

3M Advanced Materials Division

# 3M™ Glass Bubbles

## 5G Applications Comparison

### Introduction

3M™ Glass Bubbles have been used in many industries as a hollow, strong, and lightweight additive and now 3M is designing bubbles specifically for Electronics.

3M Glass Bubbles S4630 and 3M Glass Bubbles S3240-VS are designed for use in electronics and offer benefits beyond Glass Bubbles for general industrial markets such as:

- Attractive dielectric properties
- Consistent and controlled design and quality needed in the electronics space
- Smaller bubble sizes and tighter density control

These products can be used as a filler in materials for low to ultra-low dielectric electronic components, such as copper clad laminates (CCL), electrical connectors and radomes.

### Properties Comparison

	Designed for Electronic Market Applications	
	3M™ Glass Bubbles iM16k	3M™ Glass Bubbles S4630
Crush strength, 90% (psi/MPa)	≥16,000 / ≥ 110	
Dielectric Constant, Dk @10GHz	1.5	
Dielectric Loss, Df @10GHz	0.005	
Size D50 (µm)	18	
Size D95 (µm)	> 40	< 40
Moisture	Not Reported	≤ 0.35%
270 Mesh (53 µm) Sieve Retain	< 0.5%	< 0.05%
Non-white Particles greater than 45 µm	Not Controlled	< 200 / 10g Glass Bubbles
True density (g/cc)	0.46 ± 0.03	0.46 ± 0.02

## Properties Comparison

	Designed For Electronic Market Applications	
	3M™ Glass Bubbles S32HS	3M™ Glass Bubbles S3240-VS
Crush strength, 90% (psi/MPa)	≥ 6,000 / ≥ 41.4	
Dielectric Constant, Dk @10GHz	1.4	
Dielectric Loss, Df @10GHz	0.004	
Size D50 (µm)	22	
Size D95 (µm)	< 47	
Moisture	Not Reported	≤ 0.35%
270 Mesh (53 µm) Sieve Retain	< 0.5%	< 0.05%
Resin Compatibilization Treatment	None	Vinyl Silane
Non-white Particles greater than 45 µm	Not Controlled	< 200 / 10g Glass Bubbles
True density (g/cc)	0.32 ± 0.03	0.32 ± 0.02

**Warranty, Limited Remedy, and Disclaimer:** Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. User is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application. User is solely responsible for evaluating third party intellectual property rights and for ensuring that user's use of 3M product does not violate any third party intellectual property rights. Unless a different warranty is specifically stated in the applicable product literature or packaging insert, 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY OF NON-INFRINGEMENT OR ANY IMPLIED WARRANTY OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. If the 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

**Limitation of Liability:** Except where prohibited by law, 3M will not be liable for any loss or damages arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.

**Technical Information:** Technical information, recommendations, and other statements contained in this document or provided by 3M personnel are based on tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed. Such information is intended for persons with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license under any 3M or third party intellectual property rights is granted or implied with this information.



**3M Advanced Materials Division**  
 3M Center  
 St. Paul, MN 55144 USA  
 Phone 1-800-367-8905  
 Web [www.3M.com/glassbubbles](http://www.3M.com/glassbubbles)

3M is a trademark of 3M Company. Used under license by 3M subsidiaries and affiliates.  
 Please recycle. Printed in USA. © 3M 2021.  
 All rights reserved. Issued: 2/2021