



National Unit Specification: general information

UNIT Construction Materials: Properties and Testing (SCQF level 6)

CODE F3J9 12

SUMMARY

This Unit is designed to provide candidates with knowledge of the properties of construction materials commonly used in the construction industry. This Unit is a specialist module which provides the candidate with experience in testing construction materials normally carried out on the site or in a laboratory. This Unit is suitable for candidates with prior experience of an introduction to construction materials. The Unit will provide a good basis for further study in Civil Engineering and the Built Environment.

OUTCOMES

- 1 Describe and carry out laboratory tests on construction materials.
- 2 Describe relationship between measured test results and the properties of construction materials.
- 3 Report on laboratory tests.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following, or equivalent:

F3JB 12 *Introduction to Construction Materials*

Administrative Information

Superclass: TE

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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 is no automatic certification of Core Skills or Core Skill components in this Unit. Opportunities for developing aspects of Core Skills are highlighted in *Guidance on Learning and Teaching Approaches*.

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

Describe and carry out laboratory tests on construction materials.

Performance Criteria

- (a) Laboratory tests for construction materials are correctly described.
- (b) Laboratory tests for construction materials are correctly undertaken.

OUTCOME 2

Describe relationship between measured test results and the properties of construction materials.

Performance Criteria

- (a) The measured physical properties of the materials are calculated accurately.
- (b) The correct formulae are used to derive mechanical properties of the construction materials from measurements obtained in the laboratory.

OUTCOME 3

Report on laboratory tests.

Performance Criteria

- (a) Laboratory reports are well structured and technically accurate.
- (b) Laboratory reports are correctly referenced to appropriate British (European) Standards.

EVIDENCE REQUIREMENTS FOR THIS UNIT

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

Written and/or recorded oral evidence is required to demonstrate that the candidate has achieved this Unit to the standard specified in the Outcomes and Performance Criteria. The evidence for this Unit should be obtained under controlled, supervised conditions. The assessment will be closed-book and should last no more than two hours

National Unit Specification: statement of standards (cont)

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Candidates should undertake the following tasks on five construction materials from a range of 10 materials selected by the centre:

- 1 Carry out laboratory testing and correctly describe laboratory procedures for each test.
- 2 Provide written and/or oral evidence of knowledge and understanding for calculations of physical and mechanical properties of the construction materials.
- 3 Produce a well structured report with appropriate reference to British (European) Standards. Report should include a statement of the objective of the experiment, details of the testing procedures and apparatus, tables of data (both original and derived) and graphs of the results. Discussion of the results and a summary of conclusions.

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

This Unit has been developed as a mandatory Unit in the National Certificate in Civil Engineering at SCQF level 6 and an optional Unit in the National Certificate in Built Environment at SCQF level 6 and can also be delivered as a freestanding Unit.

This Unit should cover laboratory testing, analysis of test results, and a written report; all associated with a range of common materials used in construction; such as Portland cement, building lime, various materials used in bricks and blocks, concrete, aggregates, mortar, timber and timber products, glass, and plaster. Measurement and calculations of physical and mechanical properties of a range of common materials used in construction should be undertaken. Properties should include: strength, durability, density, appearance, moisture movement; permeability and porosity, absorption; fire resistance; frost resistance, chemicals, thermal properties and acoustic properties.

Health and Safety and Sustainability are integral and key to Civil Engineering and Building and throughout the Unit emphasis will be placed where appropriate on the application of Health and Safety and Sustainability. Sustainability should include reference to criteria affecting sustainability and the impact of not implementing sustainability on the environment

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

All centre staff and candidates have responsibilities under the Health & Safety at Work Act. Everyone must take reasonable care for the health and safety of themselves and others who may be affected by their actions or omissions. All candidates to themselves and to others to:

- ◆ carry out their work in a safe manner and with due regard to health and safety
- ◆ adhere to the centre safety rules as described and discussed during induction and briefings
- ◆ comply with control measures stated in all risk assessment documents (which should be made available in the appropriate laboratories), particularly the use of all PPE supplied for use, specifically dust masks, ear protection, safety glasses/goggles and gloves as appropriate to a given procedure or experiment
- ◆ inform themselves of health and safety hazards of equipment and materials with which they are concerned, in so far as these hazards may be reasonably foreseen
- ◆ bring to the notice of supervisors any potential hazard to safety and health of which they know or learn whether in routine work or arising from faults in equipment

There will be delegated authority (eg safety officer) who will be persons having the authority to cease work being undertaken if they judge it to be a breach of the centre safety procedures.

Outcomes should not be precluded from integration during teaching, learning and assessment. Still or moving images of testing of materials will be useful and these may be used for consolidation and to broaden candidates' knowledge of the range of materials available.

National Unit Specification: support notes (cont)

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OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

In this Unit candidates will be:

- ◆ able to work confidently with a number of complex numerical and graphic concepts in order to calculate physical and mechanical properties from measurements undertaken in the laboratory
- ◆ analyse, interpret and present data accurately and effectively, using tables and graphs
- ◆ reading and drawing graphs and charts

These offer opportunities to develop aspects of the Core Skills of:

- ◆ *Numeracy*
- ◆ *Problem Solving*
- ◆ *Communication*
- ◆ *Working with Others*

Practical laboratory work can provide an environment in which to discuss, review and evaluate the process, developing skills in oral communication and working with others. If testing is undertaken in small groups, candidates could be encouraged to discuss approaches taken, and agree the nature and scope of team goals, roles and responsibilities.

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)*.

An assessment duration of two hours is envisaged for an assessment of all Outcomes which should be supervised and closed-book.

In Outcome 1, candidates should be presented with a range of five common construction materials selected by the centre. Candidates should be asked to undertake appropriate laboratory tests of these materials and correctly describe the laboratory test procedures. All of the tests should be carried out by each candidate, either individually or as a member of a small team.

In Outcome 2 candidates will be required to use calculators and the appropriate formulae to calculate physical and mechanical properties from measurements undertaken in the laboratory. Centres may decide which five materials to present to the candidate in the assignment.

In Outcome 3 candidates must prepare well structured reports with appropriate references to British (European) Standards for a range of five common construction materials, selected by the Centre.

National Unit Specification: support notes (cont)

UNIT Construction Materials: Properties and Testing (SCQF level 6)

The Assessment Support Pack for this Unit provides appropriate sample assessment materials. Where centres wish to develop their own assessment materials they should refer to the Assessment Support Pack to ensure a comparable standard.

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).