



E-SPHERES[®] SL Series Hollow Ceramic Microspheres

TECHNICAL DATA

APPLICATION: REFRACTORY & METALLURGICAL

DESCRIPTION: Advanced functional additive and reinforcing filler with spherical hollow structure and ceramic composition. Key product characteristics include: thermal resistance (high melting point), high compressive strength, low thermal expansion coefficient, low density, chemically unreactive or inert and unique white colour.

APPLICATION: E-SPHERES[®] Hollow Ceramic Microspheres (HCM) are widely utilised in refractory and metallurgical industries, to formulate consistent refractory materials with a wide variety of uses in heat resistant and insulating products and applications. Due to the very low rate of thermal conductivity and partial vacuum inside the microsphere, E-SPHERES[®] contribute to extend the service life of refractory components and prevent energy waste. The spherical geometry of E-SPHERES[®] also enhances the working characteristics of refractory materials. Typical applications include:

- Kiln furniture
- Refractory insulating bricks & blocks
- Lightweight refractory gunning materials
- Refractory casting mixes
- Pre-cast refractory shapes
- Ladle covering compounds
- Feeder head assemblies (steel)
- Riser sleeves (foundry)
- Monolithic refractory
- Insulating slurry coatings

These are only examples of possible applications.

ADVANTAGES

High Temp. Continuous operation
Low linear shrinkage
Prevention of heat loss
Thermal insulation
Lightweight products
High cold crushing strength
Improved rheology/flow
Cost reduction

VALUE IN USE

due to high melting point up to 1600 °C to 1800 °C (Over 3000 °F)
thanks to dimensional stability & low thermal expansion at higher temperature
due to excellent insulation qualities
resulting from its low thermal conductivity, ceramic composition and hollow core
thanks to volume displacement by low density filling material
due to high compressive strength and hardness
act as miniature ball bearings due to smooth surface and spherical geometry
Lower fixing / installation cost / heat insulation and energy savings

CHEMICAL COMPOSITION: These figures are typical values only, not for specification purposes:

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

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



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

Property	Value
Physical Form	Free flowing powder
Colour	White
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 refractory, foundry and metallurgical materials, provide major benefits and add value through enhanced performance. A common application is the use in resin bonded fibrous components to provide rigid shapes for use as feeder head assemblies and riser sleeves in the steel and foundry industries respectively. Ladle cover applications benefit from superb flow characteristics and ensure complete coverage of the molten metal. Because of the heating cycles experienced in the petrochemical industry, considerable energy savings can be achieved with low mass construction of kiln car bases. E-SPHERES®, due to the ability to enhance dimensional stability properties will also extend the service life of refractory materials that will greatly improve the overall cost performance. These are just a few examples of how E-SPHERES® HCM enable manufacturers to improve existing products or assist to develop new ones.

E-SPHERES® are not classified as dangerous goods - they are non combustible, non flammable, non reactive, non corrosive and non toxic. E-SPHERES® are frequently blended with expanded fireclay aggregate and calcium aluminate cement for lightweight insulating refractory castable materials (10-35% by weight of microspheres content). 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.

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