



# E-SPHERES® Hollow Ceramic Microspheres

## TECHNICAL DATA

### APPLICATION: FIBRE REINFORCED PLASTICS (FRP)

**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 manufacturing of FRP components (fibre reinforced plastics) demanded by a number of industries such as transportation & automotive, electrical & energy, building & construction. FRP are also applied in industrial, service, sanitary, domestic and medical applications. E-SPHERES® improve value and performance of products and manufacturing processes by delivering weight reduction, less shrinkage, improved flow and wetting of fibre glass with resin, enhanced mechanical properties, colour, and potential cost reduction. Typical applications include:

- SMC - Sheet moulding compound
- BMC - Bulk moulding compound
- Spray and hand lay up of laminates
- Cold and hot press mouldings
- Syntactic foam
- DMC - Dough moulding compound

These are only examples of possible applications.

#### ADVANTAGES

Density and weight reduction  
 Increased stiffness  
 Improved impact resistance  
 Improved resin penetration  
 Reduced shrinkage  
 Reduced warpage (dimensional error)  
 Improved thermal insulation

#### VALUE IN USE

thanks to volume displacement by low density functional filling material  
 due to high compressive strength and optimum filling of interspacial voids  
 owing to its capacity to absorb energy and vibration within the binder matrix  
 act as miniature bearings due to its smooth surface and spherical geometry  
 as a result of its non-absorbent properties and particle size distribution  
 due to dimensional stability at higher temperatures  
 results from its low thermal conductivity and ceramic composition

#### Cost Saving and value added throughout the life cycle of the end products

Lower formulation costs  
 Transport costs  
 Packaging costs  
 Lower labour and Installation costs

due to resin extension thanks to optimised area of contact and low SG  
 by producing a lighter final product  
 less expensive packaging materials needed for lighter products  
 easier handling materials during production and faster to install components

**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.



**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 compounds, provide major benefits and add value through enhanced performance of FRP materials. E-SPHERES® can be blended into formulations for use in hot or cold press mouldings. Through the addition and because of their spherical shape, improvements will be found in the ability to flow of the compound and the reduction of surface defects; enabling manufacturers to further improve existing products or to develop new ones.

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 all epoxy, polyester, vinyl ester, phenolic and hybrid resin systems. 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.