

## Physical Properties of Various Zirconia Compositions

Composition	1968	1651	0872	0871	0890	2290	3004
Stabilizer	CaO (calcia)	CaO (calcia)	CaO (calcia)	CaO (calcia)	Y <sub>2</sub> O <sub>3</sub> (yttria)	Y <sub>2</sub> O <sub>3</sub> (yttria)	MgO (magnesia)
Bulk Density (g/cm <sup>3</sup> )	3.3	4.2	4.1	3.0	4.0	4.5	4.6
Porosity (%)	35	25	30	40	29	23	16
Modulus of Rupture (psi)	450	2,400	1,100	800	1300	2400	3500
Coefficient of Thermal Expansion RT-1300°C (in/in/°C)	8.2	7.3	8.0	7.9	9.4	5.9	2.3
Thermal Conductivity (W/m-°K) 800°C	0.68	1.2	1.2	0.52	1.0	1.2	1.4

### Refractory Backup (Thermal Insulation)

Extend the life of your furnace, and maintain tighter control over your furnace temperatures with Zircoa's pre-sintered grog refractory backup.

**Zircoa Backup 1859** — Partially stabilized with magnesia and calcia. Available in -8+100, -8+14, -14+28, -28+48 and -48+100 Tyler mesh sizes.

**Zircoa Backup 3001** — Partially stabilized with magnesia. Available in -8+14 Tyler mesh size.

**Zircoa Backup 0125** — Monoclinic zirconia, not stabilized. Available in -8+14 Tyler mesh size.

**Zircoa Backup 10B** — Calcia stabilized bubble zirconia. Available in -10+30 Tyler mesh size.

**Zircoa Grog 1593** — Magnesia stabilized. Available in -14+28, -28+48, -48+100, -100+325 and -325 Tyler mesh sizes.



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NOTICE: Recommendations, property values, and application information we publish are based on various sources including measurements by us and others, and estimates of experience. We intend this to be a reliable guide, but we do not guarantee the applicability, completeness, or accuracy of the information. Users should make their own tests to determine the suitability of any product for their application.

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### Zircoa-Cast™ Castable Refractory

Engineered for cast-in-place/fire-in-use shapes made of zirconia, intended for extremely high temperature environments. Composition 0871 has the lowest conductivity and density. All compositions are self-setting, two component (solid-liquid) systems, that harden hydraulically in a mold. Please contact Zircoa for specific recommendations.

#### Available Particle Size Distributions (Cast Materials)

Zircoa-Cast	Coarsest Particle Size (Tyler Mesh)	Application/Cross Section
0871-LD	-8	> 2.5cm (1")
0872-8D	-8	> 2.5cm (1")
0873-28D	-28	= 0.6 to 2.5cm (1/4" to 1")
0874-60D	-60	< 0.6cm (1/4")

### Ready to Assist You

Need more help, or have a specialized need? We are ready to put our 50+ years of experience to work for you. Please contact our application engineers to discuss your requirements.

# Zircoa®

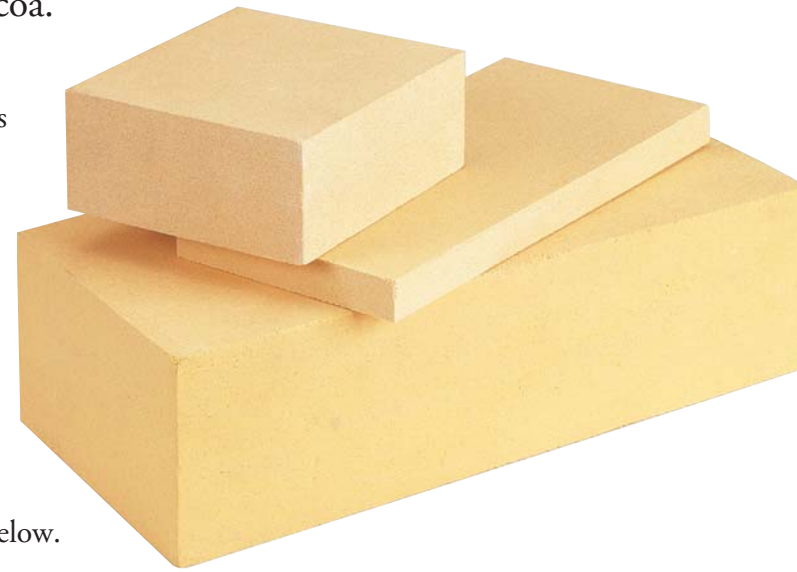
## Insulating Structures

## Compositions, Shapes and Sizes Engineered to Take the Heat

# Stand-up to the most demanding thermal extremes

with refractory products from Zircoa.

From high-temperature sintering to quartz melting, Zircoa's pressed bricks, cast materials, burner blocks, and tubes satisfy your unique insulating or melting requirements and deliver long-term service. As furnace temperatures approach 1800°C (3200°F) or more, you can depend on Zircoa's performance engineered insulating structures to: "take-the-heat."



## Bricks

Standard zirconia bricks are used primarily for custom high-temperature furnace linings, supports and heat shields. Zircoa's standard bricks withstand operating temperatures greater than 2000°C (3630°F) with capacity to spare. Quartz melting and synthetic crystal growing are typical applications. Standard brick sizes are listed below.



## Tongue and Groove Bricks

Zircoa's tongue and groove bricks are designed for the building of self-supporting structures. Their design and calcia or yttria stabilized zirconia composition makes them ideal for high temperature cycling\* environments.

Using Zircoa's tongue and groove brick eliminates line of sight radiation, and adds physical stability to the structure. Rings and circles, with an ID as small as 6" can be achieved. Applications include heat shields, furnace roofs and linings.

*\*Controlled heat-up and cool-down are important for long life.*

## Heat Transfer of Pressed Brick (Composition 1651)

Dense Brick: 4.45 g/cm <sup>3</sup> (278 lbs./ft. <sup>3</sup> )			
Hot Face: 5 hrs. exposure at 1980°C (3600°F)			
51mm (2") Thick Brick	Hot Face	Cold Face Brick	Cold Face Grog
No grog backup	1980°C (3600°F)	704°C (1300°F)	—
26mm (1") grog backup	1980°C (3600°F)	1149°C (2100°F)	538°C (1000°F)
51mm (2") grog backup	1980°C (3600°F)	1371°C (2500°F)	427°C (800°F)

## Standard Brick Sizes (Composition 1651, 1968, 2290, 3002 & 3004)

Brick	Dimensions (approximate)
25mm (1")straight	305 x 153 x 25mm (12"x 6"x 1")
19mm (3/4")split	305 x 153 x 19mm (12"x 6"x 3/4")
64mm (9")straight	230 x 114 x 64mm (9"x 4 1/2"x 2 1/2")
51mm (2")split	230 x 114 x 51mm (9"x 4 1/2"x 2")
32mm (1 1/4")split	230 x 114 x 32mm (9"x 4 1/2"x 1 1/4")
19mm (3/4")split	230 x 114 x 19mm (9"x 4 1/2"x 3/4")
13mm (1/2")split	230 x 114 x 13mm (9"x 4 1/2"x 1/2")

## Coarse Grain Tubes

Zircoa coarse grain tubes are used primarily in induction heating applications. They are either pressed or cast, and composed of calcia, yttria or magnesia stabilized zirconia. By varying the composition, manufacturing method, grain size, mass and shape, we manufacture tubes to satisfy the unique requirements of your application. Please contact us to discuss your specific needs.

### Composition 1651

Tubes made of composition 1651 are typically used for high temperature induction heated crystal growing furnaces. 1651 is composed of zirconia, stabilized with 3.5% calcia by weight. These tubes will survive repeated cycling from room temperature to 2000°C (3632°F), when used with Zircoa backup material.



## Cast Materials

Furnaces lined with Zircoa's cast materials not only stand-up to extremely high temperatures, you can expect a service life measured in years! Zircoa has the shape capability to line and insulate your furnace, regardless of its shape or size.

### Fired Cast Shapes

Zircoa's standard fired cast shapes, including brick and tongue and groove arch brick, are ideal for many furnace liner installations. Standard shapes are available in various sizes. Available in calcia and yttria stabilized zirconia compositions. Non-standard shapes can be made to customer specification. Please contact Zircoa for more information.



## Zirconia Burner Blocks

Oxy-fuel firing for glass is becoming more common because it reduces NOx emissions, reduces capital expenditures and improves glass quality. When fuel oil is used, the life of typical AZS oxy-fuel burner blocks are less than six months. This is due to the high temperatures generated by the burner and the contaminants present in the oil. Zirconia burner blocks provide the added resistance to corrosion and withstand high temperatures found in this environment. Using zirconia, burner block life is extended to more than one year.

