PINUS PATULA

Family: PINACEAE (gymnosperm)
Scientific name(s): Pinus patula
Commercial restriction: no commercial restriction

WOOD DESCRIPTION

Color: creamy white
Sapwood: not clearly demarcated
Texture: fine
Grain: straight
Interlocked grain: absent

Note: Mainly plantation wood.

More or less numerous knots and resin canals.

LOG DESCRIPTION

Diameter: from 40 to 90 cm
Thickness of sapwood:
Floats: yes
Log durability: low (must be treated)

PHYSICAL PROPERTIES

Physical and mechanical properties are based on mature heartwood specimens. These properties can vary greatly depending on origin and growth conditions.

<table>
<thead>
<tr>
<th>Property</th>
<th>Mean</th>
<th>Std dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific gravity *</td>
<td>0,49</td>
<td></td>
</tr>
<tr>
<td>Monnin hardness *</td>
<td>2,2</td>
<td></td>
</tr>
<tr>
<td>Coeff. of volumetric shrinkage</td>
<td>0,47 %</td>
<td></td>
</tr>
<tr>
<td>Total tangential shrinkage (TS)</td>
<td>8,3 %</td>
<td></td>
</tr>
<tr>
<td>Total radial shrinkage (RS)</td>
<td>3,4 %</td>
<td></td>
</tr>
<tr>
<td>TS/RS ratio</td>
<td>2,4</td>
<td></td>
</tr>
<tr>
<td>Fiber saturation point</td>
<td>31 %</td>
<td></td>
</tr>
</tbody>
</table>

Stability: moderately stable to stable

Note: Physical and mechanical properties vary according to the age and origin.

MECHANICAL AND ACOUSTIC PROPERTIES

Crushing strength *: 39 MPa
Static bending strength *: 69 MPa
Modulus of elasticity *: 11350 MPa
Musical quality factor: 84,7 measured at 2880 Hz

*: at 12% moisture content, with 1 MPa = 1 N/mm²

NATURAL DURABILITY AND TREATABILITY

Fungi and termite resistance refers to end-uses under temperate climate. Except for special comments on sapwood, natural durability is based on mature heartwood. Sapwood must always be considered as non-durable against wood degrading agents.
E.N. = Euro Norm

Fungi (according to E.N. standards): class 5 - not durable
Dry wood borers: susceptible - sapwood not or slightly demarcated (risk in all the wood)
Termites (according to E.N. standards): class 5 - susceptible
Treatability (according to E.N. standards): class 1 - easily permeable
Use class ensured by natural durability: class 1 - inside (no dampness)
Species covering the use class 5: No

Note: Often very important sapwood; end-uses under use class 4 possible with an adequate preservative treatment.

REQUIREMENT OF A PRESERVATIVE TREATMENT

Against dry wood borer attacks: requires appropriate preservative treatment
In case of risk of temporary humidification: requires appropriate preservative treatment
In case of risk of permanent humidification: requires appropriate preservative treatment
DRYING

Drying rate: rapid
Risk of distortion: slight risk
Risk of casehardening: no
Risk of checking: slight risk
Risk of collapse: no
Note: Prone to blue stain.

Possible drying schedule: 4

<table>
<thead>
<tr>
<th>M.C. (%)</th>
<th>Temperature (°C)</th>
<th>Air humidity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>dry-bulb</td>
<td>wet-bulb</td>
</tr>
<tr>
<td>Green</td>
<td>42</td>
<td>39</td>
</tr>
<tr>
<td>50</td>
<td>48</td>
<td>43</td>
</tr>
<tr>
<td>40</td>
<td>48</td>
<td>43</td>
</tr>
<tr>
<td>30</td>
<td>48</td>
<td>43</td>
</tr>
<tr>
<td>15</td>
<td>54</td>
<td>46</td>
</tr>
</tbody>
</table>

This schedule is given for information only and is applicable to thickness lower or equal to 38 mm. It must be used in compliance with the code of practice.

For thickness from 38 to 75 mm, the air relative humidity should be increased by 5 % at each step. For thickness over 75 mm, a 10 % increase should be considered.

SAWING AND MACHINING

Blunting effect: normal
Sawteeth recommended: ordinary or alloy steel
Cutting tools: ordinary
Peeling: good
Slicing: not recommended or without interest

ASSEMBLING

Nailing / screwing: poor
Gluing: correct

COMMERICAL GRADING

Appearance grading for sawn timbers: Grading depending on the source

FIRE SAFETY

Conventional French grading: Thickness > 18 mm : M.3 (moderately inflammable)
Thickness < 18 mm : M.4 (easily inflammable)
Euroclasses grading: D s2 d0
Default grading for solid wood, according to requirements of European standard EN 14081-1 annex C (April 2009). It concerns structural graded timber in vertical uses with mean density upper 0.35 and thickness upper 22 mm.

END-USES

<table>
<thead>
<tr>
<th>Boxes and crates</th>
<th>Fiber or particle boards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulp</td>
<td>Poles</td>
</tr>
<tr>
<td>Veneer for interior of plywood</td>
<td>Glued laminated</td>
</tr>
<tr>
<td>Exterior joinery</td>
<td>Interior joinery</td>
</tr>
<tr>
<td>Interior panelling</td>
<td>Current furniture or furniture components</td>
</tr>
<tr>
<td>Formwork</td>
<td>Light carpentry</td>
</tr>
</tbody>
</table>

Note: Light construction and shingle with treatment. Above mentioned end-uses depend on the wood quality (knots more or less numerous).
## MAIN LOCAL NAMES

<table>
<thead>
<tr>
<th>Country</th>
<th>Local name</th>
<th>Country</th>
<th>Local name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>OCOTE</td>
<td>Mexico</td>
<td>PINO</td>
</tr>
<tr>
<td>Characteristic</td>
<td>Values</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific gravity</td>
<td>0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1, 1.1, 1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monnin hardness</td>
<td>1, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coefficient of volumetric shrinkage</td>
<td>0.3, 0.4, 0.5, 0.6, 0.7, 0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total tangential shrinkage (%)</td>
<td>4, 5, 6, 7, 8, 9, 10, 11, 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total radial shrinkage (%)</td>
<td>2, 3, 4, 5, 6, 7, 8, 9, 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crushing strength (MPa)</td>
<td>0, 20, 30, 50, 60, 70, 80, 90, 100, 110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Static bending strength (MPa)</td>
<td>25, 50, 75, 100, 125, 150, 175, 200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modulus of elasticity (≤1000 MPa)</td>
<td>6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Resistance to fungi**
- Not durable
- Poorly durable
- Moderately durable
- Durable
- Very durable

**Resistance to dry wood insects borers**
- Susceptible
- Durable

**Resistance to termites**
- Susceptible
- Moderately durable
- Durable

**Treatability**
- Not permeable
- Poorly permeable
- Moderately permeable
- Easily permeable

**Stability**
- Poorly stable
- Moderately stable
- Stable

**Fibers Saturation Point**
- Low (15%)
- Medium (25%)
- High (35%)
- Very high (45%)