

General information

Designation

CY9

Typical uses

High temperature corrosion resistant applications.

Composition overview

Compositional summary

C

Material family

Ceramic (technical)

Base material

C (Carbon)

Composition detail (metals, ceramics and glasses)

C (carbon)	100	%

Price

Price	* 5.08	- 7.71	USD/lb

Physical properties

Density	0.0582	- 0.0603	lb/in^3
Porosity (closed)	* 0.06	- 0.13	%
Porosity (open)	0.15	- 0.21	%

Mechanical properties

Young's modulus	0.566	- 0.595	10^6 psi
Yield strength (elastic limit)	* 0.624	- 0.682	ksi
Tensile strength	* 0.624	- 0.682	ksi
Elongation	* 0.1	- 0.12	% strain
Compressive strength	* 6.24	- 6.82	ksi
Flexural modulus	* 0.566	- 0.595	10^6 psi
Flexural strength (modulus of rupture)	3.19	- 3.55	ksi
Shear modulus	* 0.232	- 0.247	10^6 psi
Bulk modulus	* 0.319	- 0.334	10^6 psi
Poisson's ratio	* 0.17	- 0.23	
Shape factor	15		
Hardness - Vickers	12.8	- 14.2	HV
Fatigue strength at 10^7 cycles	* 0.528	- 0.616	ksi
Mechanical loss coefficient (tan delta)	* 0.002	- 0.02	

Impact & fracture properties

Fracture toughness	* 0.273	- 0.364	ksi.in^0.5
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Thermal properties

Melting point	6.39e3	- 6.66e3	°F
Maximum service temperature	* 4.68e3	- 4.87e3	°F
Minimum service temperature	-459		°F
Thermal conductivity	25.5	- 27.9	BTU.ft/hr.ft^2.°F
Specific heat capacity	* 0.203	- 0.225	BTU/lb.°F
Thermal expansion coefficient	0.744	- 0.811	μstrain/°F
Latent heat of fusion	* 843	- 950	BTU/lb

Electrical properties

Electrical resistivity	* 158	- 501	μohm.cm
Galvanic potential	0.2	- 0.28	V

Optical properties

Color	Black
Transparency	Opaque

Magnetic properties

Magnetic type	Non-magnetic
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Bio-data

RoHS (EU) compliant grades?	✓
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Durability

Water (fresh)	Excellent
Water (salt)	Excellent
Weak acids	Excellent
Strong acids	Acceptable
Weak alkalis	Excellent
Strong alkalis	Unacceptable
Organic solvents	Excellent
Oxidation at 500C	Limited use
UV radiation (sunlight)	Excellent
Halogens	Acceptable
Metals	Acceptable
Flammability	Non-flammable

Primary production energy, CO2 and water

Embodied energy, primary production	8.99e4	- 9.89e4	BTU/lb
Sources	198 MJ/kg (Jungbluth, 2008); 240 MJ/kg (Jungbluth, 2008)		
CO2 footprint, primary production	15.8	- 17.4	lb/lb
Sources	14.8 kg/kg (Jungbluth, 2008); 18.3 kg/kg (Jungbluth, 2008)		
NOx creation	* 0.0196	- 0.0216	lb/lb
SOx creation	* 0.0392	- 0.0433	lb/lb
Water usage	* 8.05e3	- 8.91e3	in^3/lb

Processing energy, CO2 footprint & water

Grinding energy (per unit wt removed)	* 2.44e3	- 2.7e3	BTU/lb
Grinding CO2 (per unit wt removed)	* 0.426	- 0.471	lb/lb

Recycling and end of life

Recycle	✗		
Recycle fraction in current supply	4.73	- 5.22	%
Downcycle	✓		
Combust for energy recovery	✓		
Heat of combustion (net)	* 1.37e4	- 1.44e4	BTU/lb
Combustion CO2	* 3.58	- 3.76	lb/lb
Landfill	✓		
Biodegrade	✗		

Geo-economic data for principal component

Principal component	Carbon		
Typical exploited ore grade	0.19	- 0.21	%

Minimum economic ore grade	0.1	-	0.3	%
Abundance in Earth's crust	456	-	504	ppm
Abundance in seawater	23.8	-	26.3	ppm
Annual world production	1e6	-	1.1e6	ton/yr
Reserves	7.11e7	-	7.85e7	l. ton

Main mining areas (metric tonnes per year)

Brazil, 76e3
 Canada, 25e3
 China, 600e3
 India, 140e3
 Madagascar, 5e3
 Mexico, 7e3
 North Korea, 30e3
 Norway, 2e3
 Romania, 20e3
 Sri Lanka, 8e3
 Ukraine, 6e3
 Other countries, 6e8

Links

ProcessUniverse

Producers

Reference

Shape