

General information

Designation

Cork (high density)

Typical uses

Corks; stoppers; bungs for bottles; floats; lifebelts; walls; flooring; insulation; shoes; packaging; fancy goods; decoration; gaskets; road surfaces; linoleum; polishing; brake pads; vibration damping.

Composition overview

Compositional summary

40% Suberim/27% Lignin/12% Cellulose/4% Friedelin/17% Water

Material family	Natural
Base material	Wood (other: monocot, bark)
Renewable content	100 %

Composition detail (polymers and natural materials)

Wood	100 %
------	-------

Price

Price	* 1.22 - 6.08 USD/lb
-------	----------------------

Physical properties

Density	0.00578 - 0.00867 lb/in ³
Relative density	0.14 - 0.21
Cells/volume	3.28e9 - 8.19e9 /in ³
Anisotropy ratio	1.6 - 1.8

Mechanical properties

Young's modulus	0.00363 - 0.00725 10 ⁶ psi
Yield strength (elastic limit)	0.16 - 0.319 ksi
Tensile strength	0.145 - 0.363 ksi
Elongation	20 - 70 % strain
Compressive strength	0.145 - 0.29 ksi
Compressive stress @ 25% strain	0.0943 - 0.116 ksi
Compressive stress @ 50% strain	* 0.16 - 0.319 ksi
Flexural modulus	0.00203 - 0.0029 10 ⁶ psi
Flexural strength (modulus of rupture)	0.145 - 0.363 ksi
Shear modulus	5.8e-4 - 0.00116 10 ⁶ psi
Shear strength	0.0798 - 0.16 ksi
Bulk modulus	0.00203 - 0.0029 10 ⁶ psi
Poisson's ratio	0.08 - 0.4
Shape factor	2.7
Hardness - Brinell	* 0.174 - 0.232 ksi
Fatigue strength at 10 ⁷ cycles	* 0.0798 - 0.16 ksi
Mechanical loss coefficient (tan delta)	0.1 - 0.3
Densification strain	0.7 - 0.8
Work to maximum strength	0.245 - 0.299 ft.lbf/in ³

Impact & fracture properties

Fracture toughness	0.0637 - 0.091 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	0.0231	-	0.0277	BTU.ft/hr.ft^2.°F
Specific heat capacity	0.454	-	0.502	BTU/lb.°F
Thermal expansion coefficient	72.2	-	100	µstrain/°F

Electrical properties

Electrical resistivity	* 1e9	-	1e11	µohm.cm
Dielectric constant (relative permittivity)	* 6	-	8	
Dissipation factor (dielectric loss tangent)	* 0.02	-	0.05	
Dielectric strength (dielectric breakdown)	* 25.4	-	50.8	V/mil

Optical properties

Transparency	Opaque
--------------	--------

Magnetic properties

Magnetic type	Non-magnetic
---------------	--------------

Bio-data

RoHS (EU) compliant grades?	✓
-----------------------------	---

Durability

Water (fresh)	Acceptable
Water (salt)	Acceptable
Weak acids	Acceptable
Strong acids	Unacceptable
Weak alkalis	Acceptable
Strong alkalis	Unacceptable
Organic solvents	Acceptable
Oxidation at 500C	Unacceptable
UV radiation (sunlight)	Good
Flammability	Self-extinguishing

Primary production energy, CO2 and water

Embodied energy, primary production	1.64e3	-	1.81e3	BTU/lb
-------------------------------------	--------	---	--------	--------

Sources

4 MJ/kg (Hammond and Jones, 2008)

CO2 footprint, primary production	0.192	-	0.211	lb/lb
-----------------------------------	-------	---	-------	-------

Sources

Data reported by sources are for CO2, values were converted to CO2 footprint using the relationship: CO2 footprint = CO2 * 1.06. Relationship taken from Hammond and Jones, 2008. Note that this is only captures fuel use (i.e. not including any process related emissions). This is for the average mixture of fuels used in the UK industry.

0.19 kg/kg (Hammond and Jones, 2008)

NOx creation	* 0.00122	-	0.00135	lb/lb
SOx creation	* 0.00293	-	0.00324	lb/lb
Water usage	* 1.84e4	-	2.03e4	in^3/lb

Processing energy, CO2 footprint & water

Coarse machining energy (per unit wt removed)	* 234	-	258	BTU/lb
Coarse machining CO2 (per unit wt removed)	* 0.0408	-	0.0451	lb/lb
Fine machining energy (per unit wt removed)	* 499	-	551	BTU/lb
Fine machining CO2 (per unit wt removed)	* 0.087	-	0.0962	lb/lb
Grinding energy (per unit wt removed)	* 794	-	877	BTU/lb
Grinding CO2 (per unit wt removed)	* 0.138	-	0.153	lb/lb

Recycling and end of life

Recycle	✗			
Recycle fraction in current supply	0.1		%	
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 99	57.6		millipoints/lb
------------------	------	--	----------------

Notes

Warning

Cork has a wide range of densities and properties.

Links

ProcessUniverse

Producers

Reference

Shape