

Selection

Material	Application	Color	Properties
Aluminum Oxide	Machine components Furnace parts Thermocouple tubes	White	Conventional ceramic Electrical insulator Wear resistant
Sapphire	Optical precision components	Transparent	Transparent
Ruby	Precision balls Ball valves	Red transparent (Chromium oxide impurities)	High surface quality Chemical resistant
Boron Carbide	Nozzles Dies Armour plates	Black	High hardness Wear resistant Low density
Aluminum Nitride	Heat sinks Substrates	Grey translucent	Good heat conductivity Chemical resistance
Boron Nitride	Crucibles High-voltage insulator High temperature positioning tools	White	Good machinability Relatively soft Electrical insulator
α -Silicon Carbide	Sliding bearings (SiC on SiC) Mechanical seals Cylinders/pluniers	Black	High thermal conductivity Wear resistant
Silicon Nitride	Ball bearings Dies Crucibles	Grey	Wear resistant High strength and toughness Good thermal shock resistant
Zirconium Oxide	Welding pins Positioning tools Machine components	White	Impact resistant Heat insulator High strength and toughness
Macor			

Specific properties*

Material		Aluminum Oxide				Boron Carbide	Aluminum Nitride	Boron Nitride	α -Silicon Carbide	Silicon Nitride	Zirconium Oxide	
		Al ₂ O ₃ 92	Al ₂ O ₃ 99.7	Al ₂ O ₃ 99.8	Sapphire / Ruby	B ₄ C	AlN	BN	SiC	Si ₃ N ₄	ZrO ₂ TZP	ZrO ₂ PSZ
Young's modulus	GPa	310	390	406	426 / 462	450	168	22	410	300	172	210
Poisson ratio	-	0.24	0.23	0.22	0.31	0.17	0.31	0.25	0.14	0.26	0.33	0.30
Yield strength ($\sigma_{0.2}$)	MPa	352	375	375		400	294	70	380		584	500
Density	g/cm ³	3.64	3.85	3.95	3.99	2.51	3.30	2.05	3.10	3.26	6.05	5.74
Thermal expansion	ppm/K	8.2	8.2	8.2	5 / 8.5	5.6	4	4	4	3.2	10	10
Thermal conductivity	W/mK	12.5	30	30	23.1 / 25.2	90	180	40	110	35	2.9	2.5
Electrical resistivity	Ω cm	10 ¹⁴	10 ¹⁴	10 ¹⁸	10 ¹⁴	10 ¹	10 ¹²	10 ¹⁵	10-100	10 ¹²	>10 ⁸	>10 ⁸
Dielectric Constant	-	10.3	9.0	9.8	9.5		7.1	4.1	10.2			
Dielectric Strength	kV/mm	21.3	30	8.7	15 - 50		40	200				

* All parameters are for indication; properties are supplier-specific and should be checked.