

## SQA Advanced Unit Specification

### General information for centres

**Unit title:** Welding Procedures: Specification, Qualification and Testing

**Unit code:** HV2N 47

**Unit purpose:** This Unit is designed to enable candidates to develop knowledge and understanding and apply basic concepts of interpreting and producing welding procedure documentation, welder qualification records and welded joint test piece results.

On completion of the Unit the candidate should be able to:

- 1 Use current standards and codes to define procedure data for a given welding application.
- 2 Conduct a weldability assessment for a specific material.
- 3 Produce a welding procedure for a stated application.
- 4 Carry out an inspection of a weldment and complete a test report for a welder working to an approved welding procedure.

**Credit points and level:** 1 SQA Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7\*).

*\*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 National 1 to Doctorates.*

**Recommended prior knowledge and skills:** It would be an advantage for candidates to have a basic/general knowledge and understanding of fabrication/welding techniques, processes and their associated defects. This may be evidenced by possession of an appropriate cluster of NC and/or SQA Advanced Certificate Units.

**Core skills:** There may be opportunities to gather evidence towards the Core Skills of Communication, Numeracy and Problem Solving in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

**Context for delivery:** If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

**Assessment:** The assessment for Outcome 1 should take the form of a written report on the standard selected by the candidate to suit the specimens provided in Outcome 3.

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The assessment for Outcome 2 should take the form of short answer and structured questions relating to 60% of the knowledge and/or skills requirements. Candidates should be provided with the appropriate standard (or the relevant section from the standard for calculations).

The assessment for Outcome 4 should take the form of an Inspection Report based on the acceptance standard the candidate has selected from Outcome 1.

The assessments should be carried out under controlled and supervised conditions.

An assessment exemplar will be available for this Unit.

The suggested total assessment time for this unit is two hours.

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### **SQA Advanced Unit Specification: statement of standards**

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The sections of the Unit stating the Outcomes, knowledge and/or skills, and evidence requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

#### **Outcome 1**

Use current standards and codes to define procedure data for a given welding application

##### **Knowledge and/or skills**

- ◆ interpretation of standards and codes
- ◆ requirements of a welding procedure
- ◆ requirements for welder approval

##### **Evidence requirements**

Evidence for the knowledge and/or skills in this Outcome will be provided on a sample basis. The evidence may be provided in response to specific questions. Each candidate will need to demonstrate that they can answer questions based on a sample of the items shown above. In any assessment of this Outcome at least 60% of the knowledge and/or skills items should be sampled.

A different sample question should be asked each time the Outcome is assessed. Candidates must provide a satisfactory response to assessed questions.

##### **Assessment guidelines**

The assessment for this Outcome should take the form of a report on the various standards and codes available to the manufacturer and the candidate will select one to suit the component specifications provided in Outcome 3. The candidate will then outline the Welding Procedures and Welder Approval Test Certificates required to satisfy the component specifications.

#### **Outcome 2**

Conduct a weldability assessment for a specific material

##### **Knowledge and/or skills**

- ◆ factors affecting weldability
- ◆ methods for the control of weld defects
- ◆ the control of heat before, during and after welding

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### Evidence requirements

Evidence for the knowledge and/or skills in this Outcome will be provided on a sample basis. The evidence may be provided in response to specific questions. Each candidate will need to demonstrate that they can answer questions based on a sample of the items shown above. In any assessment of this Outcome at least 60% of the knowledge and/or skill items should be sampled.

A different sample question should be asked each time the Outcome is assessed. Candidates must provide a satisfactory response to assessed questions.

### Assessment guidelines

The assessment for this Outcome should take the form of short answer and structured questions relating to the knowledge and/or skills requirements. Candidates should be provided with the appropriate standard (or the relevant section from the standard for calculations)

## Outcome 3

Produce a welding procedure for a stated application

### Knowledge and/or skills

- ◆ procedural requirements
- ◆ extent of approval
- ◆ testing requirements

### Evidence requirements

Evidence for the knowledge and/or skills in this Outcome will be provided on a sample basis. The evidence may be provided in response to specific questions. Each candidate will need to demonstrate that they can answer questions based on a sample of the items shown above. In any assessment of this Outcome at least 60% of the knowledge and/or skills items should be sampled.

A different sample question should be asked each time the Outcome is assessed. Candidates must provide a satisfactory response to assessed questions.

### Assessment guidelines

The assessment for this Outcome should take the form of a report on a welding procedure and welder certification based on the standard the candidate has selected from Outcome 1.

The report should be based on:

- (a) A 12 mm–20 mm butt weld on a carbon steel pipe welded in the 6G or equivalent position.
- (b) A fillet weld on plate made from a non-ferrous material whose thickness is in the range from 3 mm–6 mm.

The assessment centre may substitute the items specified in (a) and (b) with appropriate specimens at their discretion.

## **Outcome 4**

Carry out an inspection of a weldment and complete a test report for a welder working to an approved welding procedure

### **Knowledge and/or skills**

- ◆ inspection requirements
- ◆ weld defect types/imperfections
- ◆ acceptance limits

### **Evidence requirements**

Evidence for the knowledge and/or skills in this Outcome will be provided on a sample basis. The evidence may be provided in response to specific questions. Each candidate will need to demonstrate that they can answer questions based on a sample of the items shown above. In any assessment of this Outcome at least 60% of the knowledge and/or skills items should be sampled.

A different sample question should be asked each time the Outcome is assessed. Candidates must provide a satisfactory response to assessed questions.

### **Assessment guidelines**

The assessment for this Outcome should take the form of an Inspection report based on the acceptance standard the candidate has selected from Outcome 1.

The specimens to be inspected should be:

- (a) A 12 mm–20 mm butt weld on a carbon steel pipe welded in the 6G or equivalent position.
- (b) A fillet weld on plate made from a non-ferrous material whose thickness is in the range from 3 mm–6 mm.

The assessment centre may substitute the items specified in (a) and (b) with appropriate specimens at their discretion.

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### Administrative Information

<b>Unit code:</b>	HV2N 47
<b>Unit title:</b>	Welding Procedures: Specification, Qualification and Testing
<b>Superclass category:</b>	XE
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## **SQA Advanced Unit Specification**

### **Unit specification: support notes**

#### **Unit title: Welding Procedures: Specification, Qualification and Team**

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**

Candidates should have access to a range of current standards, codes and specifications, which will include consumables and materials data.

#### **Guidance on the delivery and assessment of this Unit**

##### **Outcome 1**

Candidates should be introduced to a wide variety of current standards and codes and encouraged to evaluate the similarities and differences that exist between documents from different national and international organisations eg BS EN 288, BS EN 287, ASME IX, API 1104, DIN, AWS and MOD standards. It would be useful if the candidates provide their company's internal standard where possible such as BP, ICI and British Gas.

Comparisons should be made between standards and the extent of their approvals in relation to weld procedure and welder approval certification.

Candidates should be made aware of the influence that leading bodies and insurance companies have on the selection of a standard for any given industrial task eg The American Petroleum Industry; Lloyds Register etc.

It is important that candidates are made aware that good Quality Assurance dictates product reliability and that all Welding Procedure documentation forms part of the QA system in a company.

##### **Outcome 2**

Different welding processes should be demonstrated where possible but candidates should be encouraged to view them in relation to their heat input and how this is controlled by the procedure. In general it is expected that candidates will be familiar with the weld defects associated with operator control. It is intended that this Unit will concentrate on the defects that can be produced in the weldment due to incorrect power source settings and weld sequencing (eg arc energy values, promotion of distortion/residual stress, grain growth, migration of metallic elements, dilution, formation of intermetallic compounds etc).

It is recommended that candidates are provided with copies or relevant sections from standard EN1011 and asked to calculate pre heat and post heat cooling temperatures/rates for a variety of given materials/carbon equivalents.

Weldability tests: Houldcroft, Controlled Thermal Severity, Patch

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### **Outcomes 3 and 4**

The candidate should be given the opportunity to devise a weld Procedure, have the weld produced then carry out an Inspection report and conduct an Approval Test for a butt weld and a fillet weld as a project. Where time and the welding skill of the candidate is limited, then this activity could be carried out by the candidates working in small groups, or alternatively a butt weld and fillet weld could be provided for the groups to conduct their examination and inspection reports on.

### ***Opportunities for developing Core Skills***

There may be opportunities to gather evidence towards the Core Skills of Communication, Numeracy and Problem Solving in this Unit.

### **Open learning**

This Unit could be delivered by distance learning, which may incorporate some degree of online support. However, with regard to assessment for Outcomes 3 and 4 planning would be required by the centre concerned to ensure the sufficiency and authenticity of candidate evidence. Arrangements would be required to be put in place to ensure that the assessment, which is required to be a single event, was conducted under controlled, supervised conditions.

### **Equality and inclusion**

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements).



## **SQA Advanced Unit Specification**

### **General information for candidates**

#### **Unit title:** Welding Procedures: Specification, Qualification and Testing

This Unit will allow you to gain knowledge of current standards and codes used in weld procedure and welder qualification approval. You will carry out a weldability assessment for specified material and produce welding procedure documentation to industry standards such as Lloyds Register, ASME, BSEN, AWS and DIN. In addition you will carry out visual inspection techniques in the assessment of completed weldments.

In order to achieve this unit you will be required to:

- ◆ report on and interpret various standards and codes available to the manufacturer
- ◆ produce welding procedure documentation
- ◆ conduct weldability assessments
- ◆ carry out inspection processes
- ◆ complete an inspection report