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Mr Simon Pearson
Jesmonite Ltd
Challenge Court
Bishop's Castle
Shropshire
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Dear Simon,

Re – Summary Report on Jesmonite AC830

Further to our telephone conversation regarding the results of the testing programme on the Jesmonite AC830 material formulation, I am pleased to be able to offer the following summary of performance.

I should stress that as there are no specific British or European Standards that cover this type of material in the applications you have indicated, the results presented relate to the assessment of the "material" rather than a "product". It is not therefore possible to present a "pass or fail" or even a "class" of performance, however this summary report presents the results of the testing and draws comparisons with properties and performance characteristics of the AC830 with other materials in order to give some reference to the likely performance in service of this material.

Test	Result	Comment
EN 1170-6 **Water Absorption by Immersion and Density**	**Water Absorption** 24h = 4.89% 7d = 5.45% Dry Density = 1887 kg/m^3	Within the standards for GRC there are no specific pass or fail criteria, only the methodology to evaluate physical properties, therefore there are no pass or fail criteria to compare performance against, however in this case the water absorption values can be put into context when compared to other materials performing as a similar product (cast stone or manufactured stone elements). Typically clay bricks water absorption values range from 2% for dense engineering or very high strength bricks through to >25% for some stock bricks. There are few specifications for concrete products as the majority of these are based on design strength rather than on performance. In general a water absorption value of <5% is

		regarded as low to very low. On this basis it is concluded that the water absorption values measured for the AC830 are within an acceptable and "typical" range for similar products. Similarly the dry density value is towards the lower end of the typical range for fired clay and concrete (dense aggregate concrete units).
EN 1015-11 Compressive Strength	**Compressive Strength** Average of 6 Cubes 43.58 N/mm^2 (43.58 MPa)	The results indicate a compressive strength based on a cast cube strength of 43N/mm^2 (43 MPa). BS 1217 for cast stone specifies a minimum average of 25MPa EN 771-5 for manufactured stone requires a minimum strength of 20N/mm^2 (20 MPa) On this basis the measured strength of the AC830 is significantly in excess of the minimum strength requirements for materials used for similar products and functions.
EN 492 Determination of bending moment of rupture (before and after freeze-thaw cycling)	**Bending Moment of Rupture (Nm/m)** Before F/T = 131.60 After F/T = 106.81 Residual Strength After Freeze-thaw cycling R_L= 0.77 (Pass)	This test assesses the loss of strength of a thin sheet of AC830 following the exposure of the material to repeated freeze-thaw cycling. The test does have a "pass fail" requirement based on the loss in strength should be not less than 0.75 of the original (before) bending moment of rupture. Although the AC830 is not envisaged to be used as a thin sheet application, the test does show that the residual strength following severe freeze-thaw cycling meets the requirements for roofing applications, and therefore it is envisaged that applications in vertical and decorative "cast stone" applications will not prove to be a problem.
BS 1902 Thermal Expansion	**Thermal Expansion** % linear change from ambient 30C = 0.011% 50C = 0.032% 70C = 0.051%	The thermal expansion characteristics of this material shows that expansion as a result of thermal exposure (direct radiant heat) is minimal. The values indicate the following expansion per m of material as the expansion curve appears to be almost linear: 0.009 mm/m per degree C (= 9 $10^{-6}/°K$) Again to put this into some kind of context, external masonry materials referenced in BS 5628-3 (Table B.1 below) shows thermal expansion within this range.

		As can be seen, the results indicate a thermal expansion coefficient that falls within or below the "typical" range for cement based products and natural stone. The same care should therefore be taken in order to mitigate issues with expansion in the design of the façade.

Table B.1 — Coefficient of linear thermal expansion of masonry units and mortar

Material	Coefficient of linear thermal expansion $10^{-6}K^{-1}$
Clay masonry units[a]	4 to 8
Concrete masonry units[b]	7 to 14
Calcium silicate masonry units	11 to 15
Mortars	11 to 13
Natural limestone masonry units[c]	3 to 10
Natural sandstone masonry units[c]	5 to 12
Natural granite masonry units[c]	5 to 10

[a] Thermal movement of clay masonry units depends on the type of clay.
[b] Thermal movement of concrete masonry units depends on the type of material and the mix proportions.
[c] Thermal movement of natural stone masonry units depends on the type of stone.

Thermal expansion coefficients as presented in BS 5628-3 2005 for typical construction materials.

The results presented here therefore indicate that where properties can be directly compared with specified requirements in Standards, the AC830 product meets these requirements, despite not being of the same material, and for those where there are no specified classes or pass/fail criteria, the results show that the properties of the material are declared and similar to other common construction materials.

I trust that this assists in the interpretation of "what the results mean". Should you have any further queries, please do not hesitate to contact either myself or Simon Hall.

Yours sincerely

Dr Andrew S Smith
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