| | Properties* | | Units | Test | Mullite | Alumina 94% | Alumina 96% | Alumina 99.5% | Alumina 99.8% | Zirconia ZTA |
|---|---|---|---|---|---|---|---|---|---|---|
| MECHANICAL | Density | | gm/cc | ASTM-C20 | 2.80 | 3.70 | 3.72 | 3.90 | 3.92 | 4.01 |
| | Crystal Size | Average | MICRONS | THIN-SECTION | 10 | 12 | 6 | 6 | 6 | 2 |
| | Water Absorption | | % | ASTM-373 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Gas Permeability | | – | – | 0 | 0 | 0 | 0 | 0 | 0 |
| | Color | | – | – | TAN | WHITE | WHITE | IVORY | IVORY | WHITE |
| | Flexural Strength (MOR) | 20° C | MPa (psi x $10^3$) | ASTM-F417 | 170 (25) | 352 (51) | 358 (52) | 379 (55) | 375 (54) | 450 (65) |
| | Elastic Modulus | 20° C | GPa (psi x $10^6$) | ASTM-C848 | 150 (22) | 303 (44) | 303 (44) | 370 (54) | 370 (54) | 360 (52) |
| | Poisson's Ratio | 20° C | – | ASTM-C848 | – | 0.21 | 0.21 | 0.22 | 0.22 | 0.23 |
| | Compressive Strength | 20° C | MPa (psi x $10^3$) | ASTM-C773 | 550 (80) | 2103 (305) | 2068 (300) | 2600 (377) | 2500 (363) | 2900 (421) |
| | Hardness | | GPa ($kg/mm^2$) | KNOOP 1000 gm | 7.4 (750) | 11.5 (1175) | 11.5 (1175) | 14.1 (1440) | 14.1 (1440) | 14.4 (1475) |
| | | | R45N | ROCKWELL 45 N | 70 | 78 | 78 | 83 | 83 | 85 |
| | Tensile Strength | 25° C | MPa (psi x $10^3$) | ACMA TEST #4 | – | 193 (28) | 221 (32) | 262 (38) | 248 (36) | 290 (42) |
| | Fracture Toughness | K(I c) | Mpa $m^{1/2}$ | NOTCHED BEAM | 2 | 4 - 5 | 4 - 5 | 4 - 5 | 4 - 5 | 5 - 6 |
| THERMAL | Thermal Conductivity | 20° C | W/m °K | ASTM-C408 | 3.5 | 22.4 | 24.7 | 30.0 | 30.0 | 27.0 |
| | Coefficient of Thermal Expansion | 25-1000° C | 1X $10^{-6}$/°C | ASTM-C372 | 5.3 | 8.2 | 8.2 | 8.2 | 8.2 | 8.3 |
| | Specific Heat | 100° C | J/kg*K | ASTM-E1269 | 950 | 880 | 880 | 880 | 880 | 885 |
| | Thermal Shock Resistance | $^{\Delta}$Tc | °C | NOTE 3 | 300 | 250 | 250 | 200 | 200 | 300 |
| | Max Use Temperature | | °C | NO-LOAD COND. | 1700 | 1700 | 1700 | 1750 | 1750 | 1500 |
| ELECTRICAL | Dielectric Strength | | ac-kV/mm (ac V/mil) | ASTM-D116 | 9.8 (248) | 8.3 (210) | 8.3 (210) | 8.7 (220) | 8.7 (220) | 9.0 (228) |
| | Dielectric Constant | 1 MHz | 25° C | ASTM-D150 | 6.0 | 9.1 | 9 | 9.7 | 9.8 | 10.6 |
| | Dielectric Loss (tan delta) | 1 MHz | 25° C | ASTM-D150 | 0.0020 | 0.0004 | 0.0002 | 0.0001 | 0.0001 | 0.0005 |
| | Volume Resistivity | 25° C | ohm-cm | ASTM-D1829 | > $10^{14}$ | > $10^{14}$ | > $10^{14}$ | > $10^{14}$ | > $10^{14}$ | > $10^{14}$ |
| | | 500° C | ohm-cm | ASTM-D1829 | 5 x $10^{12}$ | 4 x $10^9$ | 4 x $10^9$ | 2 x $10^{10}$ | 2 x $10^{10}$ | 2 x $10^9$ |
| | | 1000° C | ohm-cm | ASTM-D1829 | 3 x $10^5$ | 5 x $10^5$ | 1 x $10^6$ | 2 x $10^6$ | 2 x $10^7$ | 3 x $10^6$ |
| WEAR | Impingement | | – | NOTE 4 | – | 0.52 | 0.50 | 0.47 | 0.47 | 0.41 |
| | Rubbing | | – | NOTE 4 | – | – | 0.60 | – | – | 0.49 |

The chart is intended to illustrate typical properties. Engineering data is representative. Property values vary somewhat with method of manufacture, size, and shape of part. Any suggested applications are not made as a representation or warranty that the material will ultimately be suitable for such applications. The customer is ultimately responsible for all design and material suitability decisions. Data contained herein is not to be construed as absolute and does not constitute a representation or warranty.

**Notes:**

1. Data Measurements – All data measurements are typical and made at room temperature unless otherwise noted.

2. Composition Control – all CoorsTek ceramic compositions are controlled using modern chemical, spectrographic, and X-ray fluorescent methods.

3. Thermal Shock Resistance – Tests are run by quenching samples into water from various elevated temperatures. The change in temperature where a sharp decrease in flexural strength is observed is listed as DTc.

4. Wear Resistance – Impingement tests are run using a dry fused alumina abrasive. Rubbing tests are run using a dry 240 grit fused alumina abrasive. The indices in the chart are calculated by dividing the material volume loss by the volume loss of an AD-85 alumina control. The lower in the index, the better the wear resistance.

5. Dielectric Strength numbers represent measurements on samples that were 0.25" thick.

*Ceramic property values vary somewhat with method of manufacture, size, and shape of part. Close control of values of most properties can be maintained if specified.