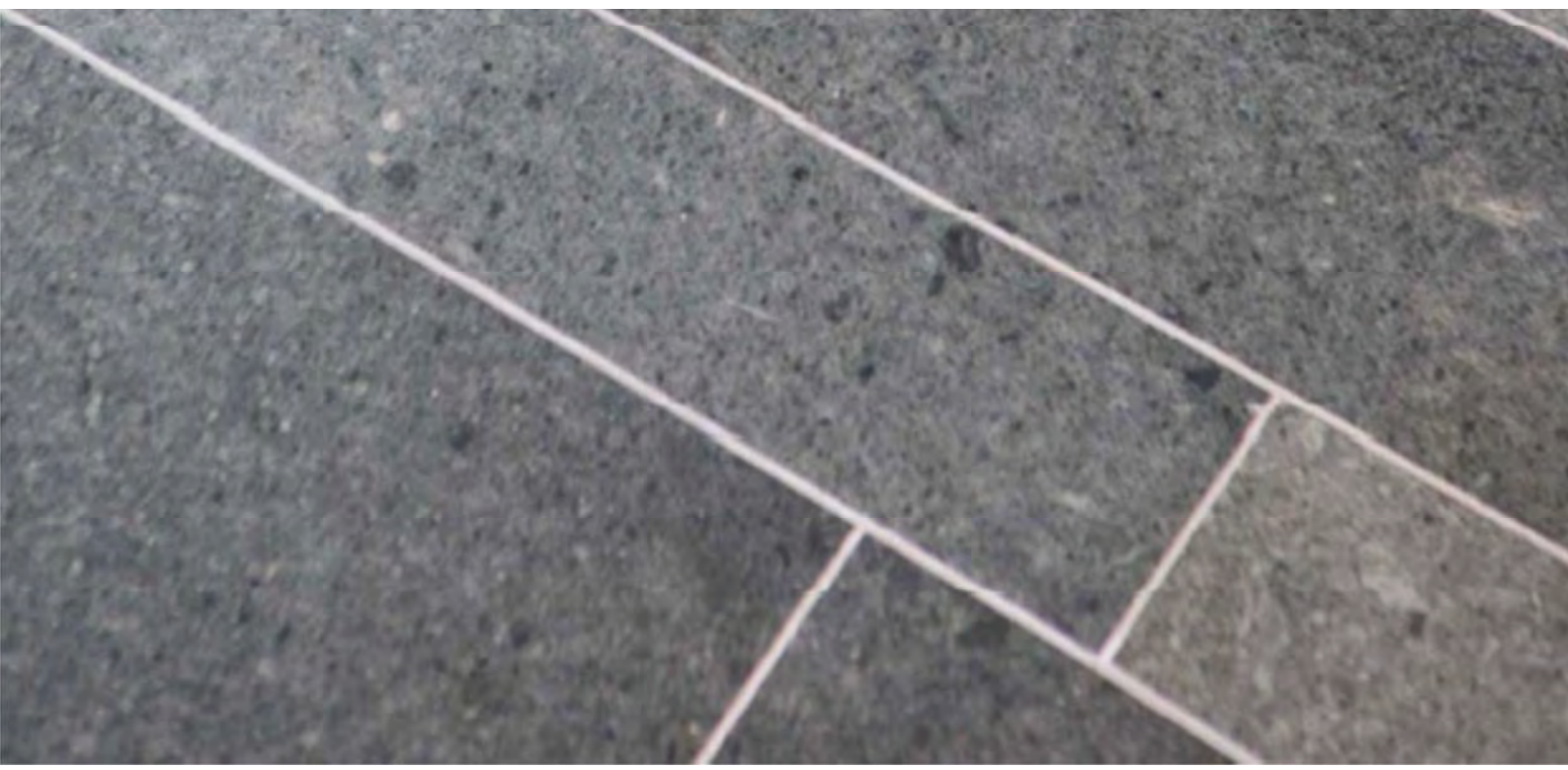




Selecting the Correct Stone



Federation
Stone
Great Britain



Selecting the Correct Stone

Stone Federation is the national trade association for the natural stone industry and provides a one-stop shop for product information, technical guidance and advice on all aspects of specifying and working with stone. Members of Stone Federation have to meet the high criteria set down to join.

When you use a Stone Federation member you can be assured that they:

- Employ a trained workforce
- Carry the correct insurance cover
- Follow the Codes of Practices set down by the Federation
- Adhere to all the relevant British Standards
- Have a current health and safety policy in place.



Published by Stone Federation Great Britain

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Stone Federation Great Britain believes that the advice contained in this document is in accordance with the latest technical developments and good practice. No responsibility is accepted by the Federation, its servants or agents, in respect of the application of this advice to a specific problem.

Introduction

This Stone Federation Great Britain guide is based on relevant sections of a number of British Standards, Codes of Practice and trade documents. It sets out the current best practice for the selection of natural stone for use in construction, notably larger cladding, flooring, paving and masonry projects.

The advice provided is especially relevant to 'larger' projects where often there are requirements for consistency over a protracted period of construction. However, much of the advice is still applicable to projects of all sizes down to domestic works.

This guide considers the important issues relating to the interpretation of samples, the role of a quarry, mine, and factory visit in the assessment of the stone selection and the relevant factors appropriate to the evaluation of the technical properties of the stone declared in the CE Certificate. It aims to identify the common misunderstandings and is designed to help the specifier to make an informed selection of a suitable stone for their project.

Stone consultants: Throughout this document we have referred to stone consultants as experts who will be able to assist you in the selection of the stone. It is vital that the person/company selected has the appropriate level of experience to assist you with the selection of the stone and that you give clear scope of requirements to the consultant, explaining exactly what you want done.



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Selecting the Correct Stone

- 1. Samples:** All samples should be labelled in accordance with BS EN 12440 Natural Stone – Denomination Criteria, ie, they should have their traditional name, quarry location, country of origin and the petrological family declared, together with a sample reference number.

All stones will have a Declaration of Performance (DoP) and a CE Certificate applicable to the proposed application, a copy should be readily available. If the DoP and the CE Certificate are not available, an alternative stone must be selected.

All samples should be clearly marked with the geological name (so that they can be accurately referenced to the DoP and CE Certificate) as well as the surface finish, including the grit size, where appropriate.

- 1.1 Indicative Samples:** An indicative sample shows the general colour, tone and texture of the stone, but cannot and should not attempt to show the range of geological characteristics that will be naturally present in all stones. These indicative samples are typically small stones, say 150mm x 150mm, so that they can be posted to various members of the project team for presentation to the planners (if appropriate). A short list of acceptable stones is normally made from viewing the indicative samples.



Selecting the Correct Stone

1.2 Range/Control Samples: The mine or quarry will normally have range/control panels showing the geological characteristics typically found in the various beds available.



If processing of the stones typically involves the use of patching, fillers or other similar products for natural holes, faults or cracks, then they should be declared by the quarry, mine or the production facility completing this operation and the reference samples should include any such feature. It is ultimately the quarry or mine's responsibility to select a suitable number of samples from various blocks from the chosen bed to show the typical range of geological variations that are present in the stone or the bed of stone but if the production company has already been and selected the stones and the blocks are all in stock and available for a pre-purchase, then this can be completed at their works instead. Invariably this inspection should take place at the extraction site but if in exceptional circumstances this is not possible, then confirmation that the source of the stone has been closely consulted in the sample selection must be sought.

The range/control panels from the different quarries and different beds should be carefully inspected and then the final selection should be made and high resolution photographs taken for future reference. The rejection of geological characteristics typically found in the stone will typically result in increased costs and prolonged procurement through abortive cutting and will increase the wastage thereby impacting on the carbon footprint and the overall sustainability of the supply.

Stone is a natural product so all characteristics accepted in these samples should be considered to be typical of the normal production and not as flaws and therefore should not become a reason for rejection, unless their concentration becomes excessive and the typical character of the stone is lost. If problems do arise the number, size and concentration of certain features should be discussed and agreed before continuing further.

Selecting the Correct Stone

Any comparison between the range/control samples and the actual production should be conducted in normal daylight for external stone work or perhaps similar light conditions to the project for internal works. Wherever possible, samples should be viewed from a distance of 2m as stated in all the relevant British Standards and in the orientation in which the stone will be used.



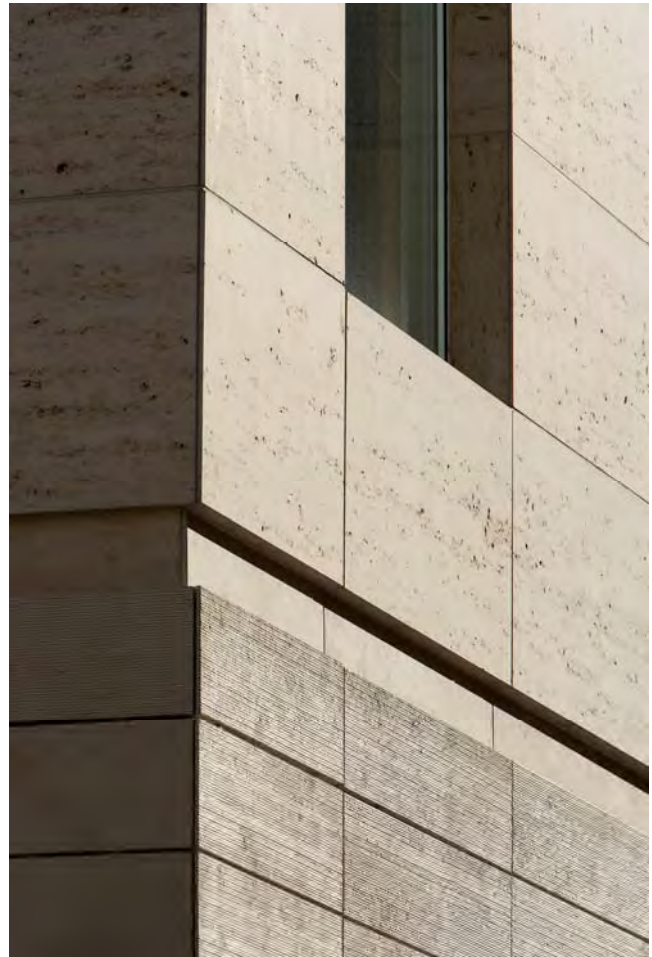
For smaller or new extraction sites it may be necessary to establish a project range by selecting a number of blocks that show the typical range. The assistance of an independent experienced stone consultant or qualified geologist to pre-select the blocks to be cut to show the geological range is recommended. The range/control samples should be of sufficient size to indicate the general appearance of the finished work, normally about 10 large stones at least 600mm x 400mm. These samples should include the typical variations in colour, texture, veining, shell content, grain size and the distribution, character and frequency of these, and all other features that are deemed to be part of the geological characteristics of the stone.

Selecting the Correct Stone

1.3 Building Inspections: It is advisable, if possible, to confirm the selection of the stone by viewing a number of buildings built in the vicinity or in a similar environment of the proposed project using the same stone or bed of stone and in the same application and exposure conditions.

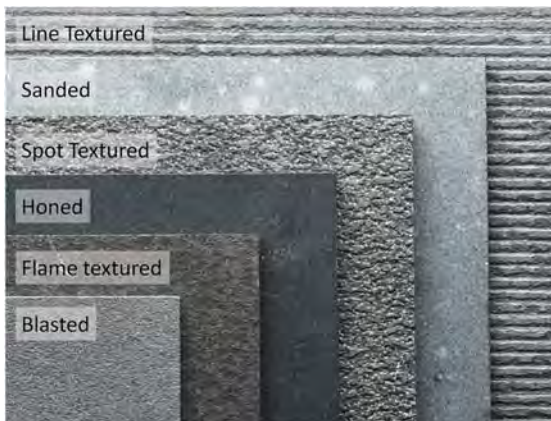
The stones on these buildings should be examined closely, noting the geological characteristics in the individual stones compared to the samples provided. It is important to remember that some of these characteristics may alter in appearance over time as part of the natural weathering process, so it may be advisable to retain the services of an independent experienced stone consultant or qualified geologist to explain possible changes and their relevance.

After examining the stone in detail it is suggested that the entire façade, floor or paving is viewed from a reasonable distance, perhaps from across the street, or from a vantage point or higher level, to see the stone as part of the overall building structure and to note the characteristics that are still visible or dominant.



Selecting the Correct Stone

- 2. Quarry, Mine and Factory Visit:** Stone Federation Great Britain strongly advises that a visit is made to the quarry or mine and factory so that the stone proposed for the project can be carefully inspected. The assistance of an independent experienced stone consultant or qualified geologist is recommended if you are not familiar with stone and it is even more important if you are looking at a stone that is not regularly used in the UK. These visits provide an opportunity to examine the stone faces and the stock to familiarise yourself with the geological variations between the different beds or types of stone.



The range/control panels should be inspected as part of the visit. Information about the quantity and programme should be provided to the stone supplier so that the availability of the stone can be considered and the potential for geological variations discussed and resolved.

Concerns regarding the environmental and ethical impacts of the extraction operations may be addressed to a degree by documentation. However, first-hand experience of the site is invaluable in assessing the merits of different operations and operators. Some of the larger operators are completing BES 6001: the Code for the Responsible Sourcing of Construction Products, which provides a framework for the organisational governance, supply chain management and environmental and social aspects that must be addressed in order to ensure the responsible sourcing of construction products.

Selecting the Correct Stone

2.1 Geological Features: An important part of any visit to the extraction site is to look at the exposed faces in the quarry or mine and note the differing geological features. Remember that in a rough cut face and particularly in a natural or split face, the features may not be immediately obvious, but the face should be examined very closely. Look for variation in different parts of the face; compare the top of the face to the bottom and look along the length of the face and different exposures of the same face to see if there are differences.

Some stones with a low natural bed height may be used and have a proven track record of being used face bedded so the details on the actual bedding planes should be more closely examined. Also examine any other data that may be available such as cores, core logs, trial pits and cuts as well as adjacent outcrops and exposed faces.

Ask where the production teams are heading and where they will be extracting when the stone for your project will be required. Carefully compare the features seen in the faces to the stocks. Examine the size of blocks in stock and the total quantity. Ask what proportion of your project will come from stock and consider whether you want to make a pre-purchase of the stone to secure the supply of a particular stone or block size for your project.



For projects running over many months and possibly years, the best way to ensure consistency of supply is to pre-purchase the necessary stone and set it aside.



Selecting the Correct Stone

2.2 Rates of Extraction: It is important to establish the rate of extraction from the quarry or mine and the quantity of blocks in stock and compare this to the stone required and programme for your project. If your requirement for the project is a large percentage of the overall stock or the production from the site, then alterations to the programme could have a big impact on the company's ability to supply the stone and perhaps a block pre-purchase should be considered.

It is also worth noting the size of the blocks compared to the stone sizes required for the project. Obviously the finished stone sizes cannot be bigger than the quarried block but if the stone sizes are larger than the average size of the blocks, then this will impact on the amount of block that the site produces and that can be used for the project. Again, to ensure there is sufficient block, a block pre-purchase should be considered.

One final consideration is the future viability of the stone over the life of the building. Is the stone likely to be available for future repairs and replacement?



Selecting the Correct Stone

2.3 Environmental Impacts: All UK and EU extraction sites will have environmental policies, restoration plans and environmental management systems in place. Extraction sites should also have environmental systems certified to ISO 14001 and some have carbon foot printing of their products and/or BES 6001 the Responsible Sourcing Standard.

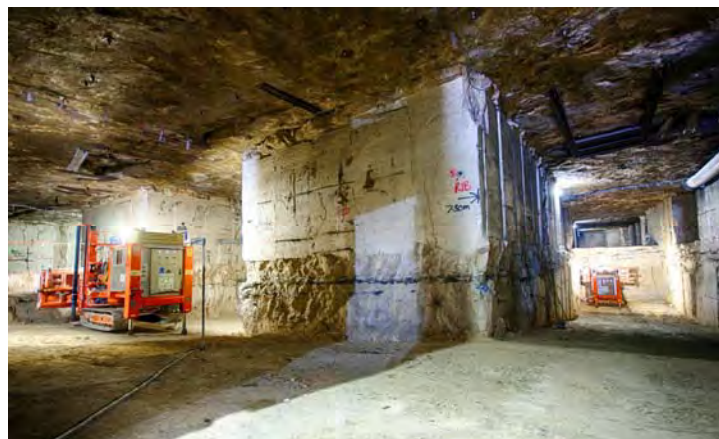
The ISO 14001 Environmental Management Certificate demonstrates that the operator has set out the criteria for an effective environmental management system to reduce waste and energy use as well as setting environmental performance targets that will be independently assessed.

The carbon footprint of stone products can be assessed through PAS 2050 and independently verified. A more comprehensive assessment of the embodied environmental impacts (including carbon) of stone products could be achieved through a verified Environmental Product Declaration (EPD) to EN 15804: 2012 + A1: 2013 (Sustainability of Construction Works – Environmental Product Declarations – core rules for the product category of construction products).

BES 6001 the Code for the Responsible Sourcing of Construction Products provides a comprehensive assessment of the entire supply chain management and environmental and social aspects that demonstrate the responsible sourcing of the stone. The performance of the operator is independently verified and scored against an established matrix to a minimum standard. The operator achieves a score ranging from pass, good, very good and excellent.



**ISO 14001
Environmental
Management
Certificate**



Selecting the Correct Stone

2.4 Health and Safety/Ethical/Social Issues: As stated in the previous section, the BES 6001 certification demonstrate that targets have been set and certain standards met and independently assessed for the health and safety, employment and local community issues.

As a minimum, the quarry or mine should have consultation with the local communities about the impact of their operations and have objectives and targets to reduce these impacts and any resulting complaints. For the employees there should be encouragement for learning and development. All major UK and EU extraction sites will have these in place, but it becomes more important when stones are being considered from developing countries.

Whilst it is tempting to look at more competitively priced stones it should be equally important to ensure that the company extracting the chosen stone is conducting its operation in an ethical manner. Child labour and bonded labour is still used in quarry sites in the developing world and companies that have been encouraged to abandon these practises should not find themselves penalised by the price being the only factor of consideration. It is vitally important that the extraction site is visited and appropriate questions asked.

Please be aware that there are a number of ‘Ethical Organisations’ that have impressive aims, but if these aims are not supported by on-site inspections we would suggest that a degree of caution is exercised when assessing their effectiveness.

The health and safety of these operations should also be assessed and health and safety policies can be requested and these can be compared to the actual operating conditions. UK and EU operations are increasingly working towards the BS OHSAS 18001 Occupational Health and Safety Management accreditation which sets out the minimum requirements for occupational health and safety management best practice.



Selecting the Correct Stone

2.5 Processing Works: It is recommended that the proposed processing works for the fabrication of the stonework for a project is visited. Such works in the UK will normally be located near to the extraction site or operated by the extraction company.

Quality controls should be evident, and production issues such as tolerances, can be reviewed and established for the project.

An integral part of the CE certification requires a system of Factory Production Control to be in place, either ISO 9001 or an equivalent system.



3. Technical Assessment of the Stone: All natural stones will weather and some will suffer from reductions in their strength, but it is important to be able to make an initial assessment of a stone's technical properties before it is added to a project short list.

There are various tests that help to build a picture of a stone's potential suitability for a particular application and whilst past projects are a good indicator, recent test data should be examined. You may need a stone consultant to assist with this interpretation, particularly when you are using a stone that is not widely used in this market or for your intended application.



Selecting the Correct Stone

3.1 CE Certificates and Declarations of Performance: CE Certificates are mandatory for most natural stone applications; cladding, flooring, paving and internal wall linings. The only notable exception is dimension stone as defined in BS EN 12059. The CE Certificates and Declaration of Performances (DoPs) will provide the test results relevant for the proposed applications (see Annex A for example of the Certificates and the DoPs).

The DoP is the formal document that sets out the operator’s commitment to supply stone that meets the technical properties stated, but the actual CE Certificate gives the designer the technical properties as either a mean, or Lowest Expected Value (LEV) figure that can then be used for example to calculate the thickness of the cladding.

Not all test results are included on the CE Certificates and in certain situations it could be prudent to look at a wider range of tests, particularly if the stone has not been used in its intended application in the locality. Stones with limited use in the UK or similar climates should be assessed for their suitability, particularly if they are being used externally as paving or cladding.

It would be sensible to seek the advice of an independent experienced stone consultant or qualified geologist who will be able to advise you on the selection of test samples from marked blocks for the initial test and perhaps even a number of tests through the production process (see Annex B for greater detail about the Sampling Plans and Report).

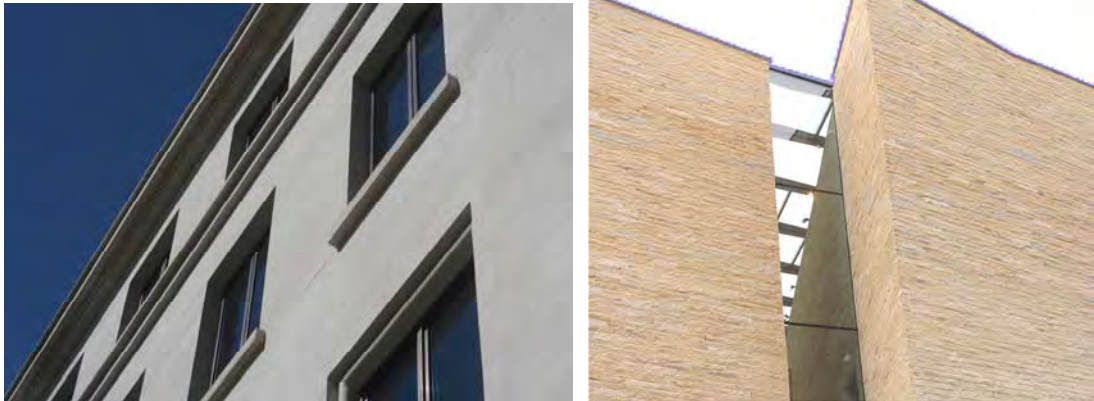
Some test values, particularly those involving strength determinations, may be given as a “Lower Expected Value” or “LEV” on the DoP. The LEV is calculated using statistical methods based on the results obtained and the number of samples tested and attempts to predict a value whereby the majority of material is likely to perform above it. This value may be used in critical engineering calculations where a factor of safety is necessary.

Characteristic	Declared values	Test method
Reaction to Fire	Class A1	Without setting loss (reaction MFR130C, see annex 2)
Flexural Strength	LEV: 3.68 MPa Mean Value: 6.39 MPa Standard Deviation: 2.81	EN 13167
Resistance to Fatigue at Tensile Work	LEV: 2.795 N Mean Value: 4.329 N Standard Deviation: 0.64	EN 12064
Frost Resistance	Passed	EN 12371
Water Vapor Permeability	WV2	EN ISO 12572 or EN 12524
Thermal Shock Resistance	WV0 (No Performance Determined)	EN 12058
Apparent Density	LEV: 2.521 kg/m ³ MEV: 2.236 kg/m ³	EN 1194



3.2 Existing Buildings: The DoP and the information in any additional technical data sheets prepared by the extraction company, provides information for the designers about the strength but also give information about the expected long term performance.

Evaluation of existing buildings will be useful in the assessment of the proposed stone, particularly its durability. Stones that have a proven track record in the same environment and in a similar application, will give the designer greater reassurance about the stone selection and greater confidence about the long term performance of the stone, which can be included into the design calculations.



4. List of relevant Product Standards, British Standards & Codes of Practice

4.1 Harmonised Product Standards

- BS EN 1469 Natural Stone Products - Slabs for cladding – Requirements
- BS EN 12057 Natural Stone Products Modular Tiles – Requirements
- BS EN 1341: Slabs of Natural Stone for external paving - Requirements and test method
- BS EN 1342: Setts of Natural Stone for external paving - Requirements and test method
- BS EN 1343: Kerbs of Natural Stone for external paving - Requirements and test method
- BS EN 771-6 Specification form masonry units – Part 6 Natural stone masonry units
- BS EN 12058 Natural Stone Products - Slabs for floors and stairs – Requirements

4.2 Other Product Standards

- BS EN 12059 Natural Stone Products – Dimensional stonework - Requirements

4.3 Denomination Standard

- BS EN 12440 Natural Stone Denomination Criteria

4.4 BRE & BSI Company Standards

- ISO 9001 Quality Management Systems
- ISO 14001 Environmental Management Systems
- BS OHSAS 18001 Occupational Health and Safety Management
- BES 6001 Environmental and Sustainability Standard which incorporates Management, Supply Chain, Environmental and Social Requirements

4.5 Stone Federation Publications

- Stone Federation Code of Practice for the Design and Installation of Internal Flooring
- CE Marking – A Concise Guide
- Natural Stone. The Sustainable Solution
- Demonstrating your Company's Sustainability Credentials
- A guide to BS 8298 - The Code of Practice for the Design and Installation of Natural Stone Cladding and Lining.

Selecting the Correct Stone

5. Annexes

Annex A

5.1 CE Certificate for Peak Moor Sandstone – Cladding



 Year: 06/2013	Reference Standard	EN 1469			
	Product	Slabs of Natural Stone for Cladding			
	Denomination	Carboniferous Millstone Grit			
	Quarry address	Peak Moor (New Pilhough) Quarry Lees Road, Stanton in Peak, Derbyshire, DE4 2LX			
	Quarry Coordinates	Grid Reference: SK 249 644			
	End Uses	External Cladding			
Realstone Ltd, Wingerworth, Chesterfield, Derbyshire S40 4SX					
Characteristics	Declared Values			Test Method	
Reaction To Fire	Class A1			Without testing (See decision 96/603/EC, as amended)	
Flexural Strength	Lowest Expected Value: 7.35 Mean Value: 7.7 Mpa			EN 13161	
Resistance to Fixings at the following thickness		LEV	Mean Value	Standard Deviation	EN 13364
	75mm	3.47N	4.58N	0.57	
Frost Resistance	Change in mean flexural strength after 48 cycles - 0.80%			EN 12371	
Thermal Shock Resistance	NPD (No Performance Determined)			EN 14066	
Apparent Density	Lowest Expected Value: 2,146kg/m ³ Highest Expected Value: 2,214kg/m ³			EN 1936	

Realstone Ltd Wingerworth, Chesterfield, Derbyshire S40 4SX Tel: 01246 270244 Fax: 01246 220095 Enquires: sales@realstone.co.uk Website: www.realstone.co.uk

Selecting the Correct Stone

Declaration of Performance for Peak Moor Sandstone - Cladding



EC DECLARATION OF PERFORMANCE No: RS/PM1/112013

This declares that the following Construction product

Peak Moor Stone Cladding

New Pilhough Quarry, Lees road, Stanton in the Peak, Derbyshire, DE4 2LX.

Grid Reference: SK 249 644

Complies with the requirements of the Harmonised European Standard EN 1469:2004

The Manufacturer has carried out the initial assessment and continuous surveillance of the factory production control system and its requirements

referred to above.

Characteristics	Declared Values				Test Method
Reaction to fire	Class A1				Without testing (see decision 96/603/EC, as amended)
Flexural Strength	Lowest Expected Value: 7.35 Mean Value: 7.7 Mpa				EN 13151
Resistance to Fixings at the following thickness		LEV	Mean Value	Standard Deviation	EN 13364
	75mm	3.47N	4.58N	0.57	
Frost Resistance	Change in mean flexural strength after 48 cycles - 0.80%				EN 12371
Thermal Shock Resistance	NPD (No Performance Determined)				EN 14066
Apparent Density	Lowest Expected Value: 2,146kg/m ³ Highest Expected Value: 2,214kg/m ³				EN 1936

System of Assessment as set out in CPR, Annex V: Attestation System 4

Compliance with the requirements of 305/2011 Construction Products

Regulation is based on the following Harmonised European Standard

EN 1469 Slabs of Stone for Cladding intended to be used for external wall finishes

This declaration is the responsibility of the manufacturer:

Realstone Ltd

Wingerworth, Chesterfield, Derbyshire S40 4SX

Tel: 01246 270244 Fax: 01246 220095 Enquires: sales@realstone.co.uk Website: www.realstone.co.uk

Signed By:

Iain Kennedy

Managing Director

Realstone Ltd

Date: 25th November 2013


Selecting the Correct Stone

CE Certificate for Portland Grove Whitbed Limestone – Paving

portland stone - naturally



ALBION STONE

 Ref. No: AS/CE/EP07/CPR08112013 Year: 06/2012	Reference Standard: EN 1341 Product: Slabs of natural stone for External Paving Denomination: Portland Grove Whitbed, Limestone Jordans Quarry and Mine, Easton Street, Portland, Dorset, England Quarry Coordinates for Jordans: 50° 33'02.38" North, 2° 26'25.36" West End Uses: External Paving	
	Albion Stone plc, Easton Street, Portland, Dorset DT5 1BW	
Characteristics	Declared Values	Test Method
Flexural Strength	Lowest Expected Value: 2.47 MPa Mean Value: 6.03 MPa Standard Deviation: 1.52	EN 13161
Slip Resistance	SRV dry: 88 Mean Value SRV wet: 76 Mean Value	EN 14231
Tactility	Rough Ground Finish – grit 60	Visual
Frost Resistance	Change in mean flexural strength after 48 cycles – 0%	EN 12371
Thermal Shock Resistance	Mean change in dynamic elastic modulus: 4.51%	EN 14066
Abrasion Resistance	Lowest Expected Value: 22.40 Mean Value: 23.63	EN 14157

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t 01737 771772 e enquiries@albionstone.com

Selecting the Correct Stone

Declaration of Performance for Portland Grove Whitbed Limestone – Paving

DECLARATION OF PERFORMANCE

Declaration No. AS/DP/EP07/CPR08112013

1. Unique identification code of the product type:

BS EN 1341 – Slabs of natural stone for external paving.

2. Type, batch, serial number or any other element allowing identification of the construction product as required under Article 11(4):

**Portland Grove Whitbed, Jordans Quarry and Mine, Easton Street, Portland, Dorset England
Quarry Coordinates for Jordans: 50°33'02.38" North, 2°26'25.36" West**

3. Intended use or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:

External Paving

4. Name, registered trade name or registered trademark and contact address of manufacturer as required under Article 11(5):

**Grove Whitbed
Albion Stone plc, Easton Street, Portland, Dorset, DT5 1BW**

5. Where applicable, name and contact address of the authorised representative whose mandate covers the tasks specified in Article 12(2):

Not applicable

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

Attestation Level 4

7. In case of the declaration of performance concerning a construction product covered by a harmonised standard:

The Manufacturer has carried out the initial assessment and continuous surveillance of the factory production control system and its requirements.

8. Declared performance:

Harmonised technical specification BS EN 1341:2001

Characteristics	Declared Values	Test Method
Flexural Strength	Lowest Expected Value: 2.47 MPa Mean Value: 6.03 MPa Standard Deviation: 1.52	EN 13161:2001
Slip Resistance	SRV dry: 88 Mean Value SRV wet: 76 Mean Value	EN 14231:2003
Tactility	Rough Ground Finish – grit 60	Visual
Frost Resistance	Change in mean flexural strength after 48 cycles – 0%	EN 12371:2001
Thermal Shock Resistance	Mean change in dynamic elastic modulus: 4.51%	EN 14066:2003
Abrasion Resistance	Lowest Expected Value: 22.40 Mean Value: 23.63	EN 14157:2004

9. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of Albion Stone by:


.....
Michael Poultney, Managing Director


Selecting the Correct Stone

CE Certificate for Portland Jordans Whitbed Limestone – Internal Flooring

portland stone - naturally



ALBION STONE

 Ref. No: AS/CE/IF05/CPR08112013 Year: 06/2012	Reference standard: EN 12058 Product: Slabs of natural stone for floors and stairs Denomination: Portland Jordans Whitbed, Limestone Jordans Quarry and Mine, Easton Street, Portland, Dorset, England Quarry Coordinates for Jordans: 50° 33'02.38" North, 2° 26'25.36" West End Uses: Internal floor finishing	
	Albion Stone plc, Easton Street, Portland, Dorset DT5 1BW	
Characteristics	Declared Values	Test Method
Reaction to Fire	Class A1	Without testing (see Decision 96/603/EC, as amended)
Flexural Strength	Lowest Expected Value: 2.47 MPa Mean Value: 6.03 MPa Standard Deviation: 1.52	EN 13161
Slip Resistance	SRV dry: 88.0 Mean Value SRV wet: 76.0 Mean Value (Results from Independent Whitbed)	EN 14231
Tactility	Fine Ground Finish – grit F120	Visual
Apparent Density	Lowest Expected Value: 2,002 kg/m ³ Highest Expected Value: 2,315 kg/m ³	EN 1936

www.albionstone.com

t 01737 771772 e enquiries@albionstone.com

Declaration of Performance for Portland Jordans Whitbed Limestone – Internal Flooring

DECLARATION OF PERFORMANCE

Declaration No. AS/DP/IF05/CPR08112013

1. Unique identification code of the product type:

BS EN 12058 – Slabs natural stone products. Slabs for floors and stairs.

2. Type, batch, serial number or any other element allowing identification of the construction product as required under Article 11(4):

**Portland Jordans Whitbed, Jordans Quarry and Mine, Easton Street, Portland, Dorset England
Quarry Coordinates for Jordans: 50° 33' 02.38" North, 2° 26' 25.36" West**

3. Intended use or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:

Internal Floor Finishing

4. Name, registered trade name or registered trademark and contact address of manufacturer as required under Article 11(5):

**Jordans Whitbed
Albion Stone plc, Easton Street, Portland, Dorset, DT5 1BW**

5. Where applicable, name and contact address of the authorised representative whose mandate covers the tasks specified in Article 12(2):

Not applicable

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

Attestation Level 4

7. In case of the declaration of performance concerning a construction product covered by a harmonised standard:

The Manufacturer has carried out the initial assessment and continuous surveillance of the factory production control system and its requirements.


8. Declared performance:

Harmonised technical specification BS EN 12058:2004

Characteristics	Declared Values	Test Method
Reaction to Fire	Class A1	Without testing (see Decision 96/603/EC, as amended)
Flexural Strength	Lowest Expected Value: 2.47 MPa Mean Value: 6.03 MPa Standard Deviation: 1.52	EN 13161:2001
Slip Resistance	SRV dry: 80.0 Mean Value SRV wet: 76.0 Mean Value (Results from Independent Whitbed)	EN 14231:2003
Tactility	Fine Ground Finish – grit F120	Visual
Apparent Density	Lowest Expected Value: 2,002 kg/m ³ Highest Expected Value: 2,315 kg/m ³	EN 1936:1999

9. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8. This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of Albion Stone by:


.....
Michael Poultney, Managing Director

Selecting the Correct Stone

CE Certificate for Hazeldean Sandstone – Masonry Units

Hutton Stone

"Quarriers and Suppliers of fine quality dimension stone"



Hutton Stone Co. Ltd
West Fishwick
Berwick-upon-Tweed
Scottish Borders
TD15 1XQ

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EN 771-6:2011

Category II, Natural stone masonry unit

Hazeldean walling stone

Dimensions:

Length random, Width random, Height random

Dimensional tolerances:

Category - Rubble stone

Configuration:

As per attached description on delivery note

Apparent density:

Mean 2240kg/m³

Compressive strength:mean

Mean 101MPa
Std.Dev. 9MPa
Var.Coeff. 0.1MPa

Flexural bond strength:

Mean 5.1MPa
Std.Dev 0.3MPa
Var.Coeff. 0.1MPa
LEV 4.6 Mpa

Reaction to fire:

Euroclass A1

Open porosity:

Mean 14.9%

Water absorption by capillarity:

NPD (No performance determined)

Freeze-thaw resistance:

NPD

Thermal conductivity:

NPD

Shear bond strength

Fixed value



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huttonstone@sof.com

Declaration of Performance for Hazeldean Sandstone – Masonry Units

DECLARATION OF PERFORMANCE

(Declaration Number) HS/DP/MU02/CPR31052013

1. Unique Identification code of the product type.

BS EN 771-6:2011 Natural Stone Masonry Units

2. Type, batch or serial number or any other element allowing identification of the construction product as required under article 11(4) of the CPR.

**Hazeldean Sandstone, Hazeldean Quarry. South Charlton. Alnwick.
Northumberland
Quarry Coordinates for Hazeldean: 55.477431 Latitude. 1.757083 Longitude.**

3. Intended use of the construction product.

Dimension Walling Stones D1, D2, D3, Squared Rubble Stone, Rubble Stone

4. Name, registered trade name or trade mark and contact address of the manufacturer as required under article 11(5).

**Hutton Stone Co Ltd. West Fishwick. Berwick upon Tweed. Scottish Borders
TD15 1XQ**

5. Where applicable name and contact address of the authorised representative whose mandate covers the tasks specified in article 12(2).

Not Applicable

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V.

Attestation System 4

7. In the case of the declaration of performance covering a construction product covered by a harmonised Standard.

The Manufacturer has carried out the initial assessment and continuous surveillance of the factory production control system and its requirements.

5.2 Technical Assessment of the Stone: As stated in section 3 of this document, all stone products covered by Harmonised Standards should be accompanied by Declarations of Performances. The CE Certificate and Declaration of Performance (DoP) will provide the test results relevant for the proposed applications (see Annex A for examples of CE Certificates and the DoPs).

The Declaration of Performance is the formal document that sets out the technical properties that the operator is committed to for the stone they are supplying. The DoP and the CE Certificate give the designer the technical properties as either a mean, or Lowest Expected Value (LEV) figure that can then be used for example, to calculate the thickness of the cladding. Using either the mean or the LEV will be reflected in the Factor of Safety.

Not all test results are included on the DoP and in certain situations, it could be prudent to look at a wider range of tests, particularly if the stone has not been used in its intended application in the locality in the UK. Stones with limited use in the UK or similar climates should be assessed for their suitability, particularly if they are being used externally as paving or cladding.

It would be sensible to seek the advice of an independent experienced stone consultant or qualified geologist who will be able to advise you on the selection of test samples from marked blocks for the initial testing and perhaps even a number of tests through the production process.

This annex explains some points that need to be considered when conducting testing of stone and the assessment of the results.



Selecting the Correct Stone

There are two types of testing;

1. Initial Testing
2. Production Testing

- 1. Initial Testing:** The production of a DoP and CE Certificate demonstrates that initial testing has been completed.

Even though a DoP may not be available, it does not necessarily follow that there is no existing technical data or even technical information from the supplier. There are a number of BRE publications and other sources may be found, but it is important that these results are carefully scrutinised and, in most cases, we would still recommend that in the absence of a DoP, a programme of testing should be completed. The exception to this recommendation could be for tests that are not recorded onto the DoP, but where the supplier can demonstrate that they have recent results available in line with the current tests methods and a factory production control procedure.



Different types of test:

1. Compressive
2. Slip
3. Salt

It is important that the initial tests are completed in plenty of time to react to any unexpected results that may involve elements of a redesign on the stone thickness for example, or even the replacement of the stone on the project.

Stone Federation recommends that the initial testing should cover a wider range of samples than the minimum required. We would suggest that at least five blocks from different locations on the production face or stock covering all aspect of the geological features typically present in the stone are used to cut enough samples for five sets of testing.

Selecting the Correct Stone

All tests should be to British Standards (not ASTM, the North American Codes) and tests should be completed preferably at an independent UKAS-accredited testing laboratory.

Depending on the tests selected, please be aware that some can take up to 10 weeks to complete and additional time will need to be set aside to complete the sampling plan and for the physical cutting of the stone samples for testing. Additional production testing should only be at the instruction of the stone consultant or to confirm the stone properties for a unique application or fixing system.

- 2. Production Testing:** Factory Production Control (FPC) will be completed by the manufacturer as part of the routine provision of the CE Certification process, but additional testing can be carried out to confirm the on-going consistent quality of the stone as it is produced for a specific project, but not to 'select' the best stone for the project in general. It could be used to confirm a particular technical criterion for an isolated area. The DoP and CE Certificate initial testing should have already confirmed that the stone is suitable for the project.

The frequency of the Production Control testing will be affected by the typical changes in geology of the stone, whether the stones are available (all or partly) from stock and the extraction progress/number of differing extraction areas in the quarry or mine.

It is important to remember that the samples for production testing are taken as the stones are processed, so by the time the results are known, the stones from the block will have been produced and in some instances, fixed onto the building.

An appropriate factor of safety for stone will allow for the typical variations of the natural product; however, the production testing may indicate a trend in the physical properties of a stone that needs further investigation.



Stone Federation recommends that the initial testing should cover a wider range of samples than the minimum required.

All tests should be to British Standards and should be completed, preferably, at an independent UKAS accredited testing laboratory.

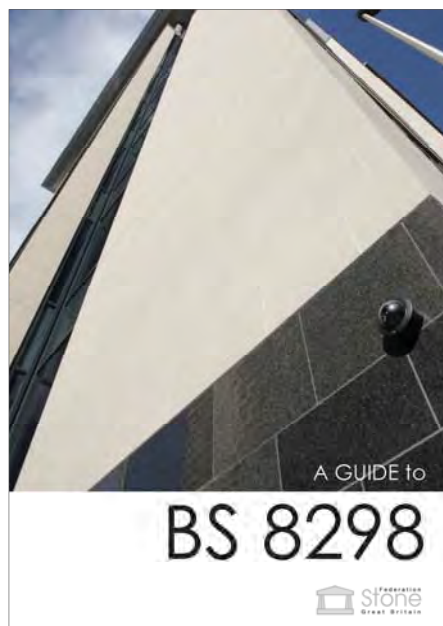
Selecting the Correct Stone

Testing Sample Plan and Report: It is important that any sample submitted for testing is representative of the typical properties of the stone. A sample plan should be prepared in compliance with the requirement set out in the relevant European Product Standard, such as BS EN 1469 Natural Stone Products – Slabs for Cladding - Requirements.

The sampling plan should define the extraction, cutting and working of the samples for testing. It should show the proposed locations in the quarry or mine that the block will be/have been extracted from on a plan, as well as the number of samples for the various tests. The sampling plan will either be prepared by the quarry or mine or a stone consultant, for approval by the client or design team. As the samples are cut, a sampling report should be completed. This provides traceability of the physical samples through to the testing laboratory.

Factor of Safety: The factor of safety applied to any technical calculation is inextricably tied to the presentation of the technical data/results as well as the knowledge of the stone in the proposed application and environment.

There is a detailed explanation in section 4 of the Guide to BS 8298, which covers such topics as the use of mean or Lowest Expected Values (LEV) using a factor of safety of 6 or 3, and the impact of the durability factor on strength testing where long term exposure can reduce the stone's strength.



technical@

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provides **technical**
advice via email.

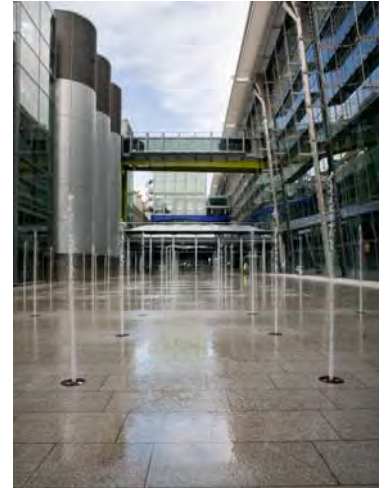
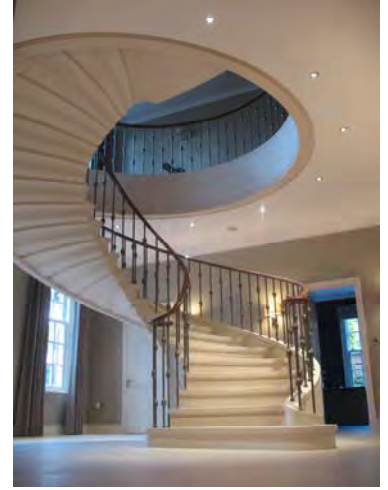
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Simply email your query to technical@stonefed.org.uk and our technical team will do their best to provide you with an answer within 3 working days.

This service is available to Stone Federation members, architects, specifiers, commercial and domestic clients, designers, engineers and other professionals.

We hope you have found this guide informative. If you require any further assistance, please contact Stone Federation at enquiries@stonefed.org.uk.





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