

NATURAL SLATE SSQ  
RIVERSTONE ULTRA COVER RE  
ROOFING THE DOWNS ST  
MARYS IOS



## REPORT DETAIL

An Introduction to the Riverstone Phylite rock and the properties that make it unique for natural slate projects in Cornwall.

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**Natural Slate Performance and specification criteria.**

**Riverstone NBS project design service.**

Random Width diminishing course fixing method.

# SSQ RIVERSTONE

## SSQ RIVERSTONE NATURAL SPECIFICATION

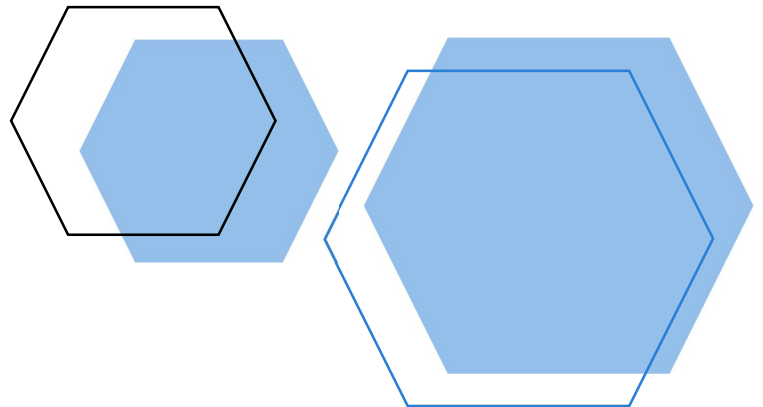
SSQ have been asked to prepare a Slate Specification Proposal document for The Duchy of Cornwall to provide a turnkey roofing Solution using Riverstone Ultra slate roofing as an The objective of using this method of 400 x 250 slating dry laid is to protect the fabric of historically important buildings where traditional slate roofing, is prohibitive due to budgetary constraints.



# SSQ RIVERSTONE QUARRY

## THE ORIGINS OF THE RIVERSTONE QUARRY.

Riverstone is phyllite stone. Phyllite marks a culmination: It is what happens when the geological forces that form slate are permitted to continue. With each step- from sediment to shale, from shale to slate and from slate to phyllite - the stone becomes harder, denser and stronger. Phyllite is rare - there are just a handful of quarries worldwide. Of these, only a few produce stone with the cleavage characteristics needed to make roofing slate. The Delabole and Trevillet indigenous slate are both Phyllite. SSQ own and operate the San Luis quarry in La Repressa, deep in central Argentina, between the Pampas and the high Andes. Quarried for centuries, its enormous reserves date back 640 million years to the pre-Cambrian era. Riverstone phyllite offers superior performance for the most demanding Roofing slate applications and is unique as it is geologically identical to the indigenous slates of both the Delabole and Trevillet slate Quarries.



## TRUSTED SOURCE

### LISTED BUILDING AND CONSERVATION PROJECTS CONSERVATION AREA AND WORLD HERITAGE SITES

Riverstone is one of the few slates that have been accepted in the past as a suitable alternative to indigenous slates on buildings of historical significance across the county. An example of this can be found on projects like the Driftwood Public House St Agnes Cornwall, where Riverstone was chosen to replace a 300-year roof supplied from local Random Width diminishing Course Cornish slate. Riverstone slate has also been chosen for the protection of iconic projects like the Kresson Kernow Cornish Records office where there was a minimum design life cycle of 100 years in a severe coastal environment. Riverstone has also been accepted for use in conservation areas to help preserve the character of these parts of the country and has been installed in World Heritage sites to protect the integrity and character of Building for generations.





# RIVERSTONE PERFORMANCE

## ACD DOCUMENT INCLUDED

Riverstone unique phyletic structure and composition produce a slate that is highly resistant to the physical and chemical processes that age building stone of any type. Riverstone slate is characterized by:

### **Low Water Absorption**

Riverstone Slate has been established as the only realistic alternative to the Cornish Indigenous slate of the Delabole and Trevillet Mill Hill Slate quarries, not only because of its striking similarity in terms of Color, Mica Content and age (Precambrian Phylite rock) but also for its low water absorption levels that surpass those of both the Delabole and Mill Hill Quarry. Riverstone slate Water absorption rate is far lower at .1% compared to Delabole and Trevillet of .3%.

The life cycle expectancy of Riverstone extends to between 75 -100 years depending on the selection.

Table 1.1 Riverstone Mineral content and Water Absorption compared to Indigenous UK slate types

Geology Performance Slates										
Slate	RU	Montana	Guresa	DCU	Welsh	Glendyne	Trevillet	Delebole	Burl Grey	Burl Green
CMOR T	21	Same	Same	46	41.9	54	20.47	Ave 37N	41	28
CMOR L	44			66	56.3	52	52.39	Ave 37N	42	30
MEAN T	32			54						
MEAN L	54			82						
MEAN T				591			900		1400	1500
MEAN L				1043			1377		1600	1950
CARBON	1.40%			0.39	2.25	1.8	0.05	Nil	8.5	17.5
NON CARBON	0.00%			0.48	0.8	1.3	0.01		0.2	0.1
WATER	0.1			0.24	0.12	0.3	0.35	0.3	0.26	0.3
Thickness						4-5mm			7-9mm	12-15mm
Guarantee	100Yr	100Yr	100Yr	100yr		75Yr				
ASTM	RU	Montana	Guresa	DCU						
Flexure S1				807						
Water S1	0.11			0.17						
Weath/R S1	0.01			0.00008						

**FAR OUT PERFORMING TEST REQUIREMENTS.**









Riverstone slate’s exceptional weather resistance makes it nearly impervious to atmospheric pollutants.

Virtual absence of deleterious minerals such as pyrite and calcite (achieves T1 classification) and surpasses all Spanish and non-indigenous imported slates.

Riverstone’s virtual absence of deleterious minerals prevents fading and weakening caused by oxidation and mineral conversion. The low calcium carbonate content prevents the calcification of the slate which has been prevalent amongst the lower cost light colored Spanish slates and Brazilian slates which are prolific in the Cornwall region. The service life cycle of these slate are lower than 30 years, with developer only requesting the absolute minimum performance standards to achieve an accredited NHBC or LABC insurance standard.



## COMPARISON OF WATER ABSORPTIONS

Roofing Slate	Water absorption (typically)		BRAZILIAN SHALE	RIVERSTONE PHYLLITE
Phyllite	0.1-0.2%	00:00 minutes		
Slate	0.25-0.5%	15:00 minutes		
Shale	0.5-1%	30:00 minutes		
Standard	Water absorption threshold	45:00 minutes		
Old BS 680	≤ 0.3%			
EN 12326	≤ 0.6%			
NF 228	≤ 0.4%			



### FURTHER ANALYSIS OF WATER ABSORPTION

The table detailed above demonstrates a further comparison between the water absorption between Brazilian slates and Riverstone Phyllite slate. No Brazilian shale slate meets the requirements of the British Standard. All roof slate development has to reach the minimum requirements of BSEN12326 of .6% water absorption. This criteria allows slate to be installed with a service life cycle of 30 years or less. The minimum service life cycle for Riverstone Random slate is 100 years design life and so most slate that are, BSEN12326 would be non-compliant. We consider that the minimum standard for mid-range and top range slate should be formed from Phyllite roofing slate or Similarly approved.

### WHAT CAN HAPPEN

Severe rusting – from reactive pyrite



### THE COSEQUENCES OF UNCONTROLLED ROOFING SLATE SPECIFIATIONS

The slate installation above demonstrates the consequences of installing Spanish slates with high levels of reactive pyrite and high water absorption slate in a sever exposure coastal Environment.

## WHAT CAN HAPPEN

High water absorption levels – moss growth

Moss is also likely to flourish in wet environments



*The photo above demonstrates the calcifications failure of light colored high water absorption slates in Falmouth Cornwall sourced from the Lugo region of Spain. In this specific example the water absorption rates exceeded .4% where a Spanish slate has been installed with excessive calcium carbonate content. The high levels of salt water exposure and the absorption of that water into the calcium carbonate content of the slate will ultimately lead to the failure of the installation before the minimum life expectancy of the slate in this case the Spanish slate was guaranteed 30 – 40 years.*

### **PRODUCER DETAILS AND GUARANTEE.**

#### **NHBC AND LABC**

*As part of any slate specification, sufficient details are required to identify the source quarry of the slates installed on sites.*

*In most all cases a developer only receives the Supplier and a rough Location where the Quarry is. Most slates entering the UK market place are re branded and the details of the original source quarry are removed either for commercial reasons or to hide the potential less favorable test results. By working with the quarry direct the origins of a low water absorption slate are always known to the investor and the guarantee is always held by the capital investor developer for the entire housing stock. Minimum performance criteria should be set at a **sub .4% or NF228** slate specification to ensure that at least the performance criteria of **Cornish indigenous slate is met, in reality a sub .3% water absorption level.** Where **Random Width slating is proposed the water absorption for Historic Buildings should be .1%, to preserve the fabric and historic features including the origin roof structure for a further 100 years and beyond.***

*The document below shows the Ultra Cover Specification and Method Statement for Riverstone 400 x 250 Ultra Cover. SSQ will guarantee slate specifications without roof modification down to pitches as low as 18 degrees. Shallow roof pitches below 18 degrees can also be design with a modified roof substructure.*

Ref: EU2985

Project: Re Roofing the Downs Higher Trenoweth St Mary's Isle of Scilly

Date: 19<sup>th</sup> July 2019

**NOTE: Only SSQ Assured Installers are approved to install Cover projects;  
Please contact SSQ to discuss suitable SSQ Assured in the locality of the project.**



**Ultra-  
Installers**

## H62 NATURAL SLATING

To be read with Preliminaries/ General Conditions.  
BS 5534: 2014, Code of Practice for Slating and Tiling.  
BS 8000: part 6: 2013 Code of Practice for Workmanship, Slating & Tiling.  
SSQ, Technical Fixing Guide.  
NHBC Chapter 7.2 Pitched roofs 2012.

### TYPES OF SLATING

- 105 ROOF SLATING
- Substrate: As Existing
  - Pitch: 37.5 deg
  - **Underlay:**
  - Recycled content: None.
  - Direction: Parallel to eaves.
  - Underlay Head-lap (minimum): 150mm
  - **Battens:**
  - Size: 50x25mm
  - Fixing: 65x3.35mm ring shank galvanised nails.
  - **Slates:**
  - Supplier: **SSQ Ltd, 301 Elveden Road, Park Royal, London, NW10 7SS.**
  - Contact: Simon Johnson [simon@ssq.co.uk](mailto:simon@ssq.co.uk) 07443804537
  - Product reference: **Riverstone Phyllite**
  - Type:
  - Size: 400 x 250 mm Ultra
  - Head-lap 90mm (minimum):
  - Fixing: Two nails each slate. 35x3.35mm X 10MM dia, head copper nails.

### SLATING GENERALLY

#### 110 SUB CONTRACTORS INFORMATION

It is the roofing subcontractor's responsibility to check that the background to which he is applying slating is square, plumb and level. If the backgrounds are defective then this should be brought to the attention of the Site Manager and under no circumstances should, felt, battens or slating be applied to defective roof slopes.

#### 205 SUPPLIERS INFORMATION

Check the existing supporting roof structure to be slated is in a suitable state to receive the roof covering. It must be sound and true to its flatness and square.

SSQ cannot be held responsible for problems that exist prior to roof slating

Comply with SSQ Natural Roofing Slate Design and Fixing Guide and the following British Standards;

BS 5534:14 code of practice for slating and tiling,

BS 8000:13 part 6 Workmanship, slating and tiling.

Specification and drawings take precedence over SSQ slates data sheets.

#### 210 BASIC WORKMANSHIP

Grading: All slates to be sorted and graded on the ground prior to going on the scaffold, into a minimum of three thicknesses, thin, medium and thick, with the thicker slates at the eaves etc.,

- General: Fix slating and accessories to make the whole sound and weather tight at earliest opportunity.
- Setting out: To true chalk lines and regular appearance, with neat fit at edges, junctions and features.
- Vertical Joints: to be no more than 5mm. Do not form tight butt joints.
- Fixings for slating accessories: As recommended by manufacturer.
- Gutters and pipes: Keep free of debris. Clean out at completion.

#### 220 REMOVING EXISTING SLATING

- General: Carefully remove slates, battens, underlay, etc. with minimum disturbance of adjacent retained slating.
- Undamaged slates: Set aside for reuse.

#### 230 MINERAL WOOL INSULATION

- Manufacturer:
- Product reference:
- Recycled content:
- Thickness: As Architects Detail
- Installation: Fix securely with closely butted joints, leaving no gaps.
- Fasteners: Use where necessary to prevent slumping.
- Ventilation paths: Do not obstruct.

#### 240 UNDERLAY

- Handling: Do not tear or puncture.
- Breather Membrane: Apex
- Manufacturer: Permavent (available via SSQ)
- Contact: Simon Johnson SSQ [simon@ssq.co.uk](mailto:simon@ssq.co.uk) 07443804537
- Laying: Maintain consistent tautness.
- Vertical laps (minimum): 100 mm wide, coinciding with supports and securely fixed.
- Fixing: Galvanized steel, copper or aluminium 20 x 3 mm extra large clout head nails.
- Eaves: Where exposed, underlay must be BS 8747 Annex B, type 5U, or equivalent UV durable type.
- Penetrations: Use proprietary underlay seals or cut underlay to give a watertight fit around pipes and components.
- Ventilation paths: Do not obstruct.

#### 245 BATTENS/ COUNTERBATTENS - TREATED

- Timber: Sawn softwood
  - Supplier; John Brash Ltd., or similar
  - Type; PNSY, WPCA, WPCE, or WPNE
  - Species: To BS 5534, clause 4.12.1.
  - Permissible characteristics and defects: Not to exceed limits in BS 5534, annex C.
  - Grading: mechanically graded to comply with BS5534 and treated to BS8417:2003 and carry a 60year guarantee and be FSC or PEFC certified..
  - Moisture content at time of fixing and covering (maximum): 22%.
  - Preservative treatment: As section Z12 and Wood Protection Association Commodity Specification C8.
  - Type: Red/Blue
- NB: It is not advisable to use Green Batten (semi graded) as further on site, grading is not always carried out, and could cause problems for the future.

#### 259 COUNTERBATTENS ON RAFTERS

Size: 50x25mm

- Fixing: Into rafters at not more than 300 mm centres.

#### 265 BATTEN FIXING



- *Setting out: Align parallel to ridge in straight horizontal lines to gauge of slates. Align on adjacent areas.*
- *Batten length (minimum): Sufficient to span over three supports.*
- *Joints in length: Square cut. Butt centrally on supports. Joints must not occur more than once in any group of four battens on one support.*  
*All cut ends to be brush treated.*
- *Additional battens: Provide where unsupported laps in underlay occur between battens.*
- *Fixing: Each batten to each support. Splay fix at joints in length.*
- *Top batten to have an additional 25x6mm lath nailed to it to take head bearing of tops slate.*

#### 270 BATTENS FIXED TO MASONRY

- *Setting out: In straight horizontal lines. Align on adjacent areas.*
- *Batten length (minimum): 3 m.*
- *Fixing centres (maximum): 400 mm.*

#### 272 TIMBER FOR SLATING SUBSTRATE WORK

- *Timber: Sawn softwood, free from wane, pitch pockets, decay and insect attack (ambrosia beetle excepted).*
- *Moisture content at time of fixing and covering (maximum): 22%.*
- *Preservative treatment: As section Z12 and Wood Protection Association Commodity Specification C8.*
- *Type: .*

#### 275 SLATE FIXING

- *Setting out: Lay slates with an even overall appearance with slightly open (maximum 5 mm) butt joints. Align tails.*
- *Slate thickness: Consistent in any one course. Lay with thicker end as tail.*
- *Ends of courses: Use extra wide slates to maintain bond and to ensure that cut slates are as large as possible. Do not use slates less than 150 mm wide.*
- *Top course: Head-nail short course to maintain gauge.*
- *Fixing: Centre nail each slate twice through countersunk holes 20-25 mm (maximum) from side edges.*
- *Nails: SSQ Copper Clout 3.35x35mm.*
- *Manufacturer: SSQ*
- *Product Reference: CN33535*
- *Nail dimensions: Determine in accordance with BS 5534 to suit site exposure, With drawl resistance, and slate supplier's recommendations.*

#### 280 SLATES - PERFORMANCE SPECIFICATION

- *Standards:*
- *Product specification: To BS EN 12326-1.*
- *Methods of test: To BS EN 12326-2.*
- *Slate type: Riverstone Ultra 500 x 300 Phyllite Slate*
- *Dimensional tolerances:*
- *Deviations from declared length, width, edge straightness, rectangularity, and flatness are not to exceed values specified in BS EN 12326-1, clause 5.12.*
- *Thickness:*
- *Nominal thickness and individual thickness variation: To BS EN 12326-1, clause, 5.2.*
- *Strength:*
- *Characteristic modulus of rupture: (What the minimum requirement is)*  
*Transverse: MPa.*  
*Longitudinal: MPa.*
- *Mean MoR: (SSQ results when tested to BS EN12326)*  
*Transverse: **MPa.***  
*Longitudinal: **MPa.***
- *Water absorption: Code: **W1: .1%***
- *Freeze-thaw resistance: Not required.*
- *Thermal cycle test: **Complies: Code: T1.***
- *Carbonate content: **Complies: 1.4 %***
- *Sulphur dioxide test **Code: S1.***
- *Non-carbonate carbon content: Less than or equal to 2%, **Complies: 0%***  
**100 Year Guarantee,**  
**ASTM 75 years**  
**Guarantee will not rust/run or fade,**  
**Every Crate Barcoded,**  
**Full Labour Backed and insurance backed guarantee.**

## 290 MORTAR BEDDING/ POINTING

- Mortar: 1:3 cement / sand, with plasticizing admixtures permitted.
- Bond strength providing resistance to uplift: To BS 5534.
- Sand: To BS EN1313.
- Cement: To BS EN197-1:2011 (Portland cement to class 42.5)
- Admixtures: To BS EN 934-3
- Pigments: To BS EN12878
- Weather: Do not use in wet or frosty conditions or when imminent.
- Preparation of concrete and clay tile accessories to be bedded: Wet and drain surface water before fixing.
- Appearance: Finish neatly as work proceeds and remove residue.

## ROOF SLATING EDGES/ JUNCTIONS/ FEATURE

### 305 GENERALLY

Ensure that related trades are provided with all relevant information relating to carpentry and other work, etc. Before starting work ensure that previous related work is complete and in accordance with the project documents.

- Form all details using the specified recommended fittings and accessories: do not improvise without prior approval.
- Please be aware that this specification complies with the minimum requirements set out in British Standards so as to conform to, Building Regulations. For certain projects such as new housing there may be additional non-regulatory technical requirements from third party insurers that have to be satisfied. For example there is now a requirement for all mortar bedded ridges and hips must be mechanically fixed to comply with the NHBC Technical Standards so as to be eligible for NHBC Buildmark Warranty Cover. It is your responsibility to check.
- Fittings and accessories: As recommended by slate supplier, to match in colour and finish unless specified otherwise. do not improvise.
- Exposed fittings and accessories: To match slate colour and finish.
- Cut slates: Cut only where necessary, to give straight, clean edges.
- Fix edge slates and fittings securely to give neat and true lines. Ensure that all lead flashings are fixed with or immediately after the slating and are neatly dressed down, to the LSA requirements.

### 325 FIRE SEPARATING WALLS

- Separating walls: Completely fill space between top of wall and underside of slates with mineral wool quilt to provide fire stopping.
- Boxed eaves: Completely seal air paths in plane of separating wall with wire reinforced mineral wool, not less than 50 mm thick, fixed to rafters and carefully cut to shape to provide fire stopping.

### 355 VENTILATED EAVES WITH SEPARATED GRILLES/ TRAYS

- Fascia grilles: SSQ Over-fascia Vent 1000x10mm
- Manufacturer: SSQ
- Product reference: OFV10-1000
- Ventilator trays: SSQ Continuous Rafter Tray 6000x400mm
- Manufacturer: SSQ
- Product reference: RPV-400
- Underlay support: SSQ Eaves Protection Boards 1500mm
- Manufacturer: SSQ
- Product reference: EPB-150
- Fix to provide free passage of air over insulation.
- Continuous to prevent water retaining troughs.
- Gutter: Dress underlay or underlay support tray to form drip into gutter.
- Under course and first course slates: Fix with tails projecting 50 mm over gutter or to centre of gutter, whichever dimension is the lesser.

### 525 MITRED HIPS

- Underlay: Take underlay over the hip rafter from both directions and additionally lay a full width of underlay down the rake of the hip rafter length.
- Overlaps (minimum): 150 mm.
- Hip slate fixing battens: 50x25mm running into the hip.
- Mitred slates: Cut extra wide slates and fix to form a straight, close mitred junction.
- Soakers: Code 3 lead soakers treated with patination oil, should interleave with the slates and fixed so that they extend a minimum of 150mm down each side of the mitred hip Interleave. Fix by turning down over head of mitred slates.
- Lead to BS EN 12588:2006.

#### 530 LEAD

To be read in Conjunction with clauses set in H71 and to BS EN12588:2006.

#### 615 METAL VALLEYS-OPEN.

- Lay an additional piece of 5mm external quality plywood on top of the valley board, the valley board should extend 225mm each side of the valley with tilting fillets positioned 150mm each side of the centre.
- Valley lining boards should not be less than 19mm thick.
- Underlay: Cut to rake. Dress over tilting fillets to lap onto lead valley. Do not lay under lead
- Roof slates: Cut extra wide slates adjacent to valley to fit neatly.
- Valley width between slates, minimum 100mm.

#### 660 SIDE ABUTMENTS-

- Abutment slates: Cut as necessary, **slates less than 150mm wide should not be used. Fix close to abutments.**
- Underlay: Turn up not less than 100 mm at abutments. -
- Code 3 lead soakers length; gauge + lap + 25mm.
- Fix cover flashing over soaker up stands and secure into brickwork joints.
- Soakers: Interleave with abutment slates. Fix by turning down over head of abutment slates.

#### 670 TOP EDGE ABUTMENTS

- Underlay: Turn up not less than 100 mm at abutments.
- Top slate courses: Fix close to abutments batten

#### 750 MORTAR BEDDED RIDGES

- Underlay: Lay courses over ridge.
- Overlap (minimum): 150 mm.
- Ridge tile fixing battens: In accordance with BS 5534
- Re use the existing according to Architects Detail.
- Gable end ridge tiles: Fill ends with mortar and slips of tiles finished flush.
- Ridge terminals
- Manufacturer:
- Product reference:

#### 855 BAT ACCESS

Bat Slate: SSQ Eclipse Bat Vent

Manufacturer: SSQ BATVENT

Product reference: Technical Author: Richard F G Cook 07734 199449; [richard@ssq.co.uk](mailto:richard@ssq.co.uk)











