

CERAMIC BALLS - PROPERTIES OF MATERIALS

PHYSICAL PROPERTIES	SAPPHIRE AND RUBY	ALUMINA OXIDE	SILICON NITRIDE	ZIRCONIUM OXIDE
STRUCTURE	single crystal	multi-crystal	multi-crystal	multi-crystal
CHEMICAL FORMULA	Al_2O_3	Al_2O_3	Si_3N_4	ZrO_2
PURITY %	99.99	99.8	95.00	97.00
DENSITY g/cm ₃	3.99	3.90	3.20	5.50
OPERATING TEMPERATURE °C		1800	1100	1000
MELTING POINT	2050 °C	2050 °C	1900 °Ñ	
SOFTENING POINT	1800 °C	1725 °Ñ	1400 °Ñ	
SPECIFIC HEAT AT 25 °C (CAL/g/°C)	0.18	0.25	0.17	9
THERMAL CONDUCTIVITY	36 W/m ^{°k}	29 W/m ^{°k}	29 W/m ^{°k}	W/m ^{°k}
MECHANICAL PROPERTIES	SAPPHIRE AND RUBY	ALUMINA OXIDE	SILICON NITRIDE	ZIRCONIUM OXIDE
VICKERS Hv10 HARDNESS (N/mm2)	17000	16500	24000	20000
MODULUS OF ELASTICITY (N/mm2)	4,3610 ⁵	3,5610 ⁵	3,1610 ⁵	2610 ⁵
BREAKING MODULUS AT 25 °C (N/mm2)	392	470	700	600
COMPRESSIVE STRENGTH AT 25 °C (N/mm2)	2060	2354	2500	2100

CHEMICAL RESISTANCE

SAPPHIRE / RUBY:

inert to most acids at very high temperatures.

ALUMINA (OXIDE):

inert to most acids, but not recommended in environments with hydrochloric or hydrofluoric acids or strong alkaline solutions

SILICON NITRIDE:

inert to most acids.

ZIRCONIUM OXIDE:

inert except to hydrofluoric acid and strong concentrations of sulphuric acid.