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RIVERSTONE

UNCOVER THE SOURCE

Natural Phyllite; Millions of years in the making and now available to you

The finest natural stone for flooring, cladding, stair treads, skirtings, worktops, copings, sills and patios

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An Introduction To Phyllite

The Stone; Phyllite

Phyllite is a type of foliated metamorphic rock primarily composed of quartz, sericite mica, and chlorite; the rock represents a gradiation in the degree of metamorphism between slate and mica schist. Minute crystals of graphite, sericite, or chlorite impart a silky, sometimes golden sheen to the surfaces of cleavage (or schistosity).

Its constituent platy minerals are larger than those in slate but are not visible with the naked eye.

The Source; Argentina

Riverstone Phyllite is quarried from SSQ's own quarry located in San Luis in Argentina. Riverstone Phyllite gives both the aesthetic pleasure and durability comparable to marble but has the additional benefit of being splittable by hand. Residents of San Luis concern Riverstone to be the local attribute and over the years have become very proud of Riverstone, which is regularly used in the local area.

Riverstone Phyllite is ideal for both internal and external purposes. However if used externally, Riverstone offers a good all round resistance to natural weathering effects.

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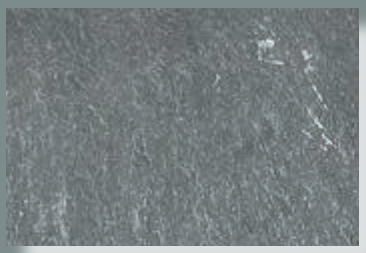
Riverstone Finish

Riverstone Phyllite can be finished in three different methods; Honed, Antic (Patina) and Natural. Each has been created in conjunction with both traditional and modern methods of design.

NATURAL

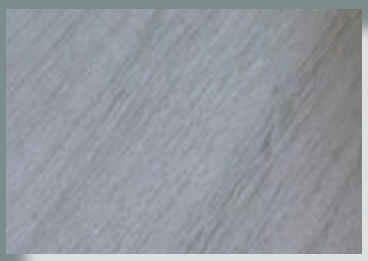


Offers a natural traditional riven finish, split by hand.

ANTIC

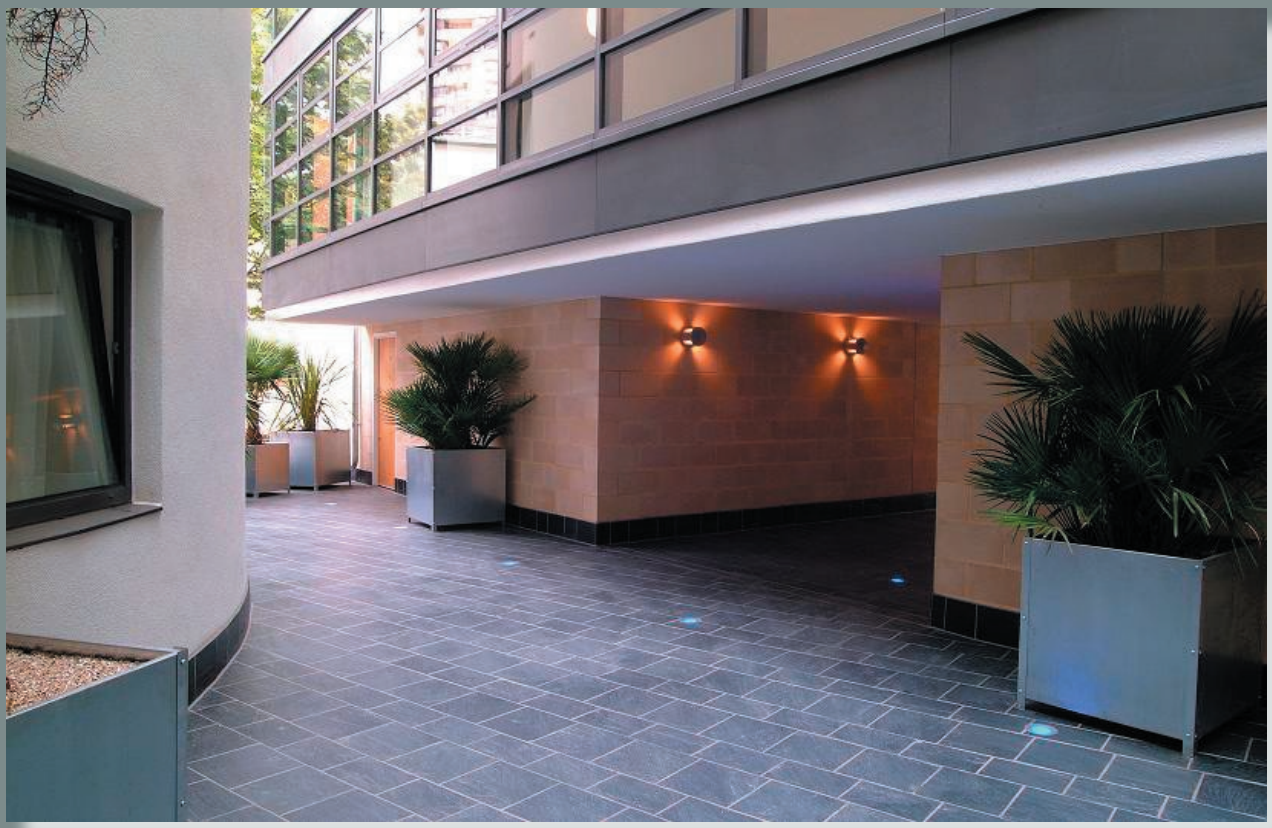
Antic smooth matt finish, but still retaining a texture similar to the natural riven finish.

HONED



Honed finish which enhances the veining and ensures that each piece is unique.

Riverstone Floor - Natural Finish



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Standards Related To Natural Tiles, Slabs & Sills

BS EN 12058; Natural Stone Products - Slabs For Floors & Stairs

Requirements For Geometric Characteristics

General - All measurements shall be carried out in accordance with EN 13373.

Thickness - Must not deviate from the nominal thickness (Table 1)

Flatness - The deviation from flatness of the surface (except for natural cleft faces) shall not exceed 0.2% of the slab length, and shall not exceed 3mm.

Angles and Special Shapes - Each slab angle shall be in accordance with the agreed geometry. Pieces of special or irregular shape shall be checked for compliance with the required shape by use of a suitable template, the permissable tolerance at any point shall be as stated in Table 2.

Nominal Thickness In mm	Tolerance
More than 12 up to and including 15	± 1.5 mm
More than 15 up to and including 30	± 10 %
More than 30 up to and including 80	± 3 mm
More than 80	± 5 mm

Table 1 - Tolerance on the nominal thickness

Length and Width - The length or width shall not deviate from the nominal by more than given in Table 2.

Table 2 - Tolerance on length and width

Nominal length or width in mm	< 600	≥ 600
Sawn edges thickness ≤ 50 mm	± 1 mm	± 1.5 mm
Sawn edges thickness > 50 mm	± 2 mm	± 3 mm

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Requirements of Surface Finish

Surfaces shall have a regular appearance as a function of the finishing process and shall be worked to meet the specified finish on all exposed surfaces, agreed in accordance with sample submitted and agreed beforehand between the purchaser and supplier.

Requirements of Natural Stone For Floors and Stairs

Denomination - Shall always be declared in accordance with EN 12440 (meaning traditional name, petrological family, typical colour and place of origin). The petrographic name shall be declared in accordance with EN 12407.

Visual Appearance - The colour, veining, texture, etc. of the stone shall be identified visually, typically by reference sample of the same stone suitable for providing a general description of visual appearance.

Flexural Strength - Shall be determined using the test method in EN 12372 or EN 13161 and the mean value, lower expected value and document deviation shall be declared.

Riverstone Sample - Honed Finish

Bond Strength Adhesion - This is within the responsibility of the person in charge of the execution of the tiling. The value of the bond strength adhesion depends on the condition of the layer, the type of adhesive/mortar and the surface finish of the back face. The person responsible shall refer to existing national codes of practice.

Water Absorption At Atmospheric Pressure - This shall be determined using the test method in EN 13755 and the results expressed accordingly.

Reaction To Fire - Natural stones are considered reaction to fire Class A1 following Commission Decision 96/603/EC.

Water Absorption By Capillarity - Shall be declared, upon request and is determined using test method EN 1925 and the results expressed accordingly.

Apparent Density and Open Porosity - This can be determined using the test method EN 1936 and the results expressed accordingly.

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Standards Related To Natural Tiles, Slabs & Sills

BS EN 12058; Natural Stone Products - Slabs For Floors & Stairs

Frost Resistance - Shall be declared where the product is expected to be subjected to freeze/ thaw cycles. Frost resistance can be determined using test method EN 12371.

Thermal Shock Resistance - This shall be determined using test method EN 14066 and the changes both in mass and dynamic modules of elasticity expressed accordingly.

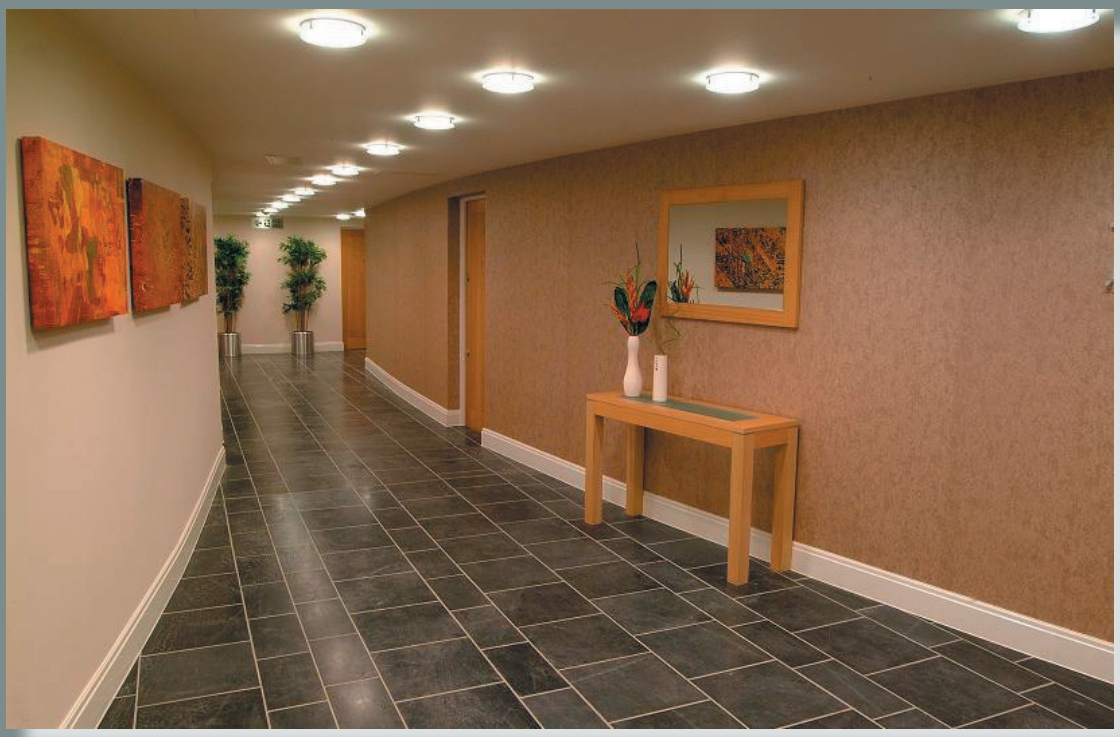
Water Vapour Permeability - This shall be given upon request (where the slab is to be used in a location subject to vapour control requirements and fixed by means of mortar or adhesives). The permeability shall be given by making reference to tabulated values in EN 12524.

Abrasion Resistance - Shall be determined using the test method in EN 14157.

Slip Resistance - This characteristic shall be declared for slabs, flooring and stairs (excluding skirting and risers), when subject to regulatory requirements, or upon request, when the roughness of the surface is less than 1mm measured following EN 13373. The slip resistance shall be determined using test method EN 14231.

Tactility - This is expressed by description of surface corrugation obtained by mechanical finishes.

Riverstone Floor- Natural Finish



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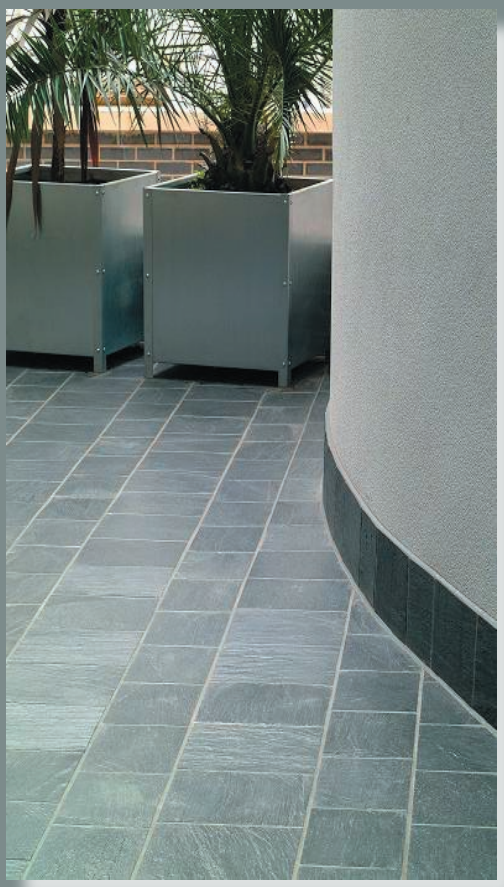
Standards Related To Natural Tiles, Slabs & Sills

American Society for Testing and Materials (ASTM) C629

Absorption - Determined using test method C-97, suitable for any type of stone. Maximum percentages of water by weight have been established for different stone classes such as limestone, sandstone and granite. May provide good information for initial product selection to determine suitability for use in moist or submerged situations.

Riverstone Floor - Natural Finish



Bulk Specific Gravity - Using test method C-97, it is possible to determine the weight per cubic foot for different stone classes. This information may be needed in the design of restraint and load bearing fixings, determining the panel sizes, and other structural considerations.

Modulus of Rupture - Can be determined using test method C-99, which determine's at what weight a stone will break when being loaded with weight in the center of a stone suspended and supported at two ends.

Water Absorption of Slate - Uses test method C-121, sets standards for water absorption of the stone.

Compressive Strength - Sets standard and minimum values for the crushing strength of stone under an evenly distributed load. Can be determined using test method C-170.

Abrasion Resistance of Stone Subjected to Foot Traffic - Can be determined using test method C-241. Test has been established to analyse the resistance to wear and grinding of foot traffic. This is helpful for selecting stone for interior and exterior paving threads.

Petrographic Examination - This standard uses test C-295 and establishes the method to use in examining and viewing thin layers of stone in microscopic terms in order to explore the grain structure and overall stone. This can help detect the presence of undesirable minerals which make a stone unsuitable for use in certain applications.

Flexural Strength of Natural Building Stone - Uses test method C-880, which helps to determine the bending strength of the stone. This test can provide valuable information related to how much a stone can flex before it breaks.

Determining Static Co-efficient of Friction - This can be determined using test method C-1028, which provides the level of slip resistance of ceramic tile and other like surfaces, including stone. It Establishes how much horizontal pressure it takes to cause a common shoe sole surface to slide across a certain type of stone surface.

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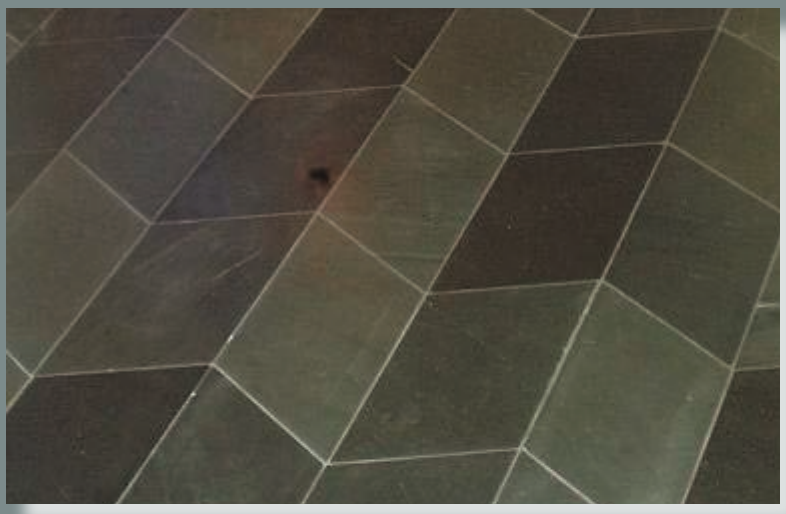
Comparison Between BS EN 12058 and ASTM C629

An ASTM (American Society for Testing Materials) comparison test with European Tests

Property	ASTM Test	European Standard
Density	ASTM C97	BS EN 1936
Porosity	ASTM C97	BS EN 1936
Modulus of Rupture	ASTM C120	BS EN 12372
Water Absorption	ASTM C121	BS EN 13755
Compressive Strength	ASTM C170	BS EN 1926
Weather Resistance	ASTM C217	BS EN 1926
Abrasion	ASTM C241	BS EN 1341 or prEN14157
Resistance Flexural Strength	ASTM C880	BS EN 13161
Slip Resistance	ASTM C1028	BS EN 14231

Riverstone Floor - Honed Finish



Both the BS EN 12058 and ASTM C629, have very similar targets from the tests. These tests are comprised to ensure the product is 'fit for purpose'. Riverstone Phyllite conforms to all European and American standards, and based not only on the look of the stone, but the quality of the stone has been a deciding factor. Riverstone has been used all across the world including the United States of America, producing some breath taking results.

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ASTM C629 Riverstone Phyllite Test Results

ASTM Testing for Dimensional Stone; Results Comparison Table

	ASTM Test	SSQ Riverstone	Kirkstone (Sea Green)	Otta Phyllite	Burlington Bursting Stone	Burlington Kirkby
	Source	Argentina	UK	Norway	UK	UK
	Density, kg/m3	2775	NR	2600	2820	2995
C121	Absoprtion, %	0.11	0.25	0.19	0.05	0.17
C120	Modulus of Rupture, MPa	89	11.32	35.1	NR	70
C241	Abrasion Resistance	10	12.2	NR	24	14
C217	Weather Resistance, mm (acid resistance)	0.003	0.03	NR	0.001	0.07
C1028	Slip Resistance Riven Finish (dry/wet)	57/51	68 (wet)	R10	NR	66/63
C1028	Slip Resistance Polished Finish (dry/wet)	54/32	27 (wet)	R9	53/15	60/42

Description of Tests:

C121 - Absorption, %:	Checks for water absorption in stone - a lower value is better
C120 - Modulus of Rupture, Mpa:	Measures the maximum load the stone can withstand - higher is better
C241 - Abrasion Resistance:	Represents the resistance of the stone's surface to wear - higher is better
C217 - Water Resistance, mm:	Measures the depth of softening as a result of acid exposure - lower is better
C1028 - Slip Resistance:	Tested in wet and dry conditions - higher is better (more resistance to slip)

Riverstone Sills - Antic Finish

By comparing Riverstone's results of the ASTM to other well known natural stone distributors you can see that there is little to no compromise on any of the test elements. In some case's Riverstone actually out perform's the better known and more established stone's such as Kirkstone & Burlington. Riverstone 'Modulus of Rupture' is 89 MPa with the Burlington Kirby having only 70 MPa, also beating Kirkstone's Sea Green with a result of only 35.1 MPa.

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Why SSQ Riverstone?

Beautiful grey/green stone with subtle veining and a distinctive texture that provides a durable and long lasting finish for any application.

High Density – The hard constituent minerals in SSQ Riverstone offer good resistance to abrasion providing a surface that would offer few maintenance requirements in office and other similar environments. Since the stone is very strong and dense, floor tiles can be made quite thin (as low as 10mm) which provides the benefit of being able to install the tiles on the existing floor.

Low Potential for Slip – SSQ Riverstone is a metamorphic rock called "phyllite" which is similar to slate but it has a coarser grain size giving it a rougher riven surface. For flooring purposes this is an advantage as the surface is rougher than slate and provides better slip resistance under wet surface conditions. The combination of silica and silicate materials provide SSQ Riverstone with a low potential for slip that will be maintained under most conditions of use.

The natural traditional riven finish has the advantage of a surface, which provides excellent slip resistance.

Low Porosity – SSQ Riverstone has very low porosity, which will not allow the concentration of ice, salts or other materials that could lead to the breakdown of the stone. For most external applications sealants are not necessarily required. (Note: the low porosity means that most treatments will be unable to penetrate the surface or even to any depth below it, so any treatments will need to be of low viscosity and small molecule size if they are to be of any real long-term benefit.)

Riverstone Sills - Honed Finish

The combination of high density with low porosity represents a good wearing surface, which should resist infiltration by general dirt, making the stone relatively easy to clean and maintain.

The physical, mechanical and chemical features are often superior to the best Phyllite or slates around the world including UK, Spain and USA.

Well Defined Cleavage – allows even thickness and exhibits little warping or curling

Choice of Finishes – SSQ Riverstone can be finished in 3 different textures:

- Natural Riven Finish – A natural rippled surface that provides the ultimate slip resistance.
- Honed – A smoother surface, which enhances the natural veining and ensures that each piece is unique.
- Antic (Patina) – This matt finish retains a texture similar to the natural riven finish.

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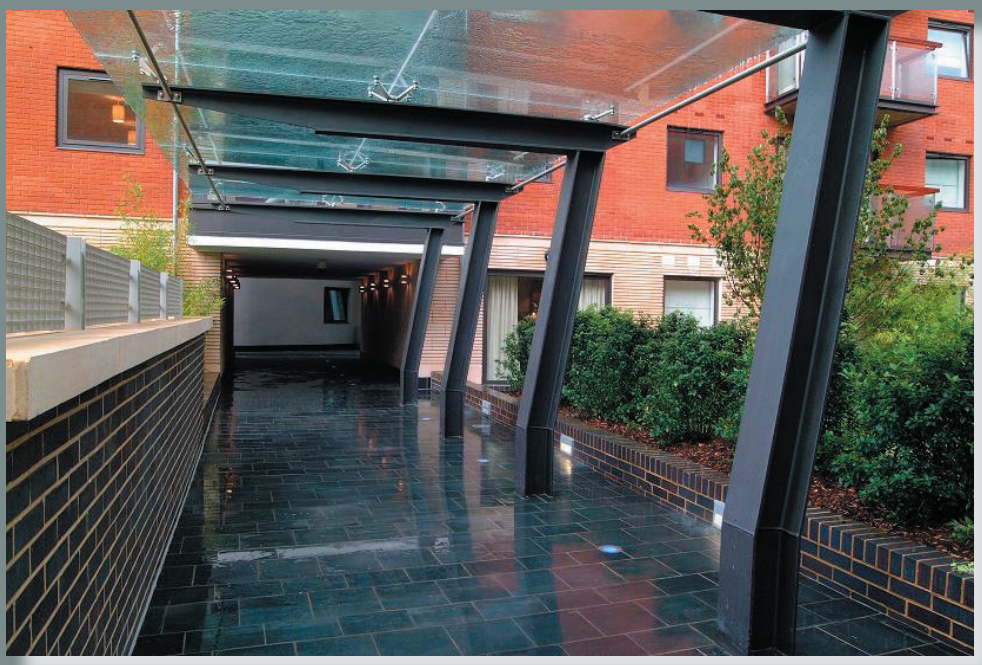
Why SSQ Riverstone?

Over 640 million years old in the making – a truly unique natural stone.

Riverstone Floor - Natural Finish



Non-Fading – Since SSQ Riverstone is a natural stone made up of composite materials and is devoid of artificial pigments. It does not fade in the sunlight and the subtle variations in colour provide an attractive appearance for any application.

Life Expectancy – since SSQ Riverstone is a denser stone than most slates it has a better life expectancy.

High Flexural Strength – in addition to helping resist the general demands of flooring, SSQ Riverstone's high flexural strength will also help to resist the various weathering forces. It is considerably higher than similar flooring materials such as Burlington, Westmorland, and Norwegian phyllite.

Low Calcite Content – SSQ Riverstone is highly resistant to acidic atmospheres.

Testing – SSQ Riverstone has been subjected to a wide variety of tests normally carried out on stones used for both internal flooring and external paving purposes. The stone performed well in all desirable tests and thus was considered to be an excellent choice for flooring purposes. SSQ

Applications – suitable for flooring, cladding, roofing and landscaping.

Why SSQ Riverstone and not marble/quartz/granite?
SSQ Riverstone is more competitively priced and can be produced in the natural riven finish.

Why SSQ Riverstone and not Brazilian?
SSQ Riverstone is available in the natural riven finish – since Brazilian is a mudstone it does not have the coarse minerals, which give a rougher riven surface. For flooring purposes this is an advantage as the surface is rougher than slate and provides better slip resistance under wet surface conditions. Most Brazilian slates are not suitable for external applications.

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Riverstone - Sizes and Shapes

Slabs (scants) - Frame sawn slab with manufactured finish to 1500 mm x 2000 mm.

Sills, treads and risers - Sawn strip with manufactured finish to 500 mm width by 2000 mm length.

Paving and miscellaneous - Paddlestones (tumbled finish) 200 mm x 200 mm, thickness to 50 mm.

Crazy paving 10 mm x 25 mm thick.

Standard Flooring tiles and slabs

Specification	Thickness (mm)	Size/Width/Dimensions (cm)	Natural	Honed & Patina (Antic)
Tiles - Not Calibrated, sawn edges	8/15; 15/25; 20/30	Random 30x20; 30x30; 40x40; 40x20 & 60x30	Yes	
Skirting Not Calibrated (Length 20-50cm) & Calibrated	8/15; 15/25; 20/30	Width 6 to 15cm	Yes	
	10;15 & 20		Yes*	Yes
Tiles - Calibrated, sawn adges	10; 15; 20; 30	30xRandom & 40x Random 30x20; 30x30; 40x40; 40x20; 60x30 & 60x40	Yes*	Yes
Treads, Risers, Window sills and other applications with sawn edges - Length 50 - 250cm	10; 15; 20; 25; 30	Width 15 to 40cm	Yes*	Yes
Slabs Length 50 - 250cm	20; 25; 30; 35; 40	Width 40 to 80cm		Yes
Crazy Paving*	10/20	Approx 8-14 Pieces/m^2 - 24 to 28 m^2/ton	Yes	
Crazy Paving*	15/25	Approx 12-14 Pieces/m^2 od. 5-7 Pieces/m^2 - 23 to 25 m^2/ton		
Crazy Paving*	20/30	Approx 6-12 Pieces/m^2 - 21 to 25 m^2/ton		
Flagstone*	30/50	Approx 5-14 Pieces/m^2 - 9 to 12 m^2/ton		

* Subject to availability

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Natural Stone Maintenance

Stone Maintenance cycle:

There are three phases in stone maintenance cycle:

Step 1 - Preventive Maintenance:

- Protecting the interior of stone with Penetrating SEALERS;
- Proper matting of entrance.

Step 2 - Daily Maintenance:

- Dusting & sweeping with Vacuum or Broom;
- Wet cleaning;
- Repairing of cracks & Joints with glues / chemicals;
- Powder or liquid polishing (if possible);
- Reabsorbing STAINS with POULTICE powders.
- Restoration:
- Resurfacing the stone with a diamond abrasive program to remove scratches and abrasions;
- Deep cleaning of pores of textured surface

Step 3 - Restoration:

- Resurfacing the stone with a diamond abrasive program to remove scratches and abrasions;
- Deep cleaning of pores of textured surface.

Quick Reference Guide For Poultice For Different Stains

Stain Type	Poultice To Be Used
Rust	Powder + Oxalic Acid + Wate (Repolishing Required)
Ink, Magic Marker	Powder + Mineral Spirits or Methylene Chloride
Paint (Oil Based)	Powder + Mineral Spirit
Paint (Water Based)	Powder + Commercial Paint Remover (Ethylene)
Oil (Food)	Powder + Amonia
Coffee/Tea	Powder + Hydrogen Peroxide (Bleaching Powder)
Metal Serates Like Copper & Bronze	Powder + Aminium Chloride
Ketchup or Mustard	Powder + Amonia
Fire, Tobacco, etc.	Powder + Tri-Sodium Phosphate (TSP) + Chlorinated Lime
Urine	Chalk + Sodium Carbonate (or Trisodium)
Iodine	Powder + Alcohol
Blood	Powder + TSP
Chewing Gum	Clay + Tri-Chloroethene
Grease	Clay + TSP

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