Family: DIPTEROCARPACEAE (angiosperm)
Scientific name(s): Dryobalanops spp.
Commercial restriction: no commercial restriction

WOOD DESCRIPTION

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>red brown</td>
</tr>
<tr>
<td>Sapwood</td>
<td>clearly demarcated</td>
</tr>
<tr>
<td>Texture</td>
<td>medium</td>
</tr>
<tr>
<td>Grain</td>
<td>straight or interlocked</td>
</tr>
<tr>
<td>Interlocked grain</td>
<td>slight</td>
</tr>
</tbody>
</table>

Log durability: good

The colour varies from red brown to pink brown. Camphor smell. Presence of thin resin veins.

LOG DESCRIPTION

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>from 50 to 100 cm</td>
</tr>
<tr>
<td>Thickness of sapwood</td>
<td>from 4 to 8 cm</td>
</tr>
<tr>
<td>Floats</td>
<td>no</td>
</tr>
<tr>
<td>Log durability</td>
<td>good</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.

<table>
<thead>
<tr>
<th>Property</th>
<th>Mean</th>
<th>Std dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific gravity *</td>
<td>0.74</td>
<td>0.07</td>
</tr>
<tr>
<td>Monnin hardness *</td>
<td>4.1</td>
<td>1.4</td>
</tr>
<tr>
<td>Coeff. of volumetric shrinkage</td>
<td>0.62 %</td>
<td>0.04 %</td>
</tr>
<tr>
<td>Total tangential shrinkage (TS)</td>
<td>9.1 %</td>
<td>0.6 %</td>
</tr>
<tr>
<td>Total radial shrinkage (RS)</td>
<td>4.5 %</td>
<td></td>
</tr>
<tr>
<td>TS/RS ratio</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Fiber saturation point</td>
<td>26 %</td>
<td></td>
</tr>
<tr>
<td>Stability</td>
<td>stable</td>
<td></td>
</tr>
</tbody>
</table>

MECHANICAL AND ACOUSTIC PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Mean</th>
<th>Std dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crushing strength *</td>
<td>60 MPa</td>
<td>9 MPa</td>
</tr>
<tr>
<td>Static bending strength *</td>
<td>110 MPa</td>
<td>26 MPa</td>
</tr>
<tr>
<td>Modulus of elasticity *</td>
<td>16150 MPa</td>
<td>3500 MPa</td>
</tr>
<tr>
<td>Musical quality factor</td>
<td>124.1</td>
<td></td>
</tr>
</tbody>
</table>

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 1-2 - very durable to durable
- Dry wood borers: durable - sapwood demarcated (risk limited to sapwood)
- Termites (according to E.N. standards): class M - moderately durable
- Treatability (according to E.N. standards): class 4 - not permeable
- Use class ensured by natural durability: class 4 - in ground or fresh water contact

Species covering the use class 5: No

Note: This species is listed in the European standard NF EN 350-2.
After felling, logs are very sensible to black holes. Under tropical climate, resistance to decay is moderate.
According to the European standard NF EN 335, performance length might be modified by the intensity of end-use exposition.

REQUIREMENT OF A PRESERVATIVE TREATMENT

Against dry wood borer attacks: does not require any preservative treatment
In case of risk of temporary humidification: does not require any preservative treatment
In case of risk of permanent humidification: does not require any preservative treatment
### DRYING

**Drying rate:** slow  
**Risk of distortion:** slight risk  
**Risk of casehardening:** no  
**Risk of checking:** high risk  
**Risk of collapse:** no  

Note: Possible resin exsudation during kiln drying.

**Possible drying schedule:** 4

<table>
<thead>
<tr>
<th>M.C. (%)</th>
<th>Temperature (°C)</th>
<th>Air humidity (%)</th>
</tr>
</thead>
<tbody>
<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:** fairly high  
**Sawteeth recommended:** stellite-tipped  
**Cutting tools:** tungsten carbide  
**Peeling:** good  
**Slicing:** not recommended or without interest  
Note: Normal to high blunting effect.

### ASSEMBLING

**Nailing / screwing:** good but pre-boring necessary  
**Gluing:** correct  
Note: Possible oxydation in contact with iron. Resin exsudation sometimes troublesome in gluing.

### COMMERCIAL GRADING

Appearance grading for sawn timbers: According to MGR grading rules (2009)  
Possible grading: Prime, Select, Standard, Serviceable, Utility

### FIRE SAFETY

Conventional French grading: Thickness > 14 mm : M.3 (moderately inflammable)  
Thickness < 14 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

**Flooring**  
**Wood frame house**  
**Exterior panelling**  
**Formwork**  
**Stairs (inside)**  
**Shingles**  
**Veneer for back or face of plywood**  
**Interior joinery**  
**Turned goods**  
**Note:** Staining of runoff waters.

**Heavy carpentry**  
**Exterior joinery**  
**Current furniture or furniture components**  
**Bridges (parts not in contact with water or ground)**  
**Vehicle or container flooring**  
**Veneer for interior of plywood**  
**Boxes and crates**  
**Tool handles (resilient woods)**
<table>
<thead>
<tr>
<th>Country</th>
<th>Local name</th>
<th>Country</th>
<th>Local name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>KAPUR</td>
<td>Indonesia</td>
<td>KAPUR EMPEDU</td>
</tr>
<tr>
<td>Indonesia</td>
<td>KAPUR KAYATAN</td>
<td>Indonesia</td>
<td>KAPUR SINGKEL</td>
</tr>
<tr>
<td>Indonesia</td>
<td>KAPUR SINTUK</td>
<td>Indonesia</td>
<td>KAPUR TANDUK</td>
</tr>
<tr>
<td>Indonesia</td>
<td>PETANANG</td>
<td>Peninsular Malaysia</td>
<td>BORNEO CAMPHORWOOD</td>
</tr>
<tr>
<td>Peninsular Malaysia</td>
<td>PAIGIE</td>
<td>Peninsular Malaysia</td>
<td>SWAMP KAPUR</td>
</tr>
<tr>
<td>Malaysia (islands)</td>
<td>KAPUR KEJATAN</td>
<td>Malaysia (islands)</td>
<td>KELADAN</td>
</tr>
</tbody>
</table>
### Properties of Wood Species

**Specific Gravity**
- Very light: 0.2
- Light: 0.3
- Medium: 0.4
- Heavy: 0.6
- Very heavy: 0.7

**Monnin Hardness**
- Very soft: 1
- Soft: 2
- Medium: 3
- Hard: 5
- Very hard: 6

**Coefficient of Volumetric Shrinkage (%)**
- Low: 0.3
- Medium: 0.4
- High: 0.5

**Total Tangential Shrinkage (%)**
- Low: 4
- Medium: 6
- High: 8

**Total Radial Shrinkage (%)**
- Low: 2
- Medium: 4
- High: 6

**Crushing Strength (MPa)**
- Low: 10
- Medium: 50
- High: 100

**Static Bending Strength (MPa)**
- Low: 25
- Medium: 75
- High: 150

**Modulus of Elasticity (≤1000 MPa)**
- Low: 6
- Medium: 8
- High: 12

### Resistance to Fungi
- Not durable
- Poorly durable
- Moderately durable
- Durable
- Very durable

### Resistance to Dry Wood Insects Borer
- 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: 45%