



Kenospheres®

**Changing the world,
one Kenosphere at a time.**

Brochure
2026

Kenospheres® are aluminosilicate hollow ceramic microspheres designed as lightweight functional fillers for industrial formulations. Their low density and spherical shape can support weight reduction, improved flow, efficient filler loading, dimensional stability, and thermal performance across a wide range of materials and processing systems.

Recovered from coal-combustion fly ash, Kenospheres® can be used in coatings, plastics, construction materials, composites, marine systems, and oil and gas applications where low density, controlled processing behaviour, and functional performance are important.

Redefining What's Possible, Starting Small.

Tiny Spheres. Monumental Impact.

Kenospheres® are hollow ceramic microspheres recovered from coal combustion. These free-flowing particles feature thin walls, low density, and a spherical geometry that can support efficient packing, improved flow, and uniform dispersion in suitable formulations. Composed of aluminosilicate ceramic, Kenospheres® are non-combustible and practically insoluble in water. Their combination of low density and controlled particle geometry makes them useful as lightweight functional fillers in a broad range of industrial applications. In construction materials, coatings, plastics, and composites, they can help reduce formulation density while supporting dimensional stability, processing efficiency, and thermal performance, depending on grade, loading level, and formulation design.

Kenospheres® can also be evaluated in oil and gas, marine, and thermal insulation systems, including lightweight cement slurries, drilling fluids, syntactic foams, and subsea formulations. Their low density and hollow structure offer design flexibility where weight, flow, thermal behaviour, or buoyancy are important. Across these applications, performance depends on grade, binder system, loading level, processing conditions, and service environment. Application-specific testing is recommended to confirm suitability.



Applications for Kenospheres®



Construction Materials

- Functional fillers for paints, coatings, and industrial mastics.
- Additives in precast concrete, fire-resistant boards, and spackling compounds.
- Functional components in tile backer boards and External Insulation Finishing Systems (EIFS).
- Improved thermal performance in roofing materials and decorative moldings.



Plastics & Polymers

- Lightweighting in injection molding and extrusion processes.
- Suitable applications in low-density polyethylene, polypropylene, PVC, and nylon.
- Body fillers, adhesives, and polymer composites for lightweight solutions.
- Acoustic and vibration performance in automotive and aerospace plastics.



Energy, Mining, and Oil & Gas

- Buoyancy modules and risers for selected deepwater systems.
- Syntactic foams for thermal insulation in demanding environments.
- Additives in lightweight cement slurries, drilling fluids, and related formulations.
- Components for deep-sea pipe insulation in selected marine applications.

The Science of Kenospheres®

The spherical shape of Kenospheres® offers inherent advantages over irregularly shaped mineral fillers or fibers.

Reduced Binder Demand

Their spherical morphology and low surface-area-to-volume ratio can help reduce binder or resin demand in suitable formulations. This key property may result in:

- Potentially lower binder demand.
- Improved flow dynamics during processing.
- Consistent filler distribution in end-use applications.

Comparative Surface Area of Fillers

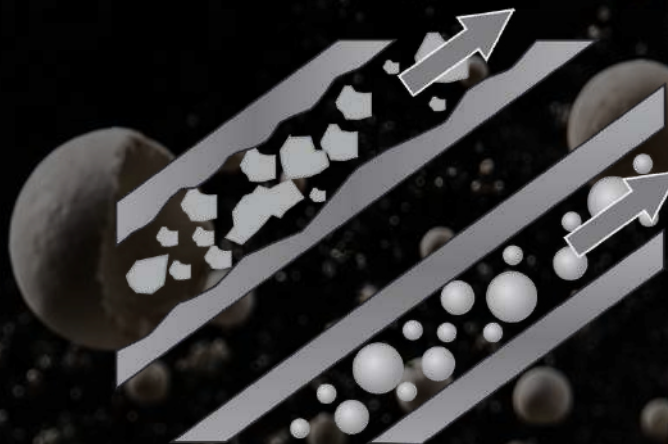
Filler Product	Surface Area (m ² /g)
Kenospheres®	2.0-3.5
Talc	3.2-14.0
Clay	7.0-21.0
CaCO ₃	1.0-10.5

Improved Flow

Due to their spherical structure, Kenospheres® can move efficiently within formulations, supporting improved flow and dispersion.

This feature:

- Supports material flow during processing.
- Facilitates filling of complex geometries in final products.
- Promotes more uniform filler distribution.



Higher Volume Loading

Kenospheres® can support higher filler loading while maintaining workable rheology.

This can lead to:

- Lower formulation density.
- Reduced shrinkage in selected applications.
- Increased filler volume at lower overall mass.

Cost Effectiveness

The low density of Kenospheres® means they occupy substantially more volume than equivalent weights of many traditional mineral fillers.

This can improve formulation efficiency when materials are compared on a volume basis, offering:

- Lower material mass per unit volume.
- Greater filler volume at a given material weight.

Densities of Common Fillers

Barium Sulfate	4.50 g/cc
Titanium Dioxide	4.17 g/cc
Wollastonite	2.99 g/cc
Talc	2.80 g/cc
Calcium Carbonate	2.71 g/cc
Feldspar	2.65 g/cc
Sand	2.6 g/cc
Alumina Trihydrate	2.42 g/cc
Clay	2.20 g/cc
Fumed Silica	2.10 g/cc
Kenospheres®	0.65 - 0.95 g/cc
Perlite	0.15 g/cc

Performance Enhancements

Performance and Versatility Beyond Lightweighting

Kenospheres® provide performance and processing advantages that extend beyond lightweighting. Their hollow ceramic structure can support improved flow, controlled density, dimensional stability, and thermal performance in suitable systems. Different grades allow formulators to target specific design goals while maintaining flexibility across diverse industrial applications.

Kenospheres® can contribute to improved material flow, dimensional stability, and thermal performance in finished products. Their spherical morphology can support higher filler loading and lower binder demand in suitable formulations, while their low density helps reduce overall formulation mass. These effects depend on grade, loading level, binder system, and processing conditions. Their versatility supports applications ranging from coatings and plastics to construction materials and syntactic foams.

Kenospheres® give manufacturers additional flexibility in product design, helping balance weight, processing behaviour, and functional performance in the final formulation.





Sustainability

Kenospheres® are recovered from cenospheres formed during coal combustion, enabling an industrial byproduct to be reused as a functional material. Their low density can support lower formulation mass when replacing denser fillers. Overall environmental benefits depend on formulation, processing, transport, and product life cycle.

Productivity & Cycle Time

In manufacturing processes such as injection molding and extrusion, the low density and spherical morphology of Kenospheres® can influence processing behaviour. Effects on heating, cooling, cycle time, and production rate depend on formulation, loading level, equipment, and process conditions.

Weight Reduction

Kenospheres® are designed for use as low-density functional fillers and can replace part of a denser filler or resin system to reduce formulation weight. The achievable reduction depends on the selected grade, loading level, binder system, and final product design. This makes Kenospheres® suitable for lightweight formulations across plastics, coatings, composites, construction materials, automotive systems, and other industrial applications.

A large red ship, possibly a tugboat or a small cargo ship, is being towed by a larger vessel. The ship is red and has a white superstructure. It is being towed by a tugboat, which is visible in the background. The ship is moving through the water, and there are waves visible. In the foreground, there is a rocky shoreline with some green plants. The sky is blue and clear.

Machinability and Sandability

Kenospheres® can improve machining and sanding behaviour in selected tooling and composite applications. Their spherical geometry may support smoother finishing, better surface definition, and consistent contours in molded or extruded products.

Surface and Barrier Applications

When added to selected films and coatings, Kenospheres® may be evaluated as functional filler components, helping modify surface properties and workability. Effects on permeability, blocking, and barrier performance depend on the formulation and require application-specific testing.

Dimensional Stability

The hollow ceramic structure of Kenospheres® can help reduce shrinkage and warpage in materials such as spackling compounds, polymer composites, and cementitious systems. Their spherical geometry and filler-loading capability may support dimensional consistency and uniform material behaviour in suitable formulations.

Water Resistance

Kenospheres® are practically insoluble in water and can be evaluated in formulations exposed to humid or wet environments. This makes them suitable for selected marine coatings, adhesives, and water-resistant construction systems, subject to formulation testing.

Buoyancy and Marine Applications

With their low density and hollow ceramic structure, Kenospheres® are suitable for syntactic foams used in buoyancy and marine applications. Pressure resistance, water uptake, durability, and service depth depend on the selected grade and final formulation and must be validated.

Thermal Insulation

Kenospheres® have a hollow, low-density ceramic structure that can support thermal insulation in selected applications, including syntactic foams and building materials. Final thermal conductivity, insulation performance, surface temperature, and condensation behaviour depend on the grade, formulation, loading level, and finished product design.

Surface Appearance

Kenospheres® can contribute to surface texture and appearance in coatings and composites. Their hollow ceramic structure may influence light scattering and visual properties, depending on grade and formulation. Any change in opacity, whiteness, or pigment demand should be verified in the finished system before use in appliances, electronics, or decorative coatings.

Reflective Coatings

The spherical shape and ceramic composition of Kenospheres® can influence light scattering and may support reflective or thermal-control coatings. Potential uses include roofing materials, coatings, and related surfaces where optical or thermal performance is required. Solar reflectance, emissivity, and heat-management performance should be verified in the final formulation.

Noise and Vibration Performance

Kenospheres® may influence noise and vibration damping in selected automotive and industrial composites. Acoustic and mechanical response depends on filler loading, particle characteristics, matrix selection, and final product design.

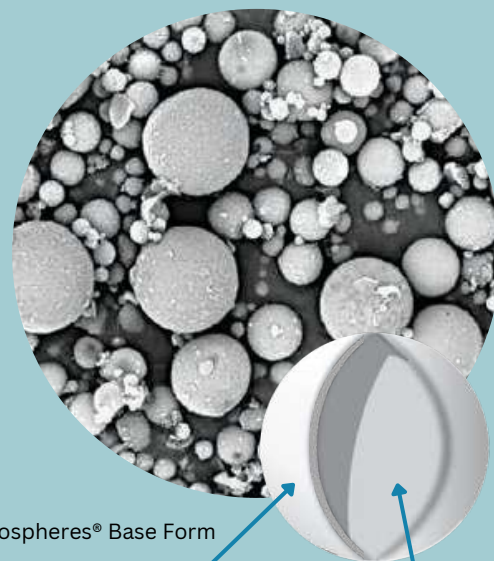
Dielectric Properties

Their hollow structure can influence dielectric behaviour, making Kenospheres® suitable for systems where electrical properties are relevant. Potential uses include polymer composites, insulating components, and radome materials, subject to grade and formulation testing.

Typical Physical Properties

(Not for specification purposes)

Property	Kenospheres®
Shape	Hollow spheres with thin walls
Composition	Aluminosilicate Ceramic
Color, unaided eye	White to Grey
Crush resistance (90% survival)	Up to 4000 psi
True density	0.65 - 0.95 g/cm ³
Median particle size	~50 - 550 µm
Softening temperature	~1000 - 1200°C
Melting Point	~1250 - 1650°C
pH Range	7.0 - 9.9
Thermal conductivity	~0.1- 0.2 W·m ⁻¹ ·K ⁻¹
Dielectric constant (@ 100 MHz)	~2.0



Kenospheres® Base Form

Surface Strength
up to 4000psi

Gas-filled internal cavity
typically CO₂ / N₂

Product	Average Diameter (µm)	Primary Size Fraction (µm)	Typical Content (%)	Sieve Residue (max.)
LGS75	~50	<63	50	>100 µm: ≤10%
WS 100	~80	63 - 100	83	>125 µm: 0%
WS 125	~92.5	63 - 150	90	>150 µm: 0%
LGS150	~104	63 - 150	90	>300 µm: 0%
WS 150	~105	63 - 150	90	>250 µm: 0%
WS 150UF	~105	100 - 150	75	>300 µm: 0%
LGS 300	~125	63 - 150	60	>500 µm: 0%
WS 300	~170	63 - 150	50	>500 µm: 0%
WS 500	~165	63 - 150	55	>720 µm: 0%
LGS 300UF	~215	150 - 300	80	>500 µm: 0%
WCS 300	~210	150 - 300	75	>500 µm: 0%
WS 300UF	~215	150 - 300	85	>500 µm: 0%
LGS-500UF	~400	300 - 500	75	>750 µm: 0%
WCS 500	~370	300 - 500	60	>720 µm: 0%*
WS 500UF	~375	300 - 500	80	>720 µm: 0%*
CS 1200	~550	300 - 500	45	>1200 µm: 0%

Typical Chemical Composition

(Not for specification purposes)

SiO ₂	54% - 60%
Al ₂ O ₃	32% - 38%
Fe ₂ O ₃	1.0% - 3.5%
TiO ₂	0.5% - 2.0%
CaO	0.8 - 2.0%
MgO	0.5 - 1.0%
MnO	0.1 - 0.5%
Na ₂ O	0.3 - 1.0%

Contact Us for Help.

Not sure which Kenospheres® grade best suits your product or process? Contact us for personalized recommendations. We'll help you select the optimal Kenospheres® to achieve your performance goals.

For more information, visit our website at <https://nanovisionchemicals.com> or reach out to our customer service team via email at sales@nanovisionchemicals.com.

Core Series (CS)

For broad industrial applications, the Core Series provides a balanced combination of performance and cost efficiency. These general-purpose microspheres are suited to formulations where dependable processing and practical lightweighting are required.

White Series (WS)

The White Series offers low-density white Kenospheres® for applications where colour, lightweighting, and consistent processing are important. These grades provide controlled physical properties across coatings, plastics, composites, and other industrial systems.

White Calcined Series (WCS)

The White Calcined Series includes calcined Kenospheres® intended for applications requiring controlled thermal and physical properties. These white microspheres can be evaluated in demanding formulations where low density, thermal performance, and consistent processing are important, with final results depending on grade selection and use conditions.

Ultra Fine Series (UFS)

The Ultra-Fine Series provide smaller-particle Kenospheres® for specialized applications requiring controlled dispersion, smoother surfaces, and refined particle-size distribution.

Light Grey Series (LGS)

The Light Grey Series provides off-white to light-grey Kenospheres® for broad industrial use. These low-density grades offer formulation versatility and consistent physical characteristics where lightweighting, flow, and reliable processing are important.

Density Range

For Lightweight Applications: Use lower-density Kenospheres® where maximum weight reduction or added buoyancy is required, including selected marine and lightweight composite applications.

For Higher Mechanical Demand: Select grades using the applicable density and strength data in the relevant TDS, particularly for demanding construction, composite, and automotive applications.

Thermal Insulation and Buoyancy

Thermal Performance: Incorporate Kenospheres® where lower density and thermal insulation are design targets. Final performance depends on grade, loading level, and formulation.

Buoyancy: Select lower-density Kenospheres® for marine and syntactic foam systems where added buoyancy is required. Final performance must be validated.

Particle Size Selection

For Smooth Applications: Use finer Kenospheres® in coatings and filled systems where smooth surfaces and uniform dispersion are required.

For Higher Build: Select coarser Kenospheres® where larger particle size is acceptable in composites, cementitious systems, and other filled formulations.

Surface Finish Considerations

Achieve Smooth Finishes: Select finer Kenospheres® where controlled surface appearance and consistent dispersion are important in coatings.

Control Surface Texture: Use particle-size selection to influence surface texture where a more pronounced or functional finish is required.

General Formulating Information

Kenospheres® can be incorporated into a variety of formulations to support product performance and formulation efficiency.

To optimize the benefits of Kenospheres®, follow these general guidelines:

Pre-Blending: For optimal results, Kenospheres® can be pre-blended with other dry components to ensure even distribution in the formulation. In cases where they are mixed into liquids, they should be introduced gradually to maintain uniform dispersion and avoid clumping.

Mixing Speed: Use moderate mixing speeds to prevent breakage of the hollow spheres. Gentle mixing ensures structural integrity while achieving uniform dispersion.

Binder Compatibility: Kenospheres® are generally compatible with commonly used resin systems, including epoxy, polyurethane, and polyester resins. Compatibility should be verified through small-scale trials.

Loading Levels: Typical loading levels range from 5% to 40% by volume, depending on the application and desired properties.

Moisture Control: Store Kenospheres® in a dry environment to minimize moisture pickup and caking, which may affect handling and performance.

For additional technical information on Kenospheres®, visit our website <https://nanovisionchemicals.com/> or contact our customer service team. Email: sales@nanovisionchemicals.com



Kenospheres®

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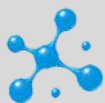
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NANOVISION CHEMICALS

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Processing Techniques: Injection Molding: Adjust screw speed and back pressure to minimize shear forces.

Extrusion: Maintain consistent feed rates to ensure uniform distribution.

Coatings: Apply sufficient mixing to achieve uniform dispersion while avoiding excessive shear that may damage the hollow microspheres.

Packaging

Kenospheres® are available in the following packaging sizes:

Big bags: 500 kg with a plastic liner (up to 2 bags stacked per pallet).

Paper bags: 20 kg net, on pallets.

Product Storage

Optimal storage conditions for Kenospheres® include keeping them in unopened bags in a cool, dry environment. Prolonged exposure to high humidity or condensation may result in caking of the microspheres.

To minimize caking and maximize storage life, consider the following:

- Promptly reseal opened bags after use.

- If the bag is damaged during shipping or handling, seal the hole immediately or transfer the contents to an undamaged bag.

- During hot and/or humid months, store bags in the driest, coolest space available.

- If controlled storage conditions are not available, maintain a minimal inventory and operate on a first-in, first-out basis.

Handling

Due to the low density and small particle size of Kenospheres®, dust generation may occur during handling and processing. To minimize dust generation, consider:

- Do not open Kenospheres® packages until ready for use.

- Use local exhaust ventilation near package openings to capture airborne particles.

- Use suitable transfer and dust collection equipment when feeding material into mixing systems.

- Use appropriate static control measures where required.

Safety

For worker protection:

- Wear safety glasses with side shields.

- Where dust exposure cannot be adequately controlled, use suitable respiratory protection in accordance with the Safety Data Sheet and applicable workplace requirements.

- Use local exhaust ventilation or dust collection where required.

- Refer to the applicable Kenospheres® Safety Data Sheet for additional safety information.

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