



Red St.Beese Sandstone

Technical Data Sheet

Red St.Bees Sandstone

Birkhams Quarry, St.Bees, Cumbria

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This data sheet was compiled by the Building Research Establishment (BRE). Where possible, data collected in earlier surveys has been used to help interpret the test results. The data sheet was compiled in July 1997 using the results of tests carried out to the proposed European Standards. It was up dated in March 2000. The work was carried out by BRE as part of a Partners in Technology Programme funded by the Department of the Environment, Transport and the Regions and Cumbria Stone Quarries Ltd and does not represent an endorsement of the stone by BRE.

General

The quarry is a cliff side quarry on the coast at Salton Bay, St Bees Head south of Whitehaven, Cumbria. The quarry and the surrounding area has been worked since medieval times with materials being shipped by sea – some to America in the 18th and 19th centuries. The present owners have operated the quarry since 1981 and there are good reserves of stone.

There is a 3 m overburden with a working face of approximately 20 m. Maximum block sizes are of the order of 1.25 x 3 x 3 m in size; 1m on bed.

Petrography

Red St.Bees is from the New Red Sandstone of Triassic age. It is a fine-grained stone, dull red in colour. There are up to 3m of overburden and the depth of the present face is 22.5m. It is thought that the stone extends right down to sea level, a depth of 90m. Stone is available, in good lengths and widths, at depths of 1m on bed.

Expected Durability and Performance

It is important that the results from the individual tests are not viewed in isolation. They should be considered together and compared to the performance of the stone in existing buildings and other uses. Sandstones from the New Red Sandstone have been used extensively in many towns and cities in the UK. Red St.Bees sandstone appears to be a less durable stone than some similar stones

(eg Plumpton Red Lazonby) and the test results suggest that although it may be resistant to air pollution, it is susceptible to weathering in very salty environments. Earlier test results showed it to have limited resistance to acidic pollution but the latest samples tested (1999) passed the test suggesting that the current material has better resistance to acidity. Based on the limited data available for the interpretation of the frost tests it seems that the Red St.Bees is typical for a sandstone. There is no loss of strength as a result of the frost cycles no spalling of the surface or other loss of material. The compressive strength of the stone is typical of the range for good sandstones. The abrasion resistance is towards the lower end of the range and the stone is probably unsuitable for use in heavily trafficked areas.

Overall, Red St Bees should be suitable for use as load bearing masonry and cladding. Special consideration is required for areas where there are high salt concentrations and a long service life is required. The stone has been used for minor paving applications.

Test Results – Birkham Red St.Bees

Safety in Use		
Slip Resistance <small>(Note 1)</small>	Wet: 75- 85	Values > 40 are considered safe.
Abrasion Resistance <small>(Note 1)</small>	30.6 – 33.4	Values <23.0 are considered suitable for use in heavily trafficked areas
Strength under load		

1) Compression ^(Note 2)	78.6 – 100.1 MPa	Loaded perpendicular to the bedding plane ambient humidity
2) Bending ^(Note 1)	8.7 – 9.4 MPa	Loaded perpendicular to the bedding plane ambient humidity
	7.9 MPa	Loaded parallel to the bedding plane ambient humidity
Porosity and Water Absorption		
1) Porosity ^(Note 3)	18.4 – 19.8%	
2) Saturation Coefficient ^(Note 3)	0.66	
3) Water Absorption	5.6 – 6.2% (by wt)	
4) Bulk specific gravity	2136-2179kg/m ³	
Resistance to Frost		

Flexural strength after Freeze/Thaw Test ^(Note 1)	12.8 MPa	Loaded perpendicular to the bedding ambient humidity
Resistance to Salt		
Sodium Sulphate Crystallisation Test ^(Note 3)	6.2% Mean wt loss	
Sodium Sulphate Crystallisation Test ^(Note 14) (saturated)	63-100% Mean wt loss	
Resistance to Acidity		
Acid Immersion Test ^(Note 4)	Fail (1997) Pass (1999)	

(Test methods Note 1 = prEn1341, Note 2 = prEN 1342, Note 3 = prEn 1341 /BRE 141, Note 4 = BRE 141)

All tests were carried out at BRE between July and September 1996 or in 1999)