SEMAUT3142

Testing prototype engines (fixed dynamometer)

Overview

This standard identifies the competences you need to carry out dynamometer tests on prototype engines, as appropriate to the engine type, in accordance with approved procedures. You will be required to carry out all necessary preparations to the engine in readiness for the tests to be carried out, and these will include ensuring that the engine is correctly connected to the dynamometer, that all ancillary equipment is fitted to the engine, appropriate blanking plates are fitted, test instrumentation is correctly connected and all necessary electrical checks are carried out.

In carrying out the tests, you will be required to follow laid-down procedures to ensure that the working area is clear, appropriate guards and notices are displayed, engine runs/tests are carried out in accordance with the appropriate schedule, monitoring procedures are complied with, analysis of results is made, 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, the specific test schedule to be followed, and will know what the various instruments and readings mean, in adequate depth to provide 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 fuelling and running the engine. 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. carry out the required tests using appropriate tools and equipment
3. set up and carry out the tests using the correct procedures and within agreed timescales
4. review and analyse the results and carry out further tests if necessary
5. deal promptly and effectively with problems within your control and report those that cannot be solved
6. ensure that work records are completed, stored securely and available to others, as per organisational requirements
7. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

Knowledge and understanding

You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you
3. the hazards associated with the activities, and how to minimise them and reduce risks
4. the personal protective equipment and clothing (PPE) to be worn during the activities
5. the preparations to be carried out on the engine prior to starting the engine tests (such as attaching to the dynamometer, fitting test instrumentation, fitting ancillary equipment, fitting blanking plates, filling engine with oil, making fuel connections, attaching electrical power and making final electrical checks of all systems)
6. how to carry out initial start-up procedures and checks (to include checking that engine starting and shutdown systems operate correctly, idle speed is satisfactory, fuel flow is operating correct, oil pressure is to specification, oil filters, connections, gaskets and seals are free from leaks)
7. how to access and set up the computer software required to run the engine tests
8. how to obtain the required test schedules and specifications for the prototype engine type being tested, and how to check their currency and validity
9. 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
10. the methods and procedures to be used to carry out the various engine tests
11. the need to apply engine power in incremental stages, and to check all readings, temperatures and pressures at each stage
12. how to record the results of each individual test, and the documentation that must be used
13. from whom to seek authorisation if you need to alter or change the test procedures
14. the procedures to be followed if the engine or system fails to meet the test

specification

15. how to analyse the test results and make valid decisions about the acceptability of the engine
16. potential problems that can occur with the testing activities, and how they can be overcome
17. problems that may cause errors or discrepancies in/with the test results, and how to avoid them
18. environmental controls required relating to the testing
19. why equipment control is critical, and what to do if a piece of equipment is unaccounted for on completion of the testing activities
20. the extent of your own responsibility and to whom you should report if you have problems that you cannot resolve
21. how to access, use and maintain information to comply with organisational requirements and legislation

Scope/range related to performance criteria

1.

Carry out all of the following during the testing activities:

1.1 obtain and use the appropriate documentation (such as job instructions, engine test schedules, test procedures, engine specifications, quality control documentation and other related documentation)
1.2 adhere to procedures or systems in place for risk assessment, hazardous substances, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
1.3 provide and maintain safe access and working arrangements for the test area, and ensure that any appropriate environmental conditions can be met
1.4 use safe and approved testing techniques and procedures at all times
1.5 return all tools and equipment to the correct location on completion of the activities
1.6 leave the engine and work area in a clean and safe condition on completion of the testing activities
1.7 dispose of waste items in a safe and environmentally acceptable manner

2.

Test one of the following types of prototype engine:

2.1 petrol vee
2.2 diesel vee
2.3 hybrid (internal combustion)
2.4 petrol inline
2.5 diesel inline

3.

Carry out tests to appropriate schedules on one of the following types of prototype engine:

3.1 production engines
3.2 repaired/overhauled engines
3.3 development engines

4.

Prepare the engine for testing and carry out initial start-up checks, to include all of the following, as applicable to the engine type:

4.1 correctly connect the engine to the dynamometer
4.2 fit all required engine ancillary equipment (such as starter motors and slave oil filters)
4.3 fit all required environmental equipment (such as forced air fans, exhaust extraction)
4.4 fit blanking plates (where appropriate)
4.5 fill the engine with oil
4.6 make all required connections to the engine (to include fuel connections,

electrical and instrumentation)
4.7 carry out all necessary electrical checks and confirm that the engine is ready for testing
4.8 ensure that all personal are clear of the test facility and that safe working distance procedures are maintained
4.9 load and prepare computer software for operation (where applicable)
4.10 check the engine starting system
4.11 run the engine and check that the engine shutdown system operates correctly
4.12 carry out idle checks
4.13 check that engine oil pressure is satisfactory
4.14 check that fuel flow is operating correctly
4.15 check all oil filters, connections, gaskets and seals for signs of leakage

5.

Undertake engine tests as listed in the appropriate engine test schedule, to include all of the following:

5.1 initiating the engine test sequence
5.2 checking engine temperature is within specification
5.3 carrying out running and handling checks
5.4 checking throttle/high pressure fuel flow operates smoothly
5.5 carrying out performance curves
5.6 checking engine pressures are within specification
5.7 ensuring maximum power is achieved

6.

Deal with two of the following complexities during the engine tests:

6.1 engine runs with no faults
6.2 engine runs with faults
6.3 engines with intermittent faults

7.

Disconnect the engine on completion of the testing procedures, to include carrying out all of the following:

7.1 shutting down the computer system
7.2 checking all oil filters, connections, gaskets and seals for signs of leakage
7.3 removing and checking magnetic chip detectors for contamination
7.4 removing and checking slave filters for contamination
7.5 installing the engine's own magnetic chip detectors and filters
7.6 draining all oil and fuel from the engine
7.7 removing all fitted blanks and instrumentation
7.8 removing the engine from the dynamometer, safely and correctly
7.9 preparing the engine for passing to strip down/inspection

8.

Review and analyse the results of the test run, using two of the following:

8.1 data sheets
8.2 calibration records

8.3 log cards/history sheet
8.4 engine test schedule
8.5 fault records

9.

Check test comply with one of the following:

9.1 current industry standards. codes of practice and procedures
9.2 customer standards and requirements
9.3 engineer developed procedures
9.4 specific engine requirements

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