

# SEMFWE2-22 - SQA Unit Code H2BF 04

## Cutting sheet metal to shape using hand and machine tools



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### Overview

This standard identifies the competencies you need to cut and shape sheet metal (up to and including 3 mm), in order to fabricate clips, brackets, covers and similar components, in accordance with approved procedures. You will be required to select the appropriate equipment to use for the material, thickness and accuracy to be achieved, and will use hand tools, hand power tools and machinery, as applicable. The cutting and shaping will involve producing straight cuts and external curved contours.

Items to be cut and shaped may include ferrous and non-ferrous materials. This will call for care in selecting the right tools, so as to avoid damage or contamination to the tools and danger to oneself.

Your responsibilities will require you to comply with organisational policy and procedures, seeking out relevant information, and to report any problems with the cutting equipment, materials or cutting activities that you cannot personally resolve, or are outside your permitted authority, to the relevant person. 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 good understanding of your work, and will provide an informed approach to applying sheet metal cutting and shaping procedures. You will have an understanding of the cutting processes used, the equipment and its application, and will know about the materials in adequate 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 fabrication tools and machinery. 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 relevant specifications for the component to be produced
  - P3 obtain the appropriate tools and equipment for the shaping operations and check they are in a safe and usable condition
  - P4 shape the materials using appropriate methods and techniques
  - P5 check that all the required shaping operations have been completed to the required specification
  - P6 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 specific safety precautions to be taken when working with sheet metal equipment and materials in a fabrication environment (general workshop and site safety, appropriate personal protective equipment (PPE), accident procedure; statutory requirements, risk assessment procedures and relevant requirements of HASAWA, COSHH and Work Equipment Regulations; safe disposal of waste materials)
- K2 the personal protective clothing and equipment to be worn when carrying out the fabrication activities (such as leather gloves, eye/ear protection, safety helmets)
- K3 the correct methods of moving or lifting sheet metal
- K4 safe working practices and procedures to be observed when using manual and power-operated tools
- K5 the hazards associated with fabrication work (such as using dangerous or badly maintained tools and equipment, operating guillotines, and when using hand and bench shears), and how they can be minimised
- K6 the procedures for obtaining the necessary drawings and specifications, and how to check that they are the latest issue
- K7 how to use and extract information from engineering drawings and related specifications (to include symbols and conventions to appropriate British, European or relevant International standards in relation to work undertaken)
- K8 how to interpret the marking out conventions on the materials to be cut and shaped (such as cutting lines, centre lines, etc)
- K9 the tools and techniques available for cutting and shaping sheet metal (such as tin snips, bench shears, guillotines, portable power tools, bench drills, saws)
- K10 what preparations you may have to carry out on the material prior to cutting it
- K11 the material characteristics and process considerations that need to be taken into account when cutting and shaping sheet metal
- K12 the use and care of tools and equipment, including checks that need to be made to ensure that the tools are fit for purpose (sharp, undamaged, plugs and cables secure and free from damage, machine guards or safety devices operating correctly)
- K13 the importance of using tools or equipment only for the purpose intended; the care that is required when using the tools or equipment; the proper way of preserving tools or equipment between operations
- K14 the problems that can occur with cutting and shaping sheet metal, and how these can be avoided
- K15 the importance of using the machine guards and safety protection equipment at all times

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- K16 inspection techniques that can be applied to check that shape and dimensional accuracy are to specification and within acceptable limits
- K17 the extent of your own authority and whom you should report to if you have problems that you cannot resolve
- K18 reporting lines and procedures, line supervision and technical experts

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### Additional Information

#### Scope/range related to performance criteria

- You must be able to:*
1. cut and finish material to the marked out shape, using **four** of the following tools:
    - 1.1 tin snips
    - 1.2 hand power tools (drill, nibbling)
    - 1.3 bench shears
    - 1.4 pillar drill
    - 1.5 guillotine
    - 1.6 files
    - 1.7 hacksaw
    - 1.8 punch/cropping machine
    - 1.9 band saw
    - 1.10 thermal devices
  2. perform operations to produce **all** of the following shapes:
    - 2.1 straight cuts
    - 2.2 external and internal curved contours
    - 2.3 round holes
  3. use sheet metal of various thicknesses, up to and including 3 mm, for **two** appropriate materials and **two** thicknesses from the following:
    - 3.1 hot-rolled mild steel
    - 3.2 brass
    - 3.3 cold-rolled mild steel
    - 3.4 copper
    - 3.5 coated mild steel (e.g. primed, tinned, galvanised)
    - 3.6 stainless steel
    - 3.7 aluminium
  4. produce cut and shaped components which meet **all** the following quality and accuracy standards:
    - 4.1 dimensionally accurate (to drawing or specifications)
    - 4.2 free from distortion
    - 4.3 free from sharp edges, slivers or burrs

## SEMFWE2-22 - SQA Unit Code H2BF 04

### Cutting sheet metal to shape using hand and machine tools

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