SEMME3013

Setting to work, testing and trialling marine electrical power generation and distribution equipment and systems

Overview

This standard identifies the competences you need to set to work and test marine electrical power generation and distribution 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 use the specified/appropriate techniques to carry out the appropriate setting-up and testing procedures. The equipment to be set up and tested will include various generators, motor generators, frequency/voltage conversion/control equipment, monitoring of analogue or digital parameters (temperature, stress, vibration and performance data). Other system components/systems to be tested will include breakers, switch fuse units/starters, current and voltage regulators and system safety elements in high, medium and low voltage systems. The tests to be carried out will include protective insulation and resistance values, load current, voltage levels and power ratings, capacitance, frequency, continuity and earthing checks.

Your responsibilities will require you to comply with organisational policy and procedures for setting-up and testing activities undertaken and to report any problems with these activities 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 good understanding of your work and will provide an informed approach to applying appropriate setting-up and testing techniques and procedures to marine power generation and distribution equipment. You will understand the systems being set up and tested and their application and will know about the test equipment and methods, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring that the work output is to the required specification. In addition, you will be expected to review the outcome of the tests, compare the results with appropriate standards, 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-up and testing operations, especially those for isolating the equipment and taking the necessary safeguards to protect yourself against direct and indirect electric shock. 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 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, test and trial marine electrical power generation and distribution equipment and systems 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, using appropriate methods and techniques
7. complete relevant documentation in line with organsiational 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 electrical power generation and distribution 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 where you are carrying out the 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 power generation and distribution equipment 4. 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) 5. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the electrical testing activities 6. the hazards associated with testing marine electrical power generation and distribution systems and with the tools and test equipment that is used and how they can be minimised 7. the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps) 8. what constitutes a hazardous voltage and how to recognise victims of electric shock 9. how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers) 10. the importance of applying the appropriate behaviours in the workplace and the implications for both the apprentice and the business if these are not adhered to 11. how to obtain and interpret drawings, circuit and physical layouts, charts, test specifications, manufacturers' manuals, graphical electrical symbols, IET wiring regulations and other documents needed in the setting-up and testing process 12. how to carry our currency/issue checks of the specifications you are working with 13. the correct operating procedures of the system being set up and tested 14. the components to be set to work and their function within the particular power generation and distribution system 15. the adjustments/corrections/tuning required to bring the equipment/system to operational standard through full range parameters 16. electrical bonding, earthing and induced current specifications and their importance 17. the types of test equipment to be used and how to select the appropriate equipment for particular types of tests 18. how to calibrate the test equipment to be used; or the organisational procedures for ensuring that the test equipment is maintained and correctly calibrated 19. how to connect the appropriate test equipment for the measurement of resistance, current, voltage, power, capacitance, inductance, power factor and protective device disconnection/trip times 20. the various testing methods and procedures, as recommended in approved electrical codes of practice and how to apply them to different operating conditions 21. how to recognise defects (such as under or over performance) 22. the various fault-finding techniques that can be used if the system fails the test 23. displaying/recording test results and the documentation to be used 24. how to interpret the test readings obtained and the significance of the readings gained 25. how to analyse test results, using tables in approved electrical codes of practice 26. the authorisation procedures for changes to test procedures 27. the importance of ensuring that test equipment is used only for its intended purpose and within its specified range and limits 28. potential problems or errors that could occur and which may affect the test results and how they can be avoided 29. the environmental control and company operating procedures relating to the testing activities 30. the documentation required and the procedures to be followed

following the test 31. the extent of your own responsibility 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-up and testing activities:

1.1 use the correct issue of the agreed setting and testing procedures and quality documentation
1.2 adhere to risk assessment, COSHH and other relevant safety standards
1.3 check that all tools and test equipment are within their calibration dates
1.4 obtain clearance to work on the system and observe power isolation and safety procedures
1.5 provide safe access and working arrangements for the testing area
1.6 carry out the setting and testing activities, using safe and approved techniques and procedures
1.7 ensure that the testing equipment is operated within its specification range
1.8 return all tools and equipment to the correct location on completion of the activities
1.9 leave the work area in a safe condition and to the prescribed category of cleanliness

2.

Set to work and test three of the following electrical generation/distribution systems:

2.1 high voltage (above 440 V)
2.2 low voltage (below 115 V)
2.3 domestic (above 115V and below 440V)
2.4 direct current systems

3.

Carry out adjustments and tests, using a range of tools equipment, to include four of the following:

3.1 oscilloscope
3.2 insulation resistance tester
3.3 thermocouple
3.4 ammeter
3.5 loop impedance tester
3.6 flow meter
3.7 voltmeter
3.8
residual current device (RCD) tester
3.9
specialist test equipment (such as for sound, speed, light, temperature)
3.10 multimeter

4.

Use appropriate equipment to carry out all of the following tests, as applicable to

the equipment being set to work:

- 4.1 insulation resistance values
- 4.2 frequency values
- 4.3 load current
- 4.4 inductance
- 4.5 voltage levels
- 4.6 safety device trip speed
- 4.7 continuity and earth (pre-start)
- 4.8 specialist tests (such as speed, sound, light, temperature)
- 4.9 power rating
- 4.10 control position calibrations
- 4.11 resistance
- 4.12 capacitance

5.

Carry out one of the following trials on the power generation and distribution 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 setting-up and testing activities:

- 6.1 equipment with no faults
- 6.2 equipment with faults
- 6.3 equipment with intermittent faults

7.

Use three of the following fault-finding techniques:

- 7.1 half-split
- 7.2 emergent problem sequence
- 7.3 input-to-output
- 7.4 equipment self-diagnostics
- 7.5 function testing
- 7.6 injection and sampling
- 7.7 unit substitution

8.

Set to work marine electrical power generation equipment which complies with one of the following standards:

- 8.1 BS or ISO standards and procedures
- 8.2 customer (contractual) standards and requirements
- 8.3 company standards and procedures
- 8.4 specific equipment requirements/manufacturer's data
- 8.5 IET Regulations (current issue)

8.6 recognised compliance agency/body's standards
8.7 other accepted international standards

9.

Complete relevant documentation in line with organisational procedures using one of the following:

9.1 installation records
9.2 acceptance documentation
9.3 system log
9.4 job cards
9.5 other specific recording method

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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Developed by	Enginuity
Version Number	3
Date Approved	28 Feb 2019
Indicative Review Date	28 Feb 2021
Validity	Current
Status	Original
Originating Organisation	Semta
Original URN	SEMME3013
Relevant Occupations	Marine Engineering Trades
Suite	Marine Engineering Suite 3
Keywords	Engineering; marine; setting to work; testing; trialling; electrical; power; generation; distribution; generators; alternators