

3M Advanced Materials Division

3M™ Fused Silica as a Polymeric Filler



Introduction

3M Technical Ceramics, Inc. offers high-purity ceramic powders used as resin fillers. 3M fused silica products are available in both standard and custom particle sizes and distributions. In addition, we can provide traceability data throughout our process, from the arrival of the high-purity sand at our facility to each bag of finished fused silica in your inventory.

3M fused silica is available in 55 lbs. (25 kg) paper bags or 2,200 lbs. (1,000 kg) tote sacks.

Features and Benefits

- Very low coefficient of thermal expansion
- High temperature resistance
- High hardness (5.5–6.5 Mohs' scale)
- High chemical purity
- Extensive optical transmission from UV to IR
- Excellent electrical insulation properties
- Low density
- Low thermal conductivity

Particle Size Distribution, % Retained

(Not for specification purposes)

U.S. Mesh (ASTM No.)	Microns	3M™ Fused Silica 20	3M™ Fused Silica 40	3M™ Fused Silica 550
100	150	0.00	<0.10	<0.25
140	106	<0.05	<0.50	<0.60
200	75	<1.00	<10.00	<0.50
325	45	<3	15–30	0.01–1.10

Typical Physical Properties

(Not for specification purposes)

Property	3M™ Fused Silica 20	3M™ Fused Silica 40	3M™ Fused Silica 550
Microtrac PM, 50%	9–16 µm	19–27 µm	3.5–5.2 µm
Magnetics (Buck Analyzer)	<20 ppm		<50
Electrical Conductivity	<5 µmhos		
Apparent Specific Gravity	2.18–2.20 g/cc		
LTE Coefficient (20–700°C)	0.5–0.6 × 10 ⁻⁶ /°C		

Typical Chemical Analysis

(Not for specification purposes)

Property	3M™ Fused Silica 20, 40 and 550
SiO ₂	>99.7%
Al ₂ O ₃	<1700 ppm
Fe ₂ O ₃	<350 ppm
TiO ₂	<250 ppm
K ₂ O	<120 ppm
CaO	<75 ppm
Na ₂ O	<50 ppm
LOI @ 1000°C	<0.5%

Fused Silica as a Polymeric Filler

We supply high-purity fused silica flour blends for a variety of filler applications. Our revolutionary furnace design and process helps prevent the fused silica product from becoming contaminated with non-silica and crystalline-silica phase materials. This results in an amorphous silica finished product that is of 99.7% chemical purity. While this revolutionary process dramatically improved purity, it also increased productivity over conventional furnaces. 3M™ Fused Silica Flours and Grains are optimized for consistency from batch to batch. These products also provide excellent heat and dimensional stability, as well as a low surface area versus other silica “flour” products. 3M™ Fused Silicas have a low density and a very low coefficient of thermal expansion. They offer excellent resistance to heat and have excellent electrical resistivity and dielectric properties.

Fused Silica Custom Lab Equipment and Capabilities

In order to ensure the purity and consistency of our fused silica products, we utilize state-of-the-art particle analysis systems, enhanced grinding and blending processes, and extensive high-intensity magnetic separation methods. Our lab facilities are equipped with a complete set of mixers, pumps and ovens for advanced testing and development. 3M Technical Ceramics technical personnel can design and perform custom tests according to your specifications.

Product Storage, Handling and Safety

Storage: Store in a dry location and protect from the elements. Store away from oxidizing agents. See product Safety Data Sheet (SDS) for additional information.

Handling: Product may contain respirable quartz silica at $\leq 0.2\%$. Avoid skin contact with hot material. Avoid breathing dust/fume/gas/mist/vapors/spray. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Avoid contact with oxidizing agents (e.g. chlorine, chromic acid etc.). See product SDS for additional information.

Safety: See product SDS for additional information.

Product is manufactured and sold by 3M Technical Ceramics Inc.

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