

Overhauling marine auxiliary power units

Overview

This standard identifies the competences you need to carry out a complete overhaul of marine auxiliary power units used for electrical power generation, 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 auxiliary power units covered by this standard include items such as shaft driven, diesel, self-contained steam turbine, back pressure steam turbine and gas turbine generators. 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 auxiliary power units to be overhauled could include pipework, turbo blowers, gearboxes, air intakes, combustion system, engine control units, fuel injectors, fuel pipes, fire detection systems, exhaust units, sea water cooling pumps, feed water extraction pumps, turbine rotors, lubricating oil coolers and other associated 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 marine auxiliary power unit 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 provide an informed approach to applying overhauling procedures to marine auxiliary power units. You will understand the dismantling and 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 overhauling activities associated with marine auxiliary power units, especially those for lifting and handling the equipment. You will be required to demonstrate safe working practices throughout and will understand your responsibility for taking the necessary safeguards

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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 auxiliary power units (such as using lifting and handling equipment, handling oils, greases, stored pressure/force, misuse of tools, using damaged or badly maintained tools and equipment, not following laid-down maintenance 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 auxiliary power units (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, filters and gaskets)
12. how to make adjustments to components/assemblies to ensure that they function correctly (such as bedding in of white metal bearings, balancing of rotating components such as armatures and turbines, 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 auxiliary power units 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 overhaul of the marine auxiliary power units:
 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 overhaul 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 the organisational requirements with regard to the 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 auxiliary power units:
 1. gas turbine generator
 2. ICE 2-stroke mechanically/turbine/naturally aspirated generator
 3. steam turbine generator
 4. ICE 4-stroke mechanically/turbine/naturally aspirated generator
3. Carry out overhauling activities on ten of the following marine auxiliary power unit components:
 1. air Intake
 2. extraction pump
 3. turbine nozzle box
 4. air charger (blower)
 5. sea water pump
 6. lubricating oil cooler
 7. combustion system
 8. fuel system
 9. feed controller

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10. gas turbine rotor
 11. air ejector
 12. lubricating oil pump
 13. engine monitoring unit
 14. fuel pump
 15. gland vapour condenser
 16. fire extinguishing system
 17. exhaust system
 18. gland sealing
 19. steam turbine rotor
 20. air start system
 21. condenser
 22. gearbox
 23. governor gear
4. Carry out eighteen of the following activities on the equipment being overhauled:
1. dismantling equipment to unit/sub-assembly level
 2. bedding in of white metal bearings
 3. dismantling units to component level
 4. lapping in valves
 5. proof-marking/labelling of components
 6. pre-loading bearings
 7. checking components for serviceability
 8. setting backlash in gears
 9. replacing all damaged or defective components
 10. electrical bonding of components
 11. setting timings and adjusting replaced components
 12. making 'off-load' checks before starting up
 13. tightening fastenings to the required torque
 14. replenishing oils and greases
 15. applying gaskets and sealant/adhesives
 16. re-assembling components to sub-assembly level
 17. re-assembling sub-assemblies to unit level
 18. balancing of rotating components (such as shafts and armatures)
 19. replacing all 'lified' items (such as seals, bearings, gaskets)
 20. securing components using mechanical fasteners and threaded devices
 21. applying bolt locking methods (such as split pins, wire locking, lock nuts, stiff nuts, swage nuts)
 22. functionally testing the completed system
5. Replace a range of marine auxiliary power unit components, to include sixteen of the following:
1. shafts
 2. shell bearings

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3. slides
 4. couplings
 5. bearing housings
 6. rollers
 7. gears
 8. keys
 9. filters
 10. valves and seats
 11. springs
 12. static and dynamic seals
 13. pistons
 14. diaphragms
 15. housings
 16. liners
 17. cams and followers
 18. actuating mechanisms
 19. splines
 20. pulleys and belts
 21. structural components
 22. roller or ball bearings
 23. levers and links
 24. flexible hoses
 25. pipes and unions
 26. shims and packing
 27. resilient mounts
 28. locking and retaining devices (such as circlips, pins)
 29. other specific components
6. Overhaul marine auxiliary power units, 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 of 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/installation
 5. other specific reporting 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

