

# Evaluation of LP Topnotch Guard 350

Evaluation by The Building Business

for ITI Timspec

April 2022

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## Introduction

This evaluation considers the structural<sup>1</sup> performance metrics of LP Topnotch guard 350. ITI Timspec supplies LP Topnotch guard 350 for use as an internal flooring substrate.

LP Topnotch guard 350 is an oriented strand board (OSB) engineered structural wood panel, manufactured from rectangular wood strands blended with thermal-set, waterproof adhesives and arranged in cross-directional layers that are pressure-bonded. It is APA rated Sturd-I-Floor 24oc and is manufactured to conform to Voluntary Product Standard PS2 *Performance standard for wood structural panels* and Design Specification PDS-2020. Panels manufactured in conformance with PS2 are recognized in all model and building codes in the US, International Building Code and International Residential Code and is virtually identical to CSA 0325 *Construction sheathing* which is recognized in the National Building Code of Canada.

The panels are boron-treated to H3.1. The panels also achieve a material group number of 3.

The panels have tongue and groove edges and a moisture-resistant edge seal. The panels also incorporate a RainChannel® notch system that allows water to drain quickly from the surface.

The boards are 1200 mm x 2440 mm x 18 mm.

## Background

The assessment of new products (which includes new, imported, and/or innovative products) against the New Zealand Building Code is often based on implied, first-principled based assessments using descriptions or solutions contained in Acceptable Solutions, Verification Methods, 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 tend to be expensive and time-consuming.

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<sup>1</sup> Compliance with B2 is achieved via B1/VM1 and therefore not covered in the evaluation.

An 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 LP Topnotch guard 350, AS/NZS 1860.1:2002 Particleboard flooring (AS/NZS 1860), as cited in paragraph 2.3.6 of NZS 3604:2011<sup>2</sup>, which is cited in B1/AS1, has been used.

## **Comparison with AS/NZS 1860**

### Evaluation

Section 2.3.6 of NZS 3604:2011 states that processed wood-based components and flooring are to be manufactured to AS/NZS 1860.

AS/NZS 1860 covers particleboard flooring manufactured to provide durability and stiffness as required for flooring as well as other structural applications.

Particleboard used as flooring in accordance with NZS 3604:2011 falls within this scope, using Class 2 classification<sup>3</sup> set out in AS/NZS 1860.

LP Topnotch guard 350 is an OSB 3 products manufactured in accordance with the Industry Voluntary Product Standard PS 2-18 Performance Standard for Wood-Based Structural-Use Panels and meet the design properties specified in APA Panel Design Specification D510-2020. The performance metrics claimed in the US standard related to stiffness and cross panel strength. This makes it difficult to directly compare the US standards to AS/NZS 1860.

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<sup>2</sup> Wherever a standard is referenced it should be taken to read as *modified by the applicable acceptable solution or verification method*.

<sup>3</sup> Class 2 classification is defined as flooring for use where resistance to prolonged extremes of moisture or dampness are not necessary.

However, the current international ISO standard for OSB (ISO 16894:2009) links together all international standards; EN, APA, US, CSA and therefore provides a link to consider typical OSB3 performance criteria. This is a conservative estimation as LP Topnotch 350 is an APA rated OSB and therefore has enhanced performance characteristics.

Values for OSB 3<sup>4</sup> have been compared with key metrics from AS/NZS 1860.

#### *Strength metrics*

Characteristic	Particleboard metrics	OSB metrics
Bending strength/modulus of rupture	≥ 17 MPa, Table 2 of AS/NZS 1860. Test method is AS/NZS 4266.5.	20 MPa major axis. 10 MPa minor axis EN 310 General OSB 3 value.
Modulus of elasticity	≥ 2650 MPa, Table 2 of AS/NZS 1860. Test method is AS/NZS 4266.5.	3500 MPa major axis. 1400 MPa minor axis EN 310 General OSB 3 value.
Internal bond strength	≥ 0.50 MPa, Table 2 of AS/NZS 1860. Test method is AS/NZS 4266.6.	0.32 MPa. EN 319 General OSB 3 value.
Glue bond quality	≥ 2.9 MPa. Test method is AS/NZS 4266.9.	Not measured, refer to strength metrics conclusion.

#### *Strength metrics conclusion*

With the exception of the internal bond strength and glue bond quality, the mechanical properties of OSB 3 exceed those of AS/NZS 1860 particleboard. LP Topnotch guard 350 OSB meets the requirements of Clause B1 (Structure) for the building element via an alternative solution compliance pathway, when used as a flooring as described in section 2.3.6 of NZS 3604 in respect of the mechanical properties required. Particleboard is formed from broken down wood fibres, glued together using wax and resin and made into panels by applying high temperature and pressure so the performance of particleboard relies on internal bond and glue bond quality. In comparison, OSB is formed from cross-oriented layers of thin, rectangular wooden strips, bonded using wax and resin, so layers of strips are bonded compared to particles. The crosswise layers of the OSB panels LP Topnotch guard 350 OSB has enhanced levels of wax and resin. Protection from moisture is included as a limitation of use to mitigate against any risk associated with the lesser bond strength metric.

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<sup>4</sup> Refer <https://europanel.org/the-wood-based-panel-industry/types-of-wood-based-panels-economic-impact/oriented-strand-board/>

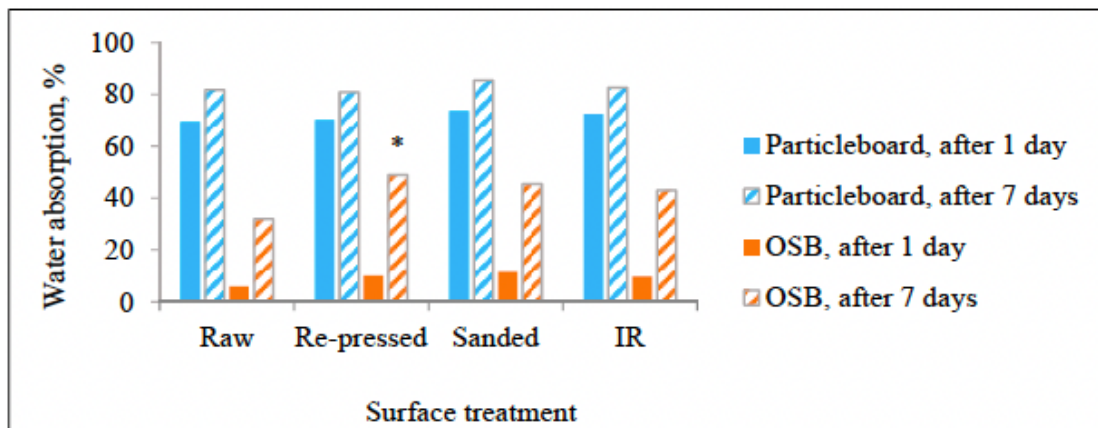
### Moisture resistance metrics

Characteristic	Particleboard metrics	OSB metrics
24-hour thickness swell	≤ 14 %. Test method is AS/NZS 4266.8.	15%. Based on EN 317 General OSB 3 threshold value.
Thickness stability	≤ 25 %. Test method is AS/NZS 4266.9.	20%. Based on EN 317 General OSB 3 threshold value.
Surface water absorption	≤ 210 g/m <sup>2</sup> . Test method is AS/NZS 4266.12.	Not measured, refer to moisture resistance metrics conclusion.

### Moisture resistance metrics conclusion

The moisture resistance properties of OSB are generally comparable or better than AS/NZS 1860 particleboard.

Research that tested particleboard and OSB panels after 1 and 7 days of immersion in water shows the water absorption of OSB is significantly less than that of particleboard, as shown in the below graph (Copak et al, 2021).



Test method is AS/NZS 4266.12 requires the surface water absorption to be ≤ 210 g/m<sup>2</sup>. EN 317 does not test for surface water absorption, however as shown in the above graph the absorption of water in OSB is significantly lower than particle board based on immersion testing. The above graph takes into consideration differing face surfaces, this is because there is a greater concentration of bonding resins on the outer faces of the particleboard and the OSB, which increases the level of water resistance when exposed to moisture on the exposed sheet face. Whilst there are very minor variations in water absorption the surface finishes have little to no impact to the tabulated comparison outcomes of either board.

## Conclusion

Based on this evaluation, the material properties and characteristics of the LP Topnotch guard 350 OSB meet the product metrics of AS/NZS 1860 in respect of wood-based components and flooring. Therefore, the LP Topnotch guard 350 complies with the Building Code as an alternative solution, when used as a flooring as described in section 2.3.6 of NZS 3604.

## References

Copak, A.; Jirouš-Rajković, V.; Španić, N.; Miklečić, J. (2021). *The Impact of Post-Manufacture Treatments on the Surface Characteristics Important for Finishing of OSB and Particleboard*. *Forests* 2021, 12, 975. Retrieved from <https://doi.org/10.3390/f12080975> [Accessed 15/04/2022].

Way, D. (2 August 2018). *Multi-scale approach to evaluation moisture durability of wood-based composites*. Retrieved from <https://ir.library.oregonstate.edu/downloads/2514nr589?locale=en> [Accessed on 15/04/2022].

European Panel Federation. (2018) *Oriented Strand Board*. Retrieved from <https://europanel.org/the-wood-based-panel-industry/types-of-wood-based-panels-economic-impact/oriented-strand-board/>. [Accessed on 15/04/2022].