SEMME3082

Setting to work and testing marine propulsion systems and equipment

Overview

This standard identifies the competences you need to set to work and test marine propulsion systems, such as alternating and direct current motors, steam turbines, gas turbines, two-stroke and four-stroke turbo blown, mechanically blown, naturally aspirated internal combustion engines, in accordance with approved procedures. You will be required to use appropriate drawings, specifications and test documentation to set up and test the various types of equipment. You will be expected to use the specified/appropriate techniques to carry out formal setting to work and testing, which will include harbour and sea trial activities, over a range of operational parameters, to establish that the machinery on test is functioning at optimal level and to specification.

Your responsibilities will require you to comply with organisational policy and procedures for the setting-up and testing activities undertaken and to report any problems with these activities, or with the tools and equipment used that you cannot personally resolve, or 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.
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Your underpinning knowledge will provide a sound understanding of your work and will provide an informed approach to applying appropriate setting-up and testing procedures to marine propulsion systems. You will understand the equipment being worked on, any test equipment to be used and the various testing procedures, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring that the equipment functions to the required specification. In addition, you will be expected to review the outcomes of the tests, to compare the results with appropriate standards, to determine the action required and to record and report the results in the appropriate format.

You will understand the safety precautions required when carrying out the setting to work and testing of marine propulsion systems, especially those relating to the risk of fire and for taking the necessary safeguards to protect yourself and others against injury. You will be required to demonstrate safe working practices throughout and will understand the responsibility you owe to yourself and others in the workplace, both in harbour and at sea.

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 setting up and operating specifications for the products or assets being configured
3. follow the defined procedures and set up the equipment correctly ensuring that all operating parameters are achieved
4. set to work and test marine propulsion systems and equipment using appropriate methods and techniques
5. deal promptly and effectively with problems within your control and report those that cannot be solved
6. check that the configuration is complete and that the equipment operates to specification
7. complete relevant documentation in line with organisational procedures

Knowledge and understanding

You need to know and understand:

1. the specific safety practices and procedures that you need to observe when carrying out the setting-up and testing activities on marine propulsion equipment (including any specific legislation, regulations and codes of practice for the activities, equipment or materials)
2. the health and safety requirements of the work area in which you are carrying out the setting-to-work and testing activities and the responsibility they place on you
3. the safety procedures that must be carried out before work is started on setting up and testing the propulsion equipment (such as standby supplies/equipment failure backup devices, warning notices, notification of trials to be conducted)
4. the specific safety precautions to be taken when carrying out formal inspection, safety checks and testing of electrical equipment
5. the hazards associated with testing marine propulsion equipment and with the tools and test equipment that is used and how they can be minimised
6. how to recognise and deal with emergencies (including methods of safely evacuating and closing down compartments in the case of fire or other major incident and methods of first aid, fire fighting and resuscitation of personnel)
7. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the setting-to-work and testing procedure
8. protection techniques for mechanical and electrical systems, to prevent burn or fire risk
9. how to obtain and interpret system drawings, circuit and physical layouts, charts, specifications, manufacturers' manuals, history/maintenance reports, graphical symbols and other documents needed for the testing and setting-to-work process
10. how to carry out currency/issue checks of the specifications you are working with
11. the correct operating procedures of the equipment and system being set up and tested
12. the basic principle of operation of the marine propulsion system being set to work and tested and the function of the various components within the system
13. the adjustments/corrections/tuning required to bring the equipment/system to

operational standard through full range parameters
14. types of test equipment to be used and their selection for particular types of tests
15. how to calibrate the test equipment to be used, or the organisational procedures for ensuring that the test equipment is maintained correctly calibrated
16.
how to connect the appropriate test equipment for the measurement of the system or device to be set to work and tested
17.
the various testing methods and procedures, as recommended in approved operating manuals and how to apply them to different operating conditions
18. displaying/recording test results and the documentation to be used
19. how to interpret the test readings obtained and the significance of the readings gained
20. how to recognise defects (such as under or over performance)
21. the various fault finding techniques that can be used if the system fails the test
22. how to analyse test results (using tables in approved codes of practice, and using comparison and sequential techniques)
23. the importance of ensuring that test equipment is used only for its intended purpose and within its specified range and limits
24. potential problems or errors that could occur and which affect the test results and how they can be avoided
25. the environmental control and company operating procedures relating to the testing activities
26. authorisation procedures for changes to test procedures
27.
the documentation required and the procedures to be followed on completion of the tests
28.
the extent of your own authority and whom you should report to if you have problems that you cannot resolve

Scope/range related to performance criteria

1.

Carry out **all** of the following during the setting to work and testing of the marine propulsion system and equipment

1.1 plan the set-to-work and test activities to cause minimal disruption to normal working
1.2 use the correct issue of the company and/or manufacturers' setting and testing procedures and quality documentation
1.3 adhere to risk assessment, COSHH and other relevant safety standards
1.4 ensure the availability of equipment and check that it is in a safe and usable condition
1.5 provide safe access and egress for the area containing the machinery to be set to work and tested
1.6 carry out the set to work and testing, using the specified techniques and procedures
1.7 shut down and make safe the system on completion of setting to work and testing
1.8 complete the records and returns to ensure that the setting to work and testing is correctly documented
1.9 leave the work area in a safe condition and to the prescribed category of cleanliness

2.

Carry out setting to work and testing on **one** of the following types of marine propulsion equipment:

2.1 steam turbine
2.2 gas turbine
2.3 direct current electric motor
2.4 alternating current electric motor
2.5 two-stroke turbo blown/mechanically blown/naturally aspirated internal combustion engine
2.6 four-stroke turbo blown/mechanically blown/naturally aspirated internal combustion engine

3.

Carry out tests using a range of test equipment, to include **six** of the following:

3.1 strobe light
3.2 ohmmeter
3.3 ammeter
3.4 Voltmeter
3.5 oscilloscope
3.6 snap tank
3.7 multimeter
3.8 flow meter

3.9 insulation resistance tester
3.10 loop Impedance tester
3.11 residual current device (RCD) tester
3.12 fixed vibration monitoring equipment
3.13 hand tachometer
3.14 portable vibration monitoring equipment
3.15 specialist tests (such as speed, sound, light, temperature)
3.16 fuel dilution test kit
3.17 torsion meter
3.18 manometer
3.19 pen recorder
3.20 laptop computer
3.21 planimeter
3.22 sounding tape
3.23 fixed computer
3.24 flue gas analyser

4.

Use appropriate test equipment to carry out **six** of the following tests, as applicable to the equipment being set to work:

4.1 revolutions per minute
4.2 torque reading
4.3 load current
4.4 voltage levels
4.5 frequency
4.6 fuel consumption
4.7 temperature
4.8 power rating
4.9 resistance
4.10 capacitance
4.11 fuel dilution
4.12 amplitude
4.13 inductance
4.14 safety device trip speed
4.15 specialist tests (such as speed, sound, light, temperature)
4.16 vibration readings
4.17 cylinder performance
4.18 funnel gases (such as CO_2, SO_2, NO_2)

5.

Carry out **one** of the following trials on the marine propulsion equipment/system:

5.1 harbour acceptance trials
5.2
sea acceptance trials
5.3
response trials

6.

Deal with **two** of the following complexities during the test activities:

6.1 equipment with fault
6.2 equipment without fault
6.3 equipment with intermittent fault
6.4 system fault

7.

Use **two** of the following fault finding techniques:

7.1 half-split technique
7.2 input/output
7.3 equipment self-diagnosis
7.4 injection and sampling
7.5 unit substitution
7.6 emergent problem sequence

8.

Carry out **all** of the following checks to ensure the accuracy and quality of the tests carried out:

8.1 the test equipment is correctly calibrated and in date for use
8.2 test equipment used is appropriate for the tests being carried out
8.3 test procedures used are as recommended in the appropriate testing and setting-to-work procedure
8.4 test equipment is operated within its specification range

9.

Provide a record/report of the test outcomes, using **one** of the following:

9.1 preventative maintenance log/report
9.2 company specific reporting procedure
9.3 acceptance documentation
9.4 system log
9.5 inspection schedule
9.6 specific test report/test records
9.7 job card/time sheet

10.

Set to work marine propulsion equipment, in compliance with **one** of the following standards:

10.1 BS or ISO standards and procedures
10.2 customer (contractual) standards and requirements
10.3 company standards and procedures
10.4 specific equipment requirements/manufacturer's data
10.5 recognised compliance agency/body's standards
10.6 other accepted international standards

Behaviours

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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