# SEMME2124 (SQA Unit Code – HF1N 04)
# 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.

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## Performance criteria

*You must be able to:*

- P1 work safely at all times, complying with health and safety legislation, regulations, directives and other relevant guidelines
- P2 follow the relevant specifications for the component to be repaired
- P3 prepare the component for repair
- P4 carry out the repairs within agreed timescale using approved materials and components and methods and procedures
- P5 ensure that the repaired component meets the specified operating conditions
- P6 produce accurate and complete records of all repair work carried out

## Knowledge and understanding

*You need to know and understand:*

K1 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

K2 the hazards associated with using composite materials, consumables, tools and equipment, and how to minimise these in the work area

K3 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)

K4 the protective equipment (PPE) that is needed for personal protection and, where required, the protection of others

K5 the application of COSHH regulations in relation to the storage, use and disposal of composite materials and consumables

K6 the specific workshop environmental conditions the 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)

K7 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

K8 how to obtain the necessary job instructions required for the work being carried out

K9 conventions and terminology used when repairing composite mouldings (such as disbonds, de-lamination, resin injection, resin voids, core potting, repair patches)

K10 the different types of composite resin systems, fibres and reinforcements and the repair techniques that can be used

K11 the different forms of damage or defect that can occur in the composite components and how this affects the type of repair selected

K12 methods of cleaning and preparing the components in readiness for the repair

K13 the importance of ensuring that the repair conforms to the repair specification

K14 the various bonding agents and methods used

K15 correct methods of storage and handling of composite materials

K16 tools and equipment used for the various activities associated with repairing composite mouldings

K17 the extent of your own responsibility and whom you should report to if

you have problems that you cannot resolve

## Additional Information

### Scope/range related to performance criteria

*You must be able to:*

1. Carry out **all** of the following during the repair of the yacht or boat composite components:
   - 1.1 ensure you have the necessary information to carry out the repair activities (such as job instructions)
   - 1.2 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations
   - 1.3 maintain safe access and working arrangements for the work area
   - 1.4 carry out the repair activities using appropriate techniques and procedures
   - 1.5 produce repairs which comply with the specification
   - 1.6 return all tools, and equipment to the correct location on completion of the repair activities
   - 1.7 leave the work area in a safe and tidy condition

2. Carry out **all** of the following when preparing for the repair activity:
   - 2.1 identify what needs to be repaired
   - 2.2 obtain the correct equipment for the activity
   - 2.3 determine the extent of the damage to be repaired
   - 2.4 check that the equipment is suitable for use
   - 2.5 identify the method of repair to be used
   - 2.6 check the availability of ancillary materials required
   - 2.7 identify and protect the repair materials in the work area

3. Carry out repairs to **three** of the following yacht or boat composite components:
   - 3.1 hull
   - 3.2 superstructure
   - 3.3 cabins or wheel houses
   - 3.4 masts and spars
   - 3.5 rudders
   - 3.6 bulkhead
   - 3.7 radar/navigational domes

3.8 berths
3.9 steering equipment (such as wheel, tiller)
3.10 air intakes/vents
3.11 consoles (such as navigational or helm)
3.12 fairings
3.13 casings and covers
3.14 hatches
3.15 vanity units
3.16 shower units
3.17 skegs
3.18 tanks
3.19 davits
3.20 seats
3.21 other specific components

4. Repair defects in composite mouldings, using **three** of the following methods:
   4.1 localised curing
   4.2 relieving distortion
   4.3 resin injection
   4.4 fettling
   4.5 separation of bonds
   4.6 wet-lay patching
   4.7 surface filling
   4.8 bonding
   4.9 pre-preg patching
   4.10 colour matching
   4.11 polishing
   4.12 osmosis
   4.13 core patching
   4.14 insert/core potting
   4.15 repair patches/kits
   4.16 laminating

5. Repair defects, using techniques/materials applicable to **both** of the following:
   5.1 resins (such as polyester, vinyl ester, epoxy, phenolic, bismaleimide, cyanate ester, acrylic)
   5.2 fibres (such as polyethylene, glass, aramid, carbon, hybrid materials)

6. Repair **four** of the following types of defect in yacht or boat composite components:

6.1 holes
6.2 de-lamination
6.3 damaged cores
6.4 fractures
6.5 broken fibres
6.6 wrong inserts
6.7 gouges
6.8 water ingress
6.9 insert positions
6.10 damaged surface finish
6.11 voids
6.12 impact damage
6.13 distortion
6.14 disbonds
6.15 abrasion/erosion
6.16 fire damage
6.17 dents or `dings'
6.18 blisters

7. Repair yacht or boat composite components which comply with **one** of the following:
   7.1 BS or ISO standards and procedures
   7.2 customer (contractual) standards and requirements
   7.3 company standards and procedures
   7.4 specific equipment requirements/manufacturer's data
   7.5 recognised compliance agency/body's standards (such as Lloyds, Boat Safety Scheme, BMEA Code)
   7.6 other accepted international standards

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