

General information

Designation

Dalbergia latifolia

Typical uses

Veneer; decorative plywood; speciality items: cutlery handles; brush backs; billiard cue butts; fancy turnery articles, woodwind instruments, boatbuilding, agricultural implements.

Composition overview

Compositional summary

Cellulose/Hemicellulose/Lignin/12%H₂O

Material family	Natural		
Base material	Wood (tropical)		
Renewable content	100		%

Composition detail (polymers and natural materials)

Wood	100		%
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Price

Price	* 3.04	-	4.88	USD/lb
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Physical properties

Density	0.0303	-	0.0368	lb/in ³
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Mechanical properties

Young's modulus	* 1.75	-	2.15	10 ⁶ psi
Yield strength (elastic limit)	* 9.04	-	11	ksi
Tensile strength	* 14.1	-	17.3	ksi
Elongation	* 2.18	-	2.66	% strain
Compressive strength	8.3	-	10.1	ksi
Flexural modulus	1.6	-	1.96	10 ⁶ psi
Flexural strength (modulus of rupture)	15.2	-	18.6	ksi
Shear modulus	* 0.131	-	0.16	10 ⁶ psi
Shear strength	1.89	-	2.31	ksi
Bulk modulus	* 0.347	-	0.389	10 ⁶ psi
Poisson's ratio	* 0.35	-	0.4	
Shape factor	5			
Hardness - Vickers	* 12.6	-	15.4	HV
Hardness - Brinell	* 10.5	-	12.9	ksi
Hardness - Janka	* 2.83e3	-	3.46e3	lbf
Fatigue strength at 10 ⁷ cycles	* 4.57	-	5.58	ksi

Mechanical loss coefficient (tan delta)	* 0.0068	-	0.0083	
Differential shrinkage (radial)	0.15	-	0.18	%
Differential shrinkage (tangential)	0.23	-	0.26	%
Radial shrinkage (green to oven-dry)	2.4	-	3	%
Tangential shrinkage (green to oven-dry)	5.2	-	6.4	%
Volumetric shrinkage (green to oven-dry)	* 11	-	18	%
Work to maximum strength	0.983	-	1.2	ft.lbf/in ³

Impact & fracture properties

Fracture toughness	* 8.01	-	9.74	ksi.in ^{0.5}
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Thermal properties

Glass temperature	171	-	216	°F
Maximum service temperature	248	-	284	°F
Minimum service temperature	* -99.4	-	-9.4	°F
Thermal conductivity	* 0.231	-	0.283	BTU.ft/hr.ft ² .°F
Specific heat capacity	0.396	-	0.408	BTU/lb.°F
Thermal expansion coefficient	* 1.11	-	6.11	µstrain/°F

Electrical properties

Electrical resistivity	* 6e13	-	2e14	µohm.cm
Dielectric constant (relative permittivity)	* 9.05	-	11.1	
Dissipation factor (dielectric loss tangent)	* 0.11	-	0.134	
Dielectric strength (dielectric breakdown)	* 10.2	-	15.2	V/mil

Magnetic properties

Magnetic type	Non-magnetic
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Optical properties

Transparency	Opaque
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Restricted substances risk indicators

RoHS (EU) compliant grades?	✓
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Durability

Water (fresh)	Limited use
Water (salt)	Limited use
Weak acids	Limited use
Strong acids	Unacceptable
Weak alkalis	Acceptable
Strong alkalis	Unacceptable
Organic solvents	Acceptable

Oxidation at 500C	Unacceptable
UV radiation (sunlight)	Good
Flammability	Highly flammable

Primary production energy, CO2 and water

Embodied energy, primary production	* 4.99e3	-	5.5e3	BTU/lb
CO2 footprint, primary production	* 0.574	-	0.633	lb/lb
NOx creation	0.00257	-	0.00284	lb/lb
SOx creation	0.00656	-	0.00725	lb/lb
Water usage	* 1.84e4	-	2.03e4	in^3/lb

Processing energy, CO2 footprint & water

Coarse machining energy (per unit wt removed)	* 483	-	534	BTU/lb
Coarse machining CO2 (per unit wt removed)	* 0.0843	-	0.0932	lb/lb
Fine machining energy (per unit wt removed)	* 2.99e3	-	3.31e3	BTU/lb
Fine machining CO2 (per unit wt removed)	* 0.522	-	0.577	lb/lb
Grinding energy (per unit wt removed)	* 5.78e3	-	6.39e3	BTU/lb
Grinding CO2 (per unit wt removed)	* 1.01	-	1.12	lb/lb

Recycling and end of life

Recycle	✗			
Recycle fraction in current supply	8.55	-	9.45	%
Downcycle	✓			
Combust for energy recovery	✓			
Heat of combustion (net)	* 8.49e3	-	9.16e3	BTU/lb
Combustion CO2	* 1.69	-	1.78	lb/lb
Landfill	✓			
Biodegrade	✓			

Eco-indicators for principal component

Eco-indicator 95	2.99			millipoints/lb
EPS value	62.7	-	69.3	

Notes

Warning

All woods have properties which show variation; they depend principally on growth conditions and moisture content.

Links

ProcessUniverse

Reference

Shape

General information

Designation

Dalbergia nigra (L)

Typical uses

Veneer; decorative plywood; speciality items: cutlery handles; brush backs; billiard cue butts; fancy turnery articles, woodwind instruments.

Composition overview

Compositional summary

Cellulose/Hemicellulose/Lignin/12%H2O

Material family	Natural
Base material	Wood (tropical)
Renewable content	100 %

Composition detail (polymers and natural materials)

Wood	100 %
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Price

Price	* 3.04 - 4.88 USD/lb
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Physical properties

Density	0.0289 - 0.0354 lb/in ³
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Mechanical properties

Young's modulus	* 1.58 - 1.93 10 ⁶ psi
Yield strength (elastic limit)	* 9.06 - 11.1 ksi
Tensile strength	* 16.8 - 20.5 ksi
Elongation	* 2.87 - 3.5 % strain
Compressive strength	8.75 - 10.7 ksi
Flexural modulus	1.44 - 1.75 10 ⁶ psi
Flexural strength (modulus of rupture)	18 - 22 ksi
Shear modulus	* 0.117 - 0.142 10 ⁶ psi
Shear strength	1.8 - 2.2 ksi
Bulk modulus	* 0.305 - 0.341 10 ⁶ psi
Poisson's ratio	* 0.35 - 0.4
Shape factor	4.9
Hardness - Vickers	* 11.4 - 14 HV
Hardness - Brinell	11.7 - 14.4 ksi
Hardness - Janka	* 2.57e3 - 3.14e3 lbf
Fatigue strength at 10 ⁷ cycles	* 5.41 - 6.6 ksi

Mechanical loss coefficient (tan delta)	* 0.0072	-	0.0088	
Differential shrinkage (radial)	0.23	-	0.25	%
Differential shrinkage (tangential)	0.35	-	0.39	%
Radial shrinkage (green to oven-dry)	* 3.2	-	7	%
Tangential shrinkage (green to oven-dry)	* 6.8	-	11.5	%
Volumetric shrinkage (green to oven-dry)	* 11	-	18	%
Work to maximum strength	* 1.59	-	1.94	ft.lbf/in ³

Impact & fracture properties

Fracture toughness	* 7.46	-	9.19	ksi.in ^{0.5}
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Thermal properties

Glass temperature	171	-	216	°F
Maximum service temperature	248	-	284	°F
Minimum service temperature	* -99.4	-	-9.4	°F
Thermal conductivity	* 0.225	-	0.272	BTU.ft/hr.ft ² .°F
Specific heat capacity	0.396	-	0.408	BTU/lb.°F
Thermal expansion coefficient	* 1.11	-	6.11	µstrain/°F

Electrical properties

Electrical resistivity	* 6e13	-	2e14	µohm.cm
Dielectric constant (relative permittivity)	* 8.67	-	10.6	
Dissipation factor (dielectric loss tangent)	* 0.105	-	0.128	
Dielectric strength (dielectric breakdown)	* 10.2	-	15.2	V/mil

Magnetic properties

Magnetic type	Non-magnetic
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Optical properties

Transparency	Opaque
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Restricted substances risk indicators

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SOx creation	0.00656	-	0.00725	lb/lb
Water usage	* 1.84e4	-	2.03e4	in^3/lb

Processing energy, CO2 footprint & water

Coarse machining energy (per unit wt removed)	* 512	-	566	BTU/lb
Coarse machining CO2 (per unit wt removed)	* 0.0893	-	0.0987	lb/lb
Fine machining energy (per unit wt removed)	* 3.28e3	-	3.62e3	BTU/lb
Fine machining CO2 (per unit wt removed)	* 0.572	-	0.632	lb/lb
Grinding energy (per unit wt removed)	* 6.35e3	-	7.02e3	BTU/lb
Grinding CO2 (per unit wt removed)	* 1.11	-	1.23	lb/lb

Recycling and end of life

Recycle	✗			
Recycle fraction in current supply	8.55	-	9.45	%
Downcycle	✓			
Combust for energy recovery	✓			
Heat of combustion (net)	* 8.49e3	-	9.16e3	BTU/lb
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