

TECHNICAL NOTE

WARNING NOTICE RE SUBSTITUTING IMPORTED PS1-95 INDUSTRIAL PLYWOOD FOR AS/NZS 2269:2004 STRUCTURAL PLYWOOD

INTRODUCTION

This Technical Note is in response to a concern that specifiers and users are under the misconception that imported plywood manufactured to the American Voluntary Product Standard PS1-95 can be legitimately substituted for Australian structural plywood to the Australian/New Zealand Standard AS/NZS 2269. This is especially true in structural applications regulated under the Building Codes of Australia or New Zealand.

The objective of this Technical Note is to highlight the critical differences between the Australian/New Zealand and U.S. product standards. These differences have the potential to impact the expected performance of these materials. Thus it was believed important to draw the attention of users and specifiers to the potential dangers associated with the substitution of structural materials manufactured to local standards with others manufactured to overseas standards and specifications.

It should be noted that National Product Standards (Australia and New Zealand) are calibrated against performance requirements of relevant Federal and State regulations such as the Building Code of Australia, Building Code of New Zealand and additional State and Territory based regulations. These requirements can include durability, structural ratings and performance, termite resistance, environmental regulations and the use of banned or restricted substances in the manufacture of such products.

The Australian/New Zealand and U.S. product standards differ significantly on a number of key criteria despite the claims of some importers that properties of both products are identical. These products, although similar in many respects, differ in a number of key requirements making the U.S. product unsuitable in a number of applications.

SIGNIFICANT DIFFERENCES BETWEEN AS/NZS 2269:2004 and PS1-95

1. Bond Durability

The adhesives that are allowed in the manufacture of the imported PS1-95 plywood are different to AS/NZS 2269 requirements, the testing regime is quite different, and more importantly, the imported products have reduced durability requirements.

The Type 'A' bond in structural plywood to the Australian/New Zealand Standard AS/NZS 2269 adhesive uses phenol formaldehyde as the adhesive. The Type 'A' bond is fully durable in full exposure or in critical structural applications for a minimum of 50 years.

The standard durability test for this Type 'A' bond adhesive is "72 hours in boiling water" followed by mechanical separation of the veneers and assessment of wood fibre. The 72-hour boil test has been confirmed by CSIRO research as an accelerated ageing test and ages the glueline by approximately 50 years. This test provides a guarantee the bond durability will meet the requirements of the Australian and New Zealand Building Codes, i.e. 50 years when used in either structural or fully exposed applications.

The PS1-95 plywood product most commonly available in Australia (and marketed as "exterior plywood") is interior plywood manufactured to the "Exposure 1" durability specification of PS1-95. It must be stressed that "exposure 1" plywood defined in PS1-95 is classified as "INTERIOR PLYWOOD BONDED WITH EXTERIOR GLUE".

By definition this product manufactured to U.S. Exposure 1 durability requirements unlike the Australian/New Zealand Standard AS/NZS 2269 is not intended for use in exposed or "wet area" applications or subjected to wetting apart from some short term, temporary exposure during the construction phase of the building.

The acceptable PS1-95 Exposure 1 adhesives include phenolic resin of reduced concentration, melamine urea resin and emulsion polymer/isocyanate. It is believed that the local Type 'B' bond will roughly meet the PS1-95 Exposure 1 requirements.

The durability tests for Exposure 1 called up in PS1-95 include a regime that involves an aggregate of two 4-hour boiling cycles for a total of 8 hours boiling as opposed to the 72 hours required under the Australian/New Zealand Standard. The PS1-95 test procedure also includes subjecting some samples while submerged to 1/2 hour vacuum and 1/2 hour pressurisation prior to assessment.

Another significant difference is in the method of mechanically separating the "aged" gluelines. Firstly PS1-95 checks only two gluelines per sample as compared to all gluelines with AS/NZS 2269. Secondly, the PS1-95 bond test is a simple shear test on a 25 x 25 mm area while the AS/NZS 2269 requirement is a more severe chiselling apart of at least 150 x 65 mm.

When the EWPA has subjected samples of PS1-95 Exposure 1 product to the 72-hour boil in our NATA Accredited Testing Laboratory, the product does not meet the Australian/New Zealand structural bond durability requirements.

Thus it can be seen that the two different test methods are substantially different. Therefore, it can be seen that the durability of the gluelines are assessed on a substantially different basis and the PS1-95 Exposure 1 plywood is not equivalent to the Type 'A' bond.

Additionally, the EWPA is now aware of a number of failures of the PS1-95 product when used in exposed horizontal applications as a substitute to AS/NZS 2269. Interestingly, the importer has failed to honour any guarantees, stating that the product is not suitable for exterior use, leaving the reseller and purchaser with significant rectification costs.

2. Structural Ratings

The structural rating requirements of the two standards are on a completely different basis, with the imported products undergoing a more general and thus potentially unreliable rating system.

The structural plywood standard AS/NZS 2269 allows the application of safe and reliable structural properties to structural plywood as detailed in Table 4.1 from AS/NZS 2269:2004. Each stress grade includes the properties of bending stiffness, bending strength, compression strength, tension strength and shear strength. The Australian/New Zealand stress grading system requires extensive testing to be done on each of these properties prior to the assignment of structural properties. The stress grade applied to each sheet of Structural Plywood is based upon actual “in-grade” test results of each plywood wood resource. To these results suitable factors of safety and reliability are applied resulting in design properties which can safely be used in the Building Code of Australia, the Timber Framing Code and the Timber Engineering Code.

Product manufactured to PS1-95 on the other hand, does not require product testing to assign structural properties. If the species, grade and thickness of veneers are known, a strength group can be assigned without laboratory testing. A similar method was utilised under the superseded Australian Plywood Standard for many years until testing by the EWPA proved that this method is unreliable and potentially unsafe due to changes in the resource in plantation and regrowth softwoods. This method has now been removed from the current Australian/New Zealand structural plywood standard.

The published stiffness figures for PS1-95 plywoods suggest that the imported panel's average stiffness is less than most of the AS/NZS 2269:2004 plywood available locally.

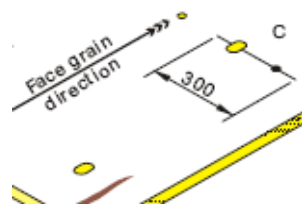
The use of structural plywood under the Building Code of Australia is defined under AS1684 parts 2, 3 and 4 and AS 1720. Both these standards reference AS/NZS 2269. Product to PS1-95 cannot be used under the Building Code of Australia without first obtaining an Engineer's Certificate for each specific design and application.

For all of the above reasons it is potentially unsafe to substitute product to AS/NZS 2269 with PS1-95.

3. Veneer Quality

The veneer qualities defined in PS1-95 are similar in many respects to those defined in AS/NZS 2269. However, one major difference of concern is the permissible limits for aggregate defect.

In the Australian/New Zealand Standard, the defect limitation across the grain in quality C and D veneer is 120mm in a 300mm line measured anywhere on the sheet. See sketch:



The technical basis behind this limitation is the assumption that a 300mm width is the narrowest section commonly to be used structurally. The 120 in 300mm limitation ensures that in any structural application a minimum of 60% of the section will be clear wood capable of carrying load. The “in-grade” test method for the determination of stress grades uses test pieces of a 300mm width. Hence stress grades are reliable down to a 300mm wide section.

PS1-95 on the other hand allows up to 250mm of aggregate defect across the width of the sheet and makes no allowance for a minimum section. As a result it is possible, when the

PS1-95 product is ripped to a narrower width that sufficient clear veneer may not be present to carry the designated load.

The EWPA has recently undertaken testing on PS1-95 product which had been misrepresented by the importer as meeting an F grade under AS/NZS 2269. A number of sheets broke in testing well below the branded grade (40% below branded grade). The broken panels failed in bending across the aggregate defect which was well outside 120mm in 300mm.

This is an obvious serious safety risk.

By substituting the PS1-95 product for the AS/NZS 2269 product, the necessary reliability required under Australian/New Zealand Design Codes and Specifications is not present. This could easily lead to unsafe structures, possible failure, and death or injury.

CONCLUSIONS

It is obvious that the differences between the Australian/New Zealand Standard AS/NZS 2269 and the U.S, Voluntary Product Standard PS1-95 are significant. Product meeting PS1-95 is not a substitute to the Australian/New Zealand Standard in almost all structural applications regulated by the Building Code of Australia, Building Code of New Zealand, AS 1720 – The Australian Timber Engineering Code, AS 1684 – The Australian Timber Framing Code without a comprehensive and experienced Engineer's Certification for each individual application and structure.

The use of this product as a substitute to AS/NZS 2269 in any structural applications is potentially unsafe and could lead to sudden catastrophic failure.

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