

# SEMFWE3-31 - SQA Unit Code H1WB 04

## Producing fillet welded joints using a manual welding process



### Overview

This standard identifies the competencies you need to produce fillet welds in plate, sheet or sections and/or fillet welded joints in pipe/tube using a manual welding process such as manual metal arc, MIG, MAG, TIG, flux cored wire, inert shield or oxy/fuel gas 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, 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. You will be required to demonstrate your capability to produce the fillet welds of the required quality and this could be through tests according to BS 4872 or EN 287 Part 1 and EN 9696 Part 1 (for aluminium).

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, taking personal responsibility for your own actions and for the quality and accuracy of the work that you produce.

Your underpinning knowledge will provide a sound basis for your work, and will provide an understanding of how the particular 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.

# SEMFWE3-31 - SQA Unit Code H1WB 04

## Producing fillet welded joints using a manual welding process

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### 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

# SEMFWE3-31 - SQA Unit Code H1WB 04

## Producing fillet welded joints using a manual welding process

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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 the selected welding equipment (general workshop and site safety, appropriate personal protective equipment (PPE), fire prevention, protecting other workers from arc eye, 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 the selected welding process and how they can be minimised (live electrical components, poor earthing, arc radiation, fumes and gases, gas supply leaks, spatter, hot slag and metal, grinding and mechanical metal/slag removal; elevated working, enclosed spaces, slips, trips and falls)
- K4 the manual welding process selected and an awareness of the different types of welding equipment (basic principles of fusion welding, AC and DC power sources, ancillary equipment, power ranges, care of equipment, terminology used in welding, flame setting)
- K5 extracting information required from drawings and welding procedure specifications (interpretation of welding symbols, scope, content and application of the welding procedure specification) to include symbols and conventions to appropriate British, European or relevant International standards in relation to work undertaken
- K6 the consumables associated with the chosen welding process (types of electrodes and or filler metal and their application, types of shielding gas and their application, gas supply and control; correct control, storage and drying of electrodes and filler wire)
- K7 the types and features of welded joints in pipe (fillet and butt welds, single and multi-run welds, welding positions, weld quality)
- K8 methods of setting up and restraining the joint to achieve correct location of components and control of distortion (edge preparation, use of jigs and fixtures, manipulators and positioners, tack welding size and spacing in relationship to material thickness and component size, use of temporary attachments, pre-setting)
- K9 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; equipment calibration before use, setting welding parameters, care and maintenance of the equipment)
- K10 the techniques of operating the welding equipment to produce a range of joints in the various joint positions (fine tuning parameters, correct

## **SEMFWE3-31 - SQA Unit Code H1WB 04**

### **Producing fillet welded joints using a manual welding process**

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- manipulation of the welding gun or electrode, safe closing down of the welding equipment)
- K11 the importance of complying with job instructions and the welding procedure specification
- 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 responsibility and whom you should report to if you have problems that you cannot resolve

# SEMFWE3-31 - SQA Unit Code H1WB 04

## Producing fillet welded joints using a manual welding process

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### 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 Manual Metal Arc
    - 1.2 TIG
    - 1.3 Cored wire
    - 1.4 MIG/MAG
    - 1.5 Plasma Arc
    - 1.6 Oxy/fuel Gas welding
  2. use consumables as specified in the welding procedure specification covering **either**:
    - 2.1 two types of electrode from:
      - rutile
      - basic
      - cellulosic
      - nickel alloy
      - stainless steel
      - other electrode type
    - OR
    - 2.2 two types of filler wire from different material groups
  3. produce fillet welded joints in **two** of the following forms of material:
    - 3.1 plate
    - 3.2 sheet
    - 3.3 sections
    - 3.4 pipe/tube
    - 3.5 other specific form
  4. weld joints according to approved welding procedures in good access situations in **two** of the following BS EN ISO 6947 positions:
    - 4.1 Flat (PA)
    - 4.2 Horizontal (PC)
    - 4.3 Horizontal Vertical (PB)
    - 4.4 Vertical Upwards (PF)
    - 4.5 Vertical Downwards (PG)
    - 4.6 Overhead (PE or PD)
  5. produce fillet welded joints which:
    - 5.1 achieve a minimum weld quality requirements applicable to fillet welds equivalent to those given in the relevant European/International Standards (such as BS EN ISO 5187 and EN30042/ISO 10042) as required by the application standard or specification

## **SEMFWE3-31 - SQA Unit Code H1WB 04**

### **Producing fillet welded joints using a manual welding process**

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5.2 meet the required dimensional accuracy within specified tolerance

## SEMFWE3-31 - SQA Unit Code H1WB 04

### Producing fillet welded joints using a manual welding process

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