
Overview

This standard identifies the competences you need to install marine hydraulic systems and equipment, in accordance with approved procedures. It includes hydraulic systems and components used for davits, weapon hoists, stores lifts, hatches, planes, cranes, aerials, periscopes, stabilisers, vehicle ramps, ramp locking systems and steering gear. You will be required to select the appropriate tools and equipment to use, based on the operations to be performed and components to be installed. The hydraulic components to be installed will include items such as pipework, control valves, reservoirs and supply tanks, pumps, cooling units, accumulators, cylinders and actuating mechanisms, mechanical and electrical controls and safety devices. The installation activities will include making all necessary checks and adjustments to ensure that components are correctly positioned and aligned, have appropriate travel and/or working clearances, are tightened to the correct torque and that they function as per the specification.

Your responsibilities will require you to comply with organisational policy and procedures for the activities undertaken and to report any problems with the installation activities that you cannot personally resolve, or are outside your permitted authority, to the relevant people. You will ensure that all tools, equipment and materials used in the installation are correctly accounted for 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 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 marine hydraulic installation procedures. You will understand the marine hydraulic system and its application and will know about the components, tools and equipment used in the installation, 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 hydraulic installation operations. 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:

- P1 work safely at all times, complying with health and safety and other relevant regulations, directives and guidelines
- P2 follow all relevant drawings and specifications for the installation being carried out
- P3 use the correct tools and equipment for the installation operations and check that they are in a safe and usable condition
- P4 install, position and secure the equipment and components in accordance with the specification
- P5 ensure that all necessary connections to the equipment are complete
- P6 deal promptly and effectively with problems within your control and report those that cannot be solved
- P7 check that the installation is complete and that all components are free from damage

Knowledge and understanding

You need to know and understand:

- K1 the specific safety practices and procedures that you need to observe when installing marine hydraulic systems (including any specific legislation, regulations/codes of practice for the activities, equipment or materials)
- K2 the procedures to be carried out before starting work on the installation (such as obtaining permits to work, obtaining and complying with risk assessments and other health and safety requirements)
- K3 the hazards associated with installing marine hydraulic systems and with the tools, materials and equipment used, (pressurised systems, fluids, moving mechanisms) and how they can be minimised
- K4 the health and safety requirements of the work area where you are carrying out the installation activities and the responsibility they place on you
- K5 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)
- K6 the protective equipment that you need to use for both personal protection (PPE) and protection of the newly installed equipment
- K7 the interpretation of drawings, standards, quality control procedures and specifications used for the installation, (including BS and ISO mechanical schematics, symbols and terminology used in marine hydraulic systems)
- K8 how to carry out currency/issue checks of the specifications you are working with
- K9 methods of marking out the site for positioning the equipment and the tools and equipment used
- K10 the basic principle of operation of the hydraulic circuit being installed, and the function of the various components being installed within the system
- K11 the different types of hydraulic pipework, hoses, fittings and manifolds and their application
- K12 the identification and application of different types of valves (such as flow control, pressure control)
- K13 the identification and application of different types of sensors and actuators (such as rotary, linear, mechanical, electrical)
- K14 the identification and application of different types of cylinders (such as single acting, double acting)
- K15 the identification and application of different types of pumps (such as positive and non-positive displacement)
- K16 the application and fitting of static and dynamic seals

- K17 the various mechanical fasteners that will be used and their method of installation (including threaded fasteners, special securing and locking devices, torque loading requirements)
- K18 the techniques used to position, align, adjust and secure the components and pipes without damage
- K19 methods of lifting, handling and supporting the components/equipment during the installation activities
- K20 the tools and equipment used in the installation activities and their calibration/care and control procedures
- K21 how to make pipe bends using fittings and by hand bending, using approved forming equipment
- K22 elimination of stress on pipework/connections and the importance of supporting the pipe at suitable intervals
- K23 the use of seals, sealant, adhesives and anti-electrolysis barriers and the precautions to be taken
- K24 why electrical bonding is critical and why it must be both mechanically and electrically secure
- K25 the quality control procedures to be followed during the installation operations
- K26 how to conduct any necessary checks to ensure the hydraulic system integrity, functionality, accuracy and quality of the installation
- K27 the problems that can occur with the installation operations and how these can be overcome
- K28 how to recognise installation defects (such as leaks, poor seals, misalignment, ineffective fasteners and damage)
- K29 recognition of contaminants and the problems they can create; the effects and likely symptoms of contamination in the system
- K30 the importance of ensuring that the completed installation is to the category of cleanliness prescribed and fitted with suitable filtration equipment and that any exposed components or pipe ends are correctly covered/protected and warning notices are fitted
- K31 the procedure for the safe disposal of waste materials
- K32 the recording documentation to be completed for the activities undertaken and where appropriate, the importance of marking and identifying specific pieces of work in relation to the documentation
- K33 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 installation of the marine hydraulic systems and equipment:
 - 1.1. use the correct issue of marine installation drawings and planning documentation
 - 1.2. use copies of relevant COSHH sheets, risk assessment and marine standards
 - 1.3. ensure that correct part numbers are used (including port or starboard items)
 - 1.4. check the calibration dates of tools and test equipment to be used
 - 1.5. obtain clearance to work on the vessel/system and observe the power isolation and safety procedures
 - 1.6. return all tools and equipment to the correct location on completion of the activities
 - 1.7. leave the work area in a safe condition and to the prescribed category of cleanliness

2. Install **one** of the following marine hydraulic systems and equipment:
 - 2.1. boat davits
 - 2.2. single arm davits
 - 2.3. ramp locking systems
 - 2.4. towing mechanisms
 - 2.5. cranes
 - 2.6. hoists
 - 2.7. stores lifts
 - 2.8. hatches
 - 2.9. planes
 - 2.10. aerials
 - 2.11. periscopes
 - 2.12. steering gear
 - 2.13. stabilisers
 - 2.14. vehicle ramps
 - 2.15. telemotor systems

3. Assemble and install marine hydraulic systems and equipment, to include **ten** of the following:
 - 3.1. rigid pipework
 - 3.2. hoses

- 3.3. oil reservoirs/supply tanks
 - 3.4. oil cooling units
 - 3.5. cylinders/actuating mechanisms
 - 3.6. control valves
 - 3.7. gauges
 - 3.8. gaskets and seals
 - 3.9. filters and regulators
 - 3.10. safety devices
 - 3.11. pumps
 - 3.12. accumulators
 - 3.13. pressure intensifiers
 - 3.14. electrical controls (such as solenoids, motors, pressure switches)
 - 3.15. mechanical controls (such as plungers, springs, rollers)
4. Use **twelve** of the following installation methods and techniques:
 - 4.1. marking/setting out of locating and securing positions
 - 4.2. preparing holes (such as drilling, cleaning out threads)
 - 4.3. positioning equipment/components
 - 4.4. levelling and aligning equipment, pipework and connections
 - 4.5. assembly/connection of components or sub-assemblies
 - 4.6. dressing and securing piping and hoses
 - 4.7. torque setting of mechanical fasteners
 - 4.8. earth bonding
 - 4.9. setting and adjusting equipment
 - 4.10. making pipe connections
 - 4.11. making pump couplings
 - 4.12. making flexible hose connections
 - 4.13. lifting and handling
 - 4.14. lubricating
 - 4.15. connecting wires and cables
 - 4.16. setting travel or working clearance
 - 4.17. securing by using mechanical fixings
 - 4.18. securing by using adhesives
 - 4.19. sealing
 - 4.20. applying screw fastening locking devices
 - 4.21. ensuring the system cleanliness (such as covering exposed pipe ends or components)
 5. Use **six** of the following types of fasteners and securing devices:
 - 5.1. swing bolts
 - 5.2. screws
 - 5.3. dowels
 - 5.4. quick-release fasteners

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- 5.5. studs with nuts
 - 5.6. wing nuts
 - 5.7. bolts
 - 5.8. flexible bellows
 - 5.9. locking devices (such as split, parallel, clevis or taper pin)
 - 5.10. keys/keyways (such as slotted, semi-circular, woodruff, taper)
6. Produce marine hydraulic system installations which comply with **one** of the following standards:
- 6.1. BS or ISO standards and procedures
 - 6.2. customer (contractual) standards and requirements
 - 6.3. company standards and procedures
 - 6.4. specific system requirements
 - 6.5. recognised compliance agency/body's standards
 - 6.6. other accepted international standards
7. Complete the relevant paperwork, to include **one** from the following and pass it to the appropriate people:
- 7.1. acceptance documentation
 - 7.2. installation records
 - 7.3. work authorisation documents
 - 7.4. job cards
 - 7.5. time sheets
 - 7.6. system log
 - 7.7. other specific recording method

SEMME3070 – HY1V 04

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Developed by	SEMTA
Version number	2
Date approved	February 2014
Indicative review date	February 2017
Validity	Current
Status	Original
Originating organisation	SEMTA
Original URN	SEMME3070
Relevant occupations	Marine Engineering Trades
Suite	Marine engineering suite 3
Key words	engineering; marine; install; hydraulic systems; equipment; davits; weapon hoists; lifts; hatches; cranes; stabilisers