30. the extent of your own authority and to whom you should report if you have a problem that you cannot resolve

Scope/range related to performance criteria

1.

Carry out all of the following during the removal and replacement activity:

1.1 obtain clearance to work on the aircraft and observe all relevant safety procedures
1.2 obtain and use the appropriate documentation (such as job instructions, aircraft manuals, technical instructions, and other relevant maintenance documentation)
1.3 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
1.4 obtain the correct tools and equipment for the activity, and check that they are in a safe, tested and usable condition and within current certification/calibration date
1.5 ensure the safe isolation and depressurisation of equipment before breaking into the system
1.6 ensure that all relevant safety devices and mechanical/physical locks are in place (where appropriate)
1.7 where appropriate, apply electrostatic discharge (ESD) protection procedures
1.8 use approved removal and replacement techniques and procedures at all times
1.9 ensure that components and surrounding structures are free from spillages, damage and foreign objects
1.10 return all tools and equipment to the correct location on completion of the activities

2.

Remove three of the following major airframe components and replace three of the following major airframe components:

2.1 main undercarriage
2.2 propeller
2.3 flaperons
2.4 weapon bay doors
2.5 nose undercarriage
2.6 rudders
2.7 flaps/slats
2.8 cabin doors
2.9 tail undercarriage
2.10 ailerons/tailerons
2.11 outriggers
2.12 main gear box
2.13 wing
2.14 main rotor assembly

2.15 canards/foreplanes
2.16 intermediate gear box
2.17 spoilers/speed brakes
2.18 tail rotor assembly
2.19 elevators
2.20 tail gear box
2.21 air brakes
2.22 canopy
2.23 stabilisers
2.24 nose gear box
2.25 horizontal stabiliser/tailplane
2.26 tail pylon
2.27 cargo doors
2.28 other specific major assembly

3.

Carry out all of the following removal and replacement activities:

3.1 isolation of the components to be removed (such as electrical, fluid power)
3.2 chocking and supporting components
3.3 disconnecting electrical connections
3.4 disconnecting mechanical fastening devices
3.5 disconnecting/removing hoses/pipes (where applicable)
3.6 replacing damaged/defective components
3.7 replacing 'lifed' items (such as seals, filters, gaskets)
3.8 releasing stored pressure (where applicable)
3.9 draining and removing fluids (where applicable)
3.10 lifting and moving components
3.11 checking components for serviceability
3.12 positioning and aligning replaced components
3.13 making mechanical connections
3.14 making electrical connections
3.15 tightening fastenings to the required torque
3.16 replacing fluids and bleeding the system(where applicable)
3.17 setting, and adjusting replaced components (such as travel, working clearance)
3.18 making 'off-load' checks before re-pressurising(where applicable)
3.19 applying and removing covering/protection to exposed components, wires, pipework or vents
3.20 re-pressurising the system (where applicable)
3.21 labelling (and storing in the correct location) components that require repair or overhaul
3.22 applying bolt locking methods (such as split pins, wire locking, lock nuts)

4.

Remove and replace aircraft major assemblies in compliance with one of the following:

4.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
4.2 extended twin operations procedures (ETOpS) (where appropriate)

4.3 Ministry of Defence (MoD)
4.4 Military Aviation Authority (MAA)
4.5 Aerospace Quality Management Standards (AS)
4.6 Federal Aviation Authority (FAA)
4.7 BS, ISO or BSEN standards and procedures
4.8 customer standards and requirements
4.9 company standards and procedures
4.10 aircraft manufacturer's requirements

5.

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

5.1 job cards
5.2 computer records
5.3 aircraft service/flight log
5.4 aircraft log book
5.5 permit to work/formal risk assessment

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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