



portland stone - naturally

ALBION STONE

## BOWERS ROACH

This technical data sheet was compiled by the Building Research Establishment (BRE) at the request of Albion Stone and is updated by Albion Stone to incorporate current test results. The 1097 tests have been carried out in accordance with current European standards by the BRE on Albion Stone's behalf, or by other accredited testing houses. The early test data that pre-dates the introduction of Euro-codes has been included providing the test methods were very similar. The work carried out by the BRE on this technical data sheet has been undertaken as a paid commission and does not represent an endorsement of the stone by the BRE. This data includes the Lowest and Highest Expected Values (LEV & HEV) using the statistical calculations from the Euro-codes. We are confident that these results give a good indication of the stones value, but as it is a natural material we, like other stone producers, are unable to guarantee individual results for specific stones. Instead, we recommend that an appropriate factor of safety is used to ensure satisfactory performance, Cladding Annex 1 of the Technical Manual provides further information, but we suggest that a suitably qualified stone consultant with geological and testing experience is employed to provide further information.

### Petrography

The stone is an open textured oolitic limestone from the Portlandian formation (Jurassic). The stone is formed from ooliths in a micrite (fine grained calcium carbonate) matrix. It is an extremely shelly stone with a large number of holes scattered throughout it. The holes are due to the removal of fossil shells by percolating rain. The finer-grained parts of the stone is very similar to Whitbed.

### Strength

#### Compression - BS EN 1926

Lowest Expected Value 23.96 MPa  
Highest Expected Value 75.09 MPa  
**Average: 44.24 MPa from 32 tests**

#### Flexural Strength - BS EN 13161

Lowest Expected Value 2.02 MPa  
Highest Expected Value 6.70 MPa  
**Average: 3.94 MPa from 140 tests**

#### Breaking Load at Dowel Hole (75mm thick stone) - BS EN 13364

Lowest Expected Value 1,981 N  
Highest Expected Value 8,264 N  
**Average: 4,287.90 N from 30 tests**

### Durability

#### Water Absorption - BS EN 13755

Lowest Expected Value 3.59%  
Highest Expected Value 10.70%  
**Average: 6.28% from 153 tests**

#### Density - BS EN 1936

Lowest Expected Value 1,868 kg/m<sup>3</sup>  
Highest Expected Value 3,952 kg/m<sup>3</sup>  
**Average: 2,254 kg/m<sup>3</sup> from 213 tests**

#### Porosity - BS EN 1936

Lowest Expected Value 10.28%  
Highest Expected Value 30.74%  
**Average: 17.92% from 267 tests**

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### **Saturation Coefficient - BS EN 1936**

Lowest Expected Value 0.53

Highest Expected Value 0.72

**Average: 0.62 from 173 tests**

### **Salt Crystallisation - BS EN 12370**

Lowest Expected Value 1.18%

Highest Expected Value 5.91%

**Average: 2.88% from 11 tests**

### **Flooring / Paving**

Stone from Bowers and Jordans Mine and Jordans Quarry compared to those collected from buildings, exposure trials and tests on quarry samples collected by BRE during the last 80 years shows that this stone compares very well with the traditional view of Portland Roach.

### **Abrasion Resistance - EN14157**

Lowest Expected Value 20.12

Highest Expected Value 26.04

**Average: 22.93 from 18 tests**

### **Slip Resistance - TRRL Pendulum Test: Grit 120 Filled (Internal Flooring)**

Lowest Expected Value 74.7

Highest Expected Value 91.6

**Wet Average 82.85 from 60 tests**

Lowest Expected Value 74.5

Highest Expected Value 83.2

**Dry Average 78.75 from 12 tests**

### **Light Reflectance - tested using NCL Colour Scan instrument - Grit 60: Mean Value 57**

*(Value from Grove Whitbed test, however these stones are very similar)*

### **Internal Flooring**

Bowers Roach is suitable for all flooring applications up to intensive use such as shopping centres and airports with estimated visitor numbers of 500,000,000 with a service life without significant wear of 20 years. The dry slip resistance results of over 40 demonstrate that the stone will be safe in all normal applications.

### **Technical Summary**

#### **Prepared by: Dr T Yates, BRE (Building Research Establishment): Durability and Weathering**

It is important that the results from the sodium sulphate crystallisation tests are not viewed in isolation. They should be considered with the results from the porosity and water absorption tests and the performance of the stone in existing buildings. Stone from the Portland Roach Bed is traditionally acknowledged as generally being a very durable and is comparable with Whitbed. It has been used in extreme environments, for example coastal walls. It is difficult to compare the results for the Roach Bed Stone from Jordans Mine to those collected from buildings and exposure trails as the stone has been little used in building construction. However, the overall test results suggest that the stone compares well with the traditional view of Portland Whitbed. Previous research by the BRE has shown that Portland Limestone which has a low saturation coefficient (>0.72) will have good weathering resistance when used on buildings. The crystallisation tests results show the stone to be Class A-B which BRE Report 141 suggests that it is suitable for most uses.

**Based on current research it seems likely that the stone would weather at a rate of between 1 and 2 mm per 100 years but it could be greater in severe exposures.**

*(Weathering rates are based on the BRE interpretation of historical data dating from 1932).*

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