SEMME3004

# Installing cable runs and circuits in marine structures

## Overview

This standard identifies the competences you need to install and secure cable runs/circuits in marine structures, in accordance with approved procedures. You will be required to use appropriate installation drawings, specifications and documentation to install the various types of cabling/circuit. You will install the appropriate cable enclosures which could include conduit systems, trunking and traywork systems and you will be expected to position, align and secure these in the correct locations, using the specified/appropriate techniques and bulkhead/screen penetration and fastening devices. The circuitry could include vessel system cable assemblies, high voltage, medium voltage and low voltage power supply cables, internal and external lighting cables, components and appropriate screening techniques. You will be expected to terminate these cables to the relevant circuit breaker panels, distribution panels and relay panels.

Your responsibilities will require you to comply with organisational policy and procedures for the electrical installation activities undertaken and to report any problems with these activities that you cannot personally resolve, or are outside your permitted authority, to the relevant people. 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 electrical cable installation techniques and procedures. You will understand the circuits being installed and their application and will know about the installation methods, tools and techniques used, 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 specification.

You will understand the safety precautions required when carrying out the electrical installations. You will be required to demonstrate safe working practices throughout and will understand the responsibility you owe to yourself and others in the workplace.

## 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 cabling and components in accordance with the specification
5. ensure that all necessary connections and terminations 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 fit for purpose
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 installing cable runs/circuits in marine structures (including any specific legislation, regulations/codes of practice for the activities, equipment or materials, particularly where the systems remain live whilst work is in hand)
2. the health and safety requirements of the work area where you are carrying out the activities and the responsibility these requirements place on you
3. the hazards and risks associated with installing cable runs/circuits in marine structures and with the tools and equipment used and how they can be minimised
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 protective equipment that you need to use for both personal protection (PPE) and protection of the vessel/equipment
6. the precautions to be taken to prevent electrostatic discharge (ESD) damage to circuits and sensitive components (such as use of earthed wrist straps)
7. what constitutes a hazardous voltage and how to recognise victims of electric shock
8. how to reduce the risks of a phase to earth shock (such as insulated tools, rubber matting and isolating transformers)
9. how to obtain and interpret drawings, circuit and physical layouts, charts, specifications, manufacturers manuals, IET wiring regulations and other documentation used during the installation process (including BS and ISO schematics, symbols and terminology)
10. currency/issue checks of the specifications you are working with
11. the cable runs/circuits to be installed and their function within the particular system

12. the different types of cabling (multicore cables, single-core cables, SWA cables, MI cables, screened cables), fittings and their application
13. the different types of electrical components (plugs, switches, lighting and fittings, junction boxes, consumer units)
14. the techniques used to position, align, adjust carry, support, secure and distribute the cabling through the vessel
15. how to extract and insert cables in wiring enclosures (such as conduit, trunking, traywork and through-bulkhead penetration) without causing damage to cables or components
16. the methods and techniques to be used for soldering and de-soldering and the importance of adhering to these procedures
17.
the methods and techniques to be used for crimping and heat-shrinking and the importance of adhering to these procedures
18.
the various mechanical fasteners/termination that will be used and their method of installation
19. the importance of ensuring that the completed installation is free from damage and of ensuring that any exposed components are protected and advisory notices are placed
20.
how to conduct any necessary checks to ensure that the completed wiring complies with all required standards
21.
the quality control procedures to be followed during the installation operations
22.
the procedures for ensuring that you have the correct tools, equipment, components and fasteners for the activities
23. methods of lifting, handling and supporting the cabling/equipment during the installation activities
24. the use of seals, sealants, adhesives and anti-electrolysis barriers and the precautions that need to be taken
25. why electrical bonding is critical and why it must be both mechanically and electrically secure
26. the procedure for the safe disposal of waste materials
27. the tools and equipment used in the installation activities and their calibration/care and control procedures

28. 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
29.
the problems that can occur with the electrical wiring installation operations and how these can be overcome
30.
the recording documentation to be completed for the activities undertaken
31. 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 electrical cable installation activities:

1.1 use the correct issue of structure/vessel/craft system installation drawings and technical documentation
1.2 use copies of relevant COSHH sheets, risk assessment, IET regulations and corporate procedures
1.3 check the calibration dates of tools to be used
1.4 obtain clearance to work on the system and observe the power isolation and safety procedures
1.5 return all tools and equipment to the correct location on completion of the activities
1.6 leave the system in a recognised condition with any incomplete terminations clearly identified
1.7 leave the work area in a safe condition and to the prescribed category of cleanliness

2.

Install four of the following types of wiring enclosures:

2.1 non-metallic conduit systems
2.2 metal trunking system
2.3 metal conduit systems
2.4 traywork systems
2.5 non-metallic trunking systems
2.6 bulkhead/screen/deck penetration
2.7 ladder racking
2.8 other (such as flat bar wireways)

3.

Apply all of the following installation methods and techniques:

3.1 marking out of location of trunking/traywork/conduit
3.2 positioning and securing trunking/traywork/conduit using mechanical fixings
3.3 drilling and hole preparation
3.4 levelling and alignment

4.

Install cable runs in support of three of the following types of marine electrical systems/equipment:

4.1 three-phase power circuits
4.2 weapons systems
4.3 single phase power circuits
4.4 computer control equipment
4.5 direct current power circuits high voltage/power distribution supply/system
4.6 rotating electrical equipment
4.7 communications systems

4.8 domestic electrical equipment
4.9 navigation systems
4.10 lighting and alarm systems
4.11 sensor systems (RADAR / SONAR)
4.12 emergency/temporary power supplies

5.

Install four of the following types of cable run:

5.1 multicore cables
5.2 mineral insulated (MI) cables
5.3 single core cables
5.4 screened cables
5.5 steel wire armoured (SWA) cables
5.6 fibre-optic cables
5.7 wiring looms
5.8 data cable
5.9 other specific type

6.

Apply three of the following installation methods and techniques:

6.1 bending and forming conduit
6.2 bending and forming trays
6.3 bending and forming trunking
6.4 through-bulkhead penetration
6.5 other specific method

Plus four more from the following:

6. allocating identification markings
7. heat shrinking
8. cable banding
9. sealing and protecting cable connections
10. earth bonding
11. taking electrostatic discharge (ESD) precautions
12. screening
13. polyweld cable joint

1.

Make six of the following types of electrical connection:

1.1 module blocks
1.2 free plugs and sockets
1.3 terminal blocks
1.4 tray-mount sockets
1.5 earth bonding points
1.6 overall screened
1.7 soldered connections
1.8 fibre-optic terminations

1.9 multi-pin plugs and sockets
1.10 armoured (SWA) cable terminations
1.11 crimped connections
1.12 mineral insulated (MI) cable terminations
1.13 co-axial cable

2.

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

2.1 BS or ISO standards and procedures
2.2 customer (contractual) standards and requirements
2.3 company standards and procedures
2.4 specific system requirements
2.5 IET Regulations (current issue)
2.6 recognised compliance agency/body's standards
2.7 other accepted international standards

3.

Complete the relevant documentation, to include one from the following and pass it to the appropriate people:

3.1 installation records
3.2 system log
3.3 job cards
3.4 vessel wiring documentation
3.5 system authorisation documentation
3.6 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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# Installing cable runs and circuits in marine structures

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