SEMFWE3-10 – SQA Unit Code HF37 04
Preparing mechanised arc welding equipment for production

Overview

This standard identifies the competencies needed to prepare a mechanised MIG/MAG, cored wire, Submerged Arc, TIG or Plasma Arc welding installation for production in accordance with approved procedures. You will be required to set up and check both the welding installation and all associated mechanical and electrical apparatus forming part of the mechanised or automated installation. This will include setting up of handling and loading equipment, workholding arrangements, traversing mechanisms, transfer mechanisms and safety equipment as is applicable to the machine type. In setting up the welding conditions you will be expected to set the electrical conditions, wire feed rate, welding speed, shielding gas supply system and, where applicable, flux dispensing and recovery mechanisms. You must produce trial welds and prove the machine is working satisfactorily before declaring the installation ready for production. Making adjustments to settings to achieve specification and solving machine related problems during production will also form part of your role.

Your responsibilities will require you to comply with organisational policy and procedures for setting up the welding equipment 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 with minimum 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 provide a good understanding of your work, and provide an informed approach to applying mechanised welding procedures. You will understand the welding process carried out, and its application, and will know about the equipment, relevant materials and consumables in adequate depth to provide a sound basis for setting up the equipment, correcting faults and ensuring the work output is produced to the required specification. You will understand the safety precautions required when working with the machine and 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.

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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 specification and job instructions for the work to be produced
- P3 check that the equipment is as specified and in usable condition
- P4 obtain the required components and check that the joint preparation complies with the specification
- P5 set up the handling, work-holding and associated equipment to achieve correct joint positioning
- P6 select and prepare the appropriate consumables in line with the joining procedure specification
- P7 set and adjust the machine operating conditions to achieve joints of the required quality and within specified dimensional accuracy
- P8 check that all safety mechanisms are in place and that the equipment is operating satisfactorily
- 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 setting and operating arc welding installations (working with machinery; the use of appropriate personal protective equipment (PPE); machine guards; ventilation and fume extraction; protecting other workers from the effects of the welding arc; machine safety devices; stopping the machine in an emergency; closing the machine down on completion of activities; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)

K2 the hazards associated with mechanised arc welding machines and how they can be minimised (dangers from the electric arc; live electrical components; fumes and gases; hot slag and metal; grinding and mechanical metal/slag removal; moving parts of machinery)

K3 the basic principles of the relevant mechanised arc welding process (using heat to join metals by fusion; forming a weld; use of filler metal; principal features of a welded joint; process principles, parameters, heat input; how variation in the parameters influences the weld features, quality and output; terminology used in welding)

K4 the key components and features of the equipment (power source; power range; electrical parameters such as arc voltage, current, and duty cycle; wire dispensing and feed mechanisms; flux dispensing and recovery and shielding gas supply; calibration of equipment)

K5 mechanised and automated welding basics (types of installations; machine functions: loading, handling, clamping and transfer of components; traversing components or welding head)

K6 extracting necessary information from the component drawings and welding procedure specifications (to include symbols and conventions to appropriate British, European or relevant International standards in relation to work undertaken)

K7 non-consumable electrodes, types, sizes, profiles, selection and maintenance

K8 types and application of electrodes; the selection, control, handling and storage of filler wires, fluxes and shielding gases

K9 types of joints applicable and the edge preparation required

K10 problems that can occur with the welding activities and how these can be overcome (causes of distortion and methods of control, welding characteristics of parent metals and sources of weld defects; methods of prevention)

K11 methods of setting up the joint to achieve correct location of components and control of distortion (work holding methods such as use of jigs/fixtures; component alignment; joint setting to give correct

penetration)

K12 setting up the welding equipment to the welding procedure specification (setting electrical conditions and filler wire feed rate; flux dispensing rate; gas flow; welding speed)

K13 checking the machine functions to the required specification (running pre-production trials to prove that the installation is working satisfactorily)

K14 organisational quality systems (standards to be achieved; production records to be kept)

K15 personal approval tests and their applicability to your work

K16 the extent of your own responsibility and whom you should report to if you have problems that you cannot resolve

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Additional Information

Scope/range related to performance criteria

You must be able to:

1. ensure the arc welding equipment is suitable for production by carrying out **all** of the following checks:
   - 1.1 the equipment is correctly maintained and in a safe and usable condition
   - 1.2 the equipment is correctly calibrated
   - 1.3 all electrical and mechanical systems function smoothly
   - 1.4 equipment shut down systems function correctly
2. prepare and set-up **one** of the following arc welding installations for **two** different joint configurations in the specified materials, forms and positions, according to work instructions and the welding procedure specification:
   - 2.1 MIG/MAG
   - 2.2 Submerged Arc
   - 2.3 Cored wire
   - 2.4 Plasma Arc
   - 2.5 TIG
3. set up the welding equipment and parameters in accordance with the welding procedure specification to include setting **all** of the following as is applicable to the machine type:
   - 3.1 electrical parameters
   - 3.2 welding speed
   - 3.3 shielding gas supply system
   - 3.4 wire feed rate
   - 3.5 consumables
   - 3.6 flux dispensing and recovery mechanisms
   - 3.7 safety devices
4. set up the work piece to achieve correct joint fit-up and alignment to include setting and checking **all** of the following as is applicable to the machine type:
   - 4.1 handling and loading equipment
   - 4.2 preparation of materials and joint faces is to specification
   - 4.3 workholding arrangements
   - 4.4 traversing mechanisms
   - 4.5 transfer mechanisms
   - 4.6 safety mechanisms
5. prove the installation is operating correctly and is ready for production by producing specified trial welds and checking **all** of the following:
   - 5.1 visual appearance of weld

5.2 quality of weld
5.3 dimensional accuracy
5.4 machine settings are as specified

6. solve problems in production relating to **two** of the following:
6.1 machine performance
6.2 joint set-up
6.3 condition of materials being joined
6.4 consumables

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