Science.
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3M Advanced Materials Division

3M™ Fused Silica 20 and 40

Introduction

3M Technical Ceramics, Inc. offers high-purity ceramic powders used as resin fillers. 3M™ Fused Silica 20 and 3M™ Fused Silica 40 have electrically insulating properties, a very low coefficient of thermal expansion, and good resistance to heat and corrosion.

3M fused silica 20 and 40 are 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
- High corrosion resistance
- 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
100	150	0	<0.1
140	106	<0.05	<0.5
200	75	<1	<10
325	45	<3	15–30

Typical Physical Properties

(Not for specification purposes)

Property	3M™ Fused Silica 20	3M™ Fused Silica 40
Microtrac PM, 50%	9–16 µm	19–27 µm
BET Surface Area	<3 m^2/g	1.3–2.1 m^2/g
Magnetics (Buck Analyzer)	<20 ppm	
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 and 40
SiO_2	>99.7%
Al_2O_3	<1700 ppm
Fe_2O_3	<350 ppm
TiO_2	<250 ppm
K_2O	<120 ppm
CaO	<75 ppm
Na_2O	<50 ppm
LOI @ 1000°C	<0.5%

3M™ Fused Silica 20 and 40

Fused Silica for Investment Casting Shells

We supply high-purity fused silica flour and advanced shell system flour blends that are used in investment casting shells. Our revolutionary furnace design helps prevent the raw silica sand from becoming contaminated during processing – resulting in a finished product that is 99.7% pure, while increasing productivity tenfold over conventional furnaces. 3M™ Fused Silica Flours and Grains are optimized for consistency from batch to batch, to help you produce components with a high degree of dimensional accuracy. 3M fused silica products are available in both standard and custom particle sizes and distributions, and our experts will work with you to optimize your application. 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.

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, slurry pots, a drying room, ovens and furnaces for advanced slurry research and development. Our labs are also capable of performing a wide variety of tests, including BET surface area analysis; shell permeability; Green or Hot Wet MOR/MOE; shell crush strength; bacteria testing; % binder silica; and accelerated gel testing. To determine shell drying characteristics we use data loggers, loss-in-weight scales and capillary absorption equipment. 3M Technical Ceramics technical personnel can design and perform additional 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 ≤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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