# HIGH TEMPERATURE CERAMICS

## 1800ºF MACOR™ Glass Ceramic

A dense, vacuum tight, glass ceramic composite that is readily machinable and usable to 1800ºF.

Can be ground, sawed, turned, tapped, milled, drilled, etc. Will provide dense "0" porosity parts in house.

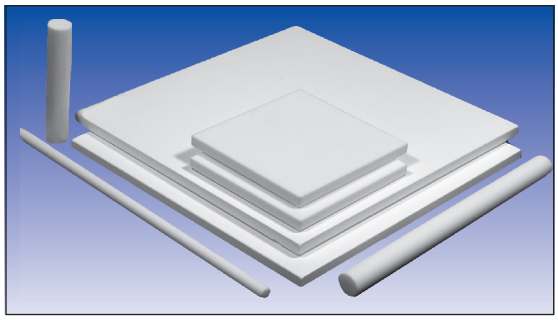
Has excellent electronic properties even at high frequencies.

Use in critical medical and high vacuum applications.

In stock for quick deliveries.

Full machining instructions are included. No post machining heat treatments required.

MACOR is a registered trade mark of Corning Glass.



Rescor™ 915 Plates and Rods

| Cat. No. | Plate Stock Sizes | Price |
|---|---|---|
| 915-01 | 1/4" x 3" x 3" | 124.90 |
| 915-02 | 1/4" x 6" x 6" | 446.40 |
| 915-03 | 1/2" x 3" x 3" | 173.75 |
| 915-04 | 1/2" x 6" x 6" | 623.33 |
| 915-05 | 3/4" x 3" x 3" | 241.42 |
| 915-06 | 3/4" x 6" x 6" | 835.16 |
| 915-07 | 1" x 3" x 3" | 311.52 |
| 915-08 | 1" x 6" x 6" | 1,072.48 |
| 915-17 | 1" x 1" x 3" | 130.31 |
| 915-16 | 2" x 2" x 3" | 401.48 |

| Cat.No. | Rod Stock Sizes | Price |
|---|---|---|
| 915-09 | 1/4" x 12" | 101.07 |
| 915-10 | 1/2" x 6" | 98.72 |
| 915-11 | 1/2" x 12" | 195.33 |
| 915-11A | 3/4" x 12" | 340.30 |
| 915-12 | 1" x 6" | 260.54 |
| 915-13 | 1" x 12" | 494.76 |
| 915-18 | 2" x 3" | 377.18 |

| Rescor™ Base | 915 Macor™ | 56L Graphite |
|---|---|---|
| Max Service Temperature | 1800ºF | 3000ºC Inert atm. |
| Mixed Density (gms/cc) | 2.52 | 1.63 |
| Thermal Cond. (BTU in / Hr. $Ft^2$ ºF) | 12 | 50+ |
| Thermal Expansion (x $10^{-6}$/ ºF) | 5.20 | 3.10 |
| Compressive Strength (psi) | 50,000 | 16,000 |
| Flexural Strength (psi) | 15,000 | 6,500 |
| Modules of Elasticity (x $10^6$) | 9.30 | 1.60 |
| Dielectric Strength (volts/mil.) | 1000 | N/A |
| Volume Resistivity (ohm-cm) | $10^{14}$ | N/A |

## 3000ºC Ultra Grade Graphite

Rescor™ 56L Graphite is a fine grain Graphite.

It is easily machined to close tolerances and will not warp, shrink or crack due to thermal stress. Will not wet by glass or metal oxides.

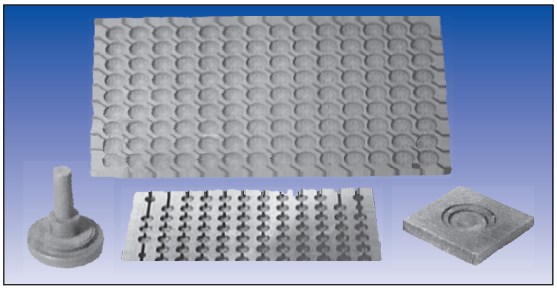
Rescor™ 56L has high strength and its unique grain structure make it ideal for all purposes.

Can be used to 600ºF - 800ºF in air atmospheres and up to 3000ºC in inert atmospheres.

Ideal for semi conductors, boats, fixtures, hot pressing dies, glass to metal, seals, heating elements, crucibles, casting precious metals, forming and handling glass, etc.

Custom sizes and quantity prices are available upon request. See page 32 for Resbond™ 931 Graphite Adhesive.

Typical tolerances are +/- 0.020".



Rescor™ 56L Graphite Precision Fixtures

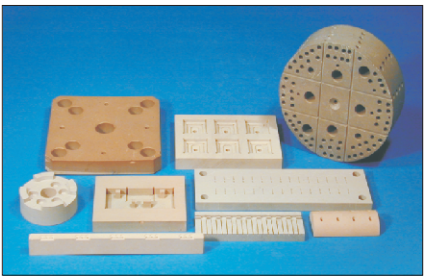
New 931S is a clear liquid which penetrates Graphite surfaces, improving both the wear and oxidation resistance (see page 32 for details).

| Cat. No. | Plate Stock Sizes | Price |
|---|---|---|
| 56L-01 | 1/4" x 6" x 6" | 48.84 |
| 56L-02 | 1/2" x 6" x 6" | 71.99 |
| 56L-03 | 1" x 6" x 6" | 123.88 |
| 56L-04 | 1" x 12" x 12" | 526.17 |

| Cat. No. | Rod Stock Sizes | Price |
|---|---|---|
| 56L-05 | 1/4" x 12" | 19.73 |
| 56L-06 | 1/2" x 12" | 24.50 |
| 56L-07 | 1" x 12" | 89.96 |
| 56L-08 | 2" x 12" | 294.08 |
| Resbond 931S-1.. | Sealer (Pint) | 50.77 |

# MACHINABLE CERAMICS INSTRUCTIONS

## 310 - 914 - 960 - 915 - 56L



### MACHINING TOOLS

Use only sharp cutting tools, carbide cutting tools are preferred. Check tools for sharpness frequently. Ceramics can cause rapid wear of cutting edges. Clamp work firmly to avoid vibration and chatter.

### LUBRICATION

Keep a continuous stream of water on the work and tool. Insufficient lubrication will cause dulling of cutting tools and chipping of the ceramic. Lubrication is a must for precision work. Lubricants recommended include Cimstar 40 Pink, Supercut S67 and Quaker 103.

### CUTTING

Use bonded silicon carbide or diamond cut off wheel with speeds of 6000 - 8000 S.F.M. (2000-2500 rpm). Cut down into work.

### BANDSAW

Blade type continuous coat, carbide grit. Use a band speed of 100 feet per minute.

### DRILLING

Use Carbide drills, Carboloy 883 or equivalent. For high speed drills, drill slower.

Never drill all the way through. Use a drill jig and drill from both sides.

Re-sharpen bits every 3 - 4 holes.

| Drill Size | RPM | Feed - RPI | Drill Size | RPM | Feed - RPI |
|---|---|---|---|---|---|
| 1/4 inch | 300 | 0.005 | 3/4 inch | 200 | 0.010 |
| 1/2 inch | 250 | 0.007 | 1 inch | 100 | 0.012 |

### MILLING

Cutting Speed (surface ft. per min.).....20 - 35
Chip Load (inches per tooth).....0.002
Depth of Cut (inches).....0.150 -0.200

### THREADING

Use a diamond wheel with a tool post grinder or tungsten carbide tools.

### TAPPING

Use high speed steel or carbide. Drill size should allow for 70% thread form. Use lubricant.

### TURNING

Use carbide tool bits or silicon carbide wheels on post grinder.

Tool Type.....Carboloy 883
Cutting Speed (surface ft. per min.)..... 30 - 50
Feed Rate (inches per revolution).....0.002 - 0.005
Depth of Cut (inches).....0.150 - 0.250

### GRINDING

Use a silicon carbide, resinoid bonded wheel at the recommended speeds. Use a soft, coarse grained wheel for heavy grinding. Use a hard, fine grained wheel for finishing.

No heat treating is required, however, shrinkage may occur in use. A test piece should be exposed to the service temp. (for the usage time) to check for shrinkage before committing to making actual parts.

**NOTE:** Cotronics ceramics particles are abrasive clean machines thoroughly after machining.