Balsa (ochroma spp.) (0.17-0.21) (l)

General information

Designation

Ochroma spp. (MD) L

Tradenames

FLEXICORE, CONTOURKORE, PRO-BALSA

Typical uses

Cores for sandwich structures; model building; floatation; insulation; packaging.

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	%

Price

Price	* 3.04	-	4.88	USD/lb

Physical properties

Density	0.00614	-	0.00759	lb/in^3
Relative density	0.1	-	0.15	
Cells/volume	8.19e6	-	1.64e7	/in^3
Anisotropy ratio	10	-	30	

Mechanical properties

Young's modulus	0.609	-	0.754	10^6 psi
Yield strength (elastic limit)	* 1.65	-	2.03	ksi
Tensile strength	2.32	-	3.63	ksi
Elongation	* 1.03	-	1.26	% strain
Compressive strength	1.23	-	1.81	ksi
Compressive stress @ 25% strain	1.09	-	1.31	ksi
Flexural modulus	0.493	-	0.609	10^6 psi
Flexural strength (modulus of rupture)	2.61	-	3.19	ksi
Shear modulus	* 0.045	-	0.0551	10^6 psi
Shear strength	* 0.464	-	0.566	ksi
Bulk modulus	* 0.0116	-	0.0145	10^6 psi
Poisson's ratio	* 0.35	-	0.4	
Shape factor	5.5			
Hardness - Vickers	* 0.35	-	0.43	HV
Hardness - Brinell	* 1.35	-	1.64	ksi
Hardness - Janka	* 78.7	-	96.7	lbf
Fatigue strength at 10^7 cycles	* 0.783	-	0.957	ksi
Mechanical loss coefficient (tan delta)	* 0.0122	-	0.015	
Densification strain	0.65	-	0.75	
Differential shrinkage (radial)	* 0.05	-	0.06	%
Differential shrinkage (tangential)	* 0.07	-	0.09	%
Radial shrinkage (green to oven-dry)	* 3.2	-	7	%
Tangential shrinkage (green to oven-dry)	4	-	4.8	%
Volumetric shrinkage (green to oven-dry)	6.8	-	8.3	%

Work to maximum strength	*	0.157	-	0.192	ft.lbf/in^3

Impact & fracture properties

Fracture toughness		0.455	-	0.546	ksi.in^0.5

Thermal properties

Glass temperature		171	-	216	°F
Maximum service temperature		248	-	284	°F
Minimum service temperature	*	-99.4	-	-9.4	°F
Thermal conductivity	*	0.052	-	0.0693	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)	*	2.45	-	3	
Dissipation factor (dielectric loss tangent)	*	0.021	-	0.026	
Dielectric strength (dielectric breakdown)		123	-	124	V/mil

Optical properties

Transparency	Opaque

Magnetic properties

Magnetic type	Non-magnetic

Bio-data

RoHS (EU) compliant grades?	✓
Food contact	Yes

Durability

Water (fresh)	Limited use
Water (salt)	Limited use
Weak acids	Limited use
Strong acids	Unacceptable
Weak alkalis	Limited use
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)	*	427	-	472	BTU/lb
Coarse machining CO2 (per unit wt removed)	*	0.0745	-	0.0823	lb/lb
Fine machining energy (per unit wt removed)	*	2.43e3	-	2.69e3	BTU/lb
Fine machining CO2 (per unit wt removed)	*	0.424	-	0.469	lb/lb
Grinding energy (per unit wt removed)	*	4.66e3	-	5.15e3	BTU/lb

Grinding CO2 (per unit wt removed)	*	0.813	-	0.899	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	✓				

Geo-economic data for principal component

Principal component	Balsa			
Annual world production	8.98e8	-	9.94e8	ton/yr

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