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3M Advanced Materials Division

3M™ Glass Bubbles S38

Introduction

3M™ Glass Bubbles S38 are high-strength polymer additives made from a water-resistant and chemically-stable soda-lime-borosilicate glass. These glass bubbles are designed for buoyancy and insulation in ultra-deep water applications in oil and gas drilling. The bubbles produce strong, stable voids and low thermal conductivity, helping coatings achieve the necessary compressive strength. They are used for many demanding applications in a wide range of industries, including paints and coatings, buoyancy, transportation, syntactic urethane and thermoset resin.

3M™ Glass Bubbles help to reduce weight; reduce noise, vibration and harmonics; reduce thermal expansion; and contribute to cost savings. They are used in a variety of applications in diverse markets, including automotive, construction materials, electronics, marine and paints and coatings.

Formulating Information

Flow properties: 3M glass bubbles S38 will remain free flowing for at least two years from the date of manufacture when stored in the original, unopened container in accordance with the recommended storage conditions. (See storage recommendations at right).

Glass bubble breakage: Breakage may occur if the product is severely processed. To minimize breakage, minimize exposure to high shear processes and point contact shear such as gear pumps and 3-roll mills. When adding to an extrusion process, the material should be added downstream of the feed hopper via a side stuffer or top feeder (similar to adding glass fiber). Contact 3M technical service or your equipment vendor for assistance if breakage is suspected.

Material Description (Not for specification purposes.)

Property	3M™ Glass Bubbles S38
Shape	Hollow spheres with thin walls
Composition	Soda-lime-borosilicate glass
Color, unaided eye	White, powdery

Typical Physical Properties (Not for specification purposes.)

Property	3M™ Glass Bubbles S38
Crush strength, 80% survival by volume (psi)	4,000
True density (g/cc)	0.38
Packing factor (bulk density to true particle density)	60%
pH (at 5 wt% loading in water)	9.5
Average diameter (microns)	40
Softening point (°C)	600
Flotation (density <1.0 g/cc)	94%
Volatile content (by weight)	0.5%

3M Advanced Materials product realization process and manufacturing sites are aligned to ISO 9001 Quality Systems. Test data is generated by following documented procedures and test methods.

Packaging

3M glass bubbles S38 are available in the following packaging sizes:

Gallon: 1.5 lb/0.68kg

Sample box: 10 lb/4.5 kg

Small box: 100 lb/45 kg

Large box: 650 lb/250 kg

Bulk bag: 700 lb/318 kg

Bulk trailer: 30,000 lb/13,608 kg

Product Storage, Handling & Safety

Storage: Ideal storage conditions include unopened cartons in a dry and temperature-controlled warehouse. Extended exposure of 3M glass bubbles S38 boxes to high humidity and/or conditions susceptible to condensation may result in some amount of “caking” of the glass bubbles.

To minimize the potential for caking and thereby maximize storage life, the following suggestions are offered:

1. Carefully re-tie opened bags immediately after use.

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Product Storage, Handling and Safety (continued)

2. If the polyethylene bag is punctured during shipping or handling, seal the hole as soon as possible or insert the contents into an undamaged bag.
3. During hot and/or humid months, store boxes in the driest, coolest space available.

If controlled storage conditions are unavailable, carry a minimum inventory, and process on a first in/first out basis.

Handling: Due to the low weight and small particle size of 3M™ Glass Bubbles S38, dusting may occur while handling and processing. To minimize the dusting potential during handling, consider the following:

- Do not open glass bubbles packages until ready to use.
- Upon opening, have local exhaust ventilation near the opening to pull away airborne particles. (Dust collection equipment may be required – check local OSHA and other applicable regulations.)
- Remove glass bubbles with a suction "wand" (with slight positive pressure aeration) and transfer to a closed mixing tank inside fully contained piping. If a closed mixing tank is not available, use dust collection equipment as close as practical to the point of entry. Pneumatic conveyor systems have been used successfully to transport glass bubbles without dusting from shipping containers to batch mixing equipment. Equipment vendors should be consulted for recommendations.
- Static eliminators should be used to prevent static buildup.

Safety: For worker protection, please consider the following:

- Use safety glasses with side shields for eye protection.
- An air-purifying respirator suitable for particulates may be selected for protection after an optional exposure assessment is performed for your specific application. (For additional information about personal protective equipment, refer to the product Safety Data Sheet.)
- Use with appropriate local exhaust ventilation/dust collection in the work area.
- Refer to the 3M™ Glass Bubbles Safety Data Sheet for additional safety information.

Additional Information

3M glass bubbles are supported by global sales, technical and customer service resources, with fully-staffed technical service laboratories in the U.S., Europe, Japan, Latin America and Southeast Asia. Users benefit from 3M's broad technology base and continuing attention to product development, performance, safety and environmental issues.

For additional technical information on 3M glass bubbles in the United States, call 3M Advanced Materials Division, **800-367-8905**. For other 3M global offices, and information on additional 3M products, visit our web site at: **www.3M.com/glassbubbles**.

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