



National Unit Specification: general information

UNIT Pipework Skills (SCQF level 5)

CODE F5EY 11

SUMMARY

This Unit can be delivered as part of a National Qualification Group Award in Engineering but 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 studying the subject for the first time.

The Unit is designed to be workshop based and includes fabrication of pipework using the following methods: spool fabricated using machine bends, spool fabricated using hand and machine thread pipe threading and pipe spool fabricated using butt weld fittings. Various aspects of pipe fabrication will be displayed and should incorporate the operating pipe working equipment and when complete the candidate should have learned the basic aspects of pipe fabrication. The candidate will also be required to display an understanding of current and relevant Health and Safety procedures when in this environment.

OUTCOMES

- 1 Produce pipework fabrications in Carbon Steel pipe.
- 2 Comply with health and safety regulations and requirements.

RECOMMENDED ENTRY

Entry is at the discretion of the centre but it will be beneficial if candidates have some experience of a welding process.

Administrative Information

Superclass: XH

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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 Skill of *Problem Solving* 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

Produce pipework fabrications in Carbon Steel pipe.

Performance Criteria

- (a) Fabricate pipe spool using hydraulic ram bender.
- (b) Fabricate pipe spool using screwed fittings.
- (c) Fabricate pipe spool using welded fittings.
- (d) Inspect and test a completed fabricated pipe spool.

OUTCOME 2

Comply with health and safety regulations and requirements.

Performance Criteria

- (a) Use Personal Protective Equipment (PPE) relevant to pipework.
- (b) Observation of safe working practices are correct.
- (c) The use of specialised safety equipment for pipework is correct.

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 to the required standard. Assessment should take place under supervised conditions and will last no more than two hours.

Performance evidence supplemented by assessor observation checklists is required to demonstrate that the candidate has safely completed following:

- ◆ produced a fabricated pipe spool to include:
 - 25–50mm diameter carbon steel pipe
 - screwed fittings
 - welded fittings
 - pipe bending
 - set-on 90⁰ branch
- ◆ carried out an inspection on a pipe bend and completed an inspection report
- ◆ carried out a hydrostatic test on a pipe spool
- ◆ complied with all health and safety requirements

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

The candidate should achieve the level of competence of a student/trainee and is required to manufacture small bore 25mm to 50mm carbon steel pipe fabrications from fabrication drawings.

The candidate could be given a supply of fittings, pipe, drawing, and charts that will enable them to complete the required tasks.

This will require the candidate to be supplied with British Standard (BS) sheets with information of flanges, seamless pipe and instruction on the use of ram bending machines. It would also be advantageous to discuss with the candidate the disadvantages of using the bending process ie ovality, flattening, wall thinning and wall thickening.

It is recommended that the candidate should be provided with the required pipe and malleable iron screwed bends threaded. The threading of the pipe can be achieved by use of hand/ratchet dies or a powered threading machine. It could also be beneficial to discuss the various jointing tapes and compounds available.

When candidates use butt weld type fittings they should have the opportunity to be taught different methods of bevelling the pipe ends, ie hand grinder, hand file, threading machine, bevelling attachment and lathe. An appreciation of a welding process would allow the candidate to carry out all aspects of this Outcome with the aid of data sheets.

Aspects of health and safety should be integrated throughout all workshop activities.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The Unit should be taught in the workshop with candidates having access to all the required materials.

When provided with an uncomplicated drawing, the trainee would be expected to fabricate a pipe spool with a minimum of two bends using the ram bending machine. It is important that allowances gained using this bending process are discussed. When using this bending process the disadvantages should be highlighted, ie ovality, stretching, thickening, wrinkling and flattening.

The pipe threads should be manufactured using either powered threading machines or ratchet hand dies. The use of the pipe threading methods available should be demonstrated and used where possible. It would be advantageous to discuss the jointing compounds and thread tapes used in industry.

National Unit Specification: support notes (cont)

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The drawing could contain a branch to be developed and manufactured then fitted to the pipe spool with a weld preparation suitable for a full penetration weld.

Candidates should be allowed to carry out inspection procedures on completed spools and also to experience a hydrostatic test.

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

Problem Solving skills such as critical thinking, planning, organising, and reviewing and evaluating, could be effectively developed and enhanced in the Unit, which requires the application of theory to fabrication of pipework. Demonstration and group discussion during formative work will allow candidates to examine factors impacting on the process and product in a work related context. A range of methods will have to be considered and equipment and appropriate techniques selected. Skills will be demonstrated within resources and timescales, complying current and relevant Health and Safety procedures. Practical work can provide an environment in which to discuss, review and evaluate achievement, enhancing problem solving techniques and approaches.

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 this Unit should be approached in an integrated way with documentation covering all Outcomes developed as an integrated whole.

The pipe fabrication for each candidate must be retained. In addition inspection checklists must be completed by each candidate.

Health and safety should be an integrated aspect of the assessment but should include as a minimum the use of appropriate PPE, observation of safe working practices and the use of specialised safety equipment.

National Unit Specification: support notes (cont)

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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).