



# Amperit Rare Earth Silicate and Silicon Powders for EBCs

## Fueling environmental excellence in gas turbine innovation

In the aerospace and energy industries, there is an increasing demand for gas turbines that are more efficient and environmentally friendly. These turbines aim to achieve reduced fuel consumption, higher operational temperatures, lower emission of pollutants, and a superior thrust-to-weight ratio.

Ceramic Matrix Composites (CMCs), which consist of a SiC-based matrix reinforced with SiC fibers, are emerging as the forefront materials for a new, more sustainable generation of gas turbines. CMCs are often protected from water vapor and molten salt attacks by Environmental Barrier Coating (EBC) systems. EBC systems for SiC/SiC CMCs typically include a top layer of rare earth silicate, with YbDS (Ytterbium Disilicate) being recognized as one of the most promising materials. These EBCs are deposited onto the surface of SiC/SiC CMCs over a bond coat.

**Amperit 873**, part of Höganäs' Rare Earth Silicate powder portfolio, is an agglomerated and sintered Ytterbium Disilicate powder specifically engineered for plasma spraying onto SiC/SiC CMCs as an EBC topcoat. This Rare Earth Silicate powder, characterized by a spherical shape free of satellites, ensure outstanding flowability and guarantee an efficient and stable coating process. For the EBC bond coat layer, it is recommended to use **Amperit 170** fused and crushed

Silicon powder or the Al-doped version, **Amperit 172**, which not only improves the bonding to the SiC/SiC CMCs but also increases the oxidation resistance of the bond coat by reducing the oxygen diffusion coefficient compared to **Amperit 170**.

Höganäs' powder engineering capabilities provide the flexibility to customize powder chemistries and physical properties, including particle size distribution and apparent density. This enables the creation of specialized solutions to meet diverse equipment and coating specifications, while ensuring consistent powder properties regardless of production volumes.

### Main Product Features:

- Custom-made powder chemistry and physical properties to meet OEMs' requirements
- Exceptional powder flowability contributing to a stable and reproducible coating process

### Available Products:

- **Amperit 873** agglomerated and sintered Ytterbium Disilicate powder for EBC topcoat (other Rare Earth Silicate powders available upon request)
- **Amperit 170** fused and crushed Silicon powder and **Amperit 172** Al-doped Silicon powder for EBC bond coat

## Chemical and Physical Properties of Amperit 873 and Other Rare Earth Silicates Powders

<b>Chemistry*</b>	Yb <sub>2</sub> Si <sub>2</sub> O <sub>7</sub> , Y <sub>2</sub> Si <sub>2</sub> O <sub>7</sub> , other Rare Earth Silicates		
<b>Manufacturing Process</b>	Agglomeration and Sintering		
<b>Purity</b>	> 99.5 %		
<b>Phases</b>	Main phase > 95 % Other phases < 5 %		
<b>Apparent Density*</b>	1.4–2.2 g/cm <sup>3</sup>		
<b>Particle Size Distribution*</b>	d10: 15–25 µm	d50: 30–40 µm	d90: 55–65 µm
<b>Coating Process</b>	Atmospheric Plasma Spray (APS)		

\* Chemistry, Apparent Density, and Particle Size Distribution can be customized.

## Chemical and Physical Properties of Amperit 170 and Amperit 172 Silicon Powders

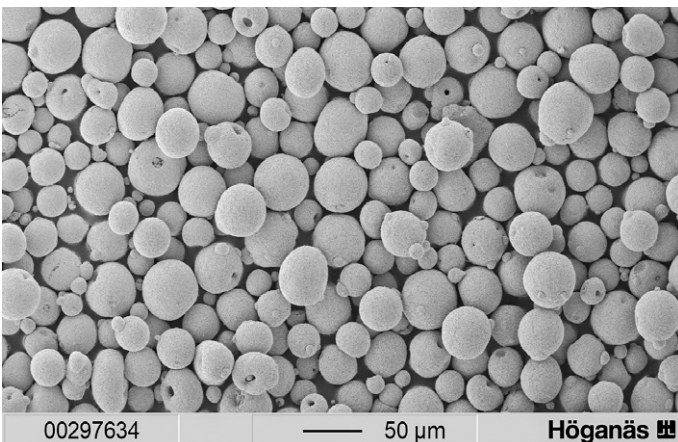
<b>Chemistry*</b>	Silicon, or Al-doped Silicon		
<b>Manufacturing Process</b>	Fusing and Crushing		
<b>Purity</b>	> 99.0 %		
<b>Particle Size*</b>	75/20 µm		
<b>Coating Process</b>	Atmospheric Plasma Spray (APS)		

\* Chemistry and Particle Size can be customized.

## Typical Application

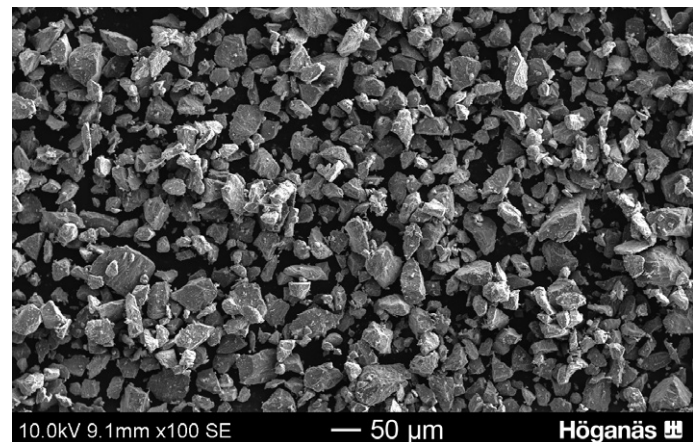
Gas turbine for the aerospace and energy industries.

### Morphology Amperit 873



Agglomerated and Sintered Ytterbium Disilicate Powder

### Morphology Amperit 170



Fused and Crushed Silicon Powder

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