



## National Unit Specification: general information

**UNIT** Metal Inert Gas (MIG)/Metal Active Gas (MAG) Welding Skills  
(SCQF level 6)

**CODE** F5F7 12

### SUMMARY

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

This is a practical Unit providing training and experience in Metal Inert Gas (MIG) and/or Metal Active Gas (MAG) welding in the downhand and horizontal/vertical position in Low Carbon Steel (LCS) and Aluminium and provides the opportunity to recognise the requirements of welding standards and specifications.

Candidates will be made aware of and required to practise the relevant health and safety regulations and requirements relating to the welding process with particular reference to the use of gases.

### OUTCOMES

- 1 Select equipment and consumables for MIG/MAG welding.
- 2 Set up and weld joints/components.
- 3 Inspect welded joints.
- 4 Comply with safety regulations and requirements.

### RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have some practical experience of welding.

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#### Administrative Information

**Superclass:** XE

**Publication date:** March 2008

**Source:** Scottish Qualifications Authority

**Version:** 01

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## **National Unit Specification: general information (cont)**

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### **CREDIT VALUE**

1 credit at Higher (6 SCQF credit points at SCQF level 6\*).

*\*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*, *Working with Others* and *Communication* at SCQF level 6 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

## **National Unit Specification: statement of standards**

### **UNIT        Metal Inert Gas (MIG)/Metal Active Gas (MAG) Welding Skills (SCQF level 6)**

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 equipment and consumables for MIG/MAG welding.

##### **Performance Criteria**

- (a) Equipment selection is correct.
- (b) Consumable selection is correct.
- (c) Correctly set parameters for MIG/MAG welding.

#### **OUTCOME 2**

Set up and weld Joints/components.

##### **Performance Criteria**

- (a) Set up Joints for welding correctly.
- (b) Weld selected joints correctly.

#### **OUTCOME 3**

Inspect welded joints.

##### **Performance Criteria**

- (a) Inspection of welded joints is correct.
- (b) Completion of inspection report is correct.

#### **OUTCOME 4**

Comply with safety regulations and requirements.

##### **Performance Criteria**

- (a) Use Personal Protective Equipment (PPE) relevant to MIG/MAG welding correctly.
- (b) Observation of safe working practices is correct.
- (c) The use of specialised safety equipment for MIG/MAG welding is correct.

## **National Unit Specification: statement of standards (cont)**

**UNIT**      Metal Inert Gas (MIG)/Metal Active Gas (MAG) Welding Skills  
(SCQF level 6)

### **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.

Performance evidence supplemented by assessor observation checklists is required to demonstrate that the candidate has safely, within a total time not exceeding two hours, carried out the following:

- ◆ selected equipment and consumables to produce a single vee butt joint in the downhand position in low carbon steel to current industrial standards
- ◆ selected equipment and consumables to produce a Tee joint/fillet weld in aluminium to current industrial standards
- ◆ visually inspected the completed joints and complete an inspection report for the single vee butt weld
- ◆ complied with all health and safety requirements

The Assessment Support Pack (ASP) for this Unit provides samples of assessor observation checklists and details of 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**

### **UNIT           Metal Inert Gas (MIG)/Metal Active Gas (MAG) Welding Skills (SCQF level 6)**

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 it may also be taken on a free-standing basis.

This Unit is designed to provide a route for welder training and the more practical welding time available the greater the opportunity for the candidate to achieve a standard where s/he may seek employment in the fabrication industry. Joints should be practiced in at least two thicknesses of carbon steel. A suggestion would be 3mm and 6mm although centres should consider local industry needs when determining the materials used. At least one of the assessment joints is to be completed in aluminium. It is advisable that there is adequate training and practice to allow the achievement of this Unit. The practice joints should be - Square butt, single vee butt, Tee joint/fillet weld, lap joint/fillet weld and a corner weld arrangements. In this Unit welding will only be required in the downhand and horizontal / vertical positions.

The candidates will have visually inspected their own welds using criteria laid down in relevant International (ISO), European (BS EN) and British (BS) standards and thus have a good basic foundation to enhance skills in other metals and/or other welding positions.

The current industrial standard for the visual inspection of fusion welded joints covers inspection (i) before, (ii) during and (iii) after welding, and should be followed in the preparation of the inspection checklist. When this Standard becomes obsolete the current industrial standard should be used in its place. Candidates will require supervision and advice on visual inspection.

Destructive testing could also be covered at the centres' discretion.

#### **GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT**

A Unit induction will be required to inform candidates of the requirements of the Unit and the assessment procedures and requirements. A safety induction will also be necessary on the workshop practices and the safe use of equipment and machinery. Candidates should be supplied with safety support materials to reinforce the inductions. It would be helpful if the candidate could be supplied with weld procedures for each of the joints that will be welded including at least those joints that are required for the end of Unit assessment. A pro forma inspection report should also be supplied along with information on defect types and acceptance limits for imperfections/defects and guidance on the defect types that may be encountered.

Since this is a practical workshop based Unit demonstrations will be required. At first this may be group demonstrations and as the Unit progresses the demonstrations will be more individual to support the needs of each of the candidates.

## National Unit Specification: support notes (cont)

### UNIT      Metal Inert Gas (MIG)/Metal Active Gas (MAG) Welding Skills (Higher)

It would be to the advantage of the candidates if practice joints are completed in two material thicknesses, especially the carbon steel joints — a suggestion would be 3mm and 6mm. The completed practice joint should be retained but need not form part of the assessment. They may however be used to support a candidate achieving where the completed assessment joint is considered borderline. There are welding guidelines available for this welding process. One example is the *Air Products Welders Handbook* — this provides guidance on voltage, current/wire feed rates wire diameters and gas shielding.

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

### OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

Candidates have opportunities to develop skills in *Problem Solving* as they investigate and select equipment and consumables appropriate to welding processes. A range of issues has to be examined and considered in depth to assure safe use of equipment and resources as welding is completed to meet current industrial standards. At relevant stages results must be visually inspected and an inspection report completed. Discussion during formative work will allow candidates to analyse all the factors impacting on the process, including best practice in safety, and will also enhance oral *Communication* skills in work related contexts. Practical work can provide an environment in which to discuss, review and evaluate the process and product, develop problem solving techniques and approaches.

There may be practical ways to foster skills in group communication and co-operative working. Candidates could be encouraged as a group to discuss approaches taken, analyse the task and its component elements and discuss and agree the nature and scope of team goals, roles and responsibilities in practical welding work. They could explain or demonstrate methodology and resources selected, reviewing and evaluating their own contribution to the workplace environment.

Access to and evaluation of technical literature and written information, including health and safety requirements, should provide and support underpinning knowledge. Candidates should produce and present written reports to industry standard; models of inspection reports should reflect acceptable formats, terminology and structures.

## **National Unit Specification: support notes (cont)**

**UNIT**      Metal Inert Gas (MIG)/Metal Active Gas (MAG) Welding Skills  
(Higher)

### **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)*.

Evidence of safe working practice/s should be recorded on a safety checklist. The checklist could be used to record non-compliance with safe working practice and procedures. No entries would confirm the candidate has achieved this part of the required assessment.

The inspection report should be recorded on an industry standard pro forma and should be treated as a reinforcement of the practical welding.

Where the assessment joints are considered borderline then completed practice joints may be used to aid an achieve decision or justify a re-assessment.

#### **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](http://www.sqa.org.uk)).