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## Overview

This standard identifies the competences you need to carry out a complete overhaul of marine steering gear, control systems and equipment, in accordance with approved procedures. The equipment to be overhauled will have been removed from the vessel or craft and the overhauling activities may take place in a shipyard or manufacturer's workshops. The marine steering gear, control systems and equipment covered by this standard include items such as mechanical, hydraulic and electro-hydraulic steering. The overhauling activities will involve stripping the equipment down to component level, cleaning and inspecting the components for wear, replacing all defective and 'lived' components, and rebuilding the equipment in line with the overhauling specification.

The marine steering gear, control systems and equipment to be overhauled could include cables and pulleys, rack and pinion, connecting rods, hydraulic relay units, hydraulic pistons, hydraulic cylinders, pumps, seals, rudder posts, rudders, locking plates, stops and other associated mechanical equipment. The overhauling activities will include making all necessary checks and adjustments to ensure that components are correctly replaced, positioned, aligned, adjusted, torque loaded, locked and fastened and that the correct sealants are used.

Your responsibilities will require you to comply with organisational policy and procedures for the overhauling 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 must ensure that all tools, equipment and materials used in the overhauling activities are removed from the work area on completion of the activities and that all necessary job/task documentation is completed 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 overhauling procedures to marine steering gear, control systems and equipment. You will understand the dismantling/reassembly methods and procedures used and their application. You will know how the equipment functions, the purpose of the individual components and associated defects, in adequate depth to provide a sound basis for carrying out the overhauling activities, correcting faults and ensuring that the repaired equipment functions to the required specification. In addition, you will have sufficient in-depth knowledge of these components to ensure that they are fit for purpose and meet the specifications, thus providing a sound basis for carrying out reassembly.

You will understand the safety precautions required when carrying out the maintenance activities associated with marine steering gear, control systems and equipment, especially those for lifting and handling the equipment. You will be required to demonstrate safe working practices throughout and will understand your responsibility

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for taking the necessary safeguards to protect yourself and others in the workplace, both ashore and afloat.

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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 the relevant maintenance schedules to carry out the required work
3. carry out the maintenance activities within the limits of your personal authority
4. carry out the maintenance activities in the specified sequence and in an agreed time scale
5. report any instances where the maintenance activities cannot be fully met or where there are identified defects outside the planned schedule
6. complete relevant documentation in line with organisational procedures, and pass them on to the appropriate person
7. dispose of waste materials in accordance with safe working practices and approved procedures

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## Knowledge and understanding

### You need to know and understand:

1. the health and safety requirements of the area in which the overhauling activity is to take place and the responsibility they place on you
2. the specific health and safety precautions to be applied during the overhauling procedure and their effects on others
3. hazards associated with carrying out overhauling activities on marine steering gear, control systems and equipment (such as using lifting and handling equipment, handling oils and greases, release of stored pressure/force, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down overhaul procedures)
4. the importance of wearing protective clothing and other appropriate safety equipment (PPE) during the overhaul
5. how to obtain and interpret drawings, specifications, manufacturers' manuals and other documents needed in the overhauling process
6. how to carry out currency/issue checks of the specifications you are working with
7. the procedure for obtaining replacement parts, materials and other consumables necessary for the overhaul
8. company policy on the repair/replacement of components during the overhauling process
9. the sequence to be adopted for the dismantling/reassembling of various types of assemblies
10. the methods and techniques used to dismantle/reassemble marine steering gear, control systems and equipment (such as release of pressures/force, proof-marking, extraction, pressing, alignment)
11. methods of checking that components are fit for purpose, how to identify defects and wear characteristics and the need to replace 'lived' items (such as seals and gaskets)
12. how to make adjustments to components/assemblies to ensure they function correctly (such as bedding in of white metal bearings, setting working clearance, setting travel, setting backlash in gears, pre-loading bearings)
13. the basic principles of how the equipment functions, its operating sequence, the working purpose of individual units/components and how they interact
14. the identification, application, fitting and removal of different types of bearings (such as roller, ball, thrust, shell)
15. methods and techniques of fitting keys and splines
16. the identification, application, fitting and removal of different types of gears
17. how to set up timing marks and position and set the tension of belts and chains, correctly
18. the identification and application of different types of locking

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- devices
19. the uses of measuring equipment (such as micrometers, verniers, expansion indicators and other measuring devices)
  20. how to check that tools and equipment are free from damage or defect, are in a safe and usable condition and are configured correctly for the intended purpose
  21. the generation of technical documentation and/or reports following completion of the overhauling activity
  22. the equipment operating and control procedures to be applied during the overhauling activity
  23. how to use lifting and handling equipment in the overhauling activity
  24. the problems associated with the overhauling of marine steering gear, control systems and equipment and how they can be overcome
  25. the organisational procedure to be adopted for the safe disposal of waste of all types of materials
  26. the extent of your own authority and to whom you should report if you have a problem that you cannot resolve

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## Scope/range related to performance criteria

1. Carry out all of the following during the overhauling of the marine steering gear and control equipment:
  1. use the correct issue of company and/or manufacturers' drawings and overhauling documentation
  2. adhere to risk assessment, COSHH and other relevant safety standards
  3. ensure the safe isolation of equipment (such as mechanical, electricity, gas, air or fluids, steam)
  4. provide safe access and working arrangements for the overhauling area
  5. use lifting and handling equipment, in accordance with health and safety guidelines and procedures
  6. carry out the overhauling activities using appropriate techniques and procedures
  7. comply with organisational requirements with regard to renewal or replacement of existing components
  8. ensure that the overhauled components meet the required specification
  9. ensure that there are no foreign objects left in the completed equipment
2. Carry out overhauling activities on one of the following types of marine steering gear, control systems and equipment:
  1. mechanical steering
  2. hydraulic steering
  3. electro-hydraulic steering
3. Carry out overhauling activities on six of the following marine steering gear, control systems and equipment components:
  1. mechanical helm
  2. mechanical steering gear
  3. hydraulic relay unit
  4. telemotor transmitter
  5. telemotor receiver
  6. emergency mechanical steering
  7. fluid power system/pump
  8. steering hand pump
  9. emergency hydraulic steering gear
  10. rudder posts
  11. rudders
  12. pintle

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### 13. local steering mechanism

#### 4. Carry out eighteen of the following activities, as applicable to the equipment being overhauled:

1. de-pressurising the system and draining fluids
2. re-filling the system and pressurising
3. dismantling equipment to unit/sub-assembly level
4. bedding in of white metal bearings
5. dismantling units to component level
6. lapping in valves
7. proof-marking/labelling of components
8. pre-loading bearings
9. checking components for serviceability
10. setting backlash in gears
11. replacing all 'lifer' items (such as seals, bearings, gaskets)
12. electrical bonding of components
13. replacing all damaged or defective components
14. tightening fastenings to the required torque
15. setting travel and timings
16. making 'off-load' checks before starting up
17. adjusting replaced components
18. replenishing oils and greases
19. applying gaskets and sealant/adhesives
20. re-assembling components to sub-assembly level
21. re-assembling sub-assemblies to unit level
22. securing components using mechanical fasteners and threaded devices
23. applying bolt locking methods (such as split pins, wire locking, lock nuts, stiff nuts, swage nuts)
24. functionally testing the completed system

#### 5. Replace a range of marine steering gear, control systems and equipment components, to include sixteen of the following:

1. shafts
2. shell bearings
3. shock and by-pass valve
4. couplings
5. bearing housings
6. slides
7. gears
8. keys
9. rollers
10. clutches
11. springs
12. static and dynamic seals
13. brakes
14. diaphragms

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15. housings
  16. valves and seats
  17. cams and followers
  18. actuating mechanisms
  19. pistons
  20. chains and sprockets
  21. structural components
  22. splines
  23. cables and pulleys
  24. pipework
  25. roller or ball bearings
  26. levers and linkages
  27. mechanical stops and indicators
  28. pipes and unions
  29. shims and packing
  30. locking plates
  31. gauges
  32. save-alls
  33. instrumentation
  34. connecting rods
  35. cylinders
  36. gland/gland packing
  37. shackle
  38. rack and pinion
  39. turnbuckle
  40. locking and retaining devices (such as circlips, pins)
  41. other specific components
6. Overhaul marine steering gear, control systems and equipment, 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 system requirements
    5. recognised compliance agency/body's standards
    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:
    1. job cards
    2. permit to work/formal risk assessment
    3. maintenance log or report
    4. chart of dimensional inspection
    5. other specific reporting method



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## 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

SEMME3125

Overhauling marine steering gear, control systems and equipment



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