

Setting to work and testing marine steam plant and equipment

Overview

This standard identifies the competences you need to set to work and test marine steam plant and equipment, 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 select the appropriate tools and equipment to use, based on the operations to be performed. The steam plant and equipment to be set to work and tested will include equipment such as fire tube boilers, water tube boilers, controlled superheat boilers, together with their machinery and systems and other associated equipment. You will be required to carry out formal setting to work and testing when warming through, under partial load and full load conditions, meeting a range of operational criteria to establish that the units on test are 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.* *

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 steam plant and equipment. You will understand the plant and 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 outcome 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 steam plant and equipment, especially those relating to the risk of seizure or mechanical failure 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.

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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 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 steam plant 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

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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 carrying out the setting-up and testing activities on marine steam plant and 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 steam plant and equipment (such as standby supplies, 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 marine steam plant and equipment
5. the methods used to safely control equipment in the case of seizure or mechanical failure of the controls under test
6. how to recognise and deal with emergencies and the procedures to be followed (such as methods of safely evacuating and closing down of compartments in the case of fire or other major incident, 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 systems to prevent risk of seizure
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 setting-to-work and testing process
10. how to carry out currency/issue checks of the specifications you are working with
11. the correct operating procedures of the marine steam plant and equipment being set up and tested
12. the basic principle of operation of the marine steam plant and equipment being set to work and tested and the function of the various components within the system
13. the adjustments/corrections 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

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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 recognise defects (such as under or over performance)
20. how to interpret the test readings obtained and the significance of the readings gained
21. the various fault finding techniques that can be used if the system fails the test
22. the importance of ensuring that test equipment is used only for its intended purpose and within its specified range and limits
23. potential problems or errors that could occur and which may affect the test results and how they can be avoided
24. the environmental control and company operating procedures relating to the testing activities
25. authorisation procedures for changes to test procedures
26. the documentation required and the procedures to be followed on completion of the testing
27. the extent of your own authority and whom you should report to 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 setting to work and testing of the marine steam plant and equipment:

1. plan the set-to-work and test activities to cause minimal disruption to normal working
2. use the correct issue of the company and/or manufacturers' setting and testing procedures and quality documentation
3. adhere to risk assessment, COSHH and other relevant safety standards
4. ensure the availability of equipment, and check that it is in a safe and usable condition (especially equipment associated with fire fighting and personnel protection)
5. provide safe access and egress for the area containing the equipment to be set to work and tested
6. shut down and make safe the system on completion of setting to work and testing
7. complete the records and returns to ensure that the setting to work and testing is correctly documented
8. leave the work area in a safe condition and to the prescribed category of cleanliness

2. Set to work and test **one** of the following marine steam plants and its associated equipment:

1. fire tube boiler, machinery and system
2. water tube boiler, machinery and system
3. controlled superheat boiler, machinery and system

3. Carry out setting to work and testing of **ten** different types of steam system equipment from the following:

1. boiler
2. superheater
3. economisers
4. air pre-heater
5. dampers
6. drain cooler
7. fuel pump
8. feed pump
9. soot blowers

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10. boiler internal gear
11. turbine gearing
12. combustion equipment
13. safety trips
14. vertical steam turbine
15. steam reciprocating engine
16. high pressure saturated steam system
17. low pressure saturated steam system
18. drain systems
19. forced draft blower
20. instrumentation
21. gearing oil pump
22. turbine governor
23. superheated steam system
24. horizontal steam turbine

4. Use appropriate test equipment to carry out **six** of the following tests:

1. torque loading
2. pressure
3. temperature
4. operating clearance checks
5. revolutions per minute
6. safety release pressure
7. governor response
8. travel
9. flow
10. no-load checks
11. partial load
12. full load

5. Carry out **one** of the following trials on the marine ancillary plant and equipment:

1. harbour acceptance trials
2. sea acceptance trials
3. partial repair trials

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

1. equipment without fault
2. equipment with fault
3. equipment with intermittent fault
4. system fault

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7. Use **two** of the following fault finding techniques:
 1. half-split technique
 2. input/output
 3. pressure test
 4. injection and sampling
 5. unit substitution
 6. emergent problem sequence

8. Carry out **all** of the following checks to ensure the accuracy and quality of the tests carried out:
 1. the test equipment is correctly calibrated and in date for use
 2. test equipment used is appropriate for the tests being carried out
 3. test procedures used are as recommended in the appropriate testing and setting-to-work procedure
 4. test equipment is operated within its specification range

9. Provide a record/report of the test outcomes, using **one** of the following:
 1. preventative maintenance log/report
 2. company specific reporting procedure
 3. acceptance documentation
 4. system log
 5. inspection schedule
 6. specific test report/test records
 7. job card/time sheet

10. Set to work marine steam plant, equipment and systems, in compliance with **one** of the following standards:
 1. BS or ISO standards and procedures
 2. customer (contractual) standards and requirements
 3. company standards and procedures
 4. specific equipment requirements/manufacture's data
 5. recognised compliance agency/body's standards
 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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