MICROCERTEC
ADVANCED CERAMICS & GLASS FOR THE HIGH-TECH

# MATERIALS PROPERTIES DATA SHEET

*Values given for information that can vary depending on the component design*

| Property | Unit | Alumina 97.6 % AL 300 | Alumina 99.5 % AL 995 | Aluminium Nitride | Zirconia Mgo-PSZ | Zirconia Y-TZP | Zirconia Y-TZP Biomedical Grade | Silicon Carbide (sintered) | Silicon Nitride (sintered) | Glass Ceramic Macor ® | Quartz Standard Grade |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Density** | g/cm³ | 3.76 | 3.86 | 3.32 | 5.65 | 6.05 | 6.09 | > 3.10 | > 3.24 | 2.52 | 2.2 |
| **Porosity** | % water absorption | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Flexural Strength** | MPa | 296 | 310 | > 300 | 545 | 1000 | 555 (biaxial) | 400 (4 points) | 700 | 67 | 94 |
| **Compressive Strength** | MPa | >1720 | >2070 | 2000 | 1700 | 2000 | 2000 | 2500 | 3000 | 345 | 1150 |
| **Young's modulus** | GPa | > 330 | > 370 | 310 | 205 | 205 | 209 | 430 | 290 | 67 | 70 |
| **Fracture toughness** | MPa.m 1/2 | - | - | 3.35 | 6.0 | 10.0 | | 4 | 7.0 | - | - |
| **Hardness** | | HR 45N 75 | HR 45N 81 | - | HV 0.3 1120 | HV 0.3 1300 | 14.6 GPa | HV 1.0 24.5 GPa | 15 GPa | - | - |
| **Thermal Conductivity** | W/m K | 26.8 | 29.3 | 170 – 190 | 2.5 | 2.4 | | 130 | 25 | 1.46 | 1.38 |
| **Coef. Linear Thermal Expansion** | $10^{-6}$ / °C | 6.9 - 9.0 25-1000°C | 6.9 - 9.4 25-1000°C | 3.6 - 5.6 25-1000°C | 10.0 | 10.0 | | 3.8 - 5.1 25-1000°C | 1.4 - 3.2 25-1000°C | 8.1 - 12.3 25-1000°C | 0.48 25-900°C |
| **Max. Working Temperature (no load)** | °C | 1650 | 1725 | - | 1000 | 1000 | | 1450 | 1200 | 800 | 1150 |
| **Dielectric Strength** | kv/mm | 43.3 | 31.5 | ≥ 20 | - | - | | - | | 40 | 40 |
| **Volume Resistivity** | Ohm.cm | > $10.^{14}$ | > $10.^{14}$ | > $10.^{12}$ | > $10.^{12}$ | > $10.^{12}$ | | > | $10.^{14}$ | > $10.^{16}$ | > $10.^{16}$ |
| **Dielectric Constant (K')** | - | 9.53 @10 MHz | 9.58 @10 MHz | 8.6 @1 MHz | - | - | | - | 8.0 @ 1 MHz | 6.03 @1 KHz | 3.7 @1 MHz |
| **Dissipation Factor (tan d)** | - | 0.4 x $10^{-4}$ @10 MHz | 0.3 x $10^{-4}$ @10 MHz | 0.5 x $10^{-3}$ @1 MHz | - | - | | | | 4.0 x $10^{-3}$ @ 1 kHz | 0,5 x $10^{-3}$ @ 1 kHz |
| **Applications** | | Electrical insulation Vacuum Brazing Mechanical | Electrical insulation Vacuum Brazing Mechanical | Electrical insulation Thermal dissipation | Mechanical Thermal insulation | Mechanical Thermal insulation | Biomedical | Mechanical Chemical corrosion Thermal dissipation | Mechanical Electrical Insulation | Electrical insulation Thermal insulation | Electrical insulation Thermal insulation |

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