SEMME3073

Installing marine mechanical control systems and equipment

Overview

This standard identifies the competences you need to install mechanical controls for marine systems, such as hydraulic, pneumatic, sewage treatment, fuel, fire-main, fresh water, oil, power transmission, power generation and engine/propulsion systems, in accordance with approved procedures. You will be required to use appropriate installation drawings, specifications and documentation to install the various items of equipment. You will be required to select the appropriate tools and equipment to use, based on the operations to be performed and components to be installed.

The mechanical controls to be installed will include items such as rod gearing, universal joints, gearing support bearings, gearing bevel boxes, pipe hangers, cables, pulleys and turnbuckles, levers and linkages, control rods, pivots and bell cranks, microswitches and stops, servo actuators and tie rods. The installation activities will include making all necessary checks and adjustments to ensure that components are correctly positioned and aligned, have appropriate tension or working clearances, are tightened to the correct torque and that they function as per the specification.

Your responsibilities will require you to comply with organisational policy and procedures for the installation of the mechanical control equipment and to report any problems with the installation activities, components or equipment that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to ensure that all tools, equipment and materials used in the installation are correctly accounted for on completion of the activities and to complete all necessary job/task documentation accurately and legibly. 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 installation techniques and procedures for marine mechanical control equipment and systems. You will understand the marine system being worked on and the function of the mechanical controls being installed and will know about the relevant components, fastening and securing devices, in adequate depth to provide a sound basis for carrying out the activities, correcting faults and ensuring that the completed installation is to the required standard.

You will understand the safety precautions required when carrying out the installation operations. 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 ashore and afloat.

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 drawings and specifications for the installation being carried out
3. use the correct tools and equipment for the installation operations and check that they are in a safe and usable condition
4. install, position and secure the equipment and components in accordance with the specification
5. ensure that all necessary connections to the equipment are complete
6. deal promptly and effectively with problems within your control and report those that cannot be solved
7. check that the installation is complete and that all components are free from damage
8. 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 working with marine mechanical controls (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)
2. the procedures to be carried out before starting work on the installation (such as obtaining permits to work, obtaining and complying with risk assessments and other health and safety requirements)
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. 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 hazards associated with installing marine mechanical controls and with the tools and equipment used and how they can be minimised
6. the protective equipment that you need to use for both personal protection (PPE) and protection of the equipment
7. the interpretation of drawings, standards, quality control procedures and specifications used for the installation (including BS and ISO schematics, symbols and terminology)
8. how to carry out currency/issue checks of the specifications you are working with
9. the components to be installed and their function within the particular mechanical control system
10. the various mechanical fasteners that will be used and their method of installation (such as keys, keyways, threaded fasteners, special securing devices)
11. the importance of using the specified fasteners for the particular installation and why you must not substitute others
12. why securing devices need to be locked and the different methods that are used
13. the torque loading requirements on the fasteners and what to do if these loadings are exceeded or not achieved
14. the quality control procedures to be followed during the installation operations
15. procedures for ensuring that you have the correct tools, equipment, components and fasteners for the activities

16. the techniques used to position, align, adjust and secure the components to the vessel without damage
17. methods of lifting, handling and supporting the components/equipment during the installation activities
18. the use of seals, sealants and adhesives and the precautions to be taken
19. the procedure for the safe disposal of waste materials
20. how to conduct any necessary checks to ensure the system integrity, functionality, accuracy and quality of the installation
21. how to recognise installation defects (such as poor seals, misalignment, ineffective fasteners or contamination)
22. the importance of ensuring that the completed installation is free from foreign object debris and that any exposed components or pipe ends are correctly covered/protected
23. the tools and equipment used in the installation activities and their calibration/care and control procedures
24. why tool/equipment control is critical
25. the problems that can occur with the installation operations and how these can be overcome
26. the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation
27. 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 installation of the mechanical control systems and equipment:

1.1 use the correct issue of the marine vessel or craft installation drawings and technical documentation
1.2 use copies of relevant COSHH sheets, risk assessment and marine or hovercraft standards
1.3 check the calibration dates of tools and equipment to be used
1.4 obtain clearance to work on the vessel and observe the power isolation procedures
1.5 return all tools and equipment to the correct location on completion of the installation
1.6 leave the work area in a safe condition and to the prescribed category of cleanliness

2.

Install mechanical control components for **six** of the following marine systems:

2.1 hydraulic systems
2.2 pneumatic systems
2.3 sewage treatment
2.4 ballast
2.5 salt water
2.6 lubricating oil
2.7 fire-main/main service
2.8 fuel systems
2.9 ventilation
2.10 steam
2.11 drain
2.12 hot/cold fresh water
2.13 pre-wet sprays
2.14 generator engine
2.15 propulsion engine
2.16 power transmission

3.

Install **eight** of the following types of components:

3.1 cables and pulleys
3.2 levers and linkages
3.3 gearing bevel box
3.4 gearing support bearing
3.5 turnbuckle
3.6 tie rods and stays
3.7 universal joint

3.8 rod gearing
3.9 microswitches and stops
3.10 seals/lubricants
3.11 shackles
3.12 struts and stays
3.13 pipe hangers
3.14 control rods
3.15 pivots and bell cranks

4.

Use **twelve** of the following installation methods and techniques:

4.1 marking/setting out of locating and securing positions
4.2 preparing holes (such as drilling, cleaning out threads)
4.3 positioning equipment/components
4.4 levelling of equipment
4.5 aligning of equipment
4.6 assembly/connection of components or sub-assemblies
4.7 setting travel
4.8 setting timings
4.9 setting and adjusting working clearance
4.10 torque setting of mechanical fasteners
4.11 tensioning cables
4.12 making pipe connections
4.13 lubricating
4.14 lifting and handling
4.15 connecting wires and cables
4.16 securing by using mechanical fixings
4.17 securing by using adhesives
4.18 sealing
4.19 applying screw fastener locking devices
4.20 earth bonding
4.21 ensuring the system cleanliness (such as covering exposed pipe ends or components)

5.

Use **six** of the following types of fasteners and securing devices:

5.1 swing bolts
5.2 screws
5.3 dowels
5.4 quick-release fasteners
5.5 studs with nuts
5.6 wing nuts
5.7 bolts
5.8 flexible bellows
5.9 locking devices (such as split, parallel, clevis or taper pin)
5.10 keys/keyways (such as slotted, semi-circular, woodruff, taper)

6.

Produce installations which comply with **one** of the following standards:

6.1 BS or ISO standards and procedures
6.2 customer (contractual) standards and requirements
6.3 company standards and procedures
6.4 specific system requirements
6.5 recognised compliance agency/body's standards
6.6 other accepted international standards

7.

Complete the relevant documentation in line with organisational procedures, to include **one** from the following and pass it to the appropriate people:

7.1 installation records
7.2 acceptance documentation
7.3 work acceptance documentation
7.4 job card
7.5 time sheet
7.6 system log
7.7 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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