

General information

Designation

Prunus avium

Typical uses

Furniture; turnery; decorative ware;

Composition overview

Compositional summary

Cellulose/Hemicellulose/Lignin/12%H2O

| | | | |
|-------------------|-----------------|--|---|
| Material family | Natural | | |
| Base material | Wood (hardwood) | | |
| Renewable content | 100 | | % |

Composition detail (polymers and natural materials)

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

Price

| | | | | |
|-------|-------|---|------|--------|
| Price | * 6.7 | - | 10.8 | USD/kg |
|-------|-------|---|------|--------|

Physical properties

| | | | | |
|---------|-----|---|-----|-------------------|
| Density | 550 | - | 670 | kg/m ³ |
|---------|-----|---|-----|-------------------|

Mechanical properties

| | | | | |
|--|---------|---|-------|----------|
| Young's modulus | * 1.36 | - | 1.52 | GPa |
| Yield strength (elastic limit) | * 2.64 | - | 3.18 | MPa |
| Tensile strength | * 4.4 | - | 5.3 | MPa |
| Elongation | * 0.94 | - | 1.15 | % strain |
| Compressive strength | * 5.36 | - | 6.55 | MPa |
| Flexural modulus | 1.24 | - | 1.38 | GPa |
| Flexural strength (modulus of rupture) | * 4.4 | - | 5.3 | MPa |
| Shear modulus | * 0.141 | - | 0.193 | GPa |
| Shear strength | * 30.9 | - | 37.5 | MPa |
| Rolling shear strength | * 1.14 | - | 3.41 | MPa |
| Bulk modulus | * 0.7 | - | 0.78 | GPa |
| Poisson's ratio | * 0.02 | - | 0.04 | |
| Shape factor | 5.6 | | | |
| Hardness - Vickers | * 3.85 | - | 4.7 | HV |
| Hardness - Brinell | 27 | - | 33 | MPa |
| Hardness - Janka | * 3.85 | - | 4.7 | kN |
| Fatigue strength at 10 ⁷ cycles | * 1.32 | - | 1.59 | MPa |

| | | | | |
|--|--------|---|-------|-------------------|
| Mechanical loss coefficient (tan delta) | * 0.02 | - | 0.026 | |
| Differential shrinkage (radial) | 0.16 | - | 0.18 | % |
| Differential shrinkage (tangential) | 0.26 | - | 0.3 | % |
| 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 | * 7.5 | - | 9.1 | kJ/m ³ |

Impact & fracture properties

| | | | | |
|--------------------|---------|---|-------|----------------------|
| Fracture toughness | * 0.429 | - | 0.524 | MPa.m ^{0.5} |
|--------------------|---------|---|-------|----------------------|

Thermal properties

| | | | | |
|-------------------------------|---------|---|--------|------------|
| Glass temperature | 77 | - | 102 | °C |
| Maximum service temperature | 120 | - | 140 | °C |
| Minimum service temperature | * -73 | - | -23 | °C |
| Thermal conductivity | * 0.093 | - | 0.114 | W/m.°C |
| Specific heat capacity | 1.66e3 | - | 1.71e3 | J/kg.°C |
| Thermal expansion coefficient | * 29 | - | 39.3 | µstrain/°C |

Electrical properties

| | | | | |
|--|----------|---|-------|---------|
| Electrical resistivity | * 2.1e14 | - | 7e14 | µohm.cm |
| Dielectric constant (relative permittivity) | * 3.49 | - | 4.27 | |
| Dissipation factor (dielectric loss tangent) | * 0.047 | - | 0.057 | |
| Dielectric strength (dielectric breakdown) | * 1 | - | 2 | MV/m |

Magnetic properties

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

Optical properties

| | |
|--------------|--------|
| Transparency | Opaque |
|--------------|--------|

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 | 11.6 | - | 12.8 | MJ/kg |
| Sources 0.5 MJ/kg (Ximenes, 2006); 2 MJ/kg (Ximenes, 2006); 9.1 MJ/kg (Hammond and Jones, 2008); 11.6 MJ/kg (Hubbard and Bowe, 2010); 23.7 MJ/kg (Ecoinvent v2.2); 26 MJ/kg (Ecoinvent v2.2) | | | | |
| CO2 footprint, primary production | 0.574 | - | 0.633 | kg/kg |
| Sources 0.229 kg/kg (Ecoinvent v2.2); 0.412 kg/kg (Ecoinvent v2.2); 0.862 kg/kg (Hammond and Jones, 2008); 0.909 kg/kg (Hubbard and Bowe, 2010) | | | | |
| Water usage | * 665 | - | 735 | l/kg |

Processing energy, CO2 footprint & water

| | | | | |
|---|----------|---|--------|-------|
| Coarse machining energy (per unit wt removed) | * 0.568 | - | 0.627 | MJ/kg |
| Coarse machining CO2 (per unit wt removed) | * 0.0426 | - | 0.0471 | kg/kg |
| Fine machining energy (per unit wt removed) | * 1.4 | - | 1.55 | MJ/kg |
| Fine machining CO2 (per unit wt removed) | * 0.105 | - | 0.116 | kg/kg |
| Grinding energy (per unit wt removed) | * 2.33 | - | 2.57 | MJ/kg |
| Grinding CO2 (per unit wt removed) | * 0.175 | - | 0.193 | kg/kg |

Recycling and end of life

| | | | | |
|------------------------------------|--------|---|------|-------|
| Recycle | ✗ | | | |
| Recycle fraction in current supply | 8.55 | - | 9.45 | % |
| Downcycle | ✓ | | | |
| Combust for energy recovery | ✓ | | | |
| Heat of combustion (net) | * 19.8 | - | 21.3 | MJ/kg |
| Combustion CO2 | * 1.69 | - | 1.78 | kg/kg |
| Landfill | ✓ | | | |
| Biodegrade | ✓ | | | |

Notes

Warning

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

Links

ProcessUniverse

Reference

Shape