

THE APPLICATION OF T & G STRUCTURAL PLYWOOD IN THE FLOORS OF TRANSPORTABLE BUILDINGS TO BE SITED IN TROPICAL & SUB TROPICAL HIGH HUMIDITY ENVIRONMENTS

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INTRODUCTION

This technical note produced by the **Plywood Association of Australia Ltd** is in response to feedback received from the marketplace in regard to perceived aesthetic problems in vinyl covered structural plywood flooring, fixed to metal subframe, in transportable buildings which are finally sited in high humidity tropical or sub tropical environments. Many of these buildings are constructed in more temperate climates and then transported to the tropical environment. It should be stressed that the aesthetic problems in no way affect the structural serviceability or integrity of the building or affect the safety of the structure.

Finally, it should be documented that the PAA has been involved in the installation of plywood flooring in transportable buildings for over thirty years and is of the opinion that the expectations of the consumers has increased significantly re aesthetics of the final vinyl surface particularly in the last 5 years. This is particularly the case for transportable buildings manufactured for sale rather than rental.

TECHNICAL CONSIDERATIONS

Plywood, because it is made from wood, is hygroscopic in nature, i.e. it absorbs and desorbs moisture from the atmosphere to reach an equilibrium moisture content in balance with the atmosphere. All wood products swell and shrink in the process of absorbing and desorbing this moisture. Wood is stable along the grain and moves 50 times as much in the radial direction and 100 times as much in the tangential direction under changes of moisture content as it does longitudinally. Plywood utilises the stability of wood along the grain via the cross laminating structure which by gluing with a permanent, durable Type A bond, as is the case in marine or structural plywood, locks the unstable cross the grain veneers to the stable long grain veneers. Plywood is the most stable wood product under atmospheric moisture variations however it still does move and this movement must be allowed for in design. 15mm T&G Structural Plywood has a hygroscopic movement of 0.016 percent change in dimension per percent change in moisture along the grain and 0.022 percent change per percent change in moisture across the grain. Structural Plywood under the standard must be in the range 8-15 percent moisture content when it leaves the factory. It is usual for the product in a temperate climate to be 8-10 percent.

If a plywood floor is laid at 8-10 percent and is then transported to a climate such as North Queensland with equilibrium moisture content of 17-20 percent the panel of 2400 x 1200mm will move theoretically approximately 3mm around the edges. This is why it is always recommended **not** to cramp joints and to leave a small 2mm gap between sheets to allow for this expansion. It is practice in the transportable building industry to cramp joints and to fill any small gaps with rigid filler. The plywood under increase in moisture content has no place to move so it peaks making a ridge mark on the vinyl. Obviously this situation is minimised if the transportable remains in a climate similar to the climate in which the plywood flooring was laid and becomes exacerbated if the building is moved to a more humid climate. The ridging due to moisture increases does not impair the structural integrity of the floor.

SOLUTION

The obvious solution is to prevent moisture uptake in the plywood when the building is transported to more humid climates. This may be achieved by sealing the back side of the plywood floor with a vapour barrier such as a high build acrylic primer at the time the vinyl is laid which would prevent the uptake of atmospheric moisture and therefore stop the moisture movement and avoid vinyl marking over the plywood joints.

A second suggestion is to leave a 1 to 2mm expansion joint that could be filled with a sandable flexible putty which would allow panels to move.

The most certain method of overcoming the vinyl marking, caused by plywood joint telegraphing, is to use a thin, approximately 3.0mm, hardboard underlay between the plywood and vinyl which is the usual practice in domestic and commercial flooring situations requiring a high quality finish. Even under these situations it would be recommended to leave a 1mm gap around individual plywood flooring panels to allow for expansion. There would be no need for bogging of any joints nor sanding over joints.

SHEET LAYOUT

- Place face grain at right angles to the supports
- Sheets must be continuous over at least two spans (three framing members).
- Lay the sheets in a staggered pattern.
- Allow a 2 to 3 mm expansion gap between sheets for square edges and 1-2 mm for tongue and grooved edges.
- Butt tongue and groove panels at the tongues because the machined edges can accommodate the movement. Allow expansion gap at the ends.
- Panels should be pushed together lightly by hand, cramping is not recommended.
- Allow 5 mm clearance inside confining structure such as concrete or brick walls adjacent to the floor.
- Allow clearance for ventilation as required.