

Remmers Information Sheet

Dimensional stability of timber – moisture related movement

Exterior timber is continuously subjected to moisture in the form of rain, dew, and surrounding high humidity. Timber is a hygroscopic material which effectively means it has a natural tendency to absorb moisture from its surroundings. As the atmospheric humidity decreases the absorbed moisture will be released from the timber. As the timber absorbs water it swells. Upon release of the moisture the timber shrinks. If this uptake and release of moisture from the timber is rapid enough it tends to lead to problems such as cracks in the timber. If the swelling is severe enough it can lead to opening of joints and can also make the opening and closing of timber doors or windows difficult. High quality timber coatings such as the Remmers Induline systems and effective adhesives can slow down the uptake and release of moisture drastically reducing the incidence of open joints and cracks.

The timber type, the initial moisture content, the cut of the section and the level of heartwood (especially with pine) all have a significant impact on the potential for movement and instability. Industry bodies such as TRADA suggest timber dimensions will on average change by 1% for every 3% moisture content change in the timber. The impact of this when dry timbers are exposed to external environments is that quite significant dimensional changes can be experienced.

A moisture content of 12-16% is typically recommended for all exterior joinery when leaving the factory. This can be difficult to achieve and if this is the case the choice of more stable timbers or designing wider tolerances into the opening and closing elements should be considered. This course of action is not always desirable due to the tolerances showing gaps that look unsightly. Failure to consider and allow for this is likely to result in the closing of clearance gaps and reduced operating performance. Doors are most prone to this due to their larger sectional dimensions, double & bi-folding doors being particularly vulnerable.

Example – If a 117 mm Sapele door stile leaves the factory at a moisture content of 9%, it can easily increase to 18% in service and its dimension increases to 120 mm, an increase of 3 mm per stile. On a pair of double doors, there would be a 6mm closing of the operation gap at the meeting stiles. Also the gap between the stiles and the jamb will reduce by 3mm on each side. In a typical UK winter the moisture content of many commercially available timbers and in particular Scots Pine will go as high as 18-20% even if the surface is protected with a microporous, moisture-controlling coating.

Attempts can be made to seal the surface of the timber to ensure that there is no moisture uptake in winter months. This is a very risky strategy however, as any small defects in glazing lines or in joint design can lead to moisture ingress at these points. The impervious coating system will not allow trapped moisture to escape and this can result in complete detachment of the coating system and wood rot.

Solutions

- **Aim to reject incoming timber with a low moisture content of lower than 12%. The lower the moisture content the worse the potential for moisture related movement.**
- **Use more dimensionally stable timbers wherever possible. If pine is being used, try to obtain timber with a high heartwood content. Also use radial sawn sections rather than tangentially sawn sections.**

- **Optimise joinery design to avoid water traps that will promote more severe moisture ingress.**
- **Design joinery to allow for seasonal dimensional changes.**
- **Seal end grain sections but avoid trying to use coatings that seal the entire timber surface. These will only work if all moisture entry points are sealed which is not practical.**

For further advice contact the Remmers Woodcoating Technical Team.

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