Family: PINACEAE (gymnosperm)
Scientific name(s): Pseudotsuga menziesii
Commercial restriction: no commercial restriction

Note: Coming from North West of America, DOUGLAS FIR is often used for reforestation in France and in Europe. Properties of European planted trees (young and with a rapid growth) which are mentioned in this sheet are different from those of the "Oregon pine" (old and with a slow growth) coming from its original growing area.

WOOD DESCRIPTION

| Color: pinkish brown | Diameter: from 50 to 80 cm |
| Sapwood: clearly demarcated | Thickness of sapwood: from 5 to 10 cm |
| Texture: medium | Floats: pointless |
| Grain: straight | Log durability: low (must be treated) |
| Interlocked grain: absent | Note: Heartwood is pinkish brown with veins, the large sapwood is yellowish. Wood may show some resin pockets, sometimes of a great dimension. |

LOG DESCRIPTION

<table>
<thead>
<tr>
<th>Mean</th>
<th>Std dev.</th>
<th>Mean</th>
<th>Std dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific gravity *: 0,54</td>
<td>0,04</td>
<td>Crushing strength *: 50 MPa</td>
<td>6 MPa</td>
</tr>
<tr>
<td>Monnin hardness *: 3,2</td>
<td>0,8</td>
<td>Static bending strength *: 91 MPa</td>
<td>6 MPa</td>
</tr>
<tr>
<td>Coeff. of volumetric shrinkage: 0,46 %</td>
<td>0,02 %</td>
<td>Modulus of elasticity *: 16800 MPa</td>
<td>1550 MPa</td>
</tr>
<tr>
<td>Total tangential shrinkage (TS): 6,9 %</td>
<td>1,2 %</td>
<td>(*: at 12% moisture content, with 1 MPa = 1 N/mm²)</td>
<td></td>
</tr>
<tr>
<td>Total radial shrinkage (RS): 4,7 %</td>
<td>0,4 %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TS/RS ratio: 1,5</td>
<td></td>
<td>Musical quality factor: 110,1 measured at 2971 Hz</td>
<td></td>
</tr>
<tr>
<td>Fiber saturation point: 27 %</td>
<td></td>
<td>Stability: moderately stable</td>
<td></td>
</tr>
</tbody>
</table>

PHYSICAL PROPERTIES

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

MECHANICAL AND ACOUSTIC PROPERTIES

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

- Funghi (according to E.N. standards): class 3-4 - moderately to poorly durable
  - Dry wood borers: durable - sapwood demarcated (risk limited to sapwood)
- Termites (according to E.N. standards): class 5 - susceptible
- Treatability (according to E.N. standards): class 4 - not permeable
- Use class ensured by natural durability: class 3 - not in ground contact, outside
- Species covering the use class 5: No

Note: This species is listed in the European standard NF EN 350-2.
- Use class 3 is only for wood components without sapwood.
- According to the European standard NF EN 335, performance length might be modified by the intensity of end-use exposition.
- Heartwood is not permeable to preservative products. Wood is used most of the time with sapwood which is moderately to poorly permeable to preservative products.

REQUIREMENT OF A PRESERVATIVE TREATMENT

Against dry wood borer attacks: does not require any preservative treatment

In case of risk of temporary humidification: requires appropriate preservative treatment

In case of risk of permanent humidification: requires appropriate preservative treatment

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DRYING

Drying rate: rapid to normal
Risk of distortion: slight risk
Risk of casehardening: no
Risk of checking: slight risk
Risk of collapse: no

Possible drying schedule: 3

<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>60</td>
<td>56</td>
</tr>
<tr>
<td>30</td>
<td>68</td>
<td>58</td>
</tr>
<tr>
<td>20</td>
<td>74</td>
<td>60</td>
</tr>
<tr>
<td>15</td>
<td>80</td>
<td>61</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: nodd

Note: Risks of clogging of saw blades and tools due to resin pockets.

ASSEMBLING

Nailing / screwing: good
Gluing: correct

Note: Slightly acid wood: risk of nail or screw corrosion if in contact with humidity.

COMMERCIAL GRADING

Appearance grading for sawn timbers: According to European standard EN 1611-1 (October 1999)
Possible grading (on 2 sides): G2-0, G2-1, G2-2, G2-3, G2-4
Possible grading (on 4 sides): G4-0, G4-1, G4-2, G4-3, G4-4*

Visual grading for structural applications: Traded timber with CE marking. Possible strength classes: C18, C24 or C30 related to the European standard EN 14081 (May 2006).

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

Exterior panelling
Interior panelling
Heavy carpentry
Exterior joinery
Ship building

Glued laminated
Interior joinery
Wood frame house
Veneer for back or face of plywood
Poles
## 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>Germany (temperate timber)</td>
<td>DOUGLASIE</td>
<td>France (temperate timber)</td>
<td>DOUGLAS</td>
</tr>
<tr>
<td>France (temperate timber)</td>
<td>PIN D'OREGON</td>
<td>France (temperate timber)</td>
<td>SAPIN DE DOUGLAS</td>
</tr>
<tr>
<td>United States (temperate timber)</td>
<td>DOUGLAS FIR</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Specific gravity

- **Very light**
- **Light**
- **Medium**
- **Heavy**
- **Very heavy**

### Monnin hardness

- **Very soft**
- **Soft**
- **Medium**
- **Hard**
- **Very hard**

### Coefficient of volumetric shrinkage (%)

- **Low**
- **Medium**
- **High**

### Total tangential shrinkage (%)

- **Low**
- **Medium**
- **High**

### Total radial shrinkage (%)

- **Low**
- **Medium**
- **High**

### Crushing strength (MPa)

- **Low**
- **Medium**
- **High**

### Static bending strength (MPa)

- **Low**
- **Medium**
- **High**

### Modulus of elasticity (≤1000 MPa)

- **Low**
- **Medium**
- **High**

### 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

- **15%**
- **25%**
- **35%**
- **45%**

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**26/03/2012**

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