Chemsize

Advanced Fused Silica Solutions

Fused Silica

Technical Data Sheet | Electrically Fused, Amorphous Silica (SiO_2)

Amorphous SiO_2 >99% — The Defining Characteristic of Fused Silica

Version 4.0 | August 2026

>99.9%	<50ppm	>99%	30,000	ISO
SiO_2 Purity (Grade A)	Fe_2O_3 (Grade A)	Amorphous Content	t/y Capacity	Certified Production

COMPANY	DOCUMENT	ISSUE DATE	SUPERSEDES
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Product Overview

Fused Silica — Electrically Fused, Amorphous Silica (SiO_2)

Fused silica is produced from high-purity crystal silica rock, electrically fused at temperatures of 1,800–2,000°C to produce amorphous silica (SiO_2). The fused material is classified into different grades by manual sorting, then specially engineered to precise particle size distributions for grain and powder applications.

Chemsize fused silica is manufactured at two ISO-certified facilities in Donghai County, Jiangsu Province, China, with a combined annual capacity of 30,000 metric tons. Each batch is quality-controlled for chemical composition and particle size distribution, with SGS-verified test reports available for every shipment.

Key Differentiators:

- **Ultra-high purity:** Grade A SiO_2 >99.9%, Fe_2O_3 <50ppm — exceeds industry standards
- **Low radioactivity capability:** Uranium <0.1 ppb achievable with selected raw materials, available for electronics-grade applications on request
- **Dual-factory supply:** 30,000 t/y assured capacity from two manufacturing partners
- **ISO-certified:** Manufacturing quality management system certified
- **SGS-verified:** Independent third-party test reports for every grade

1. Physical Properties

No.	Property	Typical Value	Unit / Note
1.1	**Chemical Composition**	SiO_2 (Amorphous)	—
1.2	**Structure**	Amorphous (glassy)	XRD verified >99%
1.3	**Colour**	White / Transparent	Visual
1.4	**Melting Point**	~1,750 °C	°C
1.5	**Softening Point**	~1,650 °C	°C
1.6	**Specific Gravity (True)**	2.21	g/cm³
1.7	**Bulk Density**	0.9 – 1.1	mt/m³
1.8	**Hardness**	7	Mohs scale
1.9	**Coefficient of Thermal Expansion**	0.5×10^{-7}	/°C (20–1,000°C)
1.10	**Thermal Conductivity**	1.3	W/m·K
1.11	**Dielectric Constant**	3.8	at 1 MHz

Chemical Composition

SGS-Verified Analytical Results by Grade

2.1 General Grades — Investment Casting & Refractory

Chemical composition verified by SGS third-party testing. Values represent guaranteed specifications with typical SGS-measured results.

Parameter	Grade A Standard	Grade B Cost Advantage	Grade C Economy	Grade C- Economy
SiO_2	**≥99.90%**	≥99.85%	≥99.70%	≥99.50%
Fe_2O_3	**≤50 ppm**	≤80 ppm	≤500 ppm	≤1,000 ppm
Al_2O_3	**≤300 ppm**	≤500 ppm	≤2,000 ppm	≤3,000 ppm
CaO	≤30 ppm	≤30 ppm	≤100 ppm	≤200 ppm
Na_2O	≤30 ppm	≤30 ppm	≤50 ppm	≤100 ppm
K_2O	≤30 ppm	≤30 ppm	≤50 ppm	≤100 ppm
Amorphous Content (XRD)	**≥99%**	≥99% *	≥97%	≥95%
SGS Report Ref.	SGS Grade A	SGS Grade B	SGS Grade C	SGS Grade C-

** Grade B Amorphous Content: SGS XRD testing typically shows ≥99% amorphous phase for Grade B, as cristobalite particles may not be captured in sampling due to their granular nature. In practice, Grade B may contain trace cristobalite particles and occasional black spots. Grades C and C- contain progressively more cristobalite and visible black spots.* ***Grade A is the standard grade with highest amorphous purity and fewest black spots; Grades B, C, and C- offer increasing cost advantages for applications where these characteristics are acceptable.***

** SGS measured values: Grade A SiO_2=99.91%, Fe_2O_3=41ppm; Grade B SiO_2=99.89%, Fe_2O_3=60ppm; Grade C SiO_2=99.79%, Fe_2O_3=440ppm. Full SGS reports available on request.*

Chemical Composition

Specialised Grades — Investment Casting

2.2 Investment Casting Grade — Specifications

Parameter	Specification	Note
SiO_2	≥99.85%	—
Al_2O_3	<100 ppm (grains)	Higher in finer powder due to alumina ball milling
Fe_2O_3	<60 ppm (grains) / <100 ppm (powder)	—
CaO	<30 ppm	—
Na_2O	<30 ppm	—
K_2O	<30 ppm	—

Investment Casting Applications

Chemsize fused silica is widely used in investment (lost-wax) casting for both primary and backup slurry shell-building. The low thermal expansion and high thermal shock resistance of amorphous silica make it the preferred refractory flour and stucco grain for precision casting of stainless steel, carbon steel, and superalloy components.

Typical investment casting grain/flour grades are available from 30-50 mesh through -325 mesh flour. Custom sieve distributions tailored to specific shell-building systems are available on request. Refer to Section 3 for standard PSD options.

Chemical Composition

Specialised Grades — Electronics & EMC

2.3 EMC Grade — Electronics & Epoxy Molding Compound

Specifically engineered for epoxy molding compound (EMC), epoxy potting compound, silicone rubber filler, functional coating, and fusion bonded epoxy powder coating applications.

Parameter	EMC Grade A	EMC Grade B
SiO_2	≥99.90%	≥99.85%
Al_2O_3	≤1,500 ppm	≤1,800 ppm
Fe_2O_3	≤30 ppm	≤60 ppm
Na^+	≤3 ppm	≤3 ppm
Cl^-	≤3 ppm	≤3 ppm
pH	5 – 7	5 – 7
Electrical Conductivity	≤3 µS/cm	≤3 µS/cm
Radioactivity (U)	<0.1 ppb **	<0.1 ppb **

*** Radioactivity (U) <0.1 ppb is achievable with selected raw materials and is not a standard feature of general grades. This specification can be met upon customer request.*

** The ultra-low Na^+ and Cl^- content makes Chemsize EMC Grade uniquely suitable for semiconductor packaging and high-reliability electronic applications. Chemical analysis is performed by ICP-OES, ICP-MS, and ion chromatography as appropriate per parameter.*

Why EMC Grade Matters

In semiconductor packaging, ionic impurities (Na^+, Cl^-) cause wire bond corrosion and device failure. Even trace uranium emits alpha particles that trigger soft errors in memory chips. Chemsize EMC Grade is produced from selected ultra-low-impurity raw materials, delivering the cleanliness required for high-reliability electronics without the premium of synthetic spherical silica.

Particle Size Distribution — Grains

ASTM Sieve Analysis for Investment Casting & Refractory Applications

3.1 Grain Particle Size Distribution (ASTM Sieve Analysis)

Standard grain sizes for investment casting and refractory applications. Sieve analysis per ASTM E11. Pan designates the percentage of fused silica passing the last reported screen for each size.

Mesh	Microns	Standard Grain Sizes						
		10-20	30-50	50-100	-100	-120	-200	-325
+8	2360	<2	—	—	—	—	—	—
+12	1700	6-25	—	—	—	—	—	—
+16	1180	33-50	—	—	—	—	—	—
+20	850	25-45	<1	—	—	—	—	—
+30	600	13	25-45	—	—	—	—	—
+40	425	—	32-45	—	—	—	—	—
+50	300	—	15-30	<13	—	—	—	—
+70	212	—	—	30-60	—	—	—	—
+80	180	—	0-11	—	—	—	—	—
+100	150	—	—	28-51	<10	—	—	—
+140	106	—	—	4-16	—	<10	—	—
+200	75	—	—	<2	—	—	—	—
+325	45	—	—	—	—	—	18-25	8-15
Pan	—	<3	<2	<1	≥90	≥90	75-82	85-92

** All values are cumulative % retained on each screen. Pan = % passing the finest screen. Custom sieve distributions available on request.*

Particle Size Distribution — Powders

Laser Diffraction Analysis — Malvern Mastersizer 2000

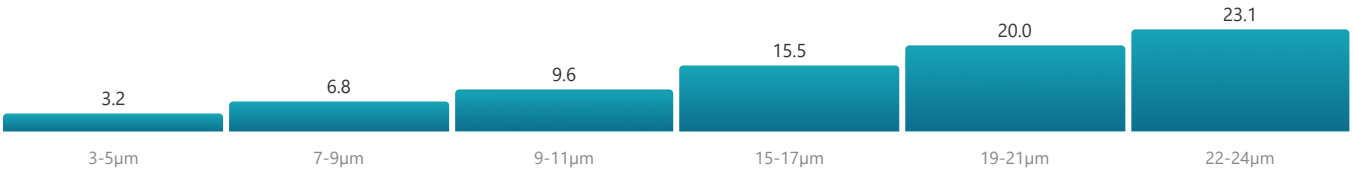
3.2 Powder Particle Size Distribution (Laser Diffraction)

Analyser: Malvern Mastersizer 2000 (Hydro 2000MU). Measurement range: 0.020–2,000 µm. Dispersion medium: Water. Results below are typical D10, D50, D90 values for standard powder grades.

Grade (D50)	D10 (µm)	D50 (µm)	D90 (µm)	D[3,2] (µm)	D[4,3] (µm)	Specific Surface (m^2/g)
3-5 µm	1.10	3.20	18.14	2.40	8.25	2.50
7-9 µm	1.88	6.77	18.17	4.18	8.63	1.44
9-11 µm	2.35	9.63	25.52	5.41	12.05	1.11
15-17 µm	2.87	15.52	50.89	7.06	21.89	0.85
19-21 µm	~3.0	~20.0	~55.0	~7.5	~24.0	~0.79
22-24 µm	2.78	23.13	90.41	7.56	36.33	0.79

** D10, D50, D90 are volume-based diameters. D[3,2] = surface-area moment mean; D[4,3] = volume moment mean. Custom D50 targets available from 3 µm to 50+ µm. Full laser diffraction distribution curves available on request.*

Typical Powder Grade D50 Distribution



Custom Powder Sizing

In addition to the standard grades listed above, Chemsize can produce custom D50 targets with narrowed or broadened distributions. Our iron-free alumina ball milling process ensures minimal contamination even in ultra-fine powder grades. Contact our technical team with your target D50 and span requirements.

Packaging, Quality Assurance & Handling

Storage, Shipping, and Quality Control

4.1 Packaging Options

Package Type	Net Weight	Description
Plastic Woven Bag	25 kg	Moisture-proof inner PE liner, standard export packing
Big Bag (FIBC)	1,000 kg	Jumbo bag with PE inner liner, pallet optional
Custom Packaging	As required	Available per customer specification

4.2 Quality Assurance System

Manufacturing Quality Control

- ISO 9001 certified manufacturing facility
- Batch sampling at production line
- Chemical composition analysis for every batch (ICP-OES equipped in-house)
- Malvern Mastersizer 2000 laser PSD verification
- XRD amorphous content verification
- Weight calibration check per shipment

Third-Party Verification

- SGS test reports available for all grades (A/B/C/C-)
- COA (Certificate of Analysis) issued per shipment
- Shipping report with batch number traceability
- Independent laboratory verification on request
- Low radioactivity (U <0.1 ppb) available on request with selected raw materials

4.3 Storage & Handling

Storage Conditions	Store in dry, covered area. Keep bags sealed until use to prevent moisture absorption.
Shelf Life	Indefinite when stored properly in original sealed packaging
Handling	Use standard dust collection / PPE. Fused silica is chemically inert and non-toxic.
Moisture Protection	All packaging includes PE inner liner. Warehouse storage with moisture-proof pallets.

4.4 Standard Mesh Size Reference

Mesh (ASTM)	Microns	Mesh (ASTM)	Microns	Mesh (ASTM)	Microns	Mesh (ASTM)	Microns
+8	2360	+30	600	+100	150	+270	53
+12	1700	+40	425	+140	106	+325	45
+16	1180	+50	300	+200	75	+400	38
+20	850	+70	212	+230	63	+500	25

Applications & Disclaimer

Where Chemsize Fused Silica Delivers Value

4.5 Applications

Investment Casting
Shell mould & core production — flour and grain sizes for primary & backup slurry

Refractories
Crucibles, nozzles, slide gates, tundish boards — high thermal shock resistance

EMC / Electronics
Epoxy molding compound filler — ultra-low Na^+, Cl^-, U for semiconductor packaging

Ceramics & Coatings
CCL, precision ceramics, functional coatings, fusion bonded epoxy powder

Engineered Stone
Artificial quartz marble & engineered stone countertops — filler for high-hardness, stain-resistant surfaces

Foundry
Medium-frequency induction furnace linings — improves lining life and heat stability, extends campaign duration

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