

<b>Ceramic - Chemical Resistance</b>					
	<b>Acids - concentrated</b>	<b>Acids - dilute</b>	<b>Alkalis</b>	<b>Halogens</b>	<b>Metals</b>
<b>Alumina/Silica/Boria</b> Al <sub>2</sub> O <sub>3</sub> 62/SiO <sub>2</sub> 24/B <sub>2</sub> O <sub>3</sub> 14	Fair	Good	Poor-Fair	-	Good
<b>Alumina/Silica/Boria</b> Al <sub>2</sub> O <sub>3</sub> 70/SiO <sub>2</sub> 28/B <sub>2</sub> O <sub>3</sub> 2	Fair	Good	Poor-Fair	-	-
<b>Alumina</b> Al <sub>2</sub> O <sub>3</sub>	Good	Good	Good	Good	Good
<b>Alumino-silicate Glass</b> SiO <sub>2</sub> 57/Al <sub>2</sub> O <sub>3</sub> 36/CaO/MgO/ BaO	Fair	Good	Good	-	-
<b>Aluminum Nitride - Machinable</b> AlN / BN	-	Fair	Poor	-	-
<b>Aluminum Nitride</b> AlN	Poor	Fair	Fair	-	Good
<b>Beryllia</b> BeO 99.5	Poor	Fair	Fair	Fair	Good
<b>Boron Carbide - Hot-pressed</b> B <sub>4</sub> C	Fair	Good	Fair	Fair	Fair
<b>Boron Nitride</b> BN	Fair	Fair	Fair	Poor	Good
<b>Leachable Ceramic</b> SiO <sub>2</sub> 50/ZrSiO <sub>4</sub> 40/Al <sub>2</sub> O <sub>3</sub> 10	Fair	Fair	Poor	Fair	Good
<b>Magnesium Oxide</b> MgO	-	-	-	-	Good
<b>Potassium Aluminosilicate</b> Muscovite Mica	Fair	Good	Good	-	-
<b>Quartz - Fused</b> SiO <sub>2</sub>	Good	Good	Fair	Good	Fair
<b>Ruby</b> Al <sub>2</sub> O <sub>3</sub> /Cr <sub>2</sub> O <sub>3</sub> /SiO <sub>2</sub>	Good	Good	Good	Good	Good
<b>Sapphire</b> Al <sub>2</sub> O <sub>3</sub> 99.9	Good	Good	Good	Good	Good
<b>Silicon Carbide - Hot- pressed</b> SiC	Good	Good	Good-Poor	Good-Poor	Fair
<b>Silicon Carbide - Reaction Bonded</b> SiC	Good	Good	Fair	Fair	Fair
<b>Silicon Nitride - Hot-pressed</b> Si <sub>3</sub> N <sub>4</sub>	Fair	Good	Good-Poor	Good	Fair

<b>Ceramic - Chemical Resistance</b>					
	<b>Acids - concentrated</b>	<b>Acids - dilute</b>	<b>Alkalis</b>	<b>Halogens</b>	<b>Metals</b>
<b>Silicon Nitride - Reaction Bonded</b> Si <sub>3</sub> N <sub>4</sub>	Fair	Good	Fair	Good	Fair
<b>Silicon Nitride/Aluminum Nitride/Aluminum Oxide</b> Sialon	Good	Good	Fair	-	-
<b>Titanium Diboride</b> TiB <sub>2</sub>	Fair	Good	Fair	Good	Good
<b>Titanium Dioxide</b> TiO <sub>2</sub> 99.6%	Fair	Good	Poor	-	Poor
<b>Vycor<sup>®</sup> 7913</b> SiO <sub>2</sub> 96	Good	Good	Fair	Good	Fair
<b>Zirconia - stabilized with Magnesia</b> ZrO <sub>2</sub> /MgO	Fair	Good	Good-Poor	Fair	Good-Fair

<b>Ceramic - Electrical Properties</b>			
	<b>Dielectric constant</b>	<b>Dielectric strength kV mm<sup>-1</sup></b>	<b>Volume resistivity Ohmcm</b>
<b>Alumina/Silica/Boria Al<sub>2</sub>O<sub>3</sub> 62/SiO<sub>2</sub> 24/B<sub>2</sub>O<sub>3</sub> 14</b>	5.2 @ 9.4GHz	-	-
<b>Alumina/Silica/Boria Al<sub>2</sub>O<sub>3</sub> 70/SiO<sub>2</sub> 28/B<sub>2</sub>O<sub>3</sub> 2</b>	5.7 @ 9.4GHz	-	-
<b>Alumina Al<sub>2</sub>O<sub>3</sub></b>	9.0-10.1	10-35	> 10 <sup>14</sup> @25C
<b>Aluminum Nitride - Machinable AlN / BN</b>	7.3	40	1.8 x 10 <sup>13</sup> @25C
<b>Aluminum Nitride - Machinable (BNP-2) AlN / BN</b>	7.1	-	-
	-	-	-
<b>Aluminum Nitride AlN</b>	9.2	35	> 10 <sup>13</sup> @25C
<b>Beryllia BeO 99.5</b>	6.5-7.5	10-14	> 10 <sup>14</sup> @25C
<b>Boron Carbide - Hot-pressed B<sub>4</sub>C</b>	-	-	0.1-10 @25C
<b>Boron Nitride BN</b>	4.3	40-200	10 <sup>11</sup> -10 <sup>14</sup> @25C
<b>Potassium Aluminosilicate Muscovite Mica</b>	6.0-6.6	40-200	10 <sup>12</sup> @25C
<b>Quartz - Fused SiO<sub>2</sub></b>	3.8	25-40	10 <sup>18</sup> @25C
<b>Ruby Al<sub>2</sub>O<sub>3</sub> /Cr<sub>2</sub>O<sub>3</sub> /Si<sub>2</sub>O<sub>3</sub></b>	7.5-11.5	15-50	10 <sup>14</sup> @25C
<b>Sapphire Al<sub>2</sub>O<sub>3</sub> 99.9</b>	7.5-11.5	15-50	> 10 <sup>14</sup> @25C
<b>Silicon Carbide - Hot- pressed SiC</b>	40	-	10 <sup>3</sup> -10 <sup>5</sup> @25C
<b>Silicon Carbide - Reaction Bonded SiC</b>	-	-	10 <sup>2</sup> -10 <sup>3</sup> @25C
<b>Silicon Nitride - Hot-pressed Si<sub>3</sub>N<sub>4</sub></b>	10	-	10 <sup>12</sup> -10 <sup>15</sup> @25C
<b>Silicon Nitride - Reaction Bonded Si<sub>3</sub>N<sub>4</sub></b>	10	-	> 10 <sup>7</sup> @25C

<b>Ceramic - Electrical Properties</b>			
	<b>Dielectric constant</b>	<b>Dielectric strength kV mm<sup>-1</sup></b>	<b>Volume resistivity Ohmcm</b>
<b>Silicon Nitride/Aluminum Nitride/Aluminum Oxide Sialon</b>	-	-	10 <sup>12</sup> -10 <sup>17</sup> @25C
<b>Titanium Diboride TiB<sub>2</sub></b>	-	-	15x10 <sup>-6</sup> @25C
<b>Titanium Dioxide TiO<sub>2</sub> 99.6%</b>	80-100	-	10 <sup>13</sup> -10 <sup>18</sup> @25C
<b>Tungsten Carbide/Cobalt WC 94/Co 6</b>	-	-	2x10 <sup>-6</sup> @25C
<b>Vycor<sup>®</sup> 7913 SiO<sub>2</sub> 96</b>	3.8	-	10 <sup>14</sup> @25C

Ceramic - Mechanical Properties							
	Compressive strength MPa	Fracture toughness MPam(0.5)	Hardness - Knoop kgf mm <sup>-2</sup>	Hardness - Vickers kgf mm <sup>-2</sup>	Poisson's ratio	Shear strength MPa	Tensile modulus GPa
Alumina/Silica/Boria Al <sub>2</sub> O <sub>3</sub> 62/SiO <sub>2</sub> 24/B <sub>2</sub> O <sub>3</sub> 14	-	-	-	-	-	-	140
Alumina/Silica/Boria Al <sub>2</sub> O <sub>3</sub> 70/SiO <sub>2</sub> 28/B <sub>2</sub> O <sub>3</sub> 2	-	-	-	-	-	-	185
Alumina Al <sub>2</sub> O <sub>3</sub>	2200-2600	-	2100	1500-1650	-	330	300-400
Alumina Al <sub>2</sub> O <sub>3</sub> 99.5	300-3000	-	-	-	-	-	-
Aluminum Nitride - Machinable AlN / BN	1000	-	-	560	-	-	160
Aluminum Nitride - Machinable (BNP-2) AlN / BN	< 1070	-	3.42 - 4.91	-	-	-	34.1 (parallel)
	-	-	-	-	-	-	-
Aluminum Nitride AlN	-	-	-	1100	-	450	-
Beryllia BeO 99.5	1550-1850	-	-	1100-1300	-	180-250	340-400
Boron Carbide - Hot-pressed B <sub>4</sub> C	1400-3400	-	2800-3500	3200	-	-	440-470
Boron Carbide B <sub>4</sub> C	200-300	-	-	-	-	-	-
Boron Nitride BN	30-120	-	-	-	-	12-25	20-35
Potassium Aluminosilicate Muscovite Mica	190-280	-	-	2-3	-	215-265	-
	-	-	-	Mohs	-	-	-
Quartz - Fused SiO <sub>2</sub>	1100	-	820	1000	-	70	72-74
Ruby Al <sub>2</sub> O <sub>3</sub> /Cr <sub>2</sub> O <sub>3</sub> /Si <sub>2</sub> O <sub>3</sub>	2100	-	2000	2500-3000	-	-	350-390
Sapphire Al <sub>2</sub> O <sub>3</sub> 99.9	2100	-	2000	1600-1800	-	-	350-390
Silicon Carbide - Hot- pressed SiC	1000-1700	-	-	2400-2800	-	210-380	200-500
Silicon Carbide - Reaction Bonded SiC	2000-3500	-	-	2500-3500	-	-	410
Silicon Carbide SiC	-	-	-	2500	-	-	-

Ceramic - Mechanical Properties							
	Compressive strength MPa	Fracture toughness MPam(0.5)	Hardness - Knoop kgf mm <sup>-2</sup>	Hardness - Vickers kgf mm <sup>-2</sup>	Poisson's ratio	Shear strength MPa	Tensile modulus GPa
Silicon Nitride - Gas Pressure Sintered Si <sub>3</sub> N <sub>4</sub>	-	7.0	-	1450	-	-	-
	-	-	-	-	-	-	-
Silicon Nitride - Hot-pressed Si <sub>3</sub> N <sub>4</sub>	2000-3500	-	-	1700-2200	-	480-960	280-310
Silicon Nitride - Reaction Bonded Si <sub>3</sub> N <sub>4</sub>	550-650	-	-	800-1000	-	190-240	170-220
Silicon Nitride/Aluminum Nitride/Aluminum Oxide Sialon	> 3500	-	-	1650-1800	-	-	280-300
Titanium Diboride TiB <sub>2</sub>	-	-	-	3000	0.18-0.20	300-600	520-570
Titanium Dioxide TiO <sub>2</sub> 99.6%	800-1000	-	-	980	-	-	250-300
Tungsten Carbide/Cobalt WC 94/Co 6	5300-7000	-	-	1550	-	-	600
Vycor <sup>®</sup> 7913 SiO <sub>2</sub> 96	-	-	-	490	-	-	65-75
Zirconia - stabilized with Magnesia ZrO <sub>2</sub> /MgO	1500-2000	-	-	1200	-	414	200
Zirconia - stabilized with Yttria ZrO <sub>2</sub> /Y <sub>2</sub> O <sub>3</sub>	2000	-	-	1250	-	-	200

Ceramic - Physical Properties					
	Apparent porosity %	Density g cm <sup>-3</sup>	Refractive index	Useful optical transmission range	Water absorption - saturation %
Alumina/Silica/Boria Al <sub>2</sub> O <sub>3</sub> 62/SiO <sub>2</sub> 24/B <sub>2</sub> O <sub>3</sub> 14	0	2.7	1.57	-	0
Alumina/Silica/Boria Al <sub>2</sub> O <sub>3</sub> 70/SiO <sub>2</sub> 28/B <sub>2</sub> O <sub>3</sub> 2	-	3.05	1.62	-	-
Alumina/Silica Al <sub>2</sub> O <sub>3</sub> 80/SiO <sub>2</sub> 20	-	3.1	-	-	-
Alumina Al <sub>2</sub> O <sub>3</sub>	0	3.9	-	-	0
Alumina Al <sub>2</sub> O <sub>3</sub> 99.5	0	3.89	-	-	-
Alumino-silicate Glass SiO <sub>2</sub> 57/Al <sub>2</sub> O <sub>3</sub> 36/CaO/MgO/ BaO	45	2.65	1.54	-	-
Aluminum Nitride - Machinable AlN / BN	0	2.95	-	-	-
Aluminum Nitride - Machinable (BNP-2) AlN / BN	0	2.90	-	-	-
	-	-	-	-	-
Aluminum Nitride AlN	-	3.33	-	500-3000nm	0
Beryllia BeO 99.5	0	2.86	-	-	0.07
Boron Carbide - Hot-pressed B <sub>4</sub> C	<3	2.45-2.52	-	-	-
Boron Carbide B <sub>4</sub> C	-	2.52	-	-	-
Boron Nitride BN	2-15	1.9-2.2	-	-	-
Leachable Ceramic SiO <sub>2</sub> 50/ZrSiO <sub>4</sub> 40/Al <sub>2</sub> O <sub>3</sub> 10	25	2.1	-	-	14
Magnesium Oxide MgO	<1%	3.40	-	-	-
Potassium Aluminosilicate Muscovite Mica	-	2.6-3.2	1.5-1.6	450-700nm	Very Low
Quartz - Fused SiO <sub>2</sub>	0	2.2	1.46	180-2500nm	0
Ruby Al <sub>2</sub> O <sub>3</sub> /Cr <sub>2</sub> O <sub>3</sub> /Si <sub>2</sub> O <sub>3</sub>	0	3.98	-	150-5500nm	0

Ceramic - Physical Properties					
	Apparent porosity %	Density g cm <sup>-3</sup>	Refractive index	Useful optical transmission range	Water absorption - saturation %
Sapphire Al <sub>2</sub> O <sub>3</sub> 99.9	0	3.985	1.71-1.79	200-5500nm	0
Silicon Carbide - Hot-pressed SiC	0	3.15	-	-	-
Silicon Carbide - Reaction Bonded SiC	0	3.10	-	-	-
Silicon carbide/Silica/ Alumina SiC 65/SiO <sub>2</sub> 17/Al <sub>2</sub> O <sub>3</sub> 14	-	0.55	-	-	-
	-	-	-	-	-
Silicon Carbide SiC	-	3.2	-	-	-
Silicon Nitride - Gas Pressure Sintered Si <sub>3</sub> N <sub>4</sub>	0	3.24	-	-	-
	-	-	-	-	-
Silicon Nitride - Hot-pressed Si <sub>3</sub> N <sub>4</sub>	0	3.11	-	-	-
Silicon Nitride - Reaction Bonded Si <sub>3</sub> N <sub>4</sub>	15-23	2.4	-	-	-
Silicon Nitride/Aluminum Nitride/Aluminum Oxide Sialon	0.01	3.24	-	-	-
Silicon Nitride Si <sub>3</sub> N <sub>4</sub>	-	3.44	-	-	-
Superwool <sup>®</sup> Silica/Calcia/Magnesia	-	0.21	-	-	-
	-	-	-	-	-
Titanium Diboride TiB <sub>2</sub>	-	4.5	-	-	-
Titanium Dioxide TiO <sub>2</sub> 99.6%	0	4.05	-	-	-
Tungsten Carbide/Cobalt WC 94/Co 6	-	14.95	-	-	-
Vycor <sup>®</sup> 7913 SiO <sub>2</sub> 96	0	2.18	1.46	365-2500nm	0
Yttrium Oxide Y <sub>2</sub> O <sub>3</sub>	-	5.03	-	-	-
Zirconia - stabilized with Magnesia ZrO <sub>2</sub> /MgO	0	5.74	-	-	0



<b>Ceramic - Physical Properties</b>					
	<b>Apparent porosity %</b>	<b>Density g cm<sup>-3</sup></b>	<b>Refractive index</b>	<b>Useful optical transmission range</b>	<b>Water absorption - saturation %</b>
<b>Zirconia - stabilized with Yttria ZrO<sub>2</sub>/Y<sub>2</sub>O<sub>3</sub></b>	-	5.9	-	-	-
<b>Zirconia - unstabilized ZrO<sub>2</sub> 99</b>	-	6.1	-	-	-

Ceramic - Thermal Properties						
	Coefficient of thermal expansion $\times 10^{-6} \text{ K}^{-1}$	Melting point C	Specific heat $\text{J K}^{-1} \text{ kg}^{-1}$	Sublimation point C	Thermal conductivity $\text{W m}^{-1} \text{ K}^{-1}$	Upper continuous use temperature C
Alumina/Silica/Boria $\text{Al}_2\text{O}_3$ 62/ $\text{SiO}_2$ 24/ $\text{B}_2\text{O}_3$ 14	3 @20-1000C	-	1100 @25C	1800	-	1200-1400
Alumina/Silica/Boria $\text{Al}_2\text{O}_3$ 70/ $\text{SiO}_2$ 28/ $\text{B}_2\text{O}_3$ 2	5 @20-1000C	-	1000 @500C	1800	-	1350-1650
Alumina/Silica $\text{Al}_2\text{O}_3$ 80/ $\text{SiO}_2$ 20	-	-	-	-	-	1600
Alumina $\text{Al}_2\text{O}_3$	8.0 @20-1000C	2100	850-900 @25C	-	26-35 @20C	1700
Alumina $\text{Al}_2\text{O}_3$ 99.5	8.3 @20-1000C	-	850 @25C	-	26.0 @20C	1800
Alumino-silicate Glass $\text{SiO}_2$ 57/ $\text{Al}_2\text{O}_3$ 36/ $\text{CaO}$ / $\text{MgO}$ / $\text{BaO}$	5 @20-1000C	-	-	-	-	900
Aluminum Nitride - Machinable $\text{AlN}$ / $\text{BN}$	5.2 @20-1000C	-	-	-	100 @20C	1000 - 1900
Aluminum Nitride - Machinable (BNP-2) $\text{AlN}$ / $\text{BN}$	0.57 parallel	-	-	-	92.6	1020 (oxidising)
	-	-	-	-	-	-
Aluminum Nitride $\text{AlN}$	4.4 @20-1000C	2200	800 @25C	2500	175 - 190 @20C	1000-1800
Beryllia $\text{BeO}$ 99.5	8.4-9.0 @20-1000C	-	1020-1120 @25C	-	260-300 @20C	1800-1900
Boron Carbide - Hot-pressed $\text{B}_4\text{C}$	5.6 @20-1000C	2450	950 @25C	-	30-90 @20C	600-800
Boron Carbide $\text{B}_4\text{C}$	-	2450	-	-	-	600-800
Boron Nitride $\text{BN}$	1.0-36 @20-1000C	-	800-2000 @25C	2600-2800	15-50 @20C	950-2500
Leachable Ceramic $\text{SiO}_2$ 50/ $\text{ZrSiO}_4$ 40/ $\text{Al}_2\text{O}_3$ 10	1.98 @20-1000C	-	-	-	-	1050
Magnesium Oxide $\text{MgO}$	-	-	-	-	-	2200
Potassium Aluminosilicate Muscovite Mica	9-36 @20-1000C	-	50 @25C	-	0.5-7 @20C	500-600
Quartz - Fused $\text{SiO}_2$	0.54 @20-1000C	1715	670-740 @25C	-	1.46 @20C	1100-1400
Ruby $\text{Al}_2\text{O}_3$ / $\text{Cr}_2\text{O}_3$ / $\text{SiO}_2$	5.8 @20-1000C	2050	750 @25C	-	35-40 @20C	1800-1950

Ceramic - Thermal Properties						
	Coefficient of thermal expansion $\times 10^{-6} \text{ K}^{-1}$	Melting point C	Specific heat $\text{J K}^{-1} \text{ kg}^{-1}$	Sublimation point C	Thermal conductivity $\text{W m}^{-1} \text{ K}^{-1}$	Upper continuous use temperature C
Sapphire $\text{Al}_2\text{O}_3$ 99.9	5.8 @20-1000C	2050	750 @25C	-	35-40 @20C	1800-1950
Silicon Carbide - Hot-pressed SiC	4.5 @20-1000C	2650-2950	670-710 @25C	-	90-160 @20C	1500-1650
Silicon Carbide - Reaction Bonded SiC	4.3-4.6 @20-1000C	-	1100 @25C	-	150-200 @20C	1350
Silicon Carbide SiC	-	2650-2950	-	-	-	-
Silicon Nitride - Gas Pressure Sintered $\text{Si}_3\text{N}_4$	RT-1000	-	-	-	25	-
	3.6	-	-	-	22	-
	-	-	-	-	-	-
Silicon Nitride - Hot-pressed $\text{Si}_3\text{N}_4$	3.3 @20-1000C	-	680-800 @25C	1900	15-43 @20C	1100-1650
Silicon Nitride - Reaction Bonded $\text{Si}_3\text{N}_4$	3.3 @20-1000C	-	690 @25C	-	10-16 @20C	1200-1500
Silicon Nitride/Aluminum Nitride/Aluminum Oxide Sialon	3.3-3.7 @20-1000C	-	620-710 @25C	-	20 @20C	1000
Silicon Nitride $\text{Si}_3\text{N}_4$	-	-	-	1900	-	-
Titanium Diboride $\text{TiB}_2$	6-7 @20-1000C	3000	-	-	50-70 @20C	1000-2000
Titanium Dioxide $\text{TiO}_2$ 99.6%	8-10 @20-1000C	1850	-	-	2.5-5.0 @20C	-
Tungsten Carbide/Cobalt WC 94/Co 6	4.6-5.0 @20-1000C	-	200-480 @25C	-	60-80 @20C	-
Vycor <sup>®</sup> 7913 $\text{SiO}_2$ 96	0.5-0.75 @20-1000C	1715	750 @25C	-	1.2-1.4 @20C	900-1200
Yttrium Oxide $\text{Y}_2\text{O}_3$	8.1 @20-1000C	2400	-	-	8-12 @20C	-
Zirconia - stabilized with Magnesia $\text{ZrO}_2/\text{MgO}$	5-10 @20-1000C	-	400-500 @25C	-	1.5-2.5 @20C	1000
Zirconia - stabilized with Yttria $\text{ZrO}_2/\text{Y}_2\text{O}_3$	10 @20-1000C	2700	400-500 @25C	-	2.5 @20C	2200
Zirconia - unstabilized $\text{ZrO}_2$ 99	-	2650	-	-	-	2200

