

## Mechanical and Physical Properties of Some Common Engineering Ceramics in Comparison with Hardmetal and Stainless Steel

	Silicon Nitride $\text{Si}_3\text{N}_4$	Zirconia Y-stabilised $\text{ZrO}_2(\text{Y}_2\text{O}_3)$	Silicon Carbide $\text{SiC}$	Aluminium Titanate $\text{Al}_2\text{TiO}_5$	Titanium Diboride $\text{TiB}_2$	Aluminium Nitride $\text{AlN}$	Aluminium Oxide $\text{Al}_2\text{O}_3$	Hard-metal WC/Co	Stainless Steel
Bending Strength (MPa)	800	1000	400	30	600	350	350	2500	200 ( $\sigma_y$ ) 490 ( $\sigma_r$ )
Compressive Strength (MPa)	3000	2200	2200	200	3000	1900	4100	5000	200 ( $\sigma_y$ ) 490 ( $\sigma_r$ )
E-modulus (GPa)	300	210	400	20	570	310	390	600	200
Vickers Hardness (GPa)	15.7	12.3	24.5	3.7	21.6	11.8	17.7	13.7	2.0
Fracture Toughness $K_{IC}$ (MPa · m <sup>1/2</sup> )	6.5	10.5	4.0	1.0	5.0	3.7	4.5	12	~50
Resistivity (ohm · cm)	$10^{14}$	$25 \cdot 10^{12}$	$10^{-1}$	---	$1.5 \cdot 10^{-7}$	$10^{14}$	$10^{14}$	$20 \cdot 10^{-6}$	$10^{-4}$
Thermal Expansion ( $10^{-6}\text{K}^{-1}$ )	2.5	10.5	3.5	1.0	7.2	4.5	7.5	5.0	16.8
Thermal Conductivity ( $\text{Wm}^{-1}\text{K}^{-1}$ )	25	1.5	100	1.4	110	150	30	95	15
Thermal Shock Resistance $\Delta T$ (°C)	700	200	200	1200	110	190	80	635	---
Density (g/cm <sup>3</sup> )	3.2	5.9	3.2	3.4	4.4	3.3	3.95	15.0	7.9