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## Overview

This standard identifies the competences you need to assemble fabricated and other components for motorsport vehicles, using manual torch brazing or soldering equipment, in accordance with approved instructions or procedures. You will be required to select the appropriate equipment to use, check that all the hoses and equipment are correctly connected, and that they are free from leaks or damage and ready for use. You will be required to set and adjust the brazing or soldering conditions in line with the specification. You will also need to select and use workholding and manipulating devices, appropriate to the size and shape of materials and joint configuration being produced. You must operate the equipment safely and correctly, and make any adjustments to settings in order to produce the joints to the required specification.

Your responsibilities will require you to comply with organisational policy and procedures for carrying out the brazing or soldering activities, and to report any problems with the equipment, materials or activities that you cannot resolve, or that 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 torch brazing or soldering process works. You will know about the equipment, materials and consumables, in adequate depth to provide a sound background for the brazing or soldering 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 brazing or soldering 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. ensure that joining and related equipment and consumables are available and in a usable condition
4. make the joints as specified using the appropriate thermal joining technique
5. produce joints of the required quality and of specified dimensional accuracy
6. check that the joint complies with the specification
7. deal promptly with excess and waste materials and temporary attachments, in line with approved and agreed procedures
8. deal promptly and effectively with problems within your control and report those that cannot be solved
9. ensure that work records are completed, stored securely and available to others, as per organisational requirements
10. leave the work area in a safe condition on completion of the activities, as per organisational and legal requirements

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## Knowledge and understanding

### You need to know and understand:

1. the specific safety precautions to be taken whilst carrying out the activities (including any specific legislation, regulations or codes of practice relating to the activities, equipment or materials)
2. the health and safety requirements of the work area and the activities, and the responsibility these requirements place on you
3. the hazards associated with the activities, and how to minimise them and reduce risks
4. types of filler metal and fluxes; forms of filler metal
5. the types of joints to be produced
6. setting up and locating the joint (methods of cleaning joint faces; use of jigs and fixtures, restraining devices, self-locating joints, pre-placement of filler metal and flux)
7. preparing to braze or solder (checks to confirm correct set-up and cleanliness; use of gauges, setting up the equipment, checking connections for leaks, checking operating parameters)
8. the techniques of operating the equipment to produce a range of joints (selection of nozzle and flame adjustment, application of flux, correct manipulation of torch and filler wire, safe closing down of the equipment)
9. the importance of complying with job instructions and the joining procedure specification
10. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to current industry standards and codes of practice)
11. how to interpret first and third angle drawings, imperial and metric systems of measurement, work reference points and system of tolerancing
12. how to carry out currency/issue checks of the specifications you are working with
13. the problems that can occur with the joining activities, and how these can be overcome (causes of distortion and methods of control; effects of heat on materials and sources of defects; methods of prevention)
14. methods of removing flux residues and cleaning the finished joint
15. organisational quality control systems and standards to be achieved; visual and non-destructive tests
16. the extent of your own authority and to whom you should report if you have problems that you cannot resolve
17. how to access, use and maintain information to comply with organisational requirements and legislation

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## Scope/range related to performance criteria

1. Prepare for the torch brazing and soldering process, to include carrying out all of the following:
  1. obtain and use the appropriate documentation (such as job instructions, assembly drawings, welding specifications, quality control documentation)
  2. adhere to procedures or systems in place for risk assessment, hazardous substances, personal protective equipment and other relevant safety regulations and procedures to realise a safe system of work
  3. obtain the appropriate equipment for the brazing or soldering activities to be carried out
  4. check the condition of, and correctly connect all required hoses, brazing torch and safety devices (where applicable)
  5. set up the brazing or soldering conditions (such as selection of nozzle and flame adjustment)
  6. prepare the work area for the brazing or soldering activities (such as removing flammable materials, positioning fume extraction equipment)
  7. ensure that the workpiece/component is correctly set up with regard to specified joint preparation, and is secure
  8. obtain and wear appropriate personal protective equipment
2. Braze or solder components to be used in one of the following types of motorsport vehicle:
  1. single seater
  2. kart
  3. motorcycle (such as circuit and off road)
  4. rallying
  5. historic
  6. sports car
  7. hill climb
  8. other specific approved competition vehicle
3. Set up, check, adjust and use one of the following processes and related equipment:
  1. brazing
  2. soldering
4. Use specified consumables appropriate to the parent metals, to include both of the following:

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1. two different filler metals
  2. appropriate fluxes
5. Produce brazed or soldered joints on six of the following motorsport vehicle components:
1. push rods
  2. swirl pots
  3. header tanks
  4. track rod ends
  5. panels
  6. heat exchangers
  7. water or oil coolers
  8. wings/bodywork
  9. pedals
  10. roll cages
  11. exhaust systems
  12. brackets
  13. radiator tanks
  14. other specific motorsport components
6. Check components comply with all of the following quality and accuracy standards:
1. achieve the specified joint quality as required by the application standard
  2. meet the required dimensional accuracy within specified tolerance
  3. are of good appearance, free from flux residues and excess filler metal

SEMAUT3077

Joining motorsport vehicle components by manual torch brazing or soldering



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