

Carrying out repairs to yacht and boat composite components

Overview

This standard identifies the competences you need to carry out repairs to composite components fitted to yachts or boats, in accordance with approved procedures. You will be required to obtain all necessary documentation relating to the repair, to obtain the tools and equipment required for the repair operations and to check that they are in a safe and usable condition. In carrying out the repair, you will be required to follow company procedures and specified repair techniques. You will repair a range of composite components such as craft/vessel structural components and ancillary components such as panels, and covers. This will require the use of a range of resin and fibre materials and appropriate repair techniques.

Your responsibilities will require you to comply with organisational policy and procedures for the repair activities undertaken and to report any problems with the repair activities, materials or equipment used, that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will be expected to work with either a high level of supervision or as a member of a team. You will take personal responsibility for your own actions and for the quality and accuracy of the work that you carry out. Where team working is involved you must demonstrate a significant personal contribution during the team activities in order to satisfy the requirements of the standard and competency in all the areas required by the standard must be demonstrated.

Your underpinning knowledge will be sufficient to provide a sound basis for your work and will provide an informed approach to applying specified repair techniques and procedures to yacht or boat composite components and assemblies. You will understand the repair techniques used and their application, in adequate depth to provide a sound basis for carrying out the activities to the required specification.

You will understand the safety precautions required when carrying out the repair activities and when using the associated tools and equipment. 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 legislation, regulations, directives and other relevant guidelines
2. follow the relevant specifications for the component to be repaired
3. prepare the component for repair
4. carry out the repairs within agreed timescale using approved materials and components and methods and procedures
5. ensure that the repaired component meets the specified operating conditions
6. repair defects using appropriate methods and techniques
7. produce accurate and complete records of all repair work carried out
8. deal promptly and effectively with problems within your control and report those that cannot be solved
9. dispose of waste and excess materials in line with agreed organisational procedures
10. leave the work area in a safe and appropriate condition on completion of the activities

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Knowledge and understanding

You need to know and understand:

1. health and safety precautions to be taken, and procedures to be used when working with composite materials, consumables, tools and equipment in the specific work area
2. the hazards associated with using composite materials, consumables, tools and equipment, and how to minimise these in the work area
3. how to recognise and deal with emergencies and the procedures to be followed (such as methods of safely evacuating and closing down compartments in the case of fire or other major incident)
4. the protective equipment (PPE) that is needed for personal protection and, where required, the protection of others
5. the application of COSHH regulations in relation to the storage, use and disposal of composite materials and consumables
6. the specific workshop environmental conditions that must be observed when repairing yacht or boat composite components (such as temperature, humidity, styrene levels to threshold limits, fume/dust extraction systems and equipment)
7. the requirements for working in confined spaces including an understanding of the importance of emergency procedures and safe systems of work including permits to work, required air quantities (RAQs) and local exhaust ventilation (LEV) to maintain safe conditions, the provision of adequate and safe lighting and avoidance of sources of ignition
8. how to obtain the necessary job instructions required for the work being carried out
9. the quality procedures used in the workplace to ensure that repairs are carried out satisfactorily
10. how to identify and use information from engineering drawings and related documentation in relation to work undertaken
11. conventions and terminology used when repairing composite mouldings (such as disbonds, de-lamination, resin injection, resin voids, core potting, repair patches)
12. the different types of composite resin systems, fibres and reinforcements and the repair techniques that can be used
13. the different forms of damage or defect that can occur in the composite components and how this affects the type of repair selected
14. methods of cleaning and preparing the components in readiness for the repair
15. the importance of ensuring that the repair conforms to the repair specification
16. the various bonding agents and methods used
17. the procedure used to determine if additional testing (such as joint integrity, strength testing) is required following a repair

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18. correct methods of storage and handling of composite materials
19. tools and equipment used for the various activities associated with repairing composite mouldings
20. why tool/equipment control is critical and what to do if a tool or piece of equipment is unaccounted for on completion of the activities
21. the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve
22. the documentation to be completed during and/or on completion of the repair activity

Scope/range related to performance criteria

1. Carry out all of the following during the repair of the yacht or boat composite components:
 1. ensure you have the necessary information to carry out the repair activities (such as job instructions)
 2. adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
 3. maintain safe access and working arrangements for the work area
 4. carry out the repair activities using appropriate techniques and procedures
 5. produce repairs which comply with the specification
 6. return all tools, and equipment to the correct location on completion of the repair activities
 7. leave the work area in a safe and tidy condition
2. Carry out all of the following when preparing for the repair activity:
 1. identify what needs to be repaired
 2. obtain the correct equipment for the activity
 3. determine the extent of the damage to be repaired
 4. check that the equipment is suitable for use
 5. identify the method of repair to be used
 6. check the availability of ancillary materials required
 7. identify and protect the repair materials in the work area
3. Carry out repairs to three of the following yacht or boat composite components:
 1. hull
 2. superstructure
 3. cabins or wheel houses
 4. masts and spars
 5. rudders
 6. bulkhead
 7. radar/navigational domes
 8. berths
 9. steering equipment (such as wheel, tiller)
 10. air intakes/vents
 11. consoles (such as navigational or helm)
 12. fairings
 13. casings and covers
 14. hatches

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15. vanity units
 16. shower units
 17. skegs
 18. tanks
 19. davits
 20. seats
 21. other specific components
4. Repair defects in composite mouldings, using three of the following methods:
1. localised curing
 2. relieving distortion
 3. resin injection
 4. fettling
 5. separation of bonds
 6. wet-lay patching
 7. surface filling
 8. bonding
 9. pre-preg patching
 10. colour matching
 11. polishing
 12. osmosis
 13. core patching
 14. insert/core potting
 15. repair patches/kits
 16. laminating
5. Repair defects, using techniques/materials applicable to both of the following:
1. resins (such as polyester, vinyl ester, epoxy, phenolic, bismaleimide, cyanate ester, acrylic)
 2. fibres (such as polyethylene, glass, aramid, carbon, hybrid materials)
6. Repair four of the following types of defect in yacht or boat composite components:
1. holes
 2. de-lamination
 3. damaged cores
 4. fractures
 5. broken fibres
 6. wrong inserts
 7. gouges
 8. water ingress
 9. insert positions
 10. damaged surface finish

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11. voids
 12. impact damage
 13. distortion
 14. disbonds
 15. abrasion/erosion
 16. fire damage
 17. dents or 'dings'
 18. blisters
7. Repair yacht or boat composite components which comply with one of the following:
1. BS, EN 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 (such as Lloyds, Boat Safety Scheme, BMEA Code)
 6. other accepted international standards

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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