SEMPEO1-18 - SQA Unit Code H02F 04
Using manual oxy-fuel gas welding equipment

Overview

This standard covers a range of basic oxy-fuel gas manual welding equipment competences that will prepare you for entry into the engineering or manufacturing sectors, creating a progression between education and employment, or that will provide a basis for the development of additional skills and occupational competences in the working environment.

You will be expected to prepare for the oxy-fuel gas welding activities by obtaining all the necessary job instructions, materials, tools, equipment and any documentation that may be required. You will also be expected to check the welding equipment to ensure that the regulators, hoses, check valves, flashback arrestor and welding torch are securely connected and are free from leaks or damage.

In preparing to weld, you will need to set and adjust the gas pressures/welding conditions, in line with instructions and/or the 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 need to be able to recognise basic oxy-fuel gas welding defects, to take appropriate action to limit any faults that occur and to ensure that the finished workpiece is within the specification requirements. On completion of the welding activities, you will be expected to return all tools, equipment and workholding devices to their designated location, and to leave the welding equipment and work area in a safe and tidy condition.

Your responsibilities will require you to comply with health and safety requirements and organisational policy and procedures for the oxy-fuel gas welding activities undertaken. You will need to report any difficulties or problems that may arise, and to carry out any agreed actions. You will work under a high level of supervision, whilst taking responsibility for your own actions and for the quality and accuracy of the work that you carry out.

Your underpinning knowledge will provide an understanding of your work, and will enable you to apply appropriate manual oxy-fuel gas welding techniques and procedures safely. You will understand the oxy-fuel gas welding process, and its application, and will know about the equipment, materials and consumables used, to the required depth to provide a sound basis for carrying out the activities to the required specification. You will understand the safety precautions required when working with the oxy-fuel gas welding equipment, and with its associated tools and 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.

Specific Standard Requirements
Welded joints must be at least 100mm long, using single or multi-run welds (as appropriate), with at least one stop and start included.

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Performance criteria

You must be able to:

P1 work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines

P2 obtain and prepare the appropriate welding equipment and welding consumables

P3 prepare and support the joint, using the appropriate methods

P4 tack weld the joint at appropriate intervals, and check the joint for accuracy before final welding

P5 weld the joint to the required quality, dimensions and profile specified

P6 report any difficulties or problems that may arise with the welding activities, and carry out any agreed actions

P7 shut down the equipment to a safe condition on conclusion of the welding activities

P8 leave the work area in a safe and tidy condition on completion of the welding activities

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Knowledge and understanding

You need to know and understand:

K1 the safe working practices and procedures to be followed when preparing and using manual oxy-fuel gas welding equipment (such as general workshop safety; appropriate personal protective equipment (PPE); fire and explosion prevention, protecting other workers, safety in enclosed/confined spaces; fume extraction/control)

K2 the hazards associated with using manual oxy-fuel gas welding equipment (such as naked flames, fumes and gases, explosive gas mixtures, oxygen enrichment, spatter, hot metal, elevated working, welding in enclosed spaces, slips trips and falls), and how they can be minimised

K3 the personal protective equipment to be worn for the welding activities (such as correctly fitting overalls; leather aprons, welding gloves/gauntlets; safety boots; head/eye shield with correct grade of filter)

K4 the correct handling and storage of gas cylinders (such as manual handling and use of cylinder trolley, leak detection procedures, relevant BCGA codes of practice, cylinder identification, gas pressures, cylinder and equipment safety features)

K5 how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken

K6 the major parts of the welding equipment, and their function

K7 the consumables associated with gas welding (such as types of filler wire, fluxes, the types of gas and its supply and control)

K8 setting gas working pressures, reading the gauges to establish content and pressures

K9 the types of welded joints to be produced (such as lap joints, corner joints, tee joints and butt welds)

K10 terminology used for the appropriate welding positions

K11 how to prepare the materials in readiness for the welding activity (such as ensuring that the material is free from excessive surface contamination (such as rust, scale, paint, oil/grease and moisture); ensuring that edges to be welded are correctly prepared (such as made flat, square or bevelled)

K12 how to set up and restrain the joint, and the tools and techniques that are used (such as the use of jigs and fixtures, restraining devices (such as clamps and weights/blocks); setting up the joint in the correct position and alignment)

K13 tack welding size and spacing (in relation to material thickness)

K14 the techniques of operating the welding equipment to produce a range of joints in the various joint positions (such as selection of nozzle, lighting and adjusting the flame, correct manipulation of torch and filler rods)

K15 the safe and correct sequence for shutting down the equipment (such as

	sequence of turning off the gases, extinguishing the flame and closing valves on gas supply/cylinders)
K16	problems that can occur with the welding activities (such as causes of distortion and methods of control; effects of welding on materials and sources of weld defects), and how these can be overcome
K17	how to check the welded joints for uniformity, alignment, position and weld size and profile
K18	when to act on your own initiative and when to seek help and advice from others
K19	the importance of leaving the work area in a safe and clean condition on completion of welding activities (such as isolation of gas supplies, safely storing equipment and consumables, removing and disposing of waste)

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Additional Information

Scope/range related to performance criteria

You must be able to:

1. Prepare for the oxy-fuel gas welding process, to include carrying out **all** of the following:
   - 1.1 adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment (PPE) and other relevant safety regulations
   - 1.2 check that regulators, hoses and check valves are securely connected and free from leaks and damage
   - 1.3 check/fit the correct gas nozzle to the torch
   - 1.4 check that a flashback arrestor is fitted
   - 1.5 set appropriate gas pressures
   - 1.6 use the correct procedure for lighting, adjusting and extinguishing the welding flame
   - 1.7 use appropriate and safe procedures for handling and storing of gas cylinders
   - 1.8 prepare the work area for the welding activities (such as positioning welding screens and fume extraction)
   - 1.9 prepare the materials and joint in readiness for welding (such as cleaning of joint faces, grinding weld preparations, setting up the joint, supporting the joint)

2. Produce **two** of the following welded joints of at least 100mm long, by single or multi-run (as appropriate), with at least one stop and start included:
   - 2.1 fillet lap joints
   - 2.2 butt joints
   - 2.3 Tee fillet joints
   - 2.4 welds made without filler wire (autogenously)
   - 2.5 corner joints

   Using **one** of the following methods:
   - 2.6 with filler wire
   - 2.7 without filler wire (autogenously)

3. Produce joints in **one** form of material from the following:
   - 3.1 sheet (less than 3mm)
   - 3.2 plate
   - 3.3 section
   - 3.4 pipe/tube
   - 3.5 other forms

4. Weld joints, in good access situations, in **one** of the following BS EN ISO 6947 positions:
   - 4.1 Flat (PA)
   - 4.2 Horizontal (PC)
   - 4.3 Vertical downwards (PG)
   - 4.4 Horizontal vertical (PB)
   - 4.5 Vertical upwards (PF)

5. Check that the welded joint conforms to the specification, by checking **all** of the following:
   - 5.1 dimensional accuracy
   - 5.2 size and profile of weld
   - 5.3 number of runs
   - 5.4 alignment/squareness

6. Produce welded joints which meet **all** of the following: (with reference to BS 4872 Part 1 Weld test requirements)
   - 6.1 welds meet the required dimensional accuracy
   - 6.2 fillet welds are equal in leg length and slightly convex in profile, with the size of the fillet equivalent to the thickness of the material welded
   - 6.3 the welds are adequately fused, and there is minimal undercut, overlap and surface inclusions
   - 6.4 joins at stop/start positions merge smoothly, with no pronounced hump or crater in the weld surface
   - 6.5 tack welds are blended in to form part of the finished weld, without excessive hump
   - 6.6 the weld surface is free from cracks and substantially free from porosity, shrinkage cavities and trapped slag
   - 6.7 the weld surface and adjacent parent metal is substantially free from arcing or chipping marks

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