

# Roof Slate

Diamond  
fibre cement slate





# Diamond slate

The best natural and man-made slates the world has to offer are available from Cembrit. Cembrit are members of the Cembrit Holding A/S Group of Denmark, one of Europe's major building material producers with over 80 years experience in the manufacture of fibre reinforced cement products for the roofing and cladding industry.

Using skills accumulated over 80 years, Cembrit select natural slate from Spain, Canada, Brazil and North America. From UK quarries, Cembrit offer Welsh and Westmorland slates.

A range of recommended accessories is also available.

Diamond slates are a flat-square edged fibre cement slate using Portland cement together with a non-asbestos formulation of superior blended synthetic and cellulose fibres. Diamond slates are pigmented during production, pre-holed and fully compressed.

Reminiscent of the original 'red diamond' slates first used in the first half of the 20th century their attractive 'retro' effect is particularly suited to re-roofing of properties from that era and for buildings in a rural setting. The cost-effective single lap format lends itself to simple duo-pitch roofs with no projections.

#### **Quality assurance**

Diamond slates are manufactured in accordance with a quality assurance system to BS EN ISO 9001:2000 and to the requirements of BS EN 492: 2004 product specification for fibre cement slates and their fittings.

#### **Environment**

Diamond slates are manufactured in a factory which complies with the requirements of BS EN ISO 14001:2004, and has been awarded BVQI Certificate No. 8000117.

#### **Colours**

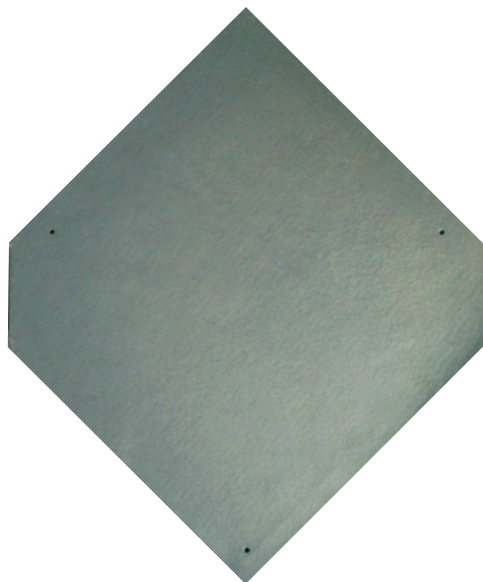
Diamond slates are available in Russet, Blue/Black and Brown colours.





## Appearance

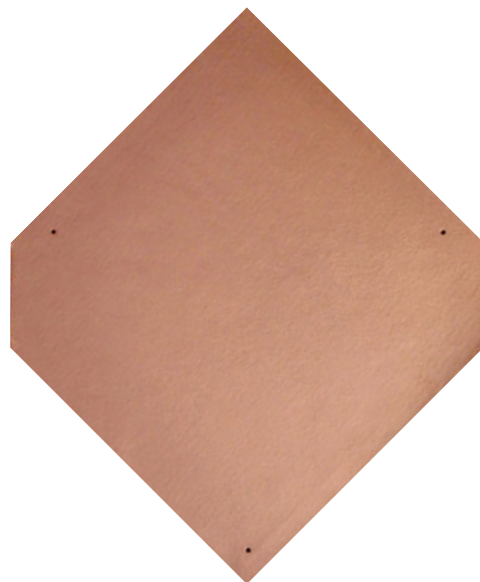
Diamond slate is available in Blue/Black, Russet and Brown.



Blue/Black



Russet



Brown

## Performance

### Compatibility

Diamond slates are compatible with most common building materials, except those vulnerable to alkaline attack. When materials such as aluminium are used as flashings or gutters they should be protected and maintained with bituminous paint if they will be subject to water run-off from the slates.

### Tolerances

Diamond slates are made to the following dimensional tolerances in accordance with BS EN 492:2004.

Length or width:  $\pm 3.0\text{mm}$  Thickness:  $4\text{mm} + 1.0\text{mm}, - 0.4\text{mm}$

### Strength

Diamond slates exceed the requirements of Class B (the highest) of BS EN 492:2004 giving an average bending moment greater than 50 Nm/m.

### Density

Diamond slates have an average density of  $1850 \text{ kg/m}^3$  when tested to BS EN 492:2004 section 7.3.1.

### Fire

Diamond slates achieve the following ratings:

BS 476: Part 2:1989 and BS 476: Part 7:1987. Fire Propagation

Index (I) of 0.9, a Sub index (ii) of 0.3 and a Class I surface.

Class 0 surface as defined in the various national Building Regulations.

BS 476: Part 3 1958 EXT. SAA

BS 476: Part 3 1975 Class P60

### Frost

Diamond slates show satisfactory frost resistance after 100 freeze/thaw cycles and satisfy the requirements of BS EN 492: 2004 section 7.4.1.

### Thermal

The coefficient of linear expansion of Diamond slates is approximately  $8 \times 10^{-6} \text{ mm/}^\circ\text{C}$ . This is equivalent to an expansion of 0.08mm/m for a  $10^\circ\text{C}$  temperature change. Thermal conductivity (k value) is  $0.35 \text{ W/m}^\circ\text{C}$ .

### Effects of chemicals

During tests Diamond slates have been found to have a good resistance to chemical attack, however it should be noted that prolonged exposure will cause surface degradation. In areas where this may be excessive please consult Cembrit for further advice.

### Biological

Diamond slates are vermin and rot proof. The acrylic coating of the slates will reduce the potential growth of moss and lichen.

## General design considerations

Diamond slate laid to BS 5534:2003 will meet the strength requirements for the imposed and uniformly distributed wind and snow loads etc. For UK and Northern Ireland locations, BS 5534:2003 will indicate the expected degree of exposure. Wind driven rain ratings less than  $56.5 \text{ l/m}^2$  per spell are described as 'moderate' (see table 1) and those above  $56.5 \text{ l/m}^2$  per spell are described as 'severe' (see table 2). Detailed guidance on wind load calculations is given in BS 5534:2003 and in BS EN 1991-1-4:2005 and 1991-1-3:2003 to calculate the wind action (design loads) on a roof it will be necessary for the designer to use two documents at the same time; the Eurocode standard BS EN 1991 Part 1-4, and the associated National Annex. The authors of the National Annex have advised that reference should also be made to the background paper PD 6688-1-4 when it is published.

In locations where abnormal conditions may be anticipated such as elevated sites, coastal locations, areas of heavy snowfall etc., the recommendation for 'severe' should be followed. Additional information can also be found in BS 8104: 1992. Where the location or construction might make a lower rafter pitch acceptable, designers are asked to seek advice.

**Table 1** Moderate exposure

less than 56.5 l/m² per spell

- In general, the recommendations below apply to rafter lengths of not more than 9m. The specifier should also take account of any abnormal local conditions that might apply.

Minimum Pitch	Slate size	Side lap	Slates	Batten Gauge	Average weight
deg	mm × mm	mm	no/m²	mm	kg/m²
30°	400 × 400	85	10.1	210	13.43

An allowance should be made for cutting and wastage.

**Table 2** Severe exposure

greater than or equal to 56.5 l/m² per spell

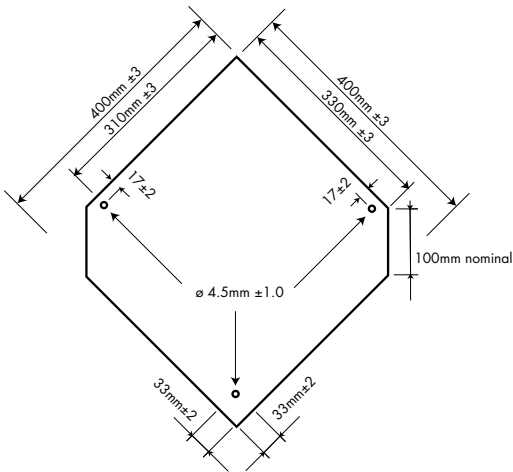
- In general, the recommendations below apply to rafter lengths of not more than 6m. The specifier should also take account of any abnormal local conditions that might apply.

Minimum Pitch	Slate size	Side lap	Slates	Batten Gauge	Average weight
deg	mm × mm	mm	no/m²	mm	kg/m²
35°	400 × 400	85	10.1	210	13.43

It is essential that a high performance weatherproof underlay is used when fixing Diamond slates in severe exposure areas.

**Table 3** Technical specification

Size	Holed	Weight per 1000	No. per Pallet	Colour
mm	mm	kg		
400 × 400	85 lap	1330	750	Blue Black
400 × 400	85 lap	1330	750	Russet
400 × 400	85 lap	1330	750	Brown



**Sitework**

**Storage and handling**

Diamond slates should not be allowed to become wet during storage as this may cause efflorescence staining as a result of water accumulating between the slate's surfaces. If stored outside for short periods, the polythene hood should be removed and the slates open stacked and covered with a tarpaulin. The slates should be carefully stacked on their longer edges with timber bearers, battens or boards between layers. The lowest layer must be arranged on a firm level base.

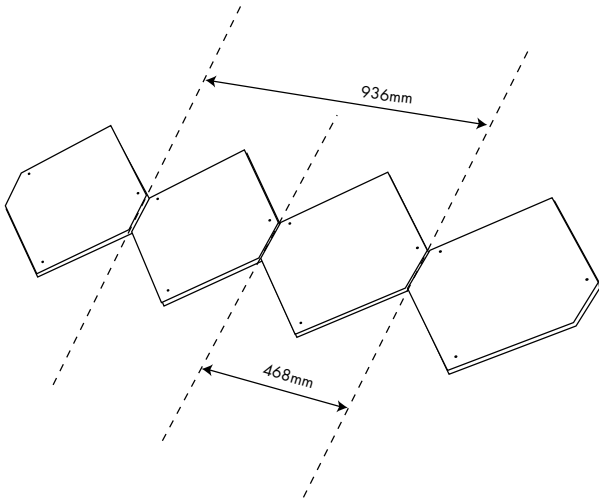
**Working**

Diamond slate can be cut using the traditional method of scribing and breaking over a straight edge. Angle grinders are not recommended due to nuisance dust levels. Additional fixing holes should be drilled using a 4.5mm drill bit. Holes should not be less than 20mm from the edge of the slate. After cutting or drilling remove all dust from the slate to avoid possible staining.

**Fixing**

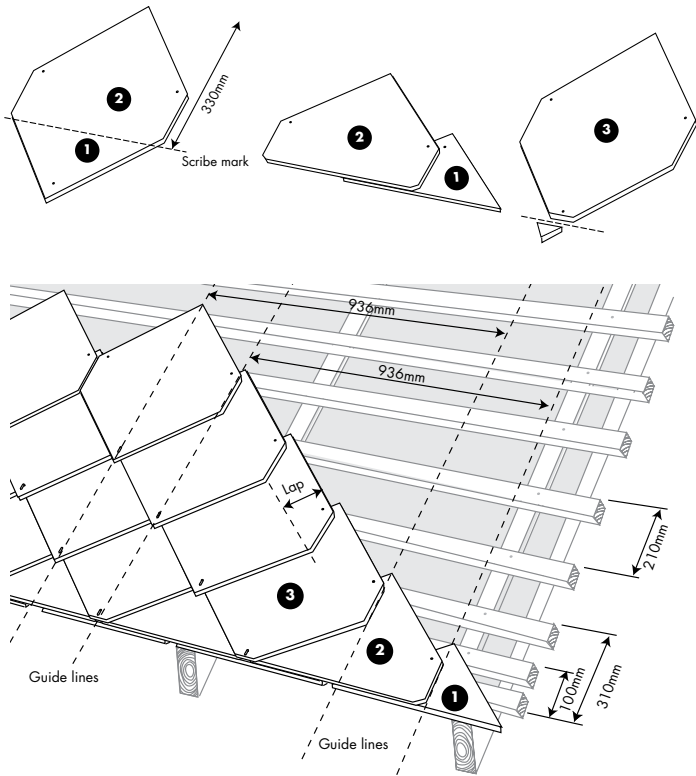
**Setting out**

- 1 The slates should be laid with the upper point to the upper edge of the batten and with spacing of 3mm. Where disc rivets are placed from row to row the slates are displaced ½ width.
- 2 Place the slate over the disc rivet and fasten it with a slate nail in each side. The bottom slate should be secured by bending the disc rivet downwards. Keep the direction in check.
- 3 The width of mounting for one slate is 468mm. Use this dimension for marking of the guide line from the base of the roof to the ridge.



**Installation**

- 1 The slate in the first and the second row are cut from the same slate. See sketch indicating the scribe mark. The dimension 330mm is firm regardless of projection in gutter. The slate should be scribed and broken over a sharp edge.
- 2 The bottom part should be turned 180° and used as the first row of slates. These should be nail fastened to the second batten through the original disc rivet hole.
- 3 The upper part should be used as the second row of slates, which are nail fastened to the bottom batten. Before fastening, the nail holes should be drilled through the first row of slates.
- 4 The point of the 3<sup>rd</sup> row of slates (1<sup>st</sup> full row) should be removed so that the tails of all 3 courses are aligned.



Diamond slates must be laid in accordance with the Code of Practice for Slating and Tiling, BS 5534: 2003, and the Code of Practice for Workmanship on Building Sites – Slating and Tiling, BS 8000: Part 6: 1990. The roof structure should be checked to ensure that it is to a true line and squareness tolerance, and set out to ensure that:

- the minimum cutting of slates is necessary.
- the long edges of the slates are parallel to the direction at which the water will run off the roof. In some instances this may result in raking cuts to all the eaves and the ridges.
- the horizontal lines of the courses are straight and true.
- the perpendicular lines of the slate are to a true alignment and allow for a small 'perp' gap between slates (3mm  $\pm$  1mm).

The last two items are best achieved using a chalked line.

The method of fixing is to centre nail each slate with two 2.65mm x 30mm long copper nails and secure the tail of the slate with a copper disc rivet of suitable quality (20mm x  $\geq$ 0.45mm base with a 20mm x 2mm pin) correctly bent down-slope through 90°.

At all verges and abutments, where part slate are used to maintain the bond they must be fixed with two nails and a rivet. If possible, slate should not be less than 150mm wide. The rivet fixing should be drilled such that the rivet passes through two thicknesses of slate. At valleys and hips where slates need to be cut on the rake, narrow cuts must be avoided to maintain an adequate width at the head or tail. At mitred hips on low pitched roofs cut slate as wide as possible should be used beneath the hip capping.

#### Battens

Minimum batten sizes as recommended in Table 1 of BS 5534: 2003 for use with fibre cement slates for roofing and vertical work:

Span(mm)	Batten size(mm)
Up to 450mm	38 x 25
Up to 600mm	50 x 25

To avoid splitting the batten, the maximum nail diameter should not exceed one tenth of the batten width. The ends of any batten should be fully supported and the length of any batten should not be less than 1.2m (except where this is unavoidable) and nailed to a maximum of 600mm centres. Where the roof is close-boarded, counter battens should be used down the slope in the roof on the line of the rafters. Counter battens should be of sufficient thickness to provide ventilation between the boarding and underlay.

The batten gauges for common laps are shown in tables 1 and 2.

#### Underlay

Suitable underlay should have a minimum standard to BS 747:2000 Type IF and/or should have a BBA Certificate. The underlay should be draped over the rafters, or fully supported on boarding or sheathing, should allow any moisture to drain and should extend over the tilting fillet, fascia board and into the eaves gutter.

#### Ventilation

Regardless of the type of underlay used the roof space and/or batten cavity must always be ventilated in accordance with the latest edition of BS 5250: 2002. Particular attention should be given to the need for adequate ventilation where the insulation follows the rafter line. In this situation the batten space above the membrane and below the slate must be ventilated. The NHBC 2011 Standards require a continuous 5mm airgap along the ridge regardless of roof type. Cembrit Ltd offer a comprehensive range of ventilation products to suit most applications and further information is available in the Cembrit Accessories technical brochure.

#### Lead staining risk

Lead develops a lead carbonate patina which, if washed over slates by rain or other moisture, causes unsightly staining. To prevent this reaction marring the work, it is advisable to treat all lead including soakers and flashings, with patination oil before any rain occurs, and not later than the day the lead is fixed. Patination oil, which is readily available from builders' merchants, should be applied following the manufacturer's instructions.

#### Identification

A minimum of 25% of the slates are marked on the underside using the following format: BB104206NTB2 where the first character denotes the factory of origin; the second character the Strength Classification from BS EN 492 section 7.3.2; the next six numbers denote the shift and year of manufacture; NT denotes non-asbestos technology; and the final two characters show the production line and painting line used for manufacture. The seven subsequent characters are internal identification markings.

#### Typical specification

Roof to be covered with Diamond single-lap slates, size 400mm x 400mm, laid to a lap of 85 mm. Colour.....

An NBS specification is available either from our Technical Department or our website.

#### Accessories

A full range of accessories including fibre cement undercloak/soffit strip is available. Please contact our Technical Department or see our website for full details.

#### Supply

Cembrit's fibre cement Diamond slates are supplied directly to approved accounts, roofing contractors and builders merchants. Prices are available on request from Cembrit.







The information contained in this publication and otherwise supplied to users of the company's products is based on the company's general experience, best knowledge and belief. However, because of factors beyond the company's knowledge and control, which can affect the use of the products, no warranty is given or implied with respect to such information.

The company's policy is one of continuous improvement. Cembrit Limited therefore reserves the right to alter specifications at any time and without notice.

As with all manufactured materials, colours and textures of slate may vary according to light and weather conditions. It is advisable to ask for samples of slate prior to specification and purchase.

Owing to this and limitations of the printing process, colours of slate in this brochure may only be taken as indicative.

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