

## Installing aircraft main engines

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### Overview

This standard identifies the competences you need to install aircraft main engines, such as turbo prop, turbo jet, by-pass, turbo shaft and ducted fan, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft engines. You will be required to select the appropriate equipment and installation techniques, based on the operations to be made and the components to be installed. The aircraft main engine components to be installed will include air compressors, air intakes, combustion system, engine control units, torque tubes, fuel pipes, fire detection systems, exhaust units and equipment. The installation activities will include making all necessary checks and adjustments, to ensure that components are correctly positioned, aligned, locked and fastened, and that correct sealants are used.

Your responsibilities will require you to comply with organisational policy and procedures for the installation of the aircraft main engines and to report any problems with the installation activities, equipment or components used that you cannot personally 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 the installation techniques and procedures used. You will understand the aircraft engine being installed, and its application and will know about the installation techniques, 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 installation 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.

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### 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 work area in a safe and appropriate condition, free from foreign object debris on completion of the activities

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## Knowledge and understanding

## You need to know and understand:

1. the specific safety practices and procedures that you need to observe when working with aircraft main engines (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)
2. the health and safety requirements of the work area where you are carrying out the activities and the responsibility these requirements place on you
3. the hazards associated with installing aircraft main engines and with the tools and equipment used and how to minimise them and reduce any risks
4. the protective equipment that you need to use for both personal protection (PPE) and protection of the aircraft
5. the interpretation of drawings, standards, quality control procedures and specifications used for the installation (including BS, ISO or BSEN schematics, symbols and terminology)
6. how to carry out currency/issue checks on the specifications you are working with
7. the operating principles of the engine being installed and the function of the various components within the system
8. the components to be installed and their function within the particular aircraft main engines
9. the various mechanical fasteners that will be used and their method of installation (such as threaded fasteners, special securing and locking devices)
10. the importance of using the specified fasteners and locking devices 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 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. how to conduct any necessary checks to ensure the system

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- integrity, functionality, accuracy and quality of the installation
21. how to recognise installation defects (such as leaks, poor seals, misalignment, ineffective fasteners, foreign object damage or contamination)
  22. the importance of ensuring that the completed installation is free from foreign object debris and of ensuring that any exposed components or pipe ends are correctly covered/protected
  23. the tools and equipment used in the installation activities and their calibration/care and control procedures
  24. 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
  25. the problems that can occur with the installation operations and how these can be overcome
  26. 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
  27. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve

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## Scope/range related to performance criteria

1. Carry out all of the following during the installation activities:
  1. obtain and use the appropriate documentation (such as job instructions, installation drawings, planning and quality control documentation, aircraft standards and specifications)
  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
  3. provide and maintain a safe working environment for the installation activities
  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
  5. obtain clearance to work on the aircraft and observe all relevant isolation and safety procedures
  6. ensure that correct part numbers are used, including (where appropriate) left or right handed parts
  7. follow safe practice/approved installation techniques and procedures at all times
  8. return all tools and equipment to the correct location on completion of the installation activities
  9. dispose of waste materials in accordance with approved procedures
2. Install one main engine from the following:
  1. turbo prop
  2. by-pass
  3. turbo-shaft
  4. turbo jet
  5. ducted fan
  6. piston
3. Assemble main engine components, to include three of the following:
  1. air intake
  2. bearings
  3. turbine
  4. air compressor
  5. engine control unit
  6. exhaust unit
  7. combustion system

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8. damper/connector arm
  9. propelling nozzle
  10. shafts/gimble
  11. fire wire
  12. fire bottle
4. Use all the following installation methods and techniques:
  1. levelling and aligning
  2. earth bonding
  3. securing and locking
  4. sealing
  5. taking electrostatic discharge (ESD) precautions (if applicable)
  6. torque loading
5. Make three of the following types of connection:
  1. threaded fasteners
  2. screws
  3. torque load bolts
  4. locking devices
  5. electrical connections
  6. quick-release fasteners
  7. pipe connectors
6. Carry out installations in compliance with one of the following standards:
  1. Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
  2. Ministry of Defence (MoD)
  3. Military Aviation Authority (MAA)
  4. Aerospace Quality Management Standards (AS)
  5. customer standards and requirements
  6. Federal Aviation Authority (FAA)
  7. company standards and procedures
  8. BS, ISO or BSEN standards and procedures
  9. manufacturers standards and procedures
7. Complete the relevant paperwork, to include one from the following and pass it to the appropriate people:
  1. build records
  2. log cards
  3. aircraft flight log
  4. job cards
  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

## Installing aircraft main engines

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