



# E-SPHERES® Hollow Ceramic Microspheres

## TECHNICAL DATA

### APPLICATION: BONDED ABRASIVES (GRINDING AND CUTTING)

**DESCRIPTION:** Advanced functional additive and reinforcing filler with spherical hollow structure and ceramic composition. Its main characteristics are lightness, high compressive strength, thermal resistance (high melting point), chemically unreactive or inert and unique off-white colour.

**APPLICATION:** E-SPHERES® Hollow Ceramic Microspheres (HCM) are utilised in the abrasives industry, to formulate advanced grinding and cutting materials. E-SPHERES® improve value and performance as a functional filler by enhancing abrasiveness, reducing weight (allowing the disc or wheel to operate at higher speeds), improving thermal stability, and potential cost reduction. Typical applications include:

- Cut-off discs
- Grinding discs
- Cone and plug tools
- Cup wheels
- Grinding wheels
- Abrasive blocks

These are only examples of possible applications.

#### ADVANTAGES

Density and weight reduction  
 Resin extension  
 Controlled porosity  
 Improved abrasiveness  
 Enhanced pre-form and moulding

Cooler operation  
 Softer cutting and grinding  
 Improved thermal properties  
 Increased strength in "green" state

Lower formulation cost

#### VALUE IN USE

thanks to volume displacement by low density filling material  
 due to optimised area of contact (spherical shape of the particles)  
 based on availability of various microspheres' particles size distributions  
 due to high melting point and hardness  
 act as miniature bearings due to its smooth surface and spherical geometry  
 allowing for less interfacial friction between the spheres and the matrix  
 pore structure left by the E-SPHERES® assists better transport of cooling fluids  
 owing to its capacity to absorb vibration within the binder matrix  
 due to dimensional stability at higher temperature & low thermal conductivity  
 due to high compressive strength and optimum filling of interspatial voids

**Cost Reduction**  
 by partially replacing volume of high cost resins with inexpensive ceramic filler

**CHEMICAL COMPOSITION:** These figures are for general representation only, not for specification purposes:

Silicon Dioxide SiO <sub>2</sub> (Silica)	55 – 60%	Iron Oxide Fe <sub>2</sub> O <sub>3</sub> (Hematite)	0.4 – 0.5%
Aluminium Oxide Al <sub>2</sub> O <sub>3</sub> (Alumina)	36 – 40%	Titanium Dioxide TiO <sub>2</sub> (Rutile)	1.4 – 1.6%

E-SPHERES® HCM can be described as aluminosilicate microspheres.

**Other advantages:** While reducing weight and extend costly resins, the particle distribution of E-SPHERES® allows excellent packing of dry ingredients and processing; they still create the pore structure desired. These pores enhance abrasiveness and keep the cutting surface clean and debris free during grinding.

Furthermore, E-SPHERES® provide the added benefit of having a low crystalline silica content (~1%). This significantly aids in keeping overall crystalline silica levels of final products as low as possible.



**TYPICAL PHYSICAL PROPERTIES** (for general representation only, not for specification purposes)

Property	Value
Physical Form	Free flowing powder
Colour	White: SL Series, Off-White: ES Series
Geometry	Spherical shape (hollow)
Particle Size	20 – 500 microns *
Relative Density	0.65 – 0.95 g/cc
Bulk Density	0.35 – 0.45 g/cc
Compressive Strength	4,800 psi (33 MPa)
Oil Absorption	~ 7g / 100g **
pH of Water Dispersion	6 – 8
Thermal Conductivity	0.1 W/m/°C
Melting Point	1500 °C – 1800 °C
Hardness	6 Mohs scale
Refractive Index	1.53

\* Consult product specifications for grades of particle size and distribution.

\*\* g of oil / 100g E-SPHERES®

**GENERAL:** E-SPHERES® HCM when utilised in formulated grinding materials, provide major benefits and add value through enhanced performance, enabling manufacturers to further improve existing products or to develop new ones.

E-SPHERES® have demonstrated excellent particle survival in real production environments; due to their high compressive strength (in excess of 4,500 psi) and very high melting point (up to 1800°C). The maximum benefits of E-SPHERES® are delivered when breakage is minimised. It is suggested that E-SPHERES® be added toward the end of the compounding process and at low shear.

E-SPHERES® are not classified as dangerous goods - they are non combustible, non flammable, non reactive, non corrosive, non toxic. E-SPHERES® are compatible with phenolic and ceramic based binder systems (resins). For more about formulating information or suggested starting point, please contact EnviroSpheres.

**DISCLAIMER:** The information stated represents typical values; all advice given should be taken as a guide only. Both are given in good faith and are to the best of EnviroSpheres' knowledge; true and accurate at the time of publishing this technical data sheet. This information is intended to give a fair description of the product and its capabilities under specific conditions. No guarantee of the accuracy and integrity of the information is made and persons receiving the information should apply technical skills and conduct their own tests to determine its suitability in all respects for their particular purpose. Users are solely responsible for the application, use and outcomes when utilising the products. EnviroSpheres assumes no liability for the use of this information, results, products related or the outcome, as most variables are in control of the user and not EnviroSpheres.

Before handling, refer to the Safety Data Sheet for health and safety information of products. Ensure that all personnel using this product have read and understood this technical data sheet and the associated SDS before using the products.