

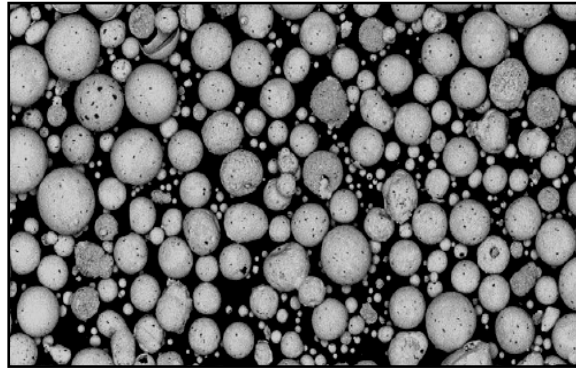
# Technical Data

## HA 9204

## 8%Yttria Stabilized Zirconia Powder

Product Code: 439204  
 Technical Data Sheet

Revision: 003  
 Dated: June 2014



Typical Powder Morphology (SEM 200X)

### HA 9204 POWDER CHARACTERISTICS

**HA 9204** is a high purity reacted 8% yttria zirconia powder with a round spherical shape with <5% monoclinic phase. HA 9204 is widely used as a thermal barrier coating (TBC) for thermal insulation. HA 9204 is highly advanced ceramic material usually applied to metallic surfaces, such as gas turbine engine parts, operating at elevated temperatures, as a form of exhaust heat management. These coatings serve to insulate components from large and prolonged heat loads by utilizing thermally insulating materials which can sustain an appreciable temperature difference between the load-bearing alloys and the coating surface. HA 9204 coatings can allow for higher operating temperatures while limiting the thermal exposure of structural components, extending part life by reducing oxidation and thermal fatigue. In conjunction with active film cooling, TBCs permit working fluid temperatures higher than the melting point of the metal airfoil in some turbine applications. HA 9204 has been specially formulated to be sprayed using Metco and Praxair plasma spray systems.

### SPECIFIC USES

**HA 9204** is specifically designed for use in Aerospace & Land Based Turbine components, Automotive Engine, Semiconductor, and Electrical applications.

- Aero & Land Based Turbine Blades, Combustion Liners & Transitions
- Combustion Engine Exhaust Components
- Semiconductor e-chucks, Bell Jars
- Heat Barrier Protection For Electrical Circuits

### PHYSICAL PROPERTIES

|   |                         |
|---|-------------------------|
| <b>Morphology</b>   | Spheroidal              |
| <b>Particle Size</b>  | -75+45 $\mu\text{m}$    |
| <b>Melting Point</b><br>[°F]/[°C]                               | 5,072/2,800             |
| <b>Hall Flow [s/50g]</b><br>ASTM B213                           | 34 $\pm$ 3              |
| <b>Apparent Density</b><br>[g/cm <sup>3</sup> ] ASTM B212       | 2 $\pm$ 0.4             |
| <b>Tensile Strength</b><br>[psi]                                | >3,500                  |
| <b>Coating Hardness</b><br>[R <sub>15N</sub> / R <sub>c</sub> ] | 80/ 40                  |
| <b>Coverage Rate</b>  | 0.04 lbs/sq. ft./0.001" |
| <b>BCC cubic Y<sub>2</sub>O<sub>3</sub></b>                     | 0%                      |
| <b>Monoclinic ZrO<sub>2</sub></b>                               | <5%                     |
| <b>Other Non ZrO<sub>2</sub></b>                                | 0%                      |

### CHEMICAL PROPERTIES (Nominal)

| Element                       | Weight Percent |
|-------------------------------|----------------|
| ZrO <sub>2</sub>              | 90 min.        |
| Y <sub>2</sub> O <sub>3</sub> | 7 – 8          |
| HfO <sub>2</sub>              | 1 – 2          |
| SiO <sub>2</sub>              | <0.20          |
| TiO <sub>2</sub>              | <0.05          |
| CaO                           | <0.05          |
| MgO                           | <0.01          |