



HOLLOW GLASS MICROSPHERES — C Series

Product Description and Applications

The high-performance hollow glass microspheres, a kind of ultra-light inorganic non-metallic powder with hollow “ball-bearing” shapes, have been developed into a new type of high performance lightweight material and widely applied in recent years. It will be the main direction for new-type compound materials in the 21st century. Its true density is 0.10-0.78 g/cm³; particle size is 2-120μm; Due to its excellent advantages of light weight, bulk density, lower thermal conductivity, higher compressive strength, improved dispersion and liquidity, it can be used as filler in painting, rubber, plastics, FRP, artificial stone, putty, exploitation of oil and gas and other materials.

The high-performance hollow glass microspheres are alternatives to conventional fillers and additives such as silicas, calcium carbonate, talc, clay, etc., for many demanding applications. These low-density particles are used in a wide range of industries to reduce part weight, lower costs and enhance product properties.

The unique spherical shape of hollow glass microspheres offers a number of important benefits, including: higher filler loading, lower viscosity/improved flow and reduced shrinkage and warpage. It also helps the hollow glass microspheres blend readily into compounds and makes them adaptable to a variety of production processes including spraying, casting and molding. The chemically stable soda-lime-borosilicate glass composition of hollow glass microspheres provides excellent water resistance to create more stable emulsions. They are also non-combustible and nonporous, so they do not absorb resin. And, their low alkalinity gives hollow glass microspheres compatibility with most resins, stable viscosity and long shelf life.

Hollow glass microspheres C series are hollow glass microspheres with a common strength-to-weight ratio. The C series of hollow glass microspheres can be your best choice when high crush strength of hollow glass microspheres is not needed for it represents the most economical product offering.

Typical Properties

True Density

Product Type	True Density (g/cm ³)		
	Typical	Minimum	Maximum
C10	0.12	0.10	0.14
C15	0.17	0.15	0.19
C20	0.22	0.20	0.24
C25	0.27	0.25	0.29
C30	0.32	0.30	0.34
C35	0.37	0.35	0.39
C40	0.42	0.40	0.46
C50	0.50	0.47	0.56
C60	0.60	0.57	0.66
C70	0.72	0.70	0.76

Nitrogen Isostatic Crush Strength

Product Type	Test Pressure PSI/MPa	Target Fractional Survival	Minimum Fractional Survival
C10	250/1.7	90%	80%
C15	300/2.1	90%	80%
C20	500/3.5	90%	80%
C25	750/5.2	90%	80%
C30	1500/10.3	90%	80%
C35	2000/13.8	90%	80%
C40	3000/20.7	90%	80%
C50	6000/41.4	90%	80%
C60	8000/55.2	90%	80%
C70	18000/124.1	90%	80%

Packing Factor

Averages about 60% (Ratio of bulk density to true particle density)

Chemical Resistance

The chemical properties of hollow glass microspheres resemble those of a soda-lime borosilicate glass.

Particle Size Distribution

Product Type	Particle Size (microns, by volume)			
	10%	50%	90%	Maximum
C10	45	80	120	130
C15	40	75	115	125
C20	40	70	110	120
C25	35	65	105	115
C30	30	55	100	110
C35	30	50	90	100
C40	25	50	80	90
C50	25	45	75	85
C60	25	40	70	80
C70	10	25	45	55

Hard Particles

No hard particles (e.g. glass slag, flow agent, etc.)

Thermal Stability

Appreciable changes in bubble properties may occur above 600°C (1112°F) depending on temperature and duration of exposure.

Thermal Conductivity

Product type	Calculated Thermal Conductivity ($W \cdot m^{-1} \cdot K^{-1}$) at 18°C (65°F)
C10	0.0427
C15	0.0479
C20	0.0506
C25	0.0512
C30	0.0536
C35	0.0559
C40	0.0621
C50	0.0749
C60	0.0835
C70	0.0967

Flootation

Product Type	Floaters(% by bulk volume)	
	Typical	Minimum
C10	98%	90%
C15	97%	90%
C20	96%	90%
C25	96%	90%
C30	95%	90%
C35	95%	90%
C40	94%	90%
C50	93%	90%
C60	92%	90%
C70	90%	90%

Oil Absorption

0.2-0.65 g oil/cm³ of hollow glass microspheres

Alkalinity

Maximum of 0.5 milli equivalents per gram

pH

When Hollow glass microspheres are mixed with deionized water at 5 volume percent loading, the resulting pH of the slurry is typically 7 to 9.

Appearance

White with unaided eye

Flowability

Hollow glass microspheres remain free flowing for at least one year from the date of shipment if stored in the original, unopened container in the minimum storage conditions of an unheated warehouse.

Labeling

Hollow glass microspheres will be packaged in suitable containers to help prevent damage during normal handling and shipping.

Each container will be labeled with: 1.

Type of hollow glass microspheres. 2.

Name of manufacturer.

3. Lot number and quantity in kilograms.

Storage and Handling

To help ensure ease of storage and handling while maintaining free flowing properties, hollow glass microspheres have been made from a chemically stable glass and are packaged in a heavy-duty polyethylene bag within a cardboard container.

Minimum storage conditions should be unopened cartons in an unheated warehouse.

Under high humidity conditions with an ambient temperature cycling over a wide range, moisture can be drawn into the bag as the temperature drops and the air contracts. The result may be moisture condensation within the bag. Extended exposure to these conditions may result in “caking” of the hollow glass microspheres to various degrees. To minimize the potential for “caking” and prolong the storage life, the following suggestions are made:

1. Carefully re-tie open bags after use.
2. If the polyethylene bag is punctured during shipping or handling, use this bag as soon as possible, patch the hole, or insert the contents into an undamaged bag.
3. During humid summer months, store in the driest, coolest space available.
4. If good storage conditions are unavailable, carry a minimum inventory, and process on a first in/first out basis.

Dusting problems that may occur while handling and processing can be minimized by the following procedures:

1. For eye protection wear chemical safety goggles. For respiratory system protection wear an appropriate NIOSH/ MSHA approved respirator. (For additional information about personal protective equipment, refer to Material Safety Data Sheet.)
2. Use appropriate ventilation in the work area.
3. Pneumatic conveyor systems have been used successfully to transport hollow glass microspheres without dusting from shipping containers to batch mixing equipment. Static eliminators should be used to help prevent static charges.

Diaphragm pumps have been used to successfully convey hollow glass microspheres. Vendors should be consulted for specific recommendations.

The high-performance hollow glass microspheres breakage may occur if the product is improperly processed. To minimize breakage, avoid high shear processes such as high speed Dissolvers, point contact shear such as gear pumps or 3-roll mills, and processing pressures above the strength test pressure for each product.

Health and Safety Information

For product Health and Safety Information, refer to product label and Material Safety Data Sheet (MSDS) before using product.
