

Higher National Unit Specification

General information for centres

Unit title: Destructive Testing

Unit code: DR21 34

Unit purpose: This Unit is designed to enable candidates to develop knowledge and understanding of destructive testing techniques. The Unit also provides candidates with a knowledge of the methods adopted in the selection of materials used in the fabrication and welding environment. The Unit enables candidates to select materials before, during or after fabrication enabling the selection of materials to be of consistent highest quality.

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

- 1 Describe the role of destructive testing in determining a material's mechanical properties.
- 2 Describe destructive testing methods and applications.
- 3 Evaluate information gained from destructive testing methods.

Credit points and level: 1 HN 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 Access 1 to Doctorates.*

Recommended prior knowledge and skills: Candidates should possess a basic/general knowledge and understanding of fabrication and welding principles. This may be evidenced by possession of any of the following National Qualification Units: (EE1B 11) Material Preparation and Forming Processes, (EE1C 11) Material Preparation and Forming Skills, (EE1X 11) Design of Welded Joints, (E7RK 12) Materials: Structures and Properties, (ED8H 11) Basic Metal Platework Skills, (EE1F 12) Basic Principles of Container Design, Manufacture and Test Methods, (D161 12) Strength of Materials, (D00A 12) Manual Metal Arc Basic Welding Practice, or Higher National Unit: (D4HK 04) Fabrication and Welding Applications: Basic.

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.

General information for centres (cont)

Assessment: The assessment for Outcome 1 in this Unit should be a written assessment paper. This paper should be taken by candidates at one single assessment event. The assessment paper should be composed of a suitable balance of short answer and structured questions.

The assessments for Outcomes 2 and 3 should be combined and take the form of a case study or structured question.

The assessment should be conducted under controlled, supervised conditions.

The total time for assessment should be 2 hours.

Higher National Unit specification: statement of standards

Unit title: Destructive Testing

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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

Describe the role of destructive testing in determining a material's mechanical properties

Knowledge and/or skills

- ◆ Mechanical properties of materials
- ◆ Destructive testing methods.
- ◆ Testing procedures
- ◆ Material specification data

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.

Assessment guidelines

Evidence should be generated through assessment undertaken in controlled, closed-book and supervised conditions.

Questions used to elicit candidate evidence should take the form of an appropriate balance of short answer and structured questions.

The assessment of Outcome 1 should be assumed to use current up-to-date standards on the appropriate destructive test. For example, current updated standards are recommended on Welding Consumables Testing for Classification, Part 1 — Test assembly for all weld metal test specimens in steel, nickel and nickel alloys.

Higher National Unit specification: statement of standards (cont)

Unit title: Destructive Testing

Outcome 2

Describe destructive testing methods and applications

Knowledge and/or skills

- ◆ Destructive test equipment.
- ◆ Recording test information
- ◆ Test results

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.

Assessment guidelines

The assessment of this Outcome should be combined with Outcome 3 and take the form of a case study or structured question. The candidate will be required to:

- ◆ select and describe appropriate test method
- ◆ evaluate information gained from testing

Outcome 3

Evaluate information gained from destructive testing methods

Knowledge and/or skills

- ◆ Test results
- ◆ Analysis and evaluation of test results

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.

Administrative Information

Unit code:	DR21 34
Unit title:	Destructive Testing
Superclass category:	WD
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Higher National Unit specification: support notes

Unit title: Destructive Testing

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 current up to date standards and specifications and be able to check destructive testing methods with national calibration methods. Modern equipment should be used for destructive testing and should be calibrated to ensure accuracy.

Outcome 1 should be to identify methods adopted and the use of video or visits to laboratory for practical evidence should be used where possible.

Explanation of the test material's mechanical properties of tensile, hardness, toughness, ductility and crack opening displacement (CTOD) test.

Explanation of the test material's properties including quality of weld metal, filler material and heat affected zone using a selection from the following: fatigue; bend; compression; cupping tests, creep tests.

Guidance on the delivery and assessment of this Unit

Outcome 1

Where sampling takes place, a candidate's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the candidate is able to:

- ◆ describe the role of destructive testing in the fabrication and welding industry
- ◆ explain how to test a material's mechanical properties
- ◆ witness destructive testing being carried out

Outcomes 2 and 3

Outcomes 2 and 3 should be combined, with all knowledge and/or skills items being assessed. The evidence should be presented in response to a practical assignment for mechanical properties testing.

A candidate's response can be judged to be satisfactory where evidence provided is sufficient to show both areas are covered and the candidate is able to:

- ◆ demonstrate a knowledge of the use of standards in preparation of test pieces and testing conditions
- ◆ select and destructively test, with all variables recorded
- ◆ produce a satisfactory report with results on the selected destructive test method
- ◆ give a final conclusion on the assignment

Higher National Unit specification: support notes (cont)

Unit title: Destructive Testing

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

The majority of this Unit could be delivered by distance learning, which may incorporate some degree of online support. Arrangements would have to be made for the candidate to have supervised access to material testing equipment. This may involve the candidate attending the centre. Alternatively special arrangements could be made for the candidate to demonstrate the practical aspect of testing to a designated, responsible person local to the candidate work.

Candidates with additional support needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. 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. For information on these, please refer to the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on the SQA website www.sqa.org.uk.

General information for candidates

Unit title: Destructive Testing

In this Unit you will study the use of destructive tests to determine the properties of a material. You will gain knowledge of destructive testing methods, testing procedures and material specification data.

You will learn about the equipment required and the recording of test result information and carry out analysis and evaluation of the results.

You will be assessed using the following:

The assessment for Outcome 1 in this Unit should be a written assessment paper taken at one single assessment event. The assessment paper should be composed of a suitable balance of short answer and structured questions.

The assessments for Outcomes 2 and 3 should be combined and take the form of a case study or structured question.