
Overview

This standard identifies the competencies you need to prepare and operate semi-automatic MIG, MAG or Flux cored-wire arc welding equipment, 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 in a usable condition. You will be expected to check the welding equipment to ensure that all the leads/cables, shielding gas system, hoses and wire feed mechanisms 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 welding 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 MIG, MAG or Flux cored-wire arc welding 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 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.

SEMFWE205 (SQA Unit Code – HF1X 04)

Joining materials by the semi-automatic MIG/MAG and flux cored arc processes

Performance criteria

You must be able to:

- P1 work safely at all times, complying with health and safety and other relevant regulations and guidelines
- P2 follow the relevant joining procedure and job instructions
- P3 check that the joint preparation complies with the specification
- P4 check that joining and related equipment and consumables are as specified and fit for purpose
- P5 make the joints as specified using the appropriate thermal joining technique
- P6 produce joints of the required quality and of specified dimensional accuracy
- P7 shut down the equipment to a safe condition on completion of joining activities
- P8 deal promptly with excess and waste materials and temporary attachments, in line with approved and agreed procedures
- P9 deal promptly and effectively with problems within your control and report those that cannot be solved

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Knowledge and understanding

You need to know and understand:

- K1 the safe working practices and procedures to be observed when working with MIG, MAG or Flux cored wire arc welding equipment (general workshop and site safety; appropriate personal protective equipment (PPE); fire prevention; protecting other workers from the effects of the welding arc; safety in enclosed/confined spaces; fume control; accident procedure; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
- K2 the correct handling and storage of gas cylinders (manual handling and use of cylinder trolley, leak detection procedures, relevant BCGA codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features, emergency shutdown procedures)
- K3 the hazards associated with arc welding (live electrical components; poor earthing; the electric arc; fumes and gases; gas supply leaks; spatter, hot slag and metal; elevated working; enclosed spaces; slips, trips and falls), and how they can be minimised
- K4 the semi-automatic MIG, MAG or Flux cored wire arc welding process (basic principles of fusion welding, power sources, ancillary equipment, power ranges, care of equipment)
- K5 the consumables associated with MIG, MAG or Flux cored wire arc welding (types of wire and their application (solid and cored), types of shielding gas and their application, gas supply and control)
- K6 the types of welded joints to be produced (fillet and butt welds, single and multi-run welds, joints in pipe, plate, sheet and sections; welding positions)
- K7 setting up and restraining the joint (the use of jigs and fixtures, manipulators and positioners, restraining devices, tack welding size and spacing in relationship to material thickness)
- K8 preparing the welding equipment and checks that need to be made to ensure that it is safe and ready to use (electrical connections, power return and earthing arrangements; wire feed mechanisms, gas supply, setting welding parameters, correct joint set-up, cleanliness of materials used; calibration before use; routine care and maintenance of equipment)
- K9 the techniques of operating the welding equipment to produce a range of joints in the various joint positions (fine tuning parameters, correct manipulation of the welding gun, safe closing down of the welding equipment)
- K10 the importance of complying with job instructions and the welding procedure specification

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- K11 how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate British, European or relevant International standards in relation to work undertaken)
- K12 problems that can occur with the welding activities and how these can be overcome (causes of distortion and methods of control, effects of welding on materials and sources of weld defects; methods of prevention)
- K13 the organisational quality systems used and weld standards to be achieved; weld inspection and test procedures used (including visual and non-destructive tests)
- K14 personal approval tests, and their applicability to your work
- K15 the extent of your own authority and whom you should report to if you have problems that you cannot resolve
- K16 reporting lines and procedures, line supervision and technical experts

Additional Information

Scope/range related to performance criteria

- You must be able to:*
1. set up, check, adjust and use welding and related equipment for one of the following welding processes:
 - 1.1 MIG
 - 1.2 MAG
 - 1.3 flux cored wire arc
 2. use consumables appropriate to the material and application, to include both of the following:
 - 2.1 two wire types from different material groups
 - 2.2 two different shielding gases (where applicable)
 3. produce welded joints which incorporates both:
 - 3.1 fillet welds
 - 3.2 butt welds
 4. produce joints in one form of specified material from the following:
 - 4.1 plate
 - 4.2 pipe/tube
 - 4.3 section
 - 4.4 sheet (<3mm)
 - 4.5 other specific forms
 5. weld joints according to approved welding procedures, in good access situations, in two of the following BS EN ISO 6947 positions:
 - 5.1 flat (PA):
 - 5.2 horizontal vertical (PB)
 - 5.3 horizontal (PC)
 - 5.4 vertical upwards (PF)
 - 5.5 vertical downwards (PG)
 6. produce welded components which:
 - 6.1 achieve a minimum weld quality equivalent to the level given in the relevant European / International Standard (such as BS EN ISO 5187, EN 30042 / ISO 10042 or EN 9606) as required by the application standard or specification
 - 6.2 meet and verify the required dimensional accuracy within specified tolerance

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