



National Unit Specification: general information

UNIT Thermal Cutting Skills (SCQF level 5)

CODE F5F1 11

SUMMARY

This Unit can be delivered as part of a National Qualification Group Award but can also be taken as a free-standing Unit by candidates who wish to enhance their skills in a fabrication environment. The Unit is also suitable for those who are studying the subject for the first time.

By undertaking this Unit candidates will gain practical skills in manual oxy-fuel gas cutting and plasma cutting of straight and curved shapes. This will involve the cutting of both ferrous and non-ferrous materials. They will also be made fully aware of safety regulations including fire hazards, tanks and containers, confined spaces, fume extraction and cylinder safety.

OUTCOMES

- 1 Select the equipment and consumables for thermal cutting of ferrous and non-ferrous materials.
- 2 Demonstrate the cutting of ferrous and non-ferrous metals.
- 3 Identify any defects arising from the cutting of ferrous and non-ferrous materials, and specify appropriate remedial measures.
- 4 Comply with safety regulations and requirements.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, it would be beneficial of candidates had attained one of the following, or equivalent:

- ◆ *Thermal Cutting Processes*
- ◆ some experience in the fabrication industry

Administrative Information

Superclass: XF

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CREDIT VALUE

1 credit at Intermediate 2 (6 SCQF credit points at SCQF level 5*).

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

CORE SKILLS

There are opportunities to develop the Core Skills of *Problem Solving* and *Numeracy* at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

National Unit Specification: statement of standards

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Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit Specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME 1

Select the equipment and consumables for thermal cutting of ferrous and non-ferrous materials.

Performance Criteria

- (a) Selection of equipment and consumables for oxy-fuel gas cutting is correct.
- (b) Selection of equipment and consumables for plasma arc cutting is correct.
- (c) The procedure for checking equipment is correct.

OUTCOME 2

Demonstrate the cutting of ferrous and non-ferrous materials.

Performance Criteria

- (a) Setting of the parameters for cutting is correct.
- (b) Operation of the equipment to cut is correct and in accordance with safety regulations.
- (c) The equipment is safely and correctly closed down.

OUTCOME 3

Identify any defects arising from the cutting of ferrous and non-ferrous materials, and specify appropriate remedial measures.

Performance Criteria

- (a) Identification of faults is correct.
- (b) Explanation of the appropriate remedial measures for faults is correct.

OUTCOME 4

Comply with safety regulations and requirements.

Performance Criteria

- (a) The use of Personal Protective Equipment (PPE) is appropriate to thermal cutting.
- (b) Candidate observation of safe working practices is correct.
- (c) The use of specialised safety equipment for thermal cutting is correct.

National Unit Specification: statement of standards (cont)

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EVIDENCE REQUIREMENTS FOR THIS UNIT

Evidence is required to demonstrate that the candidates have achieved all of the Outcomes and Performance Criteria.

Performance evidence supported by assessor checklists and written and/or recorded oral evidence is required to show that all Outcomes and Performance Criteria have been achieved. Assessment should take place under supervised conditions and should last no more than two hours.

The evidence can be generated on one or more assessment occasions throughout the duration of the Unit.

The candidate is required to:

- ◆ Select equipment and consumables to the following cuts in 6 mm thick Low Carbon Steel (LCS):
 - 225mm long straight line cut; 200mm radius cut
 - both cuts to a tolerance of ± 2 mm
- ◆ A cut in LCS bar or section
- ◆ 225mm long straight line cut in 1.5–3mm thick aluminium
- ◆ Identify THREE faults associated with thermal cutting
- ◆ Specify appropriate remedial measures for identified faults
- ◆ Comply with all health and safety requirements

The Assessment Support Pack (ASP) for this Unit provides samples of assessor observation checklists, details of the questions which exemplify the national standard. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard.

National Unit Specification: support notes

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This part of the Unit Specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

GUIDANCE ON THE CONTENT AND CONTEXT FOR THIS UNIT

The Unit is in the National Qualification Group Award (NQGA) in *Fabrication and Welding Engineering* but can also be taken on a free-standing basis.

On successful completion of this Unit the candidate should be expected achieve a reasonable level of competence in oxy-fuel gas and plasma arc cutting of straight and curved shapes. He or she should also be fully aware of safety regulations including fire hazards, tanks and containers, confined spaces, fume extraction and cylinder safety.

The practical aspect of the Unit will be achieved by:

- ◆ cutting of the material using cutting equipment
- ◆ dimensional accuracy $\pm 2\text{mm}$
- ◆ methods of assembling equipment, 'cracking' open cylinders and checking for gas leaks
- ◆ correct set up and earthing of plasma arc cutting equipment
- ◆ performance evidence that gas pressures correctly adjusted, material correctly supported, closing down procedures are correct
- ◆ faults: adhering dross; excessive scale; pronounced drag lines; drag lines irregularly spaced; drag lines not at right angles to surface; radii not smoothly blended

Candidates will also be introduced to an explanation of the technical terms and definitions associated with thermal cutting, the health and safety implications and the impact on the environment.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The delivery of the Unit could be organised in such a way that each Outcome flows naturally into the next Outcome in the sequence written. It should be the tutor/trainer's aim to constantly apply the Outcomes to practical situations in the workshop to accustom candidates to apply underpinning knowledge themselves when working in industry. Candidates should be introduced to cutting aids to produce accurate straight line and radius cuts.

This Unit should be delivered by a combination of teaching and learning approaches which could include:

- ◆ Practical activities
- ◆ Group discussions
- ◆ Tutorials
- ◆ Directed study
- ◆ Site visits
- ◆ Audio visual

National Unit Specification: support notes (cont)

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OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

All elements of the Core Skill of *Problem Solving*, including critical thinking, planning and organising, reviewing and evaluating, can be developed in work-related contexts as candidates undertake the Unit. As they apply theory to a practical task they have to make decisions on methods and approaches relevant to their materials and aims. Health and safety implications and the impact on the environment will be taken into account throughout practical working. Group discussion to support on going reflective evaluation of efficiency and achievement may be particularly useful.

The ability to calculate and consider the implications of data presented numerically and graphically will underpin competencies developed. Candidates have to focus on practical analysis and calculation in setting up and using equipment to ensure accuracy and safety in cutting. Applying knowledge and understanding will be critical to the formulation of sound working strategies. Practical exercises to support development of skills under guided supervision are undertaken as part of formative work across the award, with an emphasis on *Numeracy* as a tool to be used and applied efficiently and critically in working contexts. The provision of appropriate reference materials in numeric and graphic format could support the process.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by information and communications technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003)*, *SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

The assessment of the Unit could be approached in an integrated way with documentation covering all Outcomes developed similar to a project.

The checklists should cover the selection and setting up of the equipment and consumables, the assessment tasks, identification of faults and remedial action to correct the faults and health and safety.

CANDIDATES WITH DISABILITIES AND/OR ADDITIONAL SUPPORT NEEDS

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (www.sqa.org.uk).

National Unit Specification: support notes (cont)

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History of changes:

Version	Description of change	Date
02	Unit Title on page 4,5 and 6 Unit amended from “Joining” to “Cutting”.	14/04/2011