# National Unit specification

## General information

## Unit title: Stonemasonry Repairs (SCQF level 6)

## Unit code: H8WW 46

**Superclass:** TG

**Publication date:** February 2015

**Source:** Scottish Qualifications Authority

**Version:** 01

## Unit purpose

This Unit is suitable for learners with limited experience in the construction and heritage industries who wish to gain knowledge and understanding of stonemasonry repairs.

It is also suitable for learners from the construction and related service industries and trades, both skilled manual professions and non-manual professions, who wish to gain knowledge and understanding of stonemasonry repairs.

This Unit has been designed to develop the learners' ability to undertake repairs to stonemasonry structures by the replacement of individual stonemasonry components and with specialist repair mortars.

## Outcomes

On successful completion of the Unit the learner will be able to:

1 Demonstrate knowledge and understanding of repair methods for stonemasonry walling.
2 Remove a defective stone component from an existing structure and build in a replacement.
3 Remove defective surface from stone elements in an existing structure and repair with lime mortar repair products.

## Credit points and level

1.5 National Unit credits at SCQF level 6: (9 SCQF credit points at SCQF level 6)

## National Unit specification: General information (cont)

**Unit title:** Stonemasonry Repairs (SCQF level 6)

## Recommended entry to the Unit

Entry is at the discretion of the centre, however it may be beneficial if the learner had some industry experience and knowledge.

## Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes for this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

## 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.

## 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**.

## National Unit specification: Statement of standards

## Unit title: Stonemasonry Repairs (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

Demonstrate knowledge and understanding of repair methods for stonemasonry walling.

### Performance Criteria

(a) Identify a range of common defects associated with natural stone structures.
(b) Propose solutions for carrying out remedial work on defective stone walling.
(c) Describe the process for carrying out a range of masonry repairs.
(d) Identify and describe traditional surface finishes for natural stone.

## Outcome 2

Remove a defective stone component from an existing structure and build in a replacement.

### Performance Criteria

(a) Remove existing defective stonemasonry component.
(b) Fix, re-bed and point replacement stonemasonry component.

## Outcome 3

Remove defective surface from stone elements in an existing structure and repair with lime mortar repair products.

### Performance Criteria

(a) Remove existing defective stone surface.
(b) Repair defective stone surface with repair mortars.

### Evidence Requirements for this Unit

#### All Outcomes

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

Learners will be presented with real or simulated projects and will be given a clear brief to ensure that they have the opportunity to achieve all the Performance Criteria.

Evidence must be provided to show that learners can demonstrate, and work with, an understanding of information, materials, terminology, practices and techniques related to stonemasonry repairs. Evidence must also be provided to show that learners can apply relevant knowledge and skills in a practical context.

## National Unit specification: Statement of standards (cont)

## Unit title: Stonemasonry Repairs (SCQF level 6)

Evidence is required to show that learners can identify the needs of other occupations associated with stonemasonry repairs and work accordingly.

Written and oral recorded evidence is required to demonstrate that the learner has achieved all Outcomes to the standards specified in the Performance Criteria. Learners will be required to demonstrate their knowledge of terminology, techniques, practices, and health and safety issues associated with stonemasonry repairs.

**Outcome 1**

**Demonstrate knowledge and understanding of repair methods for stonemasonry walling.**

**Performance Criteria**

**(a) Identify a range of common defects associated with natural stone structures.**

Evidence must be provided to show that learners can:

- identify the effects of exposure to different environmental and seasonal conditions on natural stone structures.
- identify signs that a stone structure requires re-pointing.
- identify signs that a stone structure requires the replacement of stone components.
- identify inappropriate cementitious repointing and the affect it has on surrounding stone walling.
- identify a range of negative effects caused by flora and fauna.
- identify a range of algae, herbaceous plants and woody growth commonly found on stone structures.
- identify a range of appropriate methods for removing destructive growth on or near stone walling.
- identify where flora or fauna can have a greater claim for preservation and how any conflict can be addressed.
- identify chemicals used for removal of growth that can have a negative effect on stone walling.
- identify poorly detailed and poorly maintained rainwater goods and the effects that can have on stone walling.
- identify a range of negative effects caused by inappropriate stone-cleaning methods.
- identify a range of uses for the different types of Naturally Hydraulic Limes.
- identify how and why an existing mortar is sampled and tested.
- identify well-graded aggregates in relation to a lime mortars location and use.
- identify a range of reasons why a lime mortar would be friable and crumbly.
- identify the effects of a lack of protection to new lime pointing in different seasonal weather conditions.
- identify reasons why a mortar should fail to carbonate.
- identify suitable storage conditions for lime mortar materials.

- identify advantages in specifying a lime mortar that will perform well against a specific stone type.
- identify why replacement stone used for masonry repair work should be a best possible match to the existing stone walling.
- identify how a stone type can be acknowledged as a best like-for-like match.
- identify the effect a stone types porosity has on its resistance to weathering.
- identify a range of details commonly used on stone walling and how these details affect short, medium and long term performance.
- identify the effects the freeze-thaw cycle can have on stone walling and stone walling components.

**(b) Propose solutions for carrying out remedial work on defective stone walling.**

Evidence must be provided to show that learners can:

- identify methods for determining the extent of damage to existing stone walling.
- identify methods and tools used for the removal of damaged stone walling.
- identify cosmetic damage to stone components and pointing.
- identify structural damage to stone components and pointing.
- identify methods used to repair and replace stone components and pointing for both cosmetic and structural repairs.
- inspect stone walling and identify areas that require remedial work.
- prepare a range of solutions for carrying out remedial work to stone walling for both cosmetic and structural repairs.

**(c) Describe the process for carrying out a range of masonry repairs.**

Evidence must be provided to show that learners can:

- identify a range of masonry repair materials, methods and procedures, both appropriate and inappropriate.
- identify where and how inappropriate methods for stone walling repairs can have a negative effect.
- describe the processes and materials used to carry out a range of masonry repairs.

**(d) Identify and describe traditional surface finishes for natural stone.**

Evidence must be provided to show that learners can:

- identify a range of methods, tools and machinery used for producing stone components.
- identify traditional stone surface finishes and the tools used to make them.
- identify methods of replicating stone surface finishes in repair mortars.
- identify a range methods and styles for surface finishing and pointing with lime mortars and the appropriate range of tools used.

## National Unit specification: Statement of standards (cont)

## Unit title: Stonemasonry Repairs (SCQF level 6)

**Outcome 2**

**Remove a defective stone component from an existing structure and build in a replacement.**

**Performance Criteria**

**(a) Remove existing defective stonemasonry component.**

Evidence must be provided to show that learners can:

- identify and select appropriate hand tools and portable power tools for the removal of defective stone components.
- identify health and safety risks and appropriate control measures and equipment related to the removal of defective masonry.
- make a record of a defective stone component that is to be replaced and the surrounding masonry area.
- take dimensions or produce a template for a replacement stone component within a tolerance of 2 mm.
- remove a defective stone component.
- prepare the socket ensuring no loose materials remain.
- support the surrounding masonry in preparation for a replacement stone component.
- work in accordance with current health and safety legislation at all times.

**(b) Fix, re-bed and point replacement stonemasonry component.**

Evidence must be provided to show that learners can:

- identify and select appropriate tools for fixing and pointing a replacement stonemasonry component.
- source and prepare a replacement stone component within a tolerance of 5 mm.
- prepare area to receive replacement masonry components.
- prepare and mix suitable lime mortar.
- build in the replacement component to match the face line of the existing walling within a tolerance of 3 mm.
- ensure beds and joints are of uniform width and thickness.
- fill all cavities with lime mortar and grout where necessary.
- point up all open joints to match surrounding walling.
- ensure surrounding masonry is clean and free from staining.
- protect finished work and carry out aftercare with suitable materials and equipment.
- work in accordance with current health and safety legislation at all times.

## National Unit specification: Statement of standards (cont)

## Unit title: Stonemasonry Repairs (SCQF level 6)

**Outcome 3**

**Remove defective surface from stone elements in an existing structure and repair with lime mortar repair products.**

**Performance Criteria**

**(a) Remove existing defective stone surface.**

Evidence must be provided to show that learners can:

- identify and select tools appropriate for the removal of defective surfaces from stone elements.
- remove existing defective stone surfaces.
- prepare surface of stone for repair products.
- work in accordance with current health and safety legislation at all times.

**(b) Repair defective stone surface with repair mortars**

- identify and select tools appropriate for the reparation of defective stone surfaces with repair mortars.
- mix repair mortar products in accordance with manufacturers' instructions.
- apply repair mortar products in accordance with manufacturers' instructions.
- replicate a range of stone surface finishes in repair mortars.
- cure and protect finished works accordingly.
- work in accordance with current health and safety legislation at all times.

In the completion of this Unit all working practices must be in accordance with current and relevant health and safety legislation and regulations.

The following health and safety regulations, acts, approved codes of practice and any amendments or updates made by statutory bodies apply to all Outcomes in this Unit:

- Health & Safety at Work Act 1974
- The Personal Protective Equipment at Work Regulations 1992 (as amended)
- Provision and Use of Work Equipment Regulations 1998 (as amended)
- The Construction (Design & Management) Regulations 2007
- The Control of Substances Hazardous to Health 2002 (as amended)
- The Lifting Operations and Lifting Equipment Regulations 1998(as amended)
- The Work at Height Regulations 2005
- The Management of Health and Safety at Work Regulations 1999 (as amended)
- The Manual Handling Operations Regulations 1992 (as amended)

## National Unit Support Notes

## Unit title: Stonemasonry Repairs (SCQF level 6)

Unit Support Notes are offered as guidance and are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 60 hours.

## Guidance on the content and context for this Unit

This Unit has been developed as a mandatory Unit in the National Progression Award in the Conservation of Masonry at SCQF level 6. It can also be delivered as a free-standing Unit.

Much previous long-term damage to traditional structures has been caused by well–intentioned, but inappropriate or poorly-considered application of skills and materials through a lack of understanding. This Unit provides underpinning understanding and knowledge to help prevent future long term damage to traditional structures being carried out by those who successfully complete the Unit.

Learners successfully completing this Unit will gain knowledge, understanding to be competent in stonemasonry repairs. Learners will also have applied relevant knowledge and skills in a practical context.

The Unit is suitable for learners with limited experience in the construction and heritage industries who wish to gain knowledge and understanding of conservation/restoration, repair and maintenance of traditional (pre-1919) structures.

It is also suitable for learners from the construction and related service industries and trades. It is applicable to skilled manual professions and non-manual professions. The skills are transferable within different working environments, but the Unit is aimed at learners whose normal work is related directly to a site, conservation/restoration project, or a similar working environment.

The Unit is applicable to all areas of construction or other related industries but it is specifically applicable to stonemasonry repairs. It also includes the safe working practices associated with working with lime based mortars and is complemented by other building Units in Stonemasonry.

This Unit has been developed as a replacement for Units:

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| DGOMMPv0.5 (F2FY 12) | *Masonry Materials and Performance (SCQF level 6)* |
| GO/CMSv0.5 (F2GO 12) | *Consolidation of Masonry Structures (SCQF level 6)* |
| GO/MRv0.5 (F2G1 12) | *Masonry Repairs (SCQF level 6)* |

## National Unit Support Notes (cont)

## Unit title: Stonemasonry Repairs (SCQF level 6)

Where this Unit is being taken as part of the National Progression Award in Conservation of Masonry at SCQF level 6, it is recommended that it is delivered after learners have completed the following Units:

- *Understanding Conservation, Repair and Maintenance of Traditional Structures* (SCQF level 6)
- *Prepare and Mix Traditional Lime Mortars* (SCQF level 6)
- *Consolidation of Masonry Structures* (SCQF level 6)
- *Produce a Basic Stonemasonry Component and Stonemasonry Surface Finishes*

This Unit may be assessed on a live project or alternatively on a simulation module incorporating a stone built structure that provides all of the Evidence Requirements listed.

This Unit has been developed to gain knowledge, understanding and practical application related to the National Occupational Standards:

- VR547 Conserve or restore stonemasonry, brickwork or earthen structures
- VR548 Prepare and mix lime mortars
- VR196 Repair basic stonemasonry structures

This Unit provides underpinning knowledge related to the Recommended Qualifications Structure (RQS) for SVQ's in Heritage Skills suite as provided by the CITB.

This Unit is relevant and provides underpinning knowledge for progression to HNC/HND qualifications in the conservation and restoration of traditional (pre-1919) structures.

## Guidance on approaches to delivery of this Unit

The achievement of skills and underpinning knowledge required for this Unit will be assisted by the provision of information sources in the form of: oral and/or written instructions; graphic and photographic materials; technical information and examples from manufacturers of limes, sands and pre-mixed mortars; codes of practice; building standards; statutory regulations; hands-on examination of sound and decayed lime-based pointing in masonry construction; hands-on exercises in removing and reinstating suspect pointing using lime mortars correctly and safely, hands-on exercises in the removal of defective basic stone masonry components and the reinstatement of replacement basic stonemasonry components and hands-on exercises using lime-based repair mortar products.

Teachers/Lecturers should demonstrate practical elements step-by-step until the learner feels competent enough to attempt them under assessment conditions. The requirement to adopt safe working practices and comply with safety legislation must be emphasised throughout.

It is recommended that this Unit be delivered in order of Outcomes and Performance Criteria.

## National Unit Support Notes (cont)

## Unit title: Stonemasonry Repairs (SCQF level 6)

## Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

It is recommended that learners be assessed on an Outcome by Outcome basis. However centres may choose to assess a combination of Outcomes on a single assessment occasion or combined assessments.

A multiple-choice type question paper could be used for formal assessment of all underpinning knowledge for all 3 Outcomes, delivered under closed-book controlled, supervised conditions at an appropriate point in the Unit.

An appropriate instrument of assessment for Outcomes 2 and 3 would be a series of practical assignments which the learners complete in a real or simulated workplace environment. The practical assignments should require learners to:

- remove a defective basic stonemasonry component from an existing structure and build in a replacement basic stonemasonry component.
- remove defective stone surfaces from stone elements in an existing structure and repair with lime mortar repair products.

An appropriate instrument of assessment for Outcomes 2 and 3 would be a practical assignment in a simulated environment. What is to be formerly assessed is knowledge, understanding and practical Performance Criteria defined in the Outcome. Reliance on a real environment could compromise achievement. Centres can provide a suitable simulated environment allowing learners to gain knowledge, understanding and the practical Performance Criteria in a controlled environment.

In order to allow learners to achieve all Outcomes and Performance Criteria learners should be given a clear brief detailing the nature of the exercises involved.

Centres should retain observation check lists and product evidence in the form of either learners completed work evidence, photographic or video evidence.

Feedback should be provided to learners, this and all assessment material will be subject to internal and external verification.

## National Unit Support Notes (cont)

## Unit title: Stonemasonry Repairs (SCQF level 6)

## Opportunities for 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 Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

## Opportunities for developing Core and other essential skills

Elements of the Core Skill of *Problem Solving*, that is, Critical Thinking, Planning and Organising, and Reviewing and Evaluating, could be effectively developed and enhanced in the Unit, which requires the application of theoretical knowledge to a practical task. Identifying and examining the relevance of all factors at various stages of the Consolidation and Repair of Masonry Structures will be essential to ensure successful results.

Initially learners will have to establish the extent of repair needed before analysing requirements for materials in a range of environmental and seasonal contexts, which will involve a high level of critical thinking.

The ability to identify appropriate materials, test their properties, and select solutions which use appropriate approaches to working is a critical competence. Learners will devise an appropriate and safe approach to work, based on assessment of performance characteristics, and demonstrate that they can comply with current and relevant Health and Safety legislation and regulations.

Formative group discussion of issues such as site requirements, and the impact of environmental and seasonal factors may be useful to support decision making although learners should independently identify and determine best practice. Class discussions with assessor support during formative work could encourage the analytical evaluation of typical repair strategies and would also be of value in developing problem solving skills.

The ability to calculate and consider the implications of data which may be presented numerically and graphically will underpin the competencies developed in the Unit. Learners have to focus on practical analysis and calculation to determine and test the effects of exposure, environmental, and seasonal influences on the performance of existing and new repair materials. Knowledge and understanding of the mechanisms and effects of decay will be critical to the formulation of sound repair strategies. Practical exercises to support development of skills in the calculation and presentation of data could be undertaken as part of formative work and integrated with other work across the award, with an emphasis on Numeracy as a tool to be used and applied efficiently and critically in working contexts. The provision of appropriate reference materials in numeric and graphic format would assist this process.

## History of changes to Unit

| Version | Description of change | Date |
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## General information for learners

## Unit title: Stonemasonry Repairs (SCQF level 6)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

This Unit is about Stonemasonry Repairs. It is suitable for those with limited experience in the construction and heritage industries; it is also suitable for those with existing competencies in the construction industries who wish to be able to apply existing competencies to the conservation/restoration, repair and maintenance of traditional buildings.

This Unit is suitable for those who wish to gain knowledge, understanding and practical experience of carrying out stonemasonry repairs to traditional stone-built structures by replacement with new stone components and by the use of repair mortars.

Successful completion of this Unit will provide you with the underpinning knowledge, understanding and practical skills that can be applied to carrying out stonemasonry repairs.

On completion you will be able to:

1 Demonstrate knowledge and understanding of repair methods for stonemasonry walling.
2 Remove a defective stonemasonry component from an existing structure and build in a replacement.
3 Remove defective surfaces from stone elements in an existing structure and repair with lime mortar repair products.

Assessment is through completion of closed-book multiple-choice questions and in the completion of practical assignments.

Elements of the Core Skills of *Problem Solving*, that is; Critical Thinking, Planning and Organising, and Reviewing and Evaluating, will be developed in the successful completion of this Unit, but they will not be assessed or certificated.

The Unit is valuable in the potential development of enterprise, employability and citizenship in the repair and maintenance part of the construction sector, specifically in respect of traditional structures, which in turn is relevant in sustainability and sustainable development, as traditional structures are principally constructed of indigenous local materials and in many cases have survived in daily use for over a century or longer and will continue to do so for centuries more — but only provided they are cared for competently. This Unit provides underpinning knowledge and understanding to gain relevant competency.