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## Overview

This standard identifies the competences you need to prepare and operate manual metal arc (MMA) welding equipment, in a marine environment, in accordance with instructions and/or approved welding procedures. You will be required to check that all the workholding equipment and manipulating devices required are available and are in a usable condition. You will be expected to check the welding equipment to ensure that all the leads/cables, electrode holder and workpiece earthing arrangements are securely connected and free from damage. In preparing to weld, you will need to set and adjust the welding conditions, in line with the instructions or welding procedure specification. You must operate the equipment safely and correctly and make any necessary adjustments to settings in line with your permitted authority, in order to produce the welded joints to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for the welding activities undertaken and to report any problems with the welding equipment or activities that you cannot resolve, or are outside your permitted authority, to the relevant people. You will be expected to work to instructions, 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 be sufficient to provide a sound basis for your work and will provide an understanding of how the manual metal arc process works. You will know about the equipment, materials and consumables, in adequate depth to provide a sound background for the welding operations to be performed and for ensuring that the work output is produced to the required specification.

You will understand the safety precautions required when working with the welding 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.

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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 joining procedure and job instructions
3. check that the joint preparation complies with the specification
4. check that joining and related equipment and consumables are as specified and fit for purpose
5. make the joints as specified using the appropriate thermal joining technique
6. produce joints of the required quality and of specified dimensional accuracy
7. shut down the equipment to a safe condition on completion of joining activities
8. deal promptly with excess and waste materials and temporary attachments, in line with approved and agreed procedures
9. deal promptly and effectively with problems within your control and report those that cannot be solved

## Knowledge and understanding

### *You need to know and understand:*

1. the safe working practices and procedures to be observed when working with MMA welding equipment (to include general workshop and site safety; appropriate personal protective equipment (PPE); fire prevention; protecting other workers from stray arcs; safety in enclosed/confined spaces; fume control)
2. statutory requirements, risk assessment procedures; accident procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations
3. the hazards associated with MMA welding (such as live electrical components; poor earthing; the electric arc; fumes and gases; spatter; hot slag and metal; grinding and mechanical metal/slag removal; elevated working; enclosed spaces; slips, trips and falls) 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 compartments in the case of fire or other major incident)
5. the manual metal arc welding process (such as basic principles of fusion welding, AC and DC power sources, ancillary equipment; care of equipment; consumables; power ranges)
6. types of electrodes; correct control, storage and drying of electrodes
7. the types of welded joints to be produced (such as fillet and butt welds, single and multi-run welds, joints in pipe, plate and sections, welding positions)
8. setting up and restraining the joint (such as the use of jigs and fixtures, manipulators and positioners, restraining devices, tack welding size and spacing in relationship to material thickness)
9. checks to be made prior to welding (such as confirming the correct set-up of the joint and cleanliness of materials; condition of electrical connections, power return and earthing arrangements; operating parameters; calibration before use; care and maintenance of equipment)
10. the techniques of operating the welding equipment, to produce a range of joints in the various joint positions (such as fine tuning parameters; correct manipulation of electrode; safe closing down of the welding equipment)
11. the importance of complying with the job instructions and the welding procedure specification
12. how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate British, European

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or relevant International standards in relation to work undertaken)

13. problems that can occur with the welding activities and how these can be overcome (such as causes of distortion and methods of control; effects of welding on materials and sources of weld defects; methods of prevention)

14. 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

15. the organisational quality control systems used and weld standards to be achieved

16. weld inspection and test procedures used (including destructive and non-destructive methods)

17. personal approval tests and their applicability to your work

18. the disposal of waste materials in a safe and environmentally friendly way

19. the extent of your own authority and whom you should report to if you have problems that you cannot resolve

20. reporting lines and procedures, line supervision and technical experts

## Scope/range related to performance criteria

1.

Prepare for the manual metal arc welding process, to include carrying out all of the following:

- 1.1 obtaining the appropriate equipment for the welding activities to be carried out (such as type, current capacity)
- 1.2 checking the condition of and correctly connecting welding leads, earthing arrangements and electrode holder
- 1.3 setting and adjusting welding conditions/parameters, in accordance with welding procedure specification
- 1.4 preparing the work area for the welding activities (such as siting welding screens, positioning fume extraction equipment)
- 1.5 ensuring that the workpiece is correctly set up with regard to specified joint preparation and that it is secure
- 1.6 obtaining and wearing appropriate personal protective equipment

2.

Use manual metal-arc welding and related equipment, to include either of the following:

- 2.1 alternating current (AC) equipment
- 2.2 direct current (DC) equipment

3.

Use one type of electrode and two different sizes from the following:

- 3.1 rutile
- 3.2 nickel alloy
- 3.3 basic
- 3.4 cellulosic
- 3.5 stainless steel
- 3.6 other specific electrodes

4.

Produce welded joints which incorporate both of the following:

- 4.1 fillet welds
- 4.2 butt welds

5.

Produce joints in one form of specified material from the following:

- 5.1 plate
- 5.2 pipe/tube
- 5.3 section/bar
- 5.4 other specific form

6.

Weld joints according to approved welding procedures, in good access situations,

in two of the following BS EN ISO 6947 positions:

- 6.1 flat (PA)
- 6.2 horizontal vertical (PB)
- 6.3 horizontal (PC)
- 6.4 vertical upwards (PF)
- 6.5 vertical downwards (PG)

7.

Produce welded components which:

- 7.1 achieve a minimum weld quality equivalent to the level given in the relevant European/International standard (such as BS EN ISO 5817 and EN 30042/ISO 10042) required by the application standard or specification
- 7.2 meet and verify the required dimensional accuracy, within specified tolerances

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## 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

SEMME2076

Joining marine materials/structures using the manual metal arc (MMA) welding process



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