

Description

Image



Caption

1. Rubber trees in Kerala, India © M.arunprasad at en.wikipedia - (CC BY-SA 3.0) 2. Rubber bands in different colors. © Bill Ebbesen at en.wikipedia - (CC BY-SA 3.0)

The material

Natural Rubber was known to the natives of Peru many centuries ago, and is now one of Malaysia's main exports. It made the fortune of Giles Macintosh who, in 1825, devised the rubber-coated waterproof coat the still bears his name. **Latex**, the sap of the rubber tree, is cross-linked (vulcanized) by heating with sulfur; the amount of the cross-linking determines the properties. It is the most widely used of all elastomers - more than 50% of all produced.

Compositional summary ⓘ

$(\text{CH}_2\text{-C}(\text{CH}_3)\text{-CH-CH}_2)_n$

General properties

Density	ⓘ	920	-	930	kg/m ³
Price	ⓘ	* 1.74	-	2.2	EUR/kg

Mechanical properties

Young's modulus	ⓘ	0.0015	-	0.0025	GPa
Yield strength (elastic limit)	ⓘ	20	-	30	MPa
Tensile strength	ⓘ	22	-	32	MPa
Elongation	ⓘ	500	-	800	% strain
Fatigue strength at 10 ⁷ cycles	ⓘ	4.2	-	4.5	MPa
Fracture toughness	ⓘ	0.15	-	0.25	MPa.m ^{0.5}

Thermal properties

Maximum service temperature	ⓘ	68.9	-	107	°C
Thermal conductor or insulator?	ⓘ	Good insulator			
Thermal conductivity	ⓘ	0.1	-	0.14	W/m.°C
Specific heat capacity	ⓘ	1.8e3	-	2.5e3	J/kg.°C
Thermal expansion coefficient	ⓘ	150	-	450	μstrain/°C

Electrical properties

Electrical conductor or insulator?	ⓘ	Good insulator			
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Optical properties

Transparency	ⓘ	Translucent			
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Eco properties

Embodied energy, primary production	ⓘ	* 64.2	-	71	MJ/kg
CO2 footprint, primary production	ⓘ	* 1.97	-	2.18	kg/kg
Recycle	ⓘ	✗			