### E-SPHERES® Hollow Ceramic Microspheres





## Key properties that make E-SPHERES<sup>®</sup> unique:



#### **Unparalleled temperature resistance**

Melting point above 1700 °C The highest of any hollow ceramic microspheres in the market.



#### White colour

E-SPHERES<sup>®</sup> 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<sup>®</sup> 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



Chemicallyinert



Neutral pH7 pH 7<sup>\*\*\*</sup>



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 \*\*ofthe emulsion in water



### Typical chemical composition E-SPHERES S<sub>6</sub>L Series





Silicon Dioxide SiO <sub>2</sub> (Silica)	55-60%	Aluminium Oxide Al <sub>2</sub> O <sub>3</sub> (Alumina)	35 – 40%
Iron Oxide Fe <sub>2</sub> O <sub>3</sub> (Hematite)	0.4-0.6%	Titanium Dioxide TiO <sub>2</sub> (Rutile)	1.4 – 1.6%

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

### Did you know that E-SPHERES<sup>®</sup> **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 <sup>®</sup> SL Series						
Group	Product	Grade	Approximate ParticleMean [Microns]	Particle Size Range [Microns]	Particle Distribution [%]	
Coarse E-SF		SL 500	300	Above 500 180 - 500 Below 180	0 - 20 70 - 100 0 - 10	
	E-SPHERES®SL Series	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-		SLG	130	Above 300 106 - 300 Below 106	0 -1 64 - 100 0 - 35	
	E-SPHERES"SE Selles	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	



e



# 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 compounds (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 FRPapplications**

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

#### **Cosmetics**

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



E-SPHERES <sup>®</sup> 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			
<b>Coefficient of Thermal Expansion</b>	d= 8 x 10 <sup>-6</sup>			
Melting Point	1600 °C – 1800 °C			
Hardness	6 Mohs scale			
Refractive Index	1.53			
Electrical Resistance	10 <sup>15</sup> 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.



