SEMAE3153

Carrying out tests on aircraft engines and systems

Overview

This standard identifies the competences you need to test operational aircraft engines, in accordance with approved procedures. It covers both fixed wing and rotary winged aircraft, and includes testing main and auxiliary engines, as appropriate to the aircraft type.

You will be required to carry out all necessary preparations to the aircraft, in readiness for the tests to be carried out, and these will include ensuring that the aircraft is positioned in an appropriate test area, is secured, braked and chocked, and has an appropriate amount of fuel, and that all cockpit/cabin controls are in the appropriate positions.

In carrying out the tests, you will be required to follow laid-down procedures, to ensure that the working area is clear, that appropriate guards and notices are displayed, that ground tests and engine runs are carried out in accordance with the appropriate schedule, that monitoring procedures are complied with and analysis of results is undertaken and that test documentation is completed accurately and legibly.

Your responsibilities will require you to comply with organisational policy and procedures for the tests undertaken, and to report any problems with the testing activities 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 undertaking the appropriate engine test procedures. You will understand the engine being tested, and the specific test schedule to be followed, and you will know what the cabin/cockpit controls do and what the various gauges and indicators mean, in adequate depth to provide a sound basis for carrying out the tests to the required specification.

You will understand the safety precautions required when carrying out the testing activities, in particular those involved with running the engines. 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 the appropriate procedures for use of tools and equipment to carry out the required tests
3. set up and carry out the tests using the correct procedures and within agreed timescales
4. record the results of the tests in the appropriate format
5. review and analyse the results and carry out further tests if necessary
6. leave the aircraft and the system in a safe and appropriate condition, free from foreign object debris

Knowledge and understanding

You need to know and understand:

1. the specific safety practices and procedures that you need to observe when testing aircraft engines (including any specific legislation, regulations/codes of practice required for the activities, equipment or materials used)
2. the importance of maintenance on, and impact upon (extended twin operations procedures) ETOpS systems, legislation and local procedures
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 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 safety procedures that must be carried out before work is started on the aircraft (such as electrical bonding of the aircraft, checking that ground locks are in position, checking that safety pins are in critical controls (such as ejector seats, undercarriage), erecting warning signs and ensuring all personnel are clear of the test area)
6. the protective clothing and equipment (PPE) to be worn
7. the hazards associated with testing aircraft engines and how to minimise them and reduce any risks
8. the preparations to be carried out on the aircraft prior to starting the engine tests (such as applying brakes, chocking the aircraft, anchoring the aircraft to the ground, positioning cockpit and cabin controls in the correct positions, applying electrical power to the aircraft)
9. how to ensure that the aircraft is electrically bonded prior to fuelling and de-fuelling and why this is so important
10. how to obtain the required test schedules and specifications for the aircraft and engine type being tested, and how to check their currency and validity
11. how to read and interpret the specifications and from whom you can seek assistance if you have problems or issues regarding the test schedules or specifications
12. the correct operating procedures of the engines being tested
13. the methods and procedures to be used to carry out the various engine tests
14. the principle of operation of the engines under test and the function of the individual components within the system

15. the need to apply engine power in incremental stages and to check all readings, temperatures and pressures at each stage
16. why equipment and tool control is critical and what to do if a piece of equipment/tools are unaccounted for on completion of the activities
17. how to record the results of each individual test and the documentation that must be used
18. from whom to seek authorisation if you need to alter or change the test procedures
19. how to analyse the test results and how to make valid decisions about the acceptability of the aircraft
20. the procedures to be followed if the engine or system fails to meet the test specification
21. potential problems that can occur with the testing activities and how they can be overcome
22. the problems that may cause errors or discrepancies in/with the test results and how to avoid these
23. any required environmental controls relating to the testing
24. the documentation to be completed at the end of the testing activities
25. 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.

Prepare the aircraft for testing by carrying out all of the following, as applicable to the aircraft type:

1.1 obtain and use the appropriate documentation (such as technical/job instructions, ground test schedule, test procedures and quality documentations)
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 position the aircraft in an appropriate engine test bay
1.4 secure the aircraft by applying brakes, chocking and/or ground anchoring
1.5 ensure that all appropriate engine running guards and ground locks are in position and where applicable, check that ejector seat safety pins are engaged
1.6 ensure that the aircraft is electrically bonded and suitably fuelled for the tests being carried out
1.7 check that all cabin/cockpit controls are set as per the test schedule
1.8 check that electrical power is applied, either internally or by the use of external units
1.9 obtain clearance to undertake the engine test on the aircraft
1.10 ensure that safe working distance procedures are set up (with appropriate warning notices)
1.11 ensure the presence of fire fighting equipment, manual or tender, as appropriate to the situation
1.12 ensure that tests are conducted as per the test procedure for the aircraft/engine type

2.

Carry out tests on one of the following types of powerplant:

2.1 turbo prop
2.2 turbo-shaft
2.3 turbo jet
2.4 piston engines
2.5 turbo-fan
2.6 auxiliary power unit (APU)
2.7 ducted fan
2.8 ground turbine start (GTS)

3.

Carry out four of the following types of test:

3.1 post installation
3.2 functional test of engine driven component (such as generator, hydraulic pump, lubrication pump and air services)
3.3 fault proving/diagnosis
3.4 fluid sampling

3.5 performance testing
3.6 leak test
3.7 other specific tests

Including the following:

8. a full system test that incorporates three of the above tests

1.

Test aircraft engines using appropriate tools or test equipment, to include two of the following:

1.1 built in test equipment (BITE)
1.2 sampling devices
1.3 'special-to-type' test equipment
1.4 aircraft instruments

2.

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

2.1 computer records
2.2 job cards
2.3 aircraft log book
2.4 test records
2.5 aircraft service/flight log
2.6 permit to work/formal risk assessment

3.

Carry out tests in compliance with one of the following:

3.1 Civil Aviation Authority (CAA)/European Aviation Safety Agency (EASA)
3.2 extended twin operations procedures (ETOpS) (where appropriate)
3.3 Ministry of Defence (MoD)
3.4 Military Aviation Authority (MAA)
3.5 Aerospace Quality Management Standards (AS)
3.6 customer standards and requirements
3.7 Federal Aviation Authority (FAA)
3.8 company standards and procedures
3.9 BS, ISO or BSEN standards and procedures
3.10 manufacturer's specific power plant requirements

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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