E-SPHERES® Hollow Ceramic Microspheres



Reshaping the World



Welcome to the **Big World** of Small Spheres

E-SPHERES[®] - An advanced ceramic substance, designed to enhance the performance and reduce weight of engineered materials. Reshaping our world through spherical ingenuity.



Key properties that make E-SPHERES[®] unique:



Unparalleled temperature resistance

Melting point above 1800 °C The highest of any hollow ceramic microspheres in the market.



White colour

E-SPHERES[®] SL Series are distinctly whiter than any other hollow ceramic microspheres in the market thanks to their special chemistry.



Highest compressive strength

Isostatic pressure tests show over 70% rate of particle survival at 4800 psi (33 MPa). This is more than 30% the compressive strength of other hollow ceramic microspheres of similar density and 20 times higher than expanded glass fillers.

E-SPHERES[®] hollow ceramic microspheres (HCM) - an advanced functional additive, where each individual particle of almost perfect spherical shape, contributes to enhance key properties in formulated and engineered materials.

An easy solution for demanding performance



Functional low density Bulk density 0.3 - 0.4 g/cc



Chemically inert



Neutral pH7 pH 7^{**}



Low thermal conductivity 0.1 W/m/°C



Low rate of oil absorption 7g/100g*



Acoustic insulation due to vacuum core



Safe to use Non dangerous goods status



Free flowing form improves rheological properties



Hardness 6 Mohs scale

GEOMETRY

A sphere has the minimum surface area to volume ratio of any geometric shape. This maximises the filling properties (volume) and minimises area of contact.

It results in less resin to wet the surface, which is an advantage over most ground and expanded glass and mineral fillers.

*grams of oil per 100g of microspheres

** of the emulsion in water



Typical chemical composition E-SPHERES® SL Series





Silicon Dioxide SiO2 (Silica)55 - 60%Aluminium Oxide Al_2O_3 (Alumina)35 - 40%Iron Oxide Fe_2O_3 (Hematite)0.4 - 0.6%Titanium Dioxide TiO_2 (Rutile)1.4 - 1.6%

These figures are for general representation only, not for specification purposes

Did you know that E-SPHERES[®] typically deliver these benefits in formulated and engineered materials/products?

ADVANTAGES

VALUE IN USE

Density and weight reduction	Volume displacement by low density functional filling material
Increased stiffness	Due to high compressive strength and optimum filling of interspacial voids
Improved impact resistance	Owing to its capacity to absorb and disperse energy within the binder matrix
Resin extension	Less resin or binder needed due to low surface area and spherical geometry of particles
Reduced shrinkage	Resulting from resin (binder) extension and particle size distribution
Reduced warpage (dimensional error)	Due to improved dimensional stability, reduced binder and less shrinkage
Improved thermal insulation	Ceramic composition and hollow structure enhances low thermal conductivity
High temperature resistance	High melting point, non-combustible nature and stability at high temperatures
Optimised pigmentation	Reduces white pigments costs and also formulation weight
Friendly water based formulas	Neutral pH, resulting in less or no need for coated pigments and neutralisers
Improved durability	Enhanced corrosion resistance and UV stability
Environmentally friendly	Eco-friendly alternative to polymer based spheres / beads
Easy formulation	Simple dispersion and incorporation into existing or new formulas

ADDING VALUE THROUGHOUT THE LIFE CYCLE OF END PRODUCTS

Lower formulation costs	Through resin extension and lower weight products		
Transport and packaging costs	Lighter final product weight & less expensive packaging materials needed		
Lower labour and installation costs	Easier handling of materials during production and faster and lighter to install components		

Product Range E-SPHERES [®] SL Series						
Group	Product	Grade	Approximate Particle Mean [Microns]	Particle Size Range [Microns]	Particle Distribution [%]	
Coarse	E-SPHERES [®] SL Series	SL 500	300	Above 500 180 - 500 Below 180	0 - 20 70 - 100 0 - 10	
		SL 350	300	Above 500 150 - 500 Below 150	0 -5 75 - 100 0 - 20	
		SL 300	150	Above 300 150 - 300 Below 150	0 -1 54 - 100 0 - 45	
Medium	E-SPHERES® SL Series	SLG	130	Above 300 106 - 300 Below 106	0 -1 64 - 100 0 - 35	
		SL150	100	Above 150 75 - 150 Below 75	0 - 2 78 - 100 0 - 20	
Fine	E-SPHERES [®] SL Series	SL125	80	Above 125 38 - 125 Below 38	0 - 2 88 - 100 0 - 10	
		SL75	45	Above 75 Below 75	0 -2 98 - 100	





Transportation and automotive



Insulation / high temperature resistance

coatings



Lightweight cementitious and construction products



Refractory, foundry and metallurgical

Sealants, caulks, stucco and fillers

Adhesives

Hand wash cleaners and exfoliating soap





Friction materials

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®



Insulation panels

Composites components and syntactic foam



Electronics

Fibre reinforced

Explosives



plastics











Typical Applications by Industry/Segment

Composites and Fibre Reinforced Plastics (FRP) Spray / Hand Lay-up

Swimming pools Bath tubs and spa baths Tanks Motor vehicle canopies Engineered laminates: Campers and RV's roofs, boats, go-karts Signs and artwork

Dough Moulding Mompounds (DMC)

SMC and BMC compounds Motor vehicle components Panels and cabinets Electrical boxes and cases Plastic pallets Water management tanks Low pressure injection / extrusion

Cold / Hot Press Moulding

Engineered plastics Bathroom fittings Machinery housings

Other FRP Applications

Automotive anti-vibration / acoustic mats and sheets Shoe sole ceramic reinforced rubber PVC floor coverings Mannequins, displays, art and miniature models Blast resistance panels

Syntactic Foam

Thermoforming plug assist tooling Helicopter and airplane components Radar transparent materials Acoustically attenuating materials Cores for sandwich panels (fillings) Blast mitigating materials Thermal insulating compounds



Sealants, Putties, Adhesives and Caulks

Reduces weight, shrinkage and cracking, improves flow and workability, colour, cost reduction, better nail/screw grip.

- Sealants and high temperature sealants
- Waterproof products
- Acrylic caulks for cement and stucco surface
- Automotive and marine body repair fillers and putties
- Spackle / putties for crack repair
- Jointing paste for plaster and fibre cement wall boards
- Wood putties and fillers
- Acrylic latex grouts for tiles
- Adhesives mastics, tile adhesives
- High temperature gaskets engine gaskets
- Latex carpet and artificial grass backing

Epoxies and Polyurethane

Epoxy compounds and fillers Wear resistant coatings Slip resistant flooring coatings Trowel screeds and mortars Epoxy adhesives Self-levelling floors Insulation polymeric flooring

Refractory and Foundry

High melting point (1700 $^{\rm o}{\rm C}$), high compressive strength, non-flammable, thermal insulation.

- Foundry coatings or refractory coatings
- Insulating slurry coatings
- Refractory bricks and blocks
- Lightweight castables / mouldables
- Kiln furniture product supports
- Riser sleeves
- Pre-cast refractory shapes
- Ladle covering compounds or hot toppings
- Backfill for moulds
- Feeder head assemblies
- Monolithic refractory materials

Electronics

Printed circuit boards Electrical and thermal insulators













Advanced Construction Materials

Roof Related Materials

Roof pointing compounds - ridge-cap grout for tiled roofs Roof thermal insulating coatings Roof waterproof membranes Roof tiles Elastomeric roof coatings

Wall Rendering and Finish

Render compounds Texture coatings Patching mortar

Flooring

Grouts Self levelling mortar Non-Slip coatings - pigmented or clear Epoxy screeds and mortars Stencil / patterned concrete residential driveways Tile adhesives

Architectural Moulding, Facades and Cladding

Cornices, mouldings, profiles, ceiling, architraves Roses, balustrades, pier caps, parapets Modular lightweight polymeric facades Lightweight concrete - modular concrete facades, fencing, benches, walls, blocks Polymer concrete Glass reinforced concrete (GRC) panels, planter boxes, flower pots, fountains Pour / fill decorative wall cladding (artificial stone panels).

Thermal Insulating and Fire Rated Building Products

Fire-rated wall and ceiling boards Fire-rated door panels Insulating infill (sandwich boards) Thermal cement based coatings and slurries for refractory



Coatings and Plasters

Colour, reduces cost, reduces weight, improves rheology, reduces sag / shrinkage, improves thermal insulation and impact resistance, chemically inert and non-absorbent.

- Thermal insulating coatings Non-slip coatings
- Epoxy flooring systems
- Chemical resistance coatings
- Intumescent coatings
- Industrial protective coatings
- Elastomeric roof coatings
- Automotive underbody coatings
- Asphaltic surface coatings
- Architectural texture coatings and special effects
- Waterproofing membranes

Cementitious Products

Reduces weight, slump/shrinkage control, increases thermal insulation and improves flow and pumpability.

Cement based mortars Lightweight concrete pipes and pipe linings Repair / patching compounds Cement / acrylic grouts Joint fillers for fibre cement and plaster walls Tile adhesives Polymarble and artificial stone Cultured marble: shower bases and vanities Casting (poured): artificial granite, kitchen solid surfaces

Friction, Abrasives and Specialty Ceramic Materials

- Brakes blocks for trams and trains Brakes pads for motorcycles and automotive Motor vehicle, agricultural and construction machinery clutches Grinding media and grinding wheels Cutting discs Sanding (coated abrasives) Grinding cups and inserts
- Advanced high temperature ceramics

Personal Care

Skin care / exfoliating products Soap bars Industrial hand wash emulsions and cleansers











E-SPHERES [®] SL Series Typical Physical Properties				
Property	Value			
Physical Form	Free flowing powder			
Individual Particle Shape	Hollow spheres			
Colour	White			
Particle Size	20 – 500 microns			
Relative Density	0.65 – 0.85 g/cc			
Bulk Density	0.3 – 0.4 g/cc			
Compressive Strength	4,800 psi (33 MPa)			
Oil Absorption	~ 7g / 100g			
pH of Water Dispersion	7 ±1			
Thermal Conductivity	0.1 W/m/°C			
Coefficient of Thermal Expansion	d= 8 x 10 ⁻⁶			
Melting Point	1730 °C – 1850 °C			
Hardness	6 Mohs scale			
Refractive Index	1.53			
Electrical Resistance	10¹⁵ ohm			
Moisture Content	0.1% (maximum)			
Floaters by Volume	94% (minimum)			

For general representation only, not for specification purposes.

Please contact Envirospheres or its authorised distributors for more information, technical service and starting point formulas.



Envirospheres is an Australian company focused entirely on the manufacture and supply of the highest quality ceramic microspheres. The company has supplied to domestic and international markets since 1997, and is recognised as a global leader in its field.

Envirospheres is an ISO9001 certified company.



QUALITY ASSURED COMPANY BY AS/NZS 9001:2015

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Distributor

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