

# Macor® (MGC) Material Specifications



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Technical Products, Inc. is an authorized distributor of MACOR® machinable glass ceramic (MGC). We inventory large quantities of stock both [in-house](#) and [online](#) ready to ship in 1-3 business days.

MACOR® (MGC) glass ceramic offers an outstanding combination of thermal, mechanical, electrical and chemical properties. MACOR® (MGC) material withstands high temp. up to 1000 °C (no load) and demonstrates high electrical resistivity and dielectric strength. It can also be machined (using ordinary metal working tools) in intricate shapes and precision parts.

| Mechanical Properties                            | SI/Metric                                   | Imperial                  |
|--|---|---------------------------|
| Density  | 2.52 g/cm <sup>3</sup>                      | 157 lbs./ft <sup>3</sup>  |
| Porosity   | 0%  | 0%                        |
| Young's Modulus, 25°C<br>(Modulus of Elasticity) | 66.9 GPa                                    | 9.7 x 10 <sup>6</sup> psi |
| Poisson's Ratio                                  | 0.29  | 0.29                      |
| Shear Modulus, 25°C                              | 25.5 GPa                                    | 3.7 x 10 <sup>6</sup> psi |
| Knoop Hardness, 100g                             | 250 kg/mm <sup>2</sup>                      | -                         |
| Modulus of Rapture, 25°C<br>(Flexural Strength)  | 94 MPa<br>(Minimum specified average value) | 13,600 psi                |
| Compressive Strength<br>(After Polishing)        | 345 MPa<br>up to 900 MPa                    | 49,900 psi<br>130,000 psi |

| Thermal Properties                            | SI/Metric                                | Imperial                           |
|---|--|------------------------------------|
| Coefficient of Expansion<br>CTE -100°C → 25°C | 81 x 10 <sup>-7</sup> /°C                | 45 x 10 <sup>-7</sup> /°F          |
| CTE 25°C → 300°C                              | 90 x 10 <sup>-7</sup> /°C                | 50 x 10 <sup>-7</sup> /°F          |
| CTE 25°C → 600°C                              | 112 x 10 <sup>-7</sup> /°C               | 62 x 10 <sup>-7</sup> /°F          |
| CTE 25°C → 800°C                              | 123 x 10 <sup>-7</sup> /°C               | 68 x 10 <sup>-7</sup> /°F          |
| Specific Heat, 25°C                           | 0.79 kJ/kg°C                             | 0.19 Btu/lb.°F                     |
| Thermal Conductivity, 25°C                    | 1.46 W/m°C                               | 10.16 Btu.in/hr.ft <sup>2</sup> °F |
| Thermal Diffusivity, 25°C                     | 7.3 x 10 <sup>-7</sup> m <sup>2</sup> /s | 0.028 ft <sup>2</sup> /hr.         |
| Continuous Operating Temperature              | 800°C                                    | 1472°F                             |
| Maximum No Load Temperature                   | 1000°C                                   | 1832°F                             |

| Electrical Properties   | SI/Metric               | Imperial                |
|---|-------------------------|-------------------------|
| Dielectric Constant, 25°C                                     |                         |                         |
| 1 kHz   | 6.01                    | 6.01                    |
| 8.5 GHz   | 5.64                    | 5.64                    |
| Loss Tangent, 25°C  |                         |                         |
| 1 kHz   | 0.0040                  | 0.0040                  |
| 8.5 GHz   | 0.0025                  | 0.0025                  |
| Dielectric Strength (AC) avg.<br>25°C, under 0.03mm thickness | 45 kV/mm                | 1143 V/mil              |
| Dielectric Strength (DC) avg.<br>25°C, under 0.03mm thickness | 129 kV/mm               | 3277 V/mil              |
| DC Volume Resistivity, 25°C                                   | 10 <sup>17</sup> Ohm.cm | 10 <sup>17</sup> Ohm.cm |

| Chemical Properties  |      |         |       |  |
|--|------|---------|-------|--|
| Solution   | pH   | Time    | Temp. | Weight Loss (mg-cm <sup>2</sup> )<br>Gravimetric |
| 5% HCl<br>(Hydrochloric Acid)                                | 0.1  | 24 hrs. | 95°C  | 100  |
| 0.002 N HNO <sub>3</sub>                                     | 2.8  | 24 hrs. | 95°C  | 0.6  |
| 0.01 N NaHCO <sub>3</sub><br>(Sodium Bicarbonate)            | 8.4  | 24 hrs. | 95°C  | 0.3  |
| 0.02 N Na <sub>2</sub> CO <sub>3</sub><br>(Sodium Carbonate) | 10.9 | 6 hrs.  | 95°C  | 0.1  |
| 5% NaOH<br>(Sodium Hydroxide)                                | 13.2 | 6 hrs.  | 95°C  | 10   |
| Chemical Durability  |      |         |       | Class  |
| DIN 12111 / NF ISO 719                                       |      | Water   |       | HGB2   |
| DIN 12116  |      | Acid    |       | 4  |
| DIN 52322 / ISO 695  |      | Alkali  |       | A3   |

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