# FANCY BEACH WHITBED

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 1514 tests have been carried out from 2006 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, 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 was classified as a moderately sorted, moderately compacted, clast supported Oosparite Limestone. The clasts were predominantly composed of ooliths, but mollusc shell and echinoderm fragments and quartz were also present. The matrix was composed of sparitic syntaxial carbonate and some micritic carbonate. There was a moderate to high abundance of open voidage space. There was possibly some evidence of sedimentary bedding by the preferred alignment of elongate clasts.

## Strength

**Compression - BS EN 1926**

Lowest Expected Value 37.00 MPa
Highest Expected Value 61.04 MPa
**Average: 47.97 MPa from 36 tests**

**Flexural Strength - BS EN 13161**

Lowest Expected Value 3.57 MPa
Highest Expected Value 8.43 MPa
**Average: 5.68 MPa from 131 tests**

**Breaking Load at Dowel Hole - BS EN 13364:2002**

| Specimen Thickness (mm) | Mean Breaking Load (N) | Lowest Expected Value (N) / Highest Expected Value (N) |
|---|---|---|
| 75 | 4,667 | 3,383 / 6,281 |
| 50 | 2,165 | 1,469 / 3,081 |
| 40 | 1,348 | 965 / 1,834 |
| 30 | 667 | 539 / 817 |



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## Durability

**Water Absorption - BS EN 13755**
Lowest Expected Value 3.18%
Highest Expected Value 9.62%
**Average: 5.82% from 139 tests**

**Density - BS EN 1936**
Lowest Expected Value 2,006 kg/m³
Highest Expected Value 2,385 kg/m³
**Average: 2,190 kg/m³ from 174 tests**

**Porosity - BS EN 1936**
Lowest Expected Value 12.32%
Highest Expected Value 27.29%
**Average: 18.84% from 223 tests**

**Saturation Coefficient - BS EN 1936**
Lowest Expected Value 0.52
Highest Expected Value 0.82
**Average: 0.66 from 108 tests**

**Salt Crystallisation – BS EN 12370**
Lowest Expected Value 0.15%
Highest Expected Value 12.77%
**Average: 1.76% from 7 tests**

**Thermal Shock Resistance—BS EN 14066**
**(% change in elastic modulus)**
Lowest Expected Value 0.30%
Highest Expected Value 32.35%
**Average: 4.51% from 10 tests**

**Water Absorption by Capillarity - BS EN 1925**
g/m².sec$^{-2}$

## Flooring / Paving

**Abrasion Resistance - EN 14157**
Lowest Expected Value 21.01
Highest Expected Value 25.96
**Average: 23.39 from 18 tests**

**Slip Resistance - TRRL Pendulum Test: Grit 120 (Flooring)**
Lowest Expected Value 67
Highest Expected Value 86
**Wet Average value 76 from 30 tests**
Lowest Expected Value 75
Highest Expected Value 100
**Dry Average value 87 from 30 tests**



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**Freeze/Thaw — Flexural Strength - BS EN 12371 & 12372 (Pre-thermal testing)**
Lowest Expected Value 3.65 MPa
Highest Expected Value 7.31 MPa
**Average: 5.25 MPa from 20 tests**

**Freeze/Thaw—BS EN 12371 & 12372 (Average figure 14-168 cycles)**
Lowest Expected Value 1.70 MPa
Highest Expected Value 9.42 MPa
**Average: 4.37 MPa from 50 tests**

**Freeze/Thaw — Flexural Strength - BS EN 12371 & 12372 (After 14 (20) cycles) For cladding in accordance with EN 1469**
Lowest Expected Value 3.30 MPa
Highest Expected Value 7.70 MPa
**Average: 5.15 MPa from 20 tests**

**Freeze/Thaw — Flexural Strength - BS EN 12371 & 12372 (After 56 cycles) For paving in accordance with EN 1341**
Lowest Expected Value 1.06 MPa
Highest Expected Value 13.22 MPa
**Average: 4.16 MPa from 7 tests**

**Freeze/Thaw — Flexural Strength - BS EN 12371 & 12372 (after 168 cycles) in accordance with EN 771-6**
Lowest Expected Value 1.33 MPa
Highest Expected Value 7.84 MPa
**Average: 3.48 MPa from 10 tests**

**Light Reflectance - tested using NCL Colour Scan instrument - Grit 60:** Mean Value 57.00

## Internal Flooring

Fancy Beach Whitbed is suitable for all flooring applications up to semi-intensive use such as shops and offices with estimated visitor numbers of 5,000,000 with a service life without significant wear of 20 years. The slip resistance results of over 40 demonstrate that the stone will be safe in all 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 Whitbed is traditionally acknowledged as generally being a very durable building stone and it has been used extensively in many towns and cities in the UK. Comparing the results for the Whitbed Stone from Jordans Mine to those collected from buildings, exposure trials and tests on quarry samples collected by BRE during the last 70 years shows that this stone compares very well with the traditional

view of Portland Whitbed. Previous research at BRE has shown that Portland limestone which has a low saturation coefficient (<0.72), a low microporosity (<11.0 of the stone by volume) and an open oolitic structure generally performs well over long periods when used on buildings. The results summarised on these sheets show that the limited number of samples tested meet these criteria. The average crystallisation test results show the stone to be Class C which BRE Report 141 suggests is suitable for most uses including where exposure conditions are to be more severe, for example high concentrations of sulphur dioxide or severe frosts, or where a long life is required (for example >50 years). In all cases it is important that the detailing of the stonework is designed to offer the maximum protection from rainwater and rainwater runoff.
**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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