KAPUR

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

WOOD DESCRIPTION

Color: red brown
Sapwood: clearly demarcated
Texture: medium
Grain: straight or interlocked
Interlocked grain: slight
Note: Brittleheart.
The colour varies from red brown to pink brown. Camphor smell. Presence of thin resin veins.

LOG DESCRIPTION

Diameter: from 50 to 100 cm
Thickness of sapwood: from 4 to 8 cm
Floats: no
Log durability: good

PHYSICAL PROPERTIES

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

	Mean	Std dev.
Specific gravity *:	0,74	0,07
Monnin hardness *:	4,1	1,4
Coeff. of volumetric shrinkage:	0,62 %	0,04 %
Total tangential shrinkage (TS):	9,1 %	0,6 %
Total radial shrinkage (RS):	4,5 %	
TS/RS ratio:	2,0	
Fiber saturation point:	26 %	

Stability: stable

MECHANICAL AND ACOUSTIC PROPERTIES

	Mean	Std dev.
Crushing strength *:	60 MPa	9 MPa
Static bending strength *:	110 MPa	26 MPa
Modulus of elasticity *:	16150 MPa	3500 MPa

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

Musical quality factor: 124,1 measured at 2899 Hz

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 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

M.C. (%)	Temperature (°C) dry-bulb	wet-bulb	Air humidity (%)
Green	42	39	82
50	48	43	74
40	48	43	74
30	48	43	74
15	54	46	63

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.

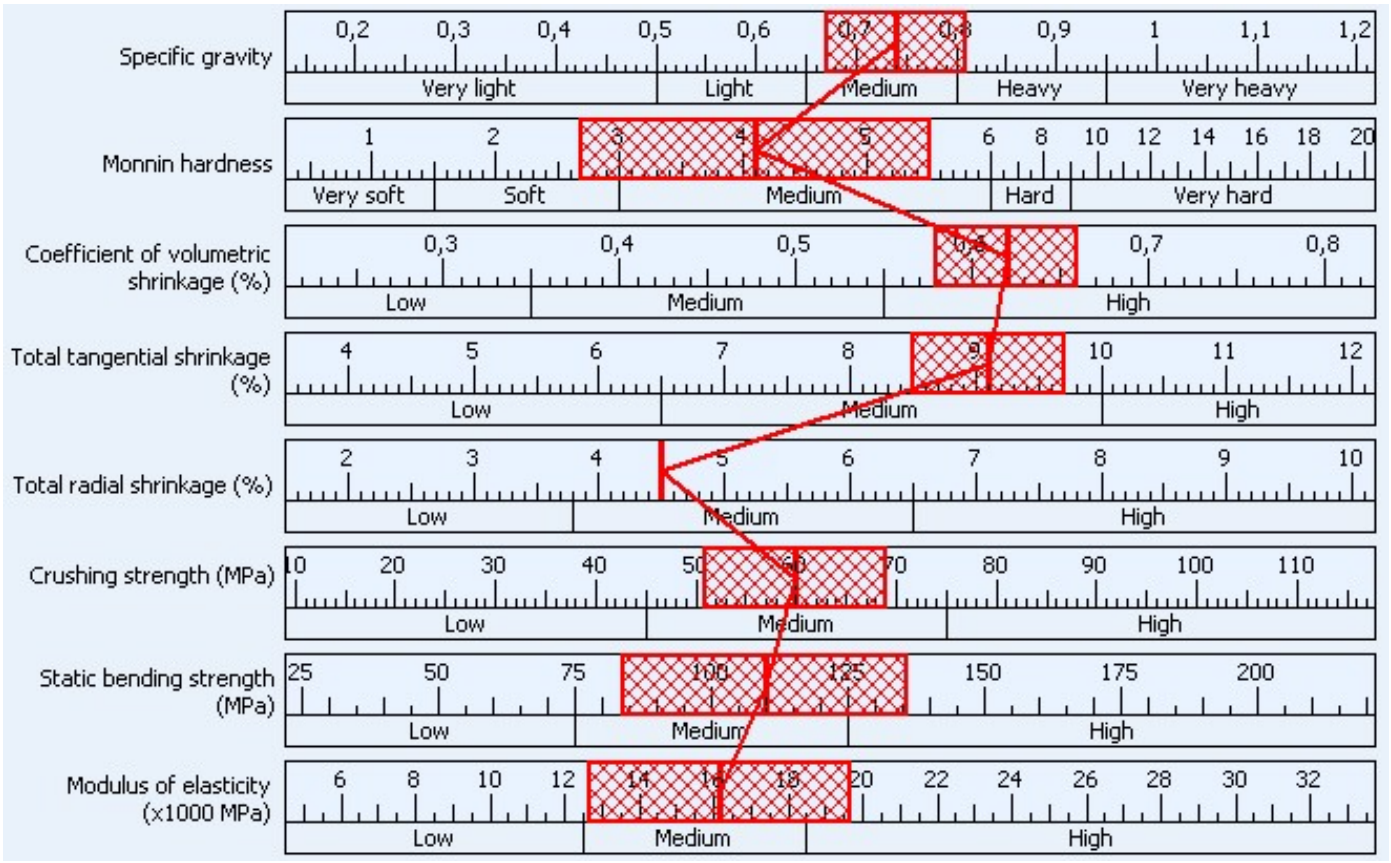
END-USES

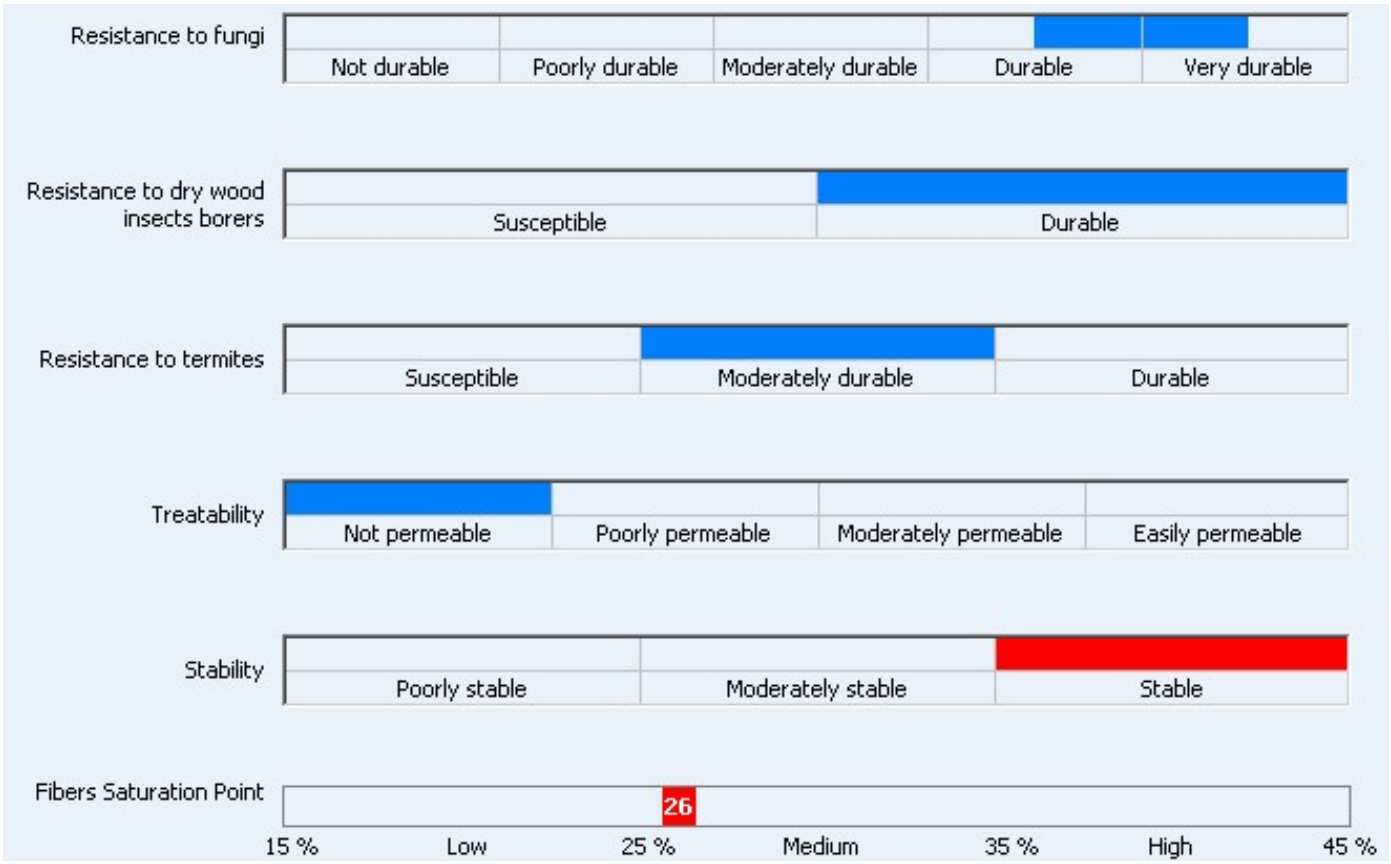
Flooring
Wood frame house
Exterior panelling
Formwork
Stairs (inside)
Shingles
Veneer for back or face of plywood
Interior joinery
Turned goods
Heavy carpentry
Exterior joinery
Current furniture or furniture components
Bridges (parts not in contact with water or ground)
Vehicle or container flooring
Veneer for interior of plywood
Boxes and crates
Tool handles (resilient woods)

Note: Staining of runoff waters.

MAIN LOCAL NAMES

Country	Local name	Country	Local name
Indonesia	KAPUR	Indonesia	KAPUR EMPEDU
Indonesia	KAPUR KAYATAN	Indonesia	KAPUR SINGKEL
Indonesia	KAPUR SINTUK	Indonesia	KAPUR TANDUK
Indonesia	PETANANG	Peninsular Malaysia	BORNEO CAMPHORWOOD
Peninsular Malaysia	PAIGIE	Peninsular Malaysia	SWAMP KAPUR
Malaysia (islands)	KAPUR KEJATAN	Malaysia (islands)	KELADAN


Specific gravity
0,2 0,3 0,4 0,5 0,6 0,7 0,8 0,9 1 1,1 1,2
Very light
Light
Medium
Heavy
Very heavy
Monnin hardness
1 2 3 4 5 6 8 10 12 14 16 18 20
Very soft
Soft
Medium
Hard
Very hard
Coefficient of volumetric shrinkage (%)
0,3 0,4 0,5 0,6 0,7 0,8
Low
Medium
High
Total tangential shrinkage (%)
4 5 6 7 8 9 10 11 12
Low
Medium
High
Total radial shrinkage (%)
2 3 4 5 6 7 8 9 10
Low
Medium
High
Crushing strength (MPa)
10 20 30 40 50 60 70 80 90 100 110
Low
Medium
High
Static bending strength (MPa)
25 50 75 100 125 150 175 200
Low
Medium
High
Modulus of elasticity (x1000 MPa)
6 8 10 12 14 16 18 20 22 24 26 28 30 32
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
26
15 %
Low
25 %
Medium
35 %
High
45 %