STRUCTAflor GP

General Purpose Structural Flooring

Fact Sheet

Shrinkage of Laid Floors

From time to time, particularly during the hot period of the year, we receive complaints from customers that floors laid in platform construction shrink and create gaps between adjoining sheets.

At times, customers feel that their floor may have suffered permanent damage and are understandably concerned. This fact sheet attempts to explain why the floor may shrink, what action should be taken, and to eliminate any doubts about the structural sufficiency of the affected floor.

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Why do Gaps Occur

Particleboard flooring behaves in general like most other timber products. One of the most annoying features of wood is its hygroscopic behavior - which means it absorbs and releases moisture and swells on absorption of water and shrinks again when it loses water. This swelling and shrinking between wet and dry can be as high as 10% with solid wood whereas with particleboard this movement is about 0.3%.

This is the main reason why solid strip flooring cannot be used in platform construction, whereas STRUCTAflor sheets can.

To illustrate, if we would take a platform floor of an area of 10m x 10m, a solid timber floor would attempt to expand by 10% across the grain and 0.1% along the grain

should the floor be thoroughly wet, whereas a particleboard floor would attempt to expand by 0.3% in both directions. Translate this into real measurements and the strip floor attempts to increase by up to 1mm across the grain and up to 10mm along the grain whereas the particleboard floor would attempt to expand by 30mm in both directions. This is substantially less than solid timber but still up to 2.7mm per 900mm wide sheet of STRUCTAflor.

It has to be remembered that these are extremes that only occur if the board is alternately soaked and then dried under the hot sun and if the sheet is not restrained, e.g. is not screwed/ nailed down. Under these conditions the floor will expand and after drying shrink back to its original size. Unfortunately, the screwing/nailing down prevents the floor from expanding freely and this, together with high summer temperatures, allows or forces the board to absorb a significant amount of the expansion forces internally, which means that the board does not expand but that the expansion is absorbed within the structure of the board by permanently, squashing each particle by its portion of the restrained expansion. In engineering terms, this means that the expansion forces have deformed the board in compression past its "elastic limit" leading to a permanent change (reduction) in dimension. It is common that elevated temperatures reduce the "elastic limit" of a material and this is one of the explanations why this problem occurs primarily during the hot period of the year.

A board which has been allowed past the elastic limit will, however, shrink like a normal board of similar length and moisture content, which means that the restrained expansion will appear on drying as a real shrinkage and consequently result in a gap.

Logic would suggest that if a permanent deformation occurs to reduce the size of an expanding, restrained sheet of board stressed past the elastic limit, then the same deformation to increase its size should occur again on shrinkage of the board. Unfortunately, a board is restrained from expanding not only by the screws/nails holding it down on the joists, but also by all the screws/nails holding down the surrounding sheets, whereas on shrinkage it is only restrained by the screws/nails holding itself down a far lower restraint and the main reason for the gaps.

This alternate expansion/contraction will be most severe during the construction phase and will never reach the same high level after the house is completed, and consequently the floor will not again be stressed past its elastic limit. The integrity of the floor is not significantly adversely affected by the deformations during the construction phase since the original design of the floor is based on this expansion/contraction occurring over 6 months when, as an industry, we recommend that exposure be limited to 3 months.

How to Reduce Gaping

Protection of the floor from the extremes of rain and heat will be most beneficial to reduce gaping, but do not attempt to seal the board itself since no seal can be perfect - so some water will get in and the seal may prevent it from drying out, which can cause serious damage.

Make certain that rainwater can drain easily off the platform - this will reduce the quantity of water absorbed by the board and consequently reduce the amount of expansion.

Prevent the board from drying out too rapidly - avoid direct sunlight as much as possible.

If gaping has occurred do nothing for as long as practical, e.g. get the roof closed as soon as possible and let the floor dry out as long as practical.

If the floor is to remain uncovered, gaps can be filled with an elastomeric filler; solid or hard fillers are not recommended.

Gaps should never be filled before the roof is closed since this could lead, after further wetting to a new cycle of constraint expansion and contraction creating a new gap, doubling the original problem.

Summary

Wetting and drying of STRUCTAflor over a period not exceeding 5 months will not adversely affect the structural properties of STRUCTAflor to a degree where the product may not be suitable for its intended use. On wetting and drying at elevated temperatures, gaps of up to 2.7 mm between adjoining 800 mm wide sheets of STRUCTAflor may occur. Peaking of some joints may also occur. The magnitude of both faults will reduce after the house is closed and the product has adjusted its moisture content to the new, protected environment.

Product Quality

STRUCTAflor is manufactured under a third party audited quality control program and is product certified by the Engineered Wood Products Association of Australia as compliant with AS/NZS 1860.1, Particleboard Flooring.

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