
The previous winter’s exceptionally wet conditions reminded many of just how significant a factor moisture content (MC) is in getting the production of joinery products right. Getting it wrong means excessive movement, leading to doors and window sashes sticking and premature coatings failure. And as moisture conditions in the UK are not necessarily the same as those in the main European markets, it’s important for UK manufacturers, timber producers and merchants to work together for the optimum practical solutions. These guidelines are intended to help members ensure the moisture content of the timber in the products they make is fit for purpose, from specifying and checking, through control within the storage and manufacturing processes, to end use.

1. Moisture Content

As timber is a hygroscopic material, its moisture content changes as the temperature and relative humidity of its surroundings change. In constant temperature and relative humidity conditions, the timber will eventually reach an ‘equilibrium moisture content’ (EMC).

Seasonal variations of 3% - 6% are not uncommon in the EMC of timber in buildings, leading to noticeable changes in dimension, such as doors and windows sticking in winter.

Water held in wood below its fibre saturation point is chemically bound to the cell walls of the wood. Shrinkage (or swelling) occurs when this ‘bound water’ is lost (or gained) from the wood.

For more information on Moisture Content, see TRADA’s Wood Information Sheet WIS 4-14, Moisture in timber.

2. Specifying Moisture Content

A specification for moisture content should include:

- The average moisture content of the batch
- The tolerance limits on the average moisture content of individual pieces within that batch, for example “The average moisture content of the timber in the batch will be 20%, with no individual reading over 24%.”
- A limitation on the variability of moisture content within the individual pieces, either at different depths (moisture gradients) or at different positions along the length, or both
- The method of measurement.

The relevant standard is BS EN 942: Timber in joinery. General requirements for joinery.

This advises that no single MC reading should exceed the maximum average value by more than 3%, and sets out MC recommendations as follows (overleaf):
In the past there have been problems with laminated hardwood sections coming into the UK below the target MC. The reason for this is that the pieces need to be 9-13% MC in the laminated scantling facility when pressing. Some work has been undertaken to address the issue; for example, Timbmet re-condition their Red Grandis TEC product on arrival in the UK to an average MC of 15% (+/-2%) specifically for the UK market. Packs are fully shrink-wrapped to maintain this MC right through to the end customer.

### 3. MC for hardwood

There are considerable supplies of hardwood species, such as Sapele, in the UK market at below 10% MC. This reflects the increasing amount of wood being imported into the UK that has been kilned at source for bigger markets such as the USA and Asia where the demand is for 10% or below. Unfortunately some of this wood ends up in the UK or Ireland.

Ensure you specify hardwood that has been kilned to the more acceptable level of c.12% MC, which most UK-kilned wood meets.

### BS EN 942 - Category

<table>
<thead>
<tr>
<th>Sub-category based on in-service climates</th>
<th>Average MC in Service</th>
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</thead>
<tbody>
<tr>
<td><strong>External joinery</strong> (windows &amp; external doors etc.)</td>
<td>12%-19%</td>
</tr>
<tr>
<td><strong>Internal joinery</strong> (internal doors etc.)</td>
<td>12%-16%</td>
</tr>
<tr>
<td>Unheated buildings</td>
<td>12%</td>
</tr>
<tr>
<td>Buildings heated to 12°C-21°C</td>
<td>9%-13%</td>
</tr>
<tr>
<td>Buildings heated to over 21</td>
<td>6%-10%</td>
</tr>
</tbody>
</table>

These MC in service values represent a compromise between natural seasonal humidity extremes and regional variations. Equally, for internal joinery, it may be worth considering the effect of air-conditioning or mechanical ventilation and heat recovery (MVHR) on a room’s humidity.

Generally mills produce timber at 18%, 16%, 14%, 12% and 10% MC, with the majority at 18% or 12%.

When specifying softwood timber for external joinery, for example, where the average MC in service value ranges from 12% - 19%, it is usual to order timber at a MC of 12% +/-2% and ensure that the timber is not consistently at the lower end of this target.

If you consider you need a higher MC, say 13% +/-2%, discuss this with your supplier. Mills with smaller kilns may be able to help if you can make a commitment to take regular volumes.

### 4. MC for laminated timber

Work undertaken by the Timber Resource Efficiency Partnership (TREP), in conjunction with the Wood Window Alliance, the British Woodworking Federation and the Timber Trade Federation, has defined a simplified range of engineered timber components available from timber and builders’ merchants on an ex-stock basis. The aim is to enable smaller to medium-sized joinery companies to have easier access to engineered components geared to manufacturing windows for today’s market at a more competitive price.

The target moisture content for laminated timber window stock should be 12% (+/- 2%).

For further advice, see the Timber Resource Efficiency Partnership (TREP) paper *Introducing an ex-stock range of Engineered Timber Components for window and door production.*
5. Testing for MC

It is easy to assume that the wood provided has an MC suitable for the intended use, however it is important to check MC as part of your quality control process. It should be checked on delivery to your factory to ensure it meets the agreed specification; during the manufacturing process, especially if the timber has been kept for a period in storage; and then finally at the despatch of the finished product to the customer.

The most common method used to check MC is an electrical resistance meter (specified in BS EN 13183-2: Moisture content of a piece of sawn timber. Estimation by electrical resistance method), such as a Delmhorst RDM-2S meter and calibration block.

Standard probes normally consist of a pair of pins, which can be pressed into the timber by hand. You will need pins at least 30mm long to hit the core of a standard 57mm sash/stile.

Resistance meters should be calibrated before use or daily, as a minimum, and for the specific timber being tested. Check and enter the temperature of the wood. Ensure the surface of the wood is dry.

Position the probe approximately 300mm from the end of the board and a third of the way in from the edge. The probe should penetrate to around a third of the board’s thickness.

In order to check MC without causing damage to the timber, a capacitance meter may be used. While the resistance meter gives a reading of the wettest timber in contact with the probes, a capacitance meter measures the highest MC within a field of penetration of about 50mm.


6. Controlling MC in the factory

The temperature and humidity in your factory and storage facilities will affect the MC of the timber. Timber should be stored undercover and away from sunlight or other direct sources of heat. You may need to consider humidity control. Packs of timber should not be stored wrapped in plastic.

7. Controlling MC on site

 Often one of the biggest dangers is the conditions found on site, with wet trades active as internal joinery is being installed, or exterior components fixed days or weeks before full decorative protection is applied. Time and contract deadlines are major pressures, but if the product fails, the manufacturer is likely to take the blame.

Windows and doors should be brought to site as close to installation time as possible. Avoid using metal storage containers, as excessive heat can damage the products. Where containers are used, ensure air can circulate to all products on the pallet, and avoid storage in direct sunlight.

Store inside on a minimum of three level, full-width, evenly-distributed bearers in a dry, shaded area clear of the ground. Ensure products stored outside are protected from the elements with a waterproof cover, such as a heat-resistant tarpaulin. Allow air circulation between products.

Products should not be stored in a damp room or building - particularly where plastering will be carried out. Avoid storing products flat. Water lying on a horizontal window or door will cause timber to swell and will invalidate the warranty.

When supplying internal doors to a newly constructed building, instruct your customer in good practice that will ensure the good performance of the doors. BWF members can access further advice here and download our BWF Members’ Day presentation on ‘Right moisture: Right Timber, Coatings and Processes’.

Note: Whilst every effort has been made to ensure the accuracy of advice given, neither the Wood Window Alliance nor the British Woodworking Federation accept liability for loss or damage arising from the use of the information supplied in this publication.