

Section 8

Ceramic Materials

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Thermal, EMI/RFI & Abrasion Protection Materials

Fax Orders: 610-340-9054 Telephone Orders: 610-906-3549 orders@abthermal.com

CerMax™ High Temperature Non Conductive Alumina & Zirconia Fasteners: Nuts, Bolts, Washers English & Metric



- High temperature use to 3000°F / 1649°C.
- English and Metric Sizes; Other sizes available.
- Alumina fasteners are 100% molded – then fired. No machining or grinding.
- Full Fired 99.8% Alumina & Zirconia, Non Conductive.
- **Minimum order is \$250.00 –mixing of pieces allowed**
- **All sales final. No warranty offered or implied**

CerMax™ High Temperature Non Conductive Ceramic Fasteners - Alumina							
English (Other Sizes Available – Please Ask)				Metric (Other Sizes Available – Please Ask)			
Part Number	Type	Size		Part Number	Type	Size	
FST-CA-E-N-0-80	Nut	0-80		FST-CA-M-N-2	Nut	2 mm	
FST-CA-E-N-2-56	Nut	2-56		FST-CA-M-N-3	Nut	3 mm	
FST-CA-E-N-4-40	Nut	4-40		FST-CA-M-N-4	Nut	4 mm	
FST-CA-E-N-5-40	Nut	5-40		FST-CA-M-N-5	Nut	5 mm	
FST-CA-E-N-6-32	Nut	6-32		FST-CA-M-N-6	Nut	6 mm	
FST-CA-E-N-8-32	Nut	8-32		FST-CA-M-N-8	Nut	8 mm	
FST-CA-E-N-10-32	Nut	10-32					
FST-CA-E-N-1/4-20	Nut	1/4-20					
FST-CA-E-N-5/16-18	Nut	5/16-18					
FST-CA-E-N-3/8-16	Nut	3/8-16					
FST-CA-E-W-0-80	Washer	0-80		FST-CA-M-W-2	Washer	2 mm	
FST-CA-E-W-2-56	Washer	2-56		FST-CA-M-W-3	Washer	3 mm	
FST-CA-E-W-4-40	Washer	4-40		FST-CA-M-W-4	Washer	4 mm	
FST-CA-E-W-5-40	Washer	5-40		FST-CA-M-W-5	Washer	5 mm	
FST-CA-E-W-6-32	Washer	6-32		FST-CA-M-W-6	Washer	6 mm	
FST-CA-E-W-8-32	Washer	8-32		FST-CA-M-W-8	Washer	8 mm	
FST-CA-E-W-10-32	Washer	10-32					
FST-CA-E-W-1/4-20	Washer	1/4-20					
FST-CA-E-W-5/16-18	Washer	5/16-18					
FST-CA-E-W-3/8-16	Washer	3/8-16					

CerMax™ High Temperature Non Conductive Ceramic Fasteners - Zirconia							
English (Other Sizes Available – Please Ask)				Metric (Other Sizes Available – Please Ask)			
Part Number	Type	Size		Part Number	Type	Size	
FST-CZ-E-N-2-56	Nut	2-56		FST-CZ-M-N-2	Nut	2 mm	
FST-CZ-E-N-4-40	Nut	4-40		FST-CZ-M-N-3	Nut	3 mm	
FST-CZ-E-N-6-32	Nut	6-32		FST-CZ-M-N-4	Nut	4 mm	
FST-CZ-E-N-8-32	Nut	8-32		FST-CZ-M-N-5	Nut	5 mm	
FST-CZ-E-N-10-32	Nut	10-32		FST-CZ-M-N-6	Nut	6 mm	
FST-CZ-E-N-1/4-20	Nut	1/4-20		FST-CZ-M-W-2	Washer	2 mm	
FST-CZ-E-W-2-56	Washer	2-56		FST-CZ-M-W-3	Washer	3 mm	
FST-CZ-E-W-4-40	Washer	4-40		FST-CZ-M-W-4	Washer	4 mm	
FST-CZ-E-W-6-32	Washer	6-32		FST-CZ-M-W-5	Washer	5 mm	
FST-CZ-E-W-8-32	Washer	8-32		FST-CZ-M-W-6	Washer	6 mm	
FST-CZ-E-W-10-32	Washer	10-32					
FST-CZ-E-W-1/4-20	Washer	1/4-20					

CerMax™ High Temperature Non Conductive Ceramic Fasteners - Alumina							
English (Other Sizes Available – Please Ask)				Metric (Other Sizes Available – Please Ask)			
Part Number	Type	Size		Part Number	Type	Size	
FST-CA-E-B-0-80x1/4	Bolt	0-80 x 1/4		FST-CA-M-B-2X5	Bolt	2 mm x 5 mm	
FST-CA-E-B-2-56x1/4	Bolt	2-56 x 1/4		FST-CA-M-B-2X10	Bolt	2 mm x 10 mm	
FST-CA-E-B-2-56x3/8	Bolt	2-56 x 3/8		FST-CA-M-B-3X5	Bolt	3 mm x 5 mm	
FST-CA-E-B-2-56x1/2	Bolt	2-56 x 1/2		FST-CA-M-B-3X10	Bolt	3 mm x 10 mm	
FST-CA-E-B-4-40x1/4	Bolt	4-40 x 1/4		FST-CA-M-B-3X20	Bolt	3 mm x 20 mm	
FST-CA-E-B-4-40x3/8	Bolt	4-40 x 3/8		FST-CA-M-B-3X25	Bolt	3 mm x 25 mm	
FST-CA-E-B-4-40x1/2	Bolt	4-40 x 1/2		FST-CA-M-B-4X5	Bolt	4 mm x 5 mm	
FST-CA-E-B-4-40x3/4	Bolt	4-40 x 3/4		FST-CA-M-B-4X10	Bolt	4 mm x 10 mm	
FST-CA-E-B-4-40x1	Bolt	4-40 x 1		FST-CA-M-B-4X20	Bolt	4 mm x 20 mm	
FST-CA-E-B-5-40x1/4	Bolt	5-40 x 1/4		FST-CA-M-B-4X25	Bolt	4 mm x 25 mm	
FST-CA-E-B-5-40x3/8	Bolt	5-40 x 3/8		FST-CA-M-B-4X30	Bolt	4 mm x 30 mm	
FST-CA-E-B-5-40x1/2	Bolt	5-40 x 1/2		FST-CA-M-B-4X40	Bolt	4 mm x 40 mm	
FST-CA-E-B-5-40x3/4	Bolt	5-40 x 3/4		FST-CA-M-B-5X5	Bolt	5 mm x 5 mm	
FST-CA-E-B-5-40x1	Bolt	5-40 x 1		FST-CA-M-B-5X10	Bolt	5 mm x 10 mm	
FST-CA-E-B-6-32x1/4	Bolt	6-32 x 1/4		FST-CA-M-B-5X20	Bolt	5 mm x 20 mm	
FST-CA-E-B-6-32x3/8	Bolt	6-32 x 3/8		FST-CA-M-B-5X25	Bolt	5 mm x 25 mm	
FST-CA-E-B-6-32x1/2	Bolt	6-32 x 1/2		FST-CA-M-B-5X30	Bolt	5 mm x 30 mm	
FST-CA-E-B-6-32x3/4	Bolt	6-32 x 3/4		FST-CA-M-B-5X40	Bolt	5 mm x 40 mm	
FST-CA-E-B-6-32x1	Bolt	6-32 x 1		FST-CA-M-B-6X5	Bolt	6 mm x 5 mm	
FST-CA-E-B-8-32x1/4	Bolt	8-32 x 1/4		FST-CA-M-B-6X10	Bolt	6 mm x 10 mm	
FST-CA-E-B-8-32x3/8	Bolt	8-32 x 3/8		FST-CA-M-B-6X20	Bolt	6 mm x 20 mm	
FST-CA-E-B-8-32x1/2	Bolt	8-32 x 1/2		FST-CA-M-B-6X25	Bolt	6 mm x 25 mm	
FST-CA-E-B-8-32x3/4	Bolt	8-32 x 3/4		FST-CA-M-B-6X30	Bolt	6 mm x 30 mm	
FST-CA-E-B-8-32x1	Bolt	8-32 x 1		FST-CA-M-B-6X40	Bolt	6 mm x 40 mm	
FST-CA-E-B-8-32x1-1/4	Bolt	8-32 x 1-1/4		FST-CA-M-B-6X50	Bolt	6 mm x 50 mm	
FST-CA-E-B-8-32x1-1/2	Bolt	8-32 x 1-1/2		FST-CA-M-B-6X60	Bolt	6 mm x 60 mm	
FST-CA-E-B-10-32x1/4	Bolt	10-32 x 1/4		FST-CA-M-B-6X75	Bolt	6 mm x 75 mm	
FST-CA-E-B-10-32x3/8	Bolt	10-32 x 3/8		FST-CA-M-B-8X5	Bolt	8 mm x 5 mm	
FST-CA-E-B-10-32x1/2	Bolt	10-32 x 1/2		FST-CA-M-B-8X10	Bolt	8 mm x 10 mm	
FST-CA-E-B-10-32x3/4	Bolt	10-32 x 3/4		FST-CA-M-B-8X20	Bolt	8 mm x 20 mm	
FST-CA-E-B-10-32x1	Bolt	10-32 x 1		FST-CA-M-B-8X25	Bolt	8 mm x 25 mm	
FST-CA-E-B-10-32x1-1/4	Bolt	10-32 x 1-1/4		FST-CA-M-B-8X30	Bolt	8 mm x 30 mm	
FST-CA-E-B-10-32x1-1/2	Bolt	10-32 x 1-1/2		FST-CA-M-B-8X40	Bolt	8 mm x 40 mm	
FST-CA-E-B-1/4-20x1/4	Bolt	1/4-20 x 1/4		FST-CA-M-B-8X50	Bolt	8 mm x 50 mm	
FST-CA-E-B-1/4-20x3/8	Bolt	1/4-20 x 3/8		FST-CA-M-B-6X60	Bolt	8 mm x 60 mm	
FST-CA-E-B-1/4-20x1/2	Bolt	1/4-20 x 1/2		FST-CA-M-B-6X75	Bolt	8 mm x 75 mm	
FST-CA-E-B-1/4-20x3/4	Bolt	1/4-20 x 3/4					
FST-CA-E-B-1/4-20x1	Bolt	1/4-20 x 1					
FST-CA-E-B-1/4-20x1-1/4	Bolt	1/4-20 x 1-1/4					
FST-CA-E-B-1/4-20x1-1/2	Bolt	1/4-20 x 1-1/2					
FST-CA-E-B-1/4-20x1-3/4	Bolt	1/4-20 x 1-3/4					
FST-CA-E-B-1/4-20x2	Bolt	1/4-20 x 2					
FST-CA-E-B-1/4-20x2-1/2	Bolt	1/4-20 x 2-1/2					
FST-CA-E-B-1/4-20x3	Bolt	1/4-20 x 3					
FST-CA-E-B-5/16-18x1/4	Bolt	5/16-18 x 1/4					
FST-CA-E-B-5/16-18x3/8	Bolt	5/16-18 x 3/8					
FST-CA-E-B-5/16-18x1/2	Bolt	5/16-18 x 1/2					
FST-CA-E-B-5/16-18x3/4	Bolt	5/16-18 x 3/4					
FST-CA-E-B-5/16-18x1	Bolt	5/16-18 x 1					
FST-CA-E-B-5/16-18x1-1/4	Bolt	5/16-18 x 1-1/4					
FST-CA-E-B-5/16-18x1-1/2	Bolt	5/16-18 x 1-1/2					
FST-CA-E-B-5/16-18x1-3/4	Bolt	5/16-18 x 1-3/4					
FST-CA-E-B-5/16-18x2	Bolt	5/16-18 x 2					
FST-CA-E-B-5/16-18x2-1/2	Bolt	5/16-18 x 2-1/2					
FST-CA-E-B-5/16-18x3	Bolt	5/16-18 x 3					
FST-CA-E-B-3/8-16x1/4	Bolt	3/8-16 x 1/4					
FST-CA-E-B-3/8-16x3/8	Bolt	3/8-16 x 3/8					
FST-CA-E-B-3/8-16x1/2	Bolt	3/8-16 x 1/2					
FST-CA-E-B-3/8-16x3/4	Bolt	3/8-16 x 3/4					
FST-CA-E-B-3/8-16x1	Bolt	3/8-16 x 1					
FST-CA-E-B-3/8-16x1-1/4	Bolt	3/8-16 x 1-1/4					
FST-CA-E-B-3/8-16x1-1/2	Bolt	3/8-16 x 1-1/2					
FST-CA-E-B-3/8-16x1-3/4	Bolt	3/8-16 x 1-3/4					
FST-CA-E-B-3/8-16x2	Bolt	3/8-16 x 2					
FST-CA-E-B-3/8-16x2-1/2	Bolt	3/8-16 x 2-1/2					
FST-CA-E-B-3/8-16x3	Bolt	3/8-16 x 3					

Strength - Alumina (A998)	
Bolt Size	Destructive Torque (in*lb) ¹
4-40	1.6
6-32	2.3
8-32	5.5
10-32	6.2
1/4-20	20.4
5/16-18	41.9
3/8-16	95

Strength Notes

1. The data in the table is not guaranteed and intended only as informational. Exposing ceramic fasteners to the same forces typically exerted on metal fasteners is not recommended and may result in catastrophic failure.

2. "Destructive Torque" is the average maximum torque on hex head bolts until failure.

Strength Notes

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CerMax™ High Temperature Non Conductive Ceramic Fasteners - Zirconia							
English (Other Sizes Available – Please Ask)				Metric (Other Sizes Available – Please Ask)			
Part Number	Type	Size		Part Number	Type	Size	
FST-CZ-E-B-2-56x1/4	Bolt	2-56 x 1/4		FST-CZ-M-B-2X5	Bolt	2 mm x 5 mm	
FST-CZ-E-B-4-40x1/4	Bolt	4-40 x 1/4		FST-CZ-M-B-2X10	Bolt	2 mm x 10 mm	
FST-CZ-E-B-4-40x3/8	Bolt	4-40 x 3/8		FST-CZ-M-B-3X5	Bolt	3 mm x 5 mm	
FST-CZ-E-B-4-40x1/2	Bolt	4-40 x 1/2		FST-CZ-M-B-3X10	Bolt	3 mm x 10 mm	
FST-CZ-E-B-4-40x3/4	Bolt	4-40 x 3/4		FST-CZ-M-B-3X15	Bolt	3 mm x 15 mm	
FST-CZ-E-B-4-40x1	Bolt	4-40 x 1		FST-CZ-M-B-3X20	Bolt	3 mm x 20 mm	
FST-CZ-E-B-6-32x1/4	Bolt	6-32 x 1/4		FST-CZ-M-B-3X25	Bolt	3 mm x 25 mm	
FST-CZ-E-B-6-32x3/8	Bolt	6-32 x 3/8		FST-CZ-M-B-4X5	Bolt	4 mm x 5 mm	
FST-CZ-E-B-6-32x1/2	Bolt	6-32 x 1/2		FST-CZ-M-B-4X10	Bolt	4 mm x 10 mm	
FST-CZ-E-B-6-32x3/4	Bolt	6-32 x 3/4		FST-CZ-M-B-4X15	Bolt	4 mm x 15 mm	
FST-CZ-E-B-6-32x1	Bolt	6-32 x 1		FST-CZ-M-B-4X20	Bolt	4 mm x 20 mm	
FST-CZ-E-B-8-32x1/4	Bolt	8-32 x 1/4		FST-CZ-M-B-4X25	Bolt	4 mm x 25 mm	
FST-CZ-E-B-8-32x3/8	Bolt	8-32 x 3/8		FST-CZ-M-B-4X30	Bolt	4 mm x 30 mm	
FST-CZ-E-B-8-32x1/2	Bolt	8-32 x 1/2		FST-CZ-M-B-5X5	Bolt	5 mm x 5 mm	
FST-CZ-E-B-8-32x3/4	Bolt	8-32 x 3/4		FST-CZ-M-B-5X10	Bolt	5 mm x 10 mm	
FST-CZ-E-B-8-32x1	Bolt	8-32 x 1		FST-CZ-M-B-5X15	Bolt	5 mm x 15 mm	
FST-CZ-E-B-10-32x1-1/4	Bolt	8-32 x 1-1/4		FST-CZ-M-B-5X20	Bolt	5 mm x 20 mm	
FST-CZ-E-B-10-32x1/4	Bolt	10-32 x 1/4		FST-CZ-M-B-5X25	Bolt	5 mm x 25 mm	
FST-CZ-E-B-10-32x3/8	Bolt	10-32 x 3/8		FST-CZ-M-B-5X30	Bolt	5 mm x 30 mm	
FST-CZ-E-B-10-32x1/2	Bolt	10-32 x 1/2		FST-CZ-M-B-5X40	Bolt	5 mm x 40 mm	
FST-CZ-E-B-10-32x3/4	Bolt	10-32 x 3/4		FST-CZ-M-B-6X5	Bolt	6 mm x 5 mm	
FST-CZ-E-B-10-32x1	Bolt	10-32 x 1		FST-CZ-M-B-6X10	Bolt	6 mm x 10 mm	
FST-CZ-E-B-10-32x1-1/4	Bolt	10-32 x 1-1/4		FST-CZ-M-B-6X15	Bolt	6 mm x 15 mm	
FST-CZ-E-B-10-32x1-1/2	Bolt	10-32 x 1-1/2		FST-CZ-M-B-6X20	Bolt	6 mm x 20 mm	
FST-CZ-E-B-1/4-20x1/4	Bolt	1/4-20 x 1/4		FST-CZ-M-B-6X25	Bolt	6 mm x 25 mm	
FST-CZ-E-B-1/4-20x3/8	Bolt	1/4-20 x 3/8		FST-CZ-M-B-6X30	Bolt	6 mm x 30 mm	
FST-CZ-E-B-1/4-20x1/2	Bolt	1/4-20 x 1/2		FST-CZ-M-B-6X40	Bolt	6 mm x 40 mm	
FST-CZ-E-B-1/4-20x3/4	Bolt	1/4-20 x 3/4		FST-CZ-M-B-6X50	Bolt	6 mm x 50 mm	
FST-CZ-E-B-1/4-20x1	Bolt	1/4-20 x 1					
FST-CZ-E-B-1/4-20x1-1/4	Bolt	1/4-20 x 1-1/4					
FST-CZ-E-B-1/4-20x1-1/2	Bolt	1/4-20 x 1-1/2					
FST-CZ-E-B-1/4-20x1-3/4	Bolt	1/4-20 x 1-3/4					
FST-CZ-E-B-1/4-20x2	Bolt	1/4-20 x 2					

Material Properties – Alumina (A998) & Zirconia (TZP)

Property	Unit	A998	TZP
Physical Properties			
Composition (1)	weight %	99.8 AL ₂ O ₃	5.4 Y ₂ O ₃
Density (2)	g/cm ³	3.89	6.0
Porosity	volume %	Impervious	Impervious
Color		Ivory	Off-white
Mechanical Properties			
Hardness	GPa (knoop)	11.1	11.7
4-point Bend (3) Strength (MOR)	MPa (ksi)	325 (47)	600 (87)
Thermal Properties			
Maximum Service Temp	°C	1650	2200
Thermal Expansion Coefficient	°C ⁻¹ (25 – 700°C)	7.5 x 10 ⁻⁶	11.2 x 10 ⁻⁶
Thermal Conductivity (20°C)	W/m•°K (Btu•in/ft ² •hr•°F)	35 (242)	2 (14)
Electrical Properties			
Dielectric Strength	Volts/mil	200	51
Dielectric Constant	@1MHz @ 20°C	10.0	28.0
	Ohm.cm @ 25°C	14	>10 ¹³
	Ohm.cm @ 300°C	2.5x10 ¹¹	n/a
Volume Resistivity	Ohm.cm @ 300°C	5.5x10 ¹⁰	4.8x10 ³
	Ohm.cm @ 500°C		

1. Controlled by the Batch Composition
2. Measured by Pycnometer Immersion Technique
3. per ASTM C 1161-02c

Zirconia (Zirconium Oxide, ZrO₂)

Zirconia is one of the most studied ceramic materials. Zirconium dioxide (in its most naturally occurring form) is the mineral baddeleyite. Zirconia begins its life following a thermal treatment process (calcining) of the zirconium dioxide. This zirconia is further processed into different forms, including powder. Zirconia formulations utilize a "ready to press" type of zirconia powder for its near-net shaping manufacturing process.

Transformation Toughened

With a melting point of 2715°C and a boiling point of 4300°C, pure zirconia is extremely tough. However, when heated, phase changes in its physical characteristics reveal a weakness. In its tetragonal phase the expansion of a pure zirconia part results in internal stresses, leading to cracks. This inherent weakness is corrected with the addition of a stabilizer, such as yttria (Yttrium oxide, Y₂O₃), producing YTZP, a yttria partially stabilized zirconia.

A part made of YTZP zirconia remains stable as it moves from its monoclinic (room temperature) phase to its tetragonal (heated) phase and back again, resulting in lessened expansion, and minimal crack propagation. These changes are referred to as Transformation Toughening.

The common threads found making YTZP zirconia the material of choice often includes:

- Resistance to high abrasion
- Chemical stability
- Coefficient of thermal expansion similar to steel

Environments in which YTZP may not be suitable include long term water immersion and temperatures of 500° C (and above) in which electrical conductivity must be avoided. As with all custom ceramic part orders, we work closely with the customer to arrive at a ceramic formulation that not only meets the spec, but also avoids such undesirable circumstances.

Alumina (Aluminum Oxide, Al₂O₃)

Alumina, one of the oldest technical ceramics, remains one of the most common still in use. Alumina, thoroughly documented since the 1920's, is an industry standard to which many other ceramic materials are compared. Many of the custom ceramic parts Ceramco manufactures for its customers are made from alumina because of its desirable properties, including:

- Chemical inertness
- Resistance to high wear
- Resistance to thermal conductivity
- Resistance to electrical conductivity

Alumina's most notable characteristics are its high hardness, dielectric constant and high mechanical stability. These characteristics make alumina ideal for customer applications subject to high wear and/or low electric loss.

Stock Sizes Notes - alumina & zirconia (PSZ) fasteners

1. The pitch diameter of male threads will not exceed the max allowable according to Class 2. Minimum allowable pitch diameter may be below that of Class 2, conversely for female threads. Due to shrink factor variances, the stack up tolerance cannot be controlled on the pitch. It is recommended that you not engage more than 5 to 10 threads on any male fastener.

2. No warranty with respect to torque strength and tensile strength is extended or implied. Ceramic materials are inherently brittle and display catastrophic failure if impacted or stressed beyond material limits.

Head Styles:

- Socket Head
- Eye-bolt Head
- Hex Head
- Flat Head - Slotted, Phillips & Socket
- Pan Head - Slotted & Phillips

CerMax™ Dense Machinable Glass-Ceramic



- Machinable Dense Glass-Ceramics
- High Temperature & High Voltage use
- Readily Machined, no firing required
- Thermal Shock Resistance
- High Dielectric & Mechanical Strength

CerMax™ High Temperature Glass-Ceramic Machinable Forms

	MC-GC-P-L	MC-GC-P-H
Max Operating Temp	750°F / 400°C	1100°F / 593°C
Hardness	5.5	5.0
Specific Gravity g/cc	3.0	2.8
Density, lbs/in ³	.11	.10
Porosity, %	Nil	Nil
Thermal Expansion in/in/°F x 10 ⁻⁶	6.0 (10.8 for °C)	5.2 (9.5 for °C)
Compressive Strength, psi	45,000	32,000
Flexural Strength, psi	13,000	14,000
Dielectric Strength, v/mil	730	380
Loss Factor at 1 MHz	.009	.012
Dielectric Constant at 1 MHz	6.7	6.8
Thermal Conductivity, BTUx in/hrxft ² x°F (W/mx°K)	6.02 (.87)	4.08 (.59)

750°F/400°C Glass-Ceramic

Part Number	Type	Size (inches)	
MC-GC-P-L-1/4-4-6	Plate	1/4 x 4 x 6	
MC-GC-P-L-1/4-14-20	Plate	1/4 x 14 x 20	
MC-GC-P-L-3/8-4-6	Plate	3/8 x 4 x 6	
MC-GC-P-L-3/8-14-20	Plate	3/8 x 14 x 20	
MC-GC-P-L-1/2-4-6	Plate	1/2 x 4 x 6	
MC-GC-P-L-1/2-14-20	Plate	1/2 x 14 x 20	
MC-GC-P-L-3/4-4-6	Plate	3/4 x 4 x 6	
MC-GC-P-L-3/4-14-20	Plate	3/4 x 14 x 20	
MC-GC-P-L-1-4-6	Plate	1 x 4 x 6	
MC-GC-P-L-1-14-20	Plate	1 x 14 x 20	
MC-GC-R-L-1/4-12	Rod	1/4 x 12	
MC-GC-R-L-1/2-12	Rod	1/2 x 12	
MC-GC-R-L-3/4-12	Rod	3/4 x 12	
MC-GC-R-L-1-12	Rod	1 x 12	

1100°F / 593°C Glass-Ceramic

Part Number	Type	Size (inches)	
MC-GC-P-H-1/4-4-6	Plate	1/4 x 4 x 6	
MC-GC-P-H-1/4-14-20	Plate	1/4 x 14 x 20	
MC-GC-P-H-3/8-4-6	Plate	3/8 x 4 x 6	
MC-GC-P-H-3/8-14-20	Plate	3/8 x 14 x 20	
MC-GC-P-H-1/2-4-6	Plate	1/2 x 4 x 6	
MC-GC-P-H-1/2-14-20	Plate	1/2 x 14 x 20	
MC-GC-P-H-3/4-4-6	Plate	3/4 x 4 x 6	
MC-GC-P-H-3/4-14-20	Plate	3/4 x 14 x 20	
MC-GC-P-H-1-4-6	Plate	1 x 4 x 6	
MC-GC-P-H-1-14-20	Plate	1 x 14 x 20	
MC-GC-R-H-1/4-12	Rod	1/4 x 12	
MC-GC-R-H-1/2-12	Rod	1/2 x 12	
MC-GC-R-H-3/4-12	Rod	3/4 x 12	
MC-GC-R-H-1-12	Rod	1 x 12	

CerMax™ Dense Machinable Unfired Aluminum Silicate



- Machinable Dense Glass-Ceramics
- High Temperature & High Voltage use
- Readily Machined, no firing required
- Thermal Shock Resistance
- High Dielectric & Mechanical Strength

CerMax™ High Temperature Glass-Ceramic Machinable Forms

	MC-GC-P-L	MC-GC-P-H
Max Operating Temp	750°F / 400°C	1100°F / 593°C
Hardness	5.5	5.0
Specific Gravity g/cc	3.0	2.8
Density, lbs/in ³	.11	.10
Porosity, %	Nil	Nil
Thermal Expansion in/in/°F x 10 ⁻⁶	6.0 (10.8 for °C)	5.2 (9.5 for °C)
Compressive Strength, psi	45,000	32,000
Flexural Strength, psi	13,000	14,000
Dielectric Strength, v/mil	730	380
Loss Factor at 1 MHz	.009	.012
Dielectric Constant at 1 MHz	6.7	6.8
Thermal Conductivity, BTUx in/hrxft ² x°F (W/mx°K)	6.02 (.87)	4.08 (.59)
750°F/400°C Glass-Ceramic		
Part Number	Type	Size (inches)
MC-AS-P-L-1/4-4-6	Plate	1/4 x 4 x 6
MC-AS-P-L-1/4-14-20	Plate	1/4 x 14 x 20
MC-AS-P-L-3/8-4-6	Plate	3/8 x 4 x 6
MC-AS-P-L-3/8-14-20	Plate	3/8 x 14 x 20
MC-AS-P-L-1/2-4-6	Plate	1/2 x 4 x 6
MC-AS-P-L-1/2-14-20	Plate	1/2 x 14 x 20
MC-AS-P-L-3/4-4-6	Plate	3/4 x 4 x 6
MC-AS-P-L-3/4-14-20	Plate	3/4 x 14 x 20
MC-AS-P-L-1-4-6	Plate	1 x 4 x 6
MC-AS-P-L-1-14-20	Plate	1 x 14 x 20
MC-AS-R-L-1/4-12	Rod	1/4 x 12
MC-AS-R-L-1/2-12	Rod	1/2 x 12
MC-AS-R-L-3/4-12	Rod	3/4 x 12
MC-AS-R-L-1-12	Rod	1 x 12

CerMax™ High Temperature Round Flat Bottom Crucibles



- Alumina & Magnesium Oxide Crucibles
- Full Fired
- Inert to Molten Metals & Slags
- Thermal Shock Resistance
- High Dielectric & Mechanical Strength

CerMax™ Round Crucibles – Magnesium Oxide / Alumina

	Magnesium Oxide	Alumina
Max Operating Temp	3270°F / 1800°C	3000°F / 1649°C
Hardness	5.5	9.0
Specific Gravity g/cc	3.45	3.9
Density, lbs/in ²	.12	.134
Porosity, %	4.5	Nil
Thermal Expansion in/in/°F x 10 ⁻⁶	7.7 (13.9 for °C)	3.5 (6.3 for °C)
Compressive Strength, psi	120,000	340,000
Flexural Strength, psi	35,000	46,000
Dielectric Strength, v/mil	150	225
Loss Factor at 1 MHz	-	.0018
Dielectric Constant at 1 MHz	9.6	9.3
Thermal Conductivity, BTUx in/hrxft ² x°F (W/mx°K)	15.0 (2.2)	220 (31.7)

Round Flat Bottom Crucibles

For "X" in the part number: use "M" for Magnesium Oxide
use "A" for Alumina

Part Number	OD		Length		
CC-FB-X-10010	1.00	25.40	1.00	25.40	
CC-FB-X-10012	1.00	25.40	1.25	31.75	
CC-FB-X-12512	1.25	31.75	1.25	31.75	
CC-FB-X-12525	1.25	31.75	2.50	63.50	
CC-FB-X-15020	1.50	38.10	2.00	50.80	
CC-FB-X-15030	1.50	38.10	3.00	76.20	
CC-FB-X-17525	1.75	44.45	2.50	63.50	
CC-FB-X-17535	1.75	44.45	3.50	88.90	
CC-FB-X-20020	2.00	50.80	2.00	50.80	
CC-FB-X-20035	2.00	50.80	3.50	88.90	
CC-FB-X-20050	2.00	50.80	5.00	127.00	
CC-FB-X-20060	2.00	50.80	6.00	152.40	
CC-FB-X-22535	2.25	57.15	3.50	88.90	
CC-FB-X-25030	2.50	63.50	3.00	76.20	
CC-FB-X-25055	2.50	63.50	5.50	139.70	
CC-FB-X-30030	3.00	76.20	3.00	76.20	
CC-FB-X-30040	3.00	76.20	4.00	101.60	
CC-FB-X-30045	3.00	76.20	4.50	114.30	
CC-FB-X-30057	3.00	76.20	5.75	146.05	
CC-FB-X-35050	3.50	88.90	5.00	127.00	
CC-FB-X-35060	3.50	88.90	6.00	152.40	
CC-FB-X-40040	4.00	101.60	4.00	101.60	
CC-FB-X-40060	4.00	101.60	6.00	152.40	
CC-FB-X-45045	4.50	114.30	4.50	114.30	
CC-FB-X-45060	4.50	114.30	6.00	152.40	
CC-FB-X-50050	5.00	127.00	5.00	127.00	
CC-FB-X-50080	5.00	127.00	8.00	203.20	
CC-FB-X-55055	5.50	139.70	5.50	139.70	
CC-FB-X-60060	6.00	152.40	6.00	152.40	
CC -FB-X-600X0	6.00	152.40	10.00	254.00	



Thermal, EMI/RFI & Abrasion Protection Materials

Fax Orders: 610-340-9054 Telephone Orders: 610-906-3549 orders@abthermal.com



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