

Product Performance Evaluation of saveBOARD

WHERE USED AS AN INTERNAL LINING OR BRACING ELEMENT

Evaluation by The Building Business
for Upcycled Building Materials

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Introduction

saveBOARD is a structural composite panel manufactured from shredded and compressed composite packaging. For use as an internal lining, there are two face finishes; Paperfaced and Exposed. The Paperfaced internal lining has a recycled paper on the finished face while the Exposed pre-finished lining has a clear LDPE plastic transparent film on the finished face. Both boards are supplied in two thicknesses; 10 mm and 12 mm, and 2400/2700/3000 mm (L) x 1200 mm (W). The Paperfaced lining can be painted, wallpapered, or tile finished; as for plasterboard. The Exposed is designed to be left in its natural state and requires no additional finishing. This evaluation considers the use of saveBOARD as an internal wall and ceiling lining, ceiling diaphragm and to provide wall bracing.

Background

The assessment of new products (which includes new, imported, and/or innovative products) against the New Zealand Building Code are often based on implied, first-principled based assessments using descriptions or solutions contained in Acceptable Solutions, Verification Methods, or cited standards, New Zealand recognised product testing, expert evaluation or appraisal.

This approach often duplicates the testing and assurance that has already been carried out in other countries or is inappropriate for the product being evaluated.

International testing is often based on harmonised European standards, international ISO standards, or ASTM international standards for products. New Zealand-based, additional testing and expert assessment or opinion do not necessarily add value to demonstrating that a new product is fit for purpose and tends to be expensive and time consuming.

A Product Performance Evaluation is intended to bridge the gap between overseas standards or supplier specifications and the New Zealand building regulatory system.

A set of product metrics is derived from Acceptable Solutions, Verification Methods, New Zealand and Australian standards, international standards already recognised in New Zealand, and similar or comparable products with a Product Certificate or Multiple Use Approval. Where possible, metrics derived from section 19 tools that must be relied upon by building consent authorities as a means of compliance are used.

The metrics and characteristics of the new product are then evaluated against the product metrics.

Methodology

To evaluate the performance metrics of saveBOARD, the following has been used:

- NZS 3604:2011¹ (NZS 3604), which is cited in Acceptable Solution B1/AS1; and
- AS/NZS 2588:2018 (AS/NZS 2588). AS/NZS 2588:2010, is referred to in the P21 bracing test and evaluation procedure, which is referenced in NZS 3604, which is cited in Acceptable Solution B1/AS1. This evaluation uses the current version of AS/NZS 2588, rather than the superseded version of the standard.

¹ Where a standard is referred to it should be read as "amended by the relevant verification method or acceptable solution" where applicable.

Evaluation

saveBOARD can be evaluated as an alternative to gypsum plasterboard by comparing the product with the requirements of NZS 3604 as a lining and wall bracing or diaphragm system, and the specifications of NZS 2588.

AS/NZS 2588 specifies requirements for gypsum plasterboard intended for use in buildings as a lining material for walls, ceilings and partitions and providing a surface suitable for receiving decorative treatments. The primary focus is the dimensional requirements and water-resistance of gypsum plasterboard.

The metrics of AS/NZS 2588 are not referenced directly by a Verification Method, Acceptable Solution, or cited performance standard. However, the previous version of the standard AS/NZS 2588:2010, is relied upon in the P21 bracing test and evaluation procedure, referenced in NZS 3604, which is cited in Acceptable Solution B1/AS1.

The standard is universally accepted, is relied upon in New Zealand and so used in this evaluation to define the product metrics.

Internal linings are described in NZS 3604 as interior linings on each side of a wall and must weigh less than 12.0 kg/m². When specified as a lining as part of a wall bracing or ceiling diaphragm system in accordance with NZS 3604, linings need to comply with sections 4, 5 and sections 8 or 13 of NZS 3604:2011. Typically, gypsum plasterboard contributes to bracing capacity in NZS 3604 construction, so the bracing capacity of saveBOARD can be compared to the bracing capacity of standard gypsum plasterboard.

Evaluation of product metrics compared to SaveBOARD metrics

Characteristics	Product metric	SaveBOARD metric	Comparison	Conclusion
Dimensions	Nominal thickness of 10, 13, 16, 19, or 25mm, +/- 0.5 mm; nominal width of 600, 900, 1200, 1350 mm, +/- 3 mm; +/- 5 mm of specified length; square within +/- 3 mm in full width of the board; as required by AS/NZS 2588.	Thicknesses of 10 and 12 mm, width of 1200 mm, length +/- 2 mm of specified length, square to +/- 3 mm. Thickness +/- 1.0mm	Comparable dimensions to AS/NZS 2588.	saveBOARD has comparable dimensions to AS/NZS 2588.
Finish	Edge finish square, recessed or bevelled; smooth finish board to be corrugation, ripples, stains, other defects that affect finish; as required by AS/NZS 2588.	Square edges or recessed tapered edges Dimpled finish with recycled paper or LPDE plastic transparent face.	Finishes are comparable with AS/NZS 2588.	saveBOARD meets the finish requirements of AS/NZS 2588.
Bending strength	490 N perpendicular and 200 N parallel modulus of rupture for 13 mm thick board, as required by AS/NZS 2588.	14.01 MPa perpendicular and 16.14 MPa parallel modulus of rupture. Scion testing to AS/NZS 2269.1 [Scion, 08/2021].	The conversion is 14.01 MPa to 14010 N/mm ² , 16.14 MPa to 16140 N/mm ² , so saveBOARD has greater bending strength than required by AS/NZS 2588. Although there are some differences in the test methodologies, these are not significant given the differences in the results achieved.	saveBOARD exceeds the bending strength requirements of AS/NZS 2588.
Edge hardness	Edge hardness not less than 45N, as required by AS/NZS 2588.	Maximum deformations of 0.83 mm at 1250 psi (8.6 MPa). Intertek testing to ASTM D2394.83 [Intertek, 26/11/2013].	ASTM D2394.83 tests wood and wood base flooring and subjects the specimen to significantly greater forces than the test method for edge testing under AS/NZS 2588. Given the maximum deformations of saveBOARD under the compression testing and therefore the core strength of saveBOARD, the testing can be used as a proxy to conclude that saveBOARD has greater edge strength than required by AS/NZS 2588.	saveBOARD exceeds edge hardness requirements of AS/NZS 2588.

Characteristics	Product metric	SaveBOARD metric	Comparison	Conclusion
Nail pull resistance	270 N for studs at 600 mm centres, 270 N for joists at 450 mm centres, 300 N for joists at 600 mm centres, as required by AS/NZS 2588.	Fastener pull resistance of 525 lbf for 13 mm thick EVERBOARD, based on ASTM C1278 [EVERBOARD, n.d]. Screw pull-through resistance of 1126 N (8G x 50 mm screws) and 1169 N (5 mm x 100 mm screws) in accordance with AS 1649:2001 [Scion, 28/09/2021].	The conversion is 525 lbf to 2.33 kN. Although there are some differences in the test methodologies, these are not significant given the differences in the results achieved, so saveBOARD has greater nail pull resistance than required by AS/NZS 2588.	saveBOARD exceeds the nail pull resistance requirements of NZS 2588.
Bond strength	Not less than 250 N after 24 hours; as required by AS/NZS 2588.	Adhesion pull resistance of 1350 psf for 13 mm thick EVERBOARD, based on ASTM C1278 [EVERBOARD, n.d].	The conversion is 1350 psf to 64 kN. Although there are some differences in the test methodologies, these are not significant given the differences in the results achieved, so saveBOARD has greater nail bond strength than required by AS/NZS 2588.	saveBOARD exceeds the bond strength requirements of NZS 2588
Humidified deflection	Cantilever method 50 mm for 450 mm board, 25 mm for 600 mm board or simply supported method 10 mm for 450 mm board, 5 mm for 600 mm board; as required by AS/NZS 2588.	High wet compressive strength stated for saveBOARD [EVERBOARD, n.d.] but no attributable test.	Humidified deflection in AS/NZS 2588 to ensure board has adequate resistance to in-service deflection or sag due to variable climatic conditions. saveBOARD's water absorption is less than gypsum board (refer to surface water resistance and water resistance). It can therefore be assumed that the increased absorption under humid conditions will be no greater than gypsum board, and saveBOARD will meet or exceed the requirements of NZS 2588 for humidified deflection.	saveBOARD meets or exceeds the humidified deflection requirements of NZS 2588 (for water-resistant gypsum board).

Characteristics	Product metric	SaveBOARD metric	Comparison	Conclusion
Water resistance	5 % water absorption using a water bath with the board submerged for 2 hours, as required by AS/NZS 2588.	3.9 % water absorption (13 mm thick fibreglass faced board) using a water bath with the board submerged for 2 hours, based on ASTM C473 [EVERBOARD, n.d.].	AS/NZS 2588 test is for water-resistant gypsum. Performance of Exposed saveBOARD (low-density polyethylene faced) will be comparable to fibreglass faced saveBOARD test result, based on properties of low-density polyethylene wrap.	saveBOARD exceeds the water resistance requirements of NZS 2588 (for water-resistant gypsum board).
Surface water resistance	1.6 g water absorption using a dam on the surface of the board for 2 hours, as required by AS/NZS 2588, which refers to AS/NZS 4201.4 (resistance to water penetration).	No penetration from a water column after 24 hours, based on AS/NZS 4201.4:1994 [Upcycled Building Materials Ltd, n.d.].	AS/NZS 2588 test is for water-resistant gypsum. Exposed board with the low-density polyethylene surface prevents transmission of surface water. saveBOARD has greater resistance to water penetration than standard gypsum plasterboard.	saveBOARD exceeds the surface water resistance requirements of NZS 2588 (for water-resistant gypsum board).
Bracing value	NZS 3604 requires wall bracing capacity to be provided to resist horizontal wind and earthquake forces. NZS 3604 also provides for bracing capacity to be provided by diaphragms that can be used to distribute horizontal loads. Standard 10 mm gypsum plasterboard typically contributes (single side) 55 BU/m for wind and 50 BU/m for earthquake to NZS 3604 bracing capacity requirements.	Bracing capacity of 10 mm saveBOARD is 128 BU/m for wind and 141 BU/m for earthquake, based on the P21 bracing test and evaluation procedure [Scion, 18/09/2020a; 18/09/2020b].	saveBOARD has greater bracing capacity than standard gypsum plasterboard.	saveBOARD exceeds the contribution to NZS 3604 bracing capacity requirements provided by standard gypsum board.

Conclusion

The material properties and characteristics of the saveBOARD meet or exceed the product metrics of AS/NZS 2588 and contribute to compliance with NZS 3604 as a bracing element.

Based on the evaluation, we are able to conclude that the saveBOARD metrics meet or exceed the minimum required to meet the provisions of the Building Code in respect of:

- B1.3.1, B1.3.2, B1.3.3 (a, b, e, j, q), B1.3.4 (a, b, c, d, e), B2.3.1 (c), E3.3.1, E3.3.4, E3.3.5, E3.3.6 and F2.3.1 as an internal lining in general and wet areas; and
- B1.3.1, B1.3.2, B1.3.3 (a, b, e, j, q), B1.3.4 (a, b, c, d, e), B2.3.1 (c) and F2.3.1 as NZS 3604 wall and diaphragm bracing units.

The scope and limitations to the use of saveBOARD will need to apply with respect to:

- use in wet areas with respect to the surface finish, as the product needs a protective coating in wet areas
- use in buildings where material group 3 or less applies, as the product has a material group number of 3, so cannot be used when Clause C3.4(a) of the Building Code requires a surface finish material of less than material group 3
- use as part of a thermally rated wall assembly, as the product has thermal resistance properties.

References

- EVERBOARD. [n.d.] *EVERBOARD™ High-Performance Roof Board.*
- Intertek. [26/11/2013] *Test Report.* Report number 101416039MID-001.
- Scion. [08/2021] *Bending stiffness and strength tests on 12mm saveBOARD*
- Scion. [28/09/2021] *Screw head pull through Testing Results.*
- Scion. [18/09/2020a] P21:2010 1200mm x 2.4m 10mm Saveboard with brackets (single wall).
- Scion. [18/09/2020b] P21:2010 1200mm x 2.4m 10mm Saveboard without brackets.
- Upcycled Building Materials. [n.d] *Test Report.*