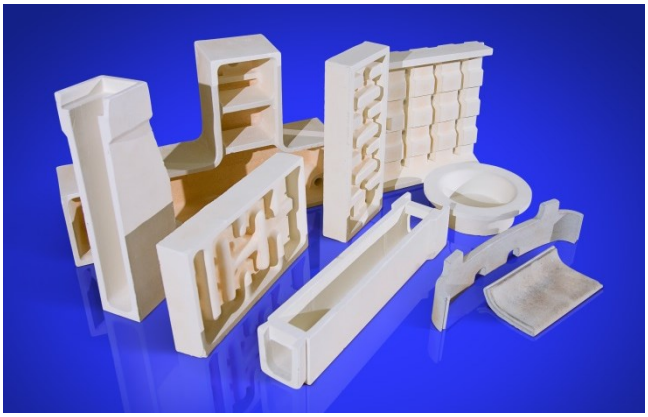
# Cerox® Fired Refractory Shapes

Datasheet Code US: 1-14-15



**Product Description**

Cerox fired refractory shapes are thixotropically cast using a dispersion agent, which allows the Cerox mix to flow when vibrated without requiring a high water content. These manufacturing techniques, combined with precisely controlled firing and 100% product inspection, produce high-quality components suited to the most arduous of high-temperature environments.

A number of compositions are available:

- Cerox 120 - 51% alumina, economical
- Cerox 200 - 74% alumina, fired mullite composition
- Cerox FC 200 - 74% aluminam fast casting
- Cerox 700 - High alumina, versatile shape capability
- Cerox 710 - High alumina, fine grain for thin wall shapes
- Cerox 720 - High alumina, high strength, fine grain for thin wall shapes
- Cerox 1000 - High alumina
- Cerox 1200 - Ultra-high alumina (99%)
- Cerox 1300 - Alumina, zirconia, silica
- Cerox 1400 - Silicon carbide

Cerox refractory shapes are dense, hard, and chemically stable, offering resistance to acids, slags, and gases.

**Features**

- Variety of available compositions using high-alumina, alumina-silica, zirconia, and silicon carbide
- Excellent chemical attack resistance
- Excellent thermal shock resistance
- Low gas permeability
- Hundreds of standard molds in stock
- Tight tolerance capability

**Applications**

- Combustion chambers and components
- Burner blocks
- Pipes
- Gas reactor components
- Wear plates
- Crucibles
- Nozzles
- Resistance heater hangers, holders, etc.
- Runners
- Induction blocks
- Tundish boxes
- Distribution plates
- Skid rails
- Rabble blocks and teeth
- Saggers
- Setters
- Pusher tiles
- Tubes
- Plates
- Muffles
- Piers

Morgan Advanced Materials

THERMAL CERAMICS

# Cerox® Fired Refractory Shapes

| Physical properties | 100 | 120 | 200 | FC 200 | 700 | 720 | 730 | 1000 | 1200 | 1300 | 1400 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Color | Off white | | | | White | | | | Bright white | Yellow-white | Gray |
| Bulk Density, lb/ft$^3$, pcf (kg/m$^3$) | 154 (2468) | 136 (2179) | 161 (2580) | 157 (2515) | 173 (2772) | 176 (2820) | 172 (2756) | 179 (2869) | 183 (2933) | 190 (3045) | 161 (2580) |
| Apparent Porosity, % | 20 | 20 | 20 | 23 | 19 | 16 | 19 | 17 | 21 | 17 | 21 |
| Permeability, ft$^3$/hr•ft$^2$•in.,psi (MPa) | 4 (0.03) | 3 (0.02) | 4 (0.03) | | | | | | 6 (0.04) | 4 (0.03) | |
| Hot Modulus of Rupture, psi (MPa) | | | | | | | | | | | |
| @ 75°F (24°C) | 1200 (8.28) | 1200 (8.28) | 1600 (11.03) | 1500 (10.34) | 1600 (11.03) | 2400 (16.55) | 1300 (8.97) | 1600 (11.03) | 5000 (34.48) | 3000 (20.69) | 1800 (12.41) |
| @ 2300°F (1260°C) | 2400 (16.55) | 2400 (16.55) | 2000 (13.79) | 1800 (12.41) | 2400 (16.55) | 4800 (33.10) | - | 1600 (11.03) | 2600 (17.93) | 3000 (20.69) | 2200 (15.17) |
| @ 2600°F (1426°C) | 1000 (6.89) | 1000 (6.89) | 1100 (7.59) | 1000 (6.89) | 1900 (13.10) | 3700 (25.52) | - | 900 (6.21) | 1400 (9.65) | 2300 (15.86) | 1000 (6.89) |
| @ 2800°F (1538°C) | 600 (4.14) | 600 (4.14) | 800 (5.51) | 700 (4.83) | 1000 (6.89) | 1600 (11.03) | - | 700 (4.83) | 700 (4.83) | 1400 (9.66) | 500 (3.44) |
| Cold Crushing Strength, psi (MPa) | | | | | | | | | | | |
| @ 2800°F (1538°C) | - | - | 7000 - 10000 (48 - 69) | 5000 – 8000 (34 - 55) | 8000 – 10000 (55 - 69) | 9000 – 10000 (62 - 76) | - | - | - | 8000 – 11000 (55 - 76) | - |
| Permanent Linear Change, %, 5 hours | | | | | | | | | | | |
| @ 3000°F (1648°C) | - | -3.3 | - | | - | - | - | -3.3 | - | - | - |
| @ 3200°F (1760°C) | - | - | -1.3 | | -0.4 | -1.0 | - | - | -1.3 | -0.4 | -1.0 |
| Deformation Under Hot Load, % @ 25 psi (0.17 Mpa), 1½ hr | | | | | | | | | | | |
| @ 2640°F (1448°C) | - | 0.4 | - | | - | 0.0 | - | - | - | 0.0 | - |
| @ 2800°F (1538°C) | - | - | - | | - | - | - | - | - | 0.2 | 1.6 |
| @ 2850°F (1566°C) | - | - | 6.0 | | 0.2 | 0.3 | - | - | 3.6 | - | - |
| @ 3000°F (1760°C) | - | - | - | | - | 1.3 | - | - | 0.5 | - | - |
| Coefficient of Thermal Expansion, in./in. °F, x 10$^{-6}$ | - | - | 3.3 | | 4.3 | 4.0 | 3.7 | 4.7 | 5.8 | 3.4 | 3.3 |
| Abrasion Loss, cc's | - | 10.0 | 7.0 | | 6.5 | 4.5 | - | 5.0 | 4.5 | 4.0 | 5.0 |
| Relative Spall Resistance | Good | Good | Very good | | Very good | Good | Very good | Fair | Low | Excellent | Very good |
| **Chemical Analysis, % weight basis after firing** | | | | | | | | | | | |
| Alumina, $Al_2O_3$ | 47 | 51 | 74 | | 90 | 90 | 90 | 93 | >99 | 64 | 35 |
| Silica, $SiO_2$ | 50 | 46 | 22 | | 10 | 9 | 10 | 5 | 0.4 | 12 | 5 |
| Zirconia, $ZrO_2$ | - | - | - | | - | - | - | - | - | 23 | - |
| Silicon carbide, SiC | - | - | - | | - | - | - | - | - | - | 59 |
| Ferric oxide, $Fe_2O_3$ | 1.0 | 0.6 | 1.0 | | 0.2 | 0.2 | 0.2 | 0.5 | 0.1 | 0.2 | 0.2 |
| Titanium oxide, $TiO_2$ | 1.9 | 1.5 | 2.3 | | 0.1 | 0.1 | 0.1 | 0.7 | trace | 0.1 | 0.1 |
| Magnesium oxide, MgO | 0.1 | trace | | | | | | | | | |
| Alkalies, as $NaO_2$ | 0.1 | 0.3 | 0.2 | | | | trace | 0.2 | 0.1 | 0.2 | 0.2 |