

**PRELIMINARY REPORT ON
AMDEL REPORT M6296/89**

SUMMARY:

(1) Bulk Density.

The bulk density figure of 2.71 agrees with the expected figure for pure calcite

(2) Water Absorption

The results meet ASTM specification.

(3) Ultrasonic Pulse Velocity

“Opale Bianco” is superior to the imported samples and other Chillangoe marbles. The anisotropy lies within acceptable limits.

(4) Flexural Strength

The Flexural Strength is low in comparison to the imported marbles and is an indication of the limitations on the performance of the marble in service.

(5) Abrasion Index

“Opale Bianco” meets the minimum ASTM standard and falls slightly below two of the imported marbles tested.

(6) Recommendations

- (i) that these AMDEL results should not be presented in isolation.
- (ii) A program of non-going testing of the various imported Austcorp competes with on the domestic market and the full range of marbles Austcorp markets.
- (iii) That Austcorp undertake a product research and development program to form the basis of a far more professional marketing and selling approach. Technical aspects of such a marketing package should be prepared by the Operations Group.
- (iv) In the future, no advertising material containing technical data to be issued without vetting by Operations.

The results of the preliminary comparative tests between four imported marbles and the “Opale Bianco” have been completed.

(1) Bulk Density

The bulk density figure of 2.71 agrees precisely with the expected figure for pure calcite.

(2) Water Absorption

The results for absorption, apparent porosity, effective porosity and saturation coefficient fall below the maximum allowable by the ASTM for exterior marbles and show the Opale Bianco to be marginally superior to the imported marbles. Anticipate that the Opale Bianco would perform well in terms of resistance to penetration by fresh and saline water and to staining by non-acidic solutions.

(3) Ultrasonic Pulse Velocity

The measurement of Ultrasonic Pulse Velocity provides information relating to the strength, elasticity, homogeneity and anisotropy of the marble.

The results clearly show the Opale Bianco to be superior to the imported products. Previous tests on other Chillagoe marbles gave results in the range 4 500 to 5 000 m/s.

The anisotropy lies within acceptable limits.

(4) Flexural Strength

The Flexural Strength is low in comparison to the imported marbles. However, I feel that the result is open to some interpretation.

The method used to measure Flexural Strength loads 20 mm thick samples across two points 100 mm apart. The result reflects a combination of the internal integrity of the component minerals grains and the strength of the grain-to-grain bond.

In a sample that has an average grain size of say, 0.1 mm a standard 100 mm x 100 mm test sample would contain about 200 million individual grains. In cross-section the strength and “bonding” characteristics of about 200 000 grains and grain boundaries is tested.

In the Opale Bianco, a 100 mm span will, on average, encompass fewer than five individual grains and may represent only part of a single crystal. As a result, test samples would tend to

fail along a single cleavage plane (perfect rhombohedral) or the parting plane due to twinning rather than along or through grains boundaries.

In my opinion the test for Flexural Strength is not strictly valid for very coarse-grained marbles. However, the test is a valid indication of how the marble would perform in actual service. It appears that Opale Bianco would need to be backed or reinforced in applications where it is unsupported over long spans, such as furniture or some types of wall cladding.

(5) Abrasion Index

This test shows that the Opale Bianco meets the minimum ASTM standard and falls slightly below two of the imported marbles tested. I interpret this as implying that Opale Bianco is suitable for paving applications in most circumstances but may be suspect in areas of heavy traffic or where abrasive substances may be carried onto the marble surface (such as in beach-front resorts). Our salesmen and distributors should be instructed to encourage the use of honed rather than polished finishes in flooring applications.

(6) Recommendations

- (i) the comparison of the Opale Bianco with several imported marbles only covered selected basic tests. The testing was far from comprehensive. None – the – less, these preliminary tests indicate that the Opale Bianco would perform satisfactorily in comparison to imported product in most applications.

Recommend that the testing program of the imported and Austcorp marbles be expanded to include all the appropriate test methods available and cover a more complete range of marble types.

- (ii) a problem that applies to both imported and domestic marbles is the general lack of knowledge by architects of its correct use together with a lack of both qualitative information that would encourage architects to specify Austcorp marble.

Recommend that Austcorp undertake a product research and development program carried out by ourselves in conjunction with AMDEL and selected marble processors to assemble the necessary data required by architects and builders.

RESULTS

The results are summarised in Table 1, and reproduced in full in the Appendix to this report.

Table 1: Test results		
Sample name		Opale Bianco
ULTRASONIC PULSE VELOCITY (m/s)		5730
		5160
ANISOTROPY		10%
BULK DENSITY (t/m ³)		2,71
WATER ABSORPTION % BY WEIGHT (atmospheric pressure)		0,03
APPARENT POROSITY (% by volume)		0,08
EFFECTIVE POROSITY (% by volume)		0,11
SATURATION COEFFICIENT		0,73
FLEXURAL STRENGTH (Mpa)		
DIRECTION XX	dry	4,3
DIRECTION YY	dry	4,3
	soaked	5,6
REDUCTION IN STRENGTH		–
ANISOTROPY		1%
TABER ABRASION RESISTANCE INDEX		10