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## Overview

This standard identifies the competences you need to assemble fabricated and other components for experimental vehicle development activities, using manual torch brazing and soldering equipment, in accordance with approved instructions or procedures. You will be required to check that all the hoses and equipment are correctly connected, free from leaks or damage and ready for use. You will be required to set and adjust the brazing 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 activities, and to report any problems with the brazing equipment, or brazing 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 process works. You will know about the equipment, materials and consumables, in adequate depth to provide a sound background for the brazing 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 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 procedures, job instructions and specifications
3. check that joining and related equipment and consumables are, as specified and fit for purpose
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 preparation and assembly 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

## 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. the personal protective equipment and clothing (PPE) to be worn during the activities
5. the types of filler metal and fluxes; forms of filler metal
6. the types of joint to be produced
7. 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)
8. how to prepare 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)
9. 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)
10. the importance of complying with job instructions and the joining procedure specification
11. how to extract and use information from engineering drawings and related specifications (to include symbols and conventions, current industry standards and codes of practice)
12. how to interpret first and third angle drawings, imperial and metric systems of measurement, work reference points and system of tolerancing
13. how to carry out currency/issue checks of the specifications problems that can occur with the joining activities, and how these can be overcome (such as 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. reporting lines and procedures, line supervision and technical experts
18. how to access, use and maintain information to comply with

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organisational requirements and legislation

### Scope/range related to performance criteria

1. Carry out all of the following during the brazing and soldering activities:
  1. obtain and use the appropriate documentation (such as job instructions, drawings, brazing/soldering 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. check that all tools and equipment to be used are within current calibration/certification dates
  4. use safe and appropriate brazing and soldering methods and procedures at all times
  5. return all tools and equipment to the correct location on completion of the brazing and soldering activities
  6. leave the work area in a safe and appropriate condition on completion of the activities
  7. produce brazed and soldered joints that meet the requirements of the specification
2. Set up, check, adjust and use equipment for one of the following processes:
  1. brazing
  2. soldering
3. Use specified consumables appropriate to the parent metals, to include both of the following:
  1. two different filler metals
  2. appropriate fluxes
4. Produce brazed or soldered joints, according to work procedures in good access situations, covering both of the following:
  1. two different components or assemblies
  2. two different parent metal groups
5. Check components comply with all of the following quality and accuracy standards:
  1. achieve the specified joint quality as required by the application standard

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2. meet the required dimensional accuracy within specified tolerance
  3. are of good appearance, free from flux residues and excess filler metal

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