

General information

Overview

Jute is a long, soft, shiny vegetable fiber made from plants in the genus *Corchorus*, family *Malvaceae*. Like kenaf, industrial hemp, flax (linen) and ramie, jute is a bast fiber plant, one in which the fibers extracted from the stem or bast. Jute is one of the cheapest natural fibers and is second only to cotton in amount produced and variety of uses. It can be spun into coarse, strong threads. When woven it is called hessian or burlap. There is growing interest in using jute as reinforcement in composites, replacing glass.

Designation

Jute

Typical uses

Jute is used chiefly to make cloth for wrapping bales of raw cotton, and to make sacks and coarse cloth. The fibers are also woven into curtains, chair coverings, carpets, area rugs, hessian cloth, and backing for linoleum.

Composition overview

Compositional summary

Jute fibers are composed primarily of cellulose and lignin

Form	Fiber		
Material family	Natural		
Base material	Cellulose		
Renewable content	100		%

Composition detail (polymers and natural materials)

Natural material	100		%
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Price

Price	* 0.159	-	0.68	USD/lb
Price per unit volume	* 12.9	-	63.7	USD/ft^3

Physical properties

Density	0.047	-	0.0542	lb/in^3
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Mechanical properties

Young's modulus	1.89	-	8.7	10^6 psi
Yield strength (elastic limit)	21	-	76.9	ksi
Tensile strength	34.7	-	125	ksi
Elongation	1.16	-	1.8	% strain
Flexural modulus	* 1.89	-	8.7	10^6 psi
Shear modulus	* 1.88	-	3.23	10^6 psi
Poisson's ratio	* 0.343	-	0.357	
Shape factor	1			
Fatigue strength at 10^7 cycles	* 23.2	-	49.9	ksi

Mechanical loss coefficient (tan delta)	* 0.00226	-	0.00325	
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Impact & fracture properties

Fracture toughness	0.638	-	14.6	ksi.in ^{0.5}
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Thermal properties

Glass temperature	* 716	-	734	°F
Maximum service temperature	* 752	-	788	°F
Thermal conductivity	* 0.144	-	0.202	BTU.ft/hr.ft ² .°F
Specific heat capacity	0.287	-	0.291	BTU/lb.°F
Thermal expansion coefficient	* 8.33	-	16.7	µstrain/°F

Magnetic properties

Magnetic type	Non-magnetic
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Optical properties

Transparency	Opaque
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Critical materials risk

Contains >5wt% critical elements?	No
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Absorption & permeability

Water absorption @ 24 hrs	* 2.2	-	2.6	%
Water absorption @ sat	11	-	13	%
Humidity absorption @ sat	* 3.67	-	4.33	%

Durability

Water (fresh)	Acceptable
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	2.74e4	-	3.02e4	BTU/lb
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Sources

61.9 MJ/kg (Ecoinvent v2.2); 72 MJ/kg (Ecoinvent v2.2)

CO2 footprint, primary production	2.69	-	2.96	lb/lb
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Sources



2.58 kg/kg (Ecoinvent v2.2); 3.06 kg/kg (Ecoinvent

Water usage	* 7.06e4	-	7.81e4	in^3/lb
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Processing energy, CO2 footprint & water

Fabric production energy	* 1.07e3	-	1.17e3	BTU/lb
Fabric production CO2	* 0.198	-	0.218	lb/lb
Fabric production water	* 28.5	-	42.9	in^3/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)	* 7.25e3	-	7.61e3	BTU/lb
Combustion CO2	* 1.39	-	1.46	lb/lb
Landfill				
Biodegrade				

Links

ProcessUniverse

Reference

Shape