MAKORE

Family: SAPOTACEAE (angiosperm)

Scientific name(s): Tieghemella heckelii
Tieghemella africana
Dumoria spp. (synonymous)

Commercial restriction: no commercial restriction

WOOD DESCRIPTION

Color: red brown
Sapwood: clearly demarcated
Texture: medium
Grain: straight or interlocked
Interlocked grain: marked but not frequent
Note: Some logs are not floatable.
Wood dark pink brown to dark red brown with sometimes purplish glints and/or pale veins slightly distinct. Often moiré.

LOG DESCRIPTION

Diameter: from 90 to 130 cm
Thickness of sapwood: from 4 to 8 cm
Floats: yes
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 *:	0,69	0,05
Monnin hardness *:	4,0	1,5
Coeff. of volumetric shrinkage:	0,48 %	0,05 %
Total tangential shrinkage (TS):	7,3 %	0,5 %
Total radial shrinkage (RS):	5,6 %	0,6 %
TS/RS ratio:	1,3	
Fiber saturation point:	28 %	

Stability: moderately stable to stable

MECHANICAL AND ACOUSTIC PROPERTIES

	Mean	Std dev.
Crushing strength *:	59 MPa	10 MPa
Static bending strength *:	98 MPa	17 MPa
Modulus of elasticity *:	13850 MPa	1908 MPa

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

Musical quality factor: 92,5 measured at 2213 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 - very durable
Dry wood borers: durable - sapwood demarcated (risk limited to sapwood)
Termites (according to E.N. standards): class D - 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: Yes
Note: This species is listed in the European standard NF EN 350-2.
It naturally covers the use class 5 (end-uses in marine environment or in brackish water) due to its high silica content.
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: normal
Risk of distortion: slight risk
Risk of casehardening: no
Risk of checking: slight risk
Risk of collapse: no
Note: Initial surface drying prior to kiln drying is recommended in order to reduce defects.

Possible drying schedule: 2

M.C. (%)	Temperature (°C) dry-bulb	wet-bulb	Air humidity (%)
Green	50	47	84
40	50	45	75
30	55	47	67
20	70	55	47
15	75	58	44

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: high
Sawteeth recommended: stellite-tipped
Cutting tools: tungsten carbide
Peeling: good
Slicing: nood
Note: Very irritant sawdust. Sometimes clogging of sawblades.

ASSEMBLING

Nailing / screwing: good but pre-boring necessary
Gluing: correct
Note: Tends to split when nailing. Gluing requries care (dense wood).

COMMERCIAL GRADING

Appearance grading for sawn timbers: According to SATA grading rules (1996)
For the "General Purpose Market":
Possible grading for square edged timbers: choix I, choix II, choix III, choix IV
Possible grading for short length lumbers: choix I, choix II
Possible grading for short length rafters: choix I, choix II, choix III
For the "Special Market":
Possible grading for strips and small boards (ou battens): choix I, choix II, choix III
Possible grading for rafters: choix I, choix II, choix III

FIRE SAFETY

Conventional French grading: Thickness > 14 mm : M.3 (moderately inflammable)
Thickness < 14 mm : M.4 (easily inflammable)

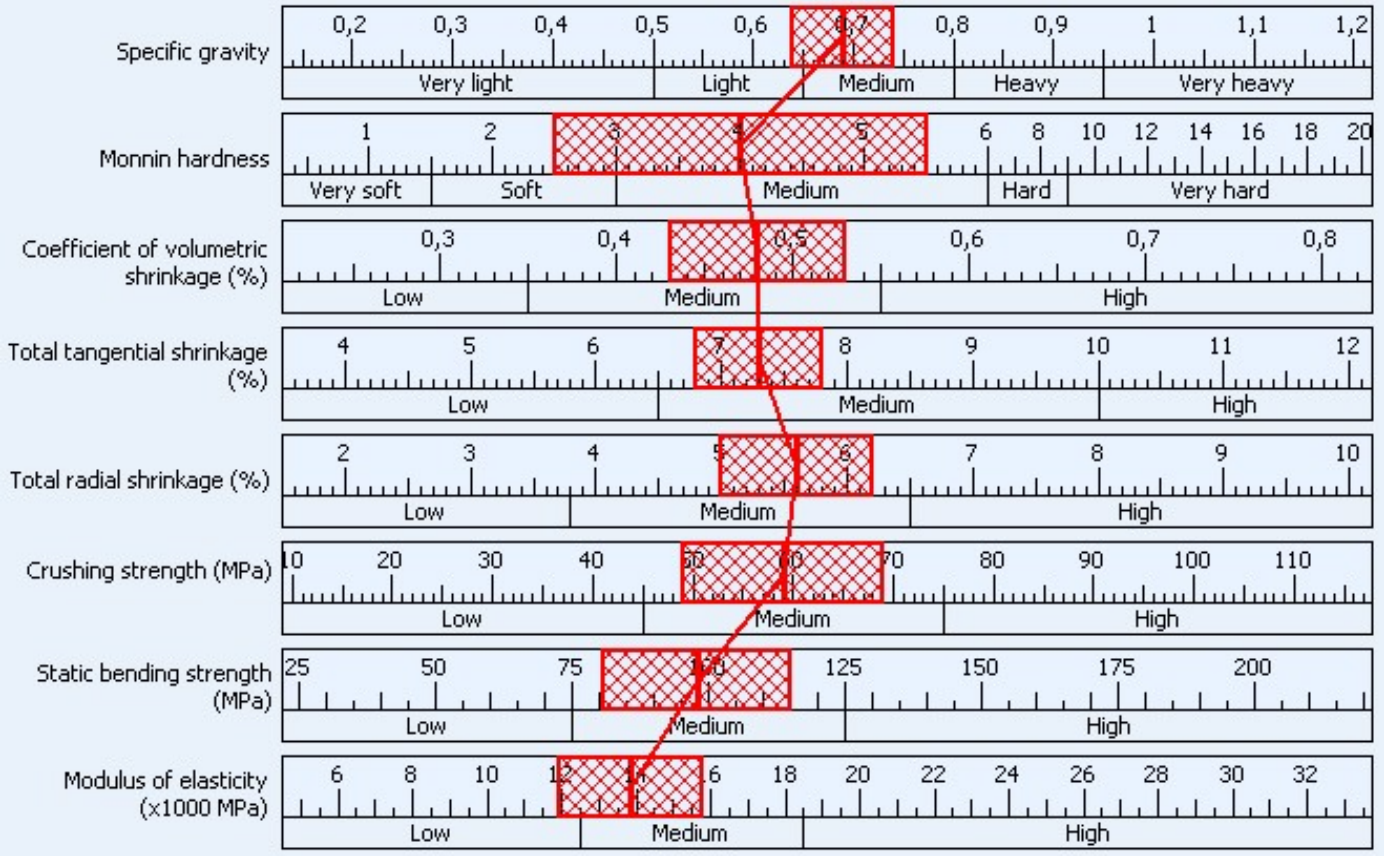
Euroclasses grading: D s2 d0
Default grading for solid wood, according to requirements of European standard EN 14081-1 annex C (April 2009). It concerns structural graded timber in vertical uses with mean density upper 0.35 and thickness upper 22 mm.

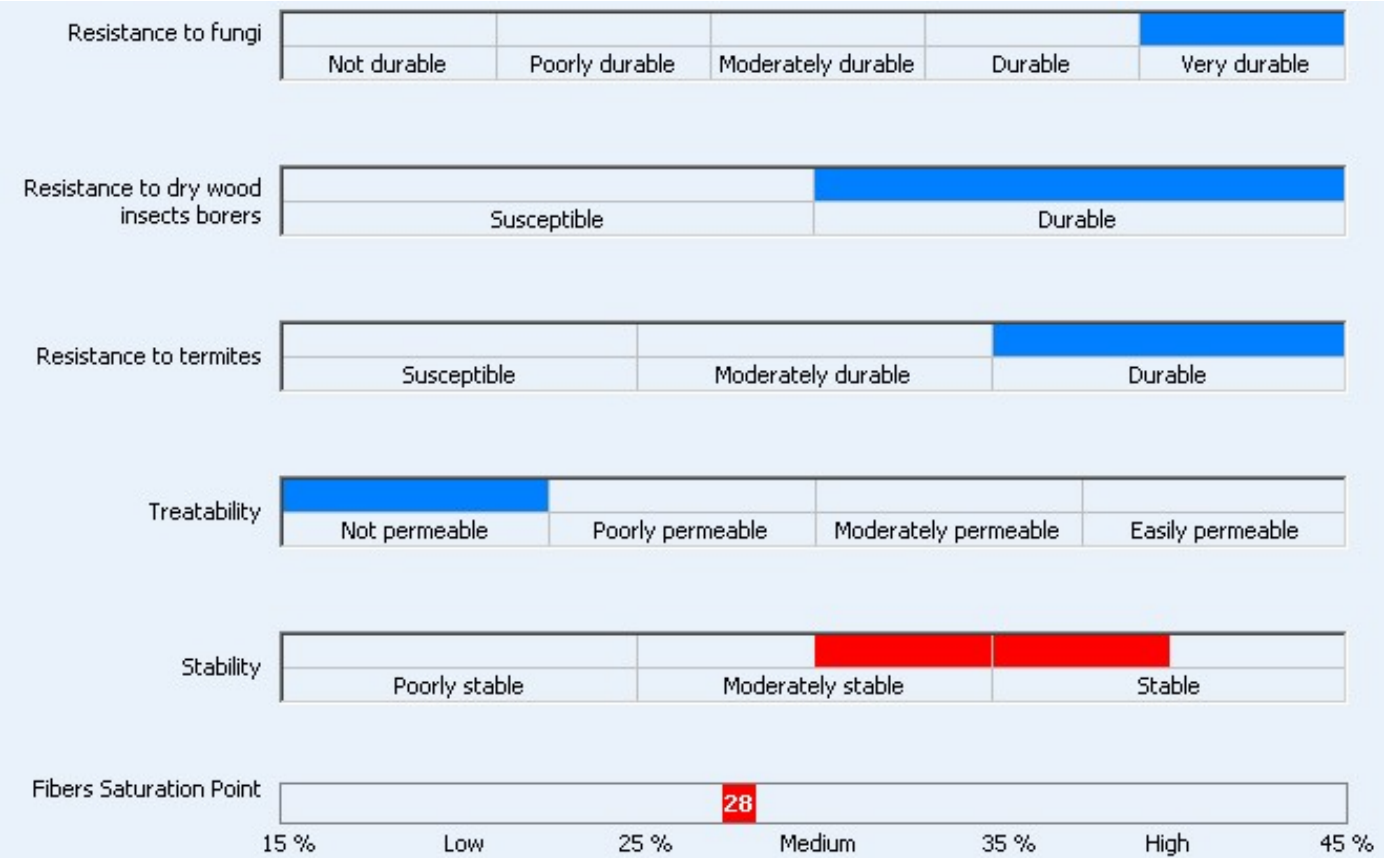
END-USES

Exterior joinery
Flooring
Bridges (parts not in contact with water or ground)
Exterior panelling
Sliced veneer
Light carpentry
Ship building (planking and deck)
Veneer for back or face of plywood
Sculpture
Interior joinery
Stairs (inside)
Interior panelling
Current furniture or furniture components
Cabinetwork (high class furniture)
Ship building (ribs)
Veneer for interior of plywood
Vehicle or container flooring
Turned goods

MAIN LOCAL NAMES

Country	Local name	Country	Local name
Cameroon	NOM ADJAP ELANG	Congo	N' DUKA
Ivory Coast	MAKORE	Gabon	DOUKA
Ghana	ABACU	Ghana	BAKU
Ghana	MAKORE	Equatorial Guinea	OKOLA
Germany	DOUKA	France	DOUKA


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
28
15 %
Low
25 %
Medium
35 %
High
45 %