

SILICA FUME (Microsilica)



1. Brief Introduction

Silica Fume or said Microsilica, is a by-product or said fumes collected from the production of Ferro Alloys especially for the Silicon Metal and/or Ferro Silicon which can be purified, processed and densified according to the final purpose and applications. The process involves the reduction of high purity quartz in electric arc furnace at temperature in exceed of 2000 degree centigrade. The Silica Fume is a very fine powder consisting mainly of spherical particles or microspheres of mean diameter about 0.15 micros with a very high specific surface area (15,000 to 25,000 square meters per Kilogram) . Each microsphere is on average 100 times smaller than an average cement grain. At a typical dosage of 10% by mass of cement, there will be 50,000 to 100,000 Silica Fume particles per cement grain.

The usage is varied and open to the imagination of the designers. It has become an integral part of many of the items we use in our daily life. In this section we have chosen some of the applications that demonstrate the versatility of the product. From High Performance Concrete (HPC) in construction projects to filler in lawn care products it is rather amazing how far this “smoke” by-product has evolved.

2. Type and Specifications

We, SINOSI, are supplying the SF series silica fume in China and cover the world wide market including the following types and related typical specifications:

Physical Properties & Chemical Components	Type and Re-Order No. (Typical Data, Reference Only)							
	SF85	SF88	SF90	SF93	SF96	SF98	SF85W	SF95W
Color	Grey	Grey	Grey	W.G.	W.G.	W.G.	White	White
SiO ₂ %	≥85.0	≥88.0	≥90.0	≥93.0	≥96.0	≥98.0	≥85.0	≥95.0
Al ₂ O ₃ %	≤1.5	≤1.5	≤1.5	≤1.0	≤1.0	≤1.0	≤1.5	≤1.0
Fe ₂ O ₃ %	≤2.0	≤2.0	≤2.0	≤1.0	≤1.0	≤1.0	≤2.0	≤1.0
CaO+MgO %	≤3.0	≤3.0	≤2.0	≤1.5	≤1.0	≤1.0	≤3.0	≤1.0
K ₂ O+Na ₂ O %	≤3.0	≤3.0	≤2.0	≤1.5	≤1.0	≤1.0	≤3.0	≤1.0
C %	≤2.5	≤2.5	≤2.0	≤2.0	≤1.0	≤1.0	≤2.5	≤1.0
Cl ⁻ %	≤0.3	≤0.2	≤0.1	≤0.1	≤0.1	≤0.1	≤0.3	≤0.1
Ph	4-8	4-8	4-8	4-8	4-8	4-8	4-8	4-8
Loss on ignition %	≤6	≤6	≤5	≤3	≤2	≤1	≤6	≤2
Specific Surface Area (m ² /g)	≥15	≥15	≥15	≥15	≥15	≥15	≥15	≥15

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Pozzolanic Activity Index (28d) %	≥85	≥85	≥85	≥85	≥85	≥85	≥85	≥85
Water Demand Ratio %	≤125	≤125	≤125	≤125	≤125	≤125	≤125	≤125
45μ Sieving Residue %	≤10	≤10	≤5	≤5	≤3	≤3	≤10	≤3
Moisture %	≤3	≤3	≤2	≤2	≤1.5	≤1.5	≤3	≤1.5
Type	Amorphous							

Special Note:

All of the above specifications are only typical data for your reference, not the guarantee value. The exact data and value shall be subject to the confirmed Testing Report issued by the Technical Dept. of Sinosi Group.

3. Packing and Loading

All of the above silica fume shall be packed by 500 to 1000Kg net per Jumbo Bag and loaded on heat treated pallet per 4 or 8 Bags according to the present packing and loading conditions, or re-design per the users' request if necessary.

4. Standard and Quality Control

All of SF series silica fume produced and/or supplied by Sinosi Group shall be exactly carried on the China National GB Standard GB/T21236-2007 and related Industrial Standard YB/T115-2004, and subject to the above typical data and value.

Quality control measures should aim at ensuring uniformity of properties of a particular silica fume or said microsilica to minimize variations in the performance of the concrete. Laboratory testing to verify performance in concrete is recommended if a change occurs. In order to have a performance of the quality control, Sinosi has also determined exactly about the testing per the following standards:

1. For SiO₂ testing per the GB/T 6901.2 或 GB/T 6901.3
2. For Al₂O₃ testing per the GB/T 6901.5 或 GB/T 6901.6
3. For Fe₂O₃ testing per the GB/T 14506.11-199
4. For CaO and MgO testing per the GB/T 6901.8
5. For K₂O and Na₂O testing per the GB/T 14506.11-1993
6. For C testing per the GB/T 16555.1-1996
7. For Cl⁻ testing per the JC/T 420
8. For pH value testing per the GB/T 9274
9. For LOI testing per the GB/T 6901.1
10. For Moisture testing per the GB/T3007
11. For Specific Surface Area testing per the GB/T 19587
12. For the 45μ Sieving Residue testing per the YB/T 5164
13. For the Water Demand Ratio and Pozzolanic Activity Index (28d) % testing per the GB/T 18736-2002 and Appendix C.

5. Application of the Silica Fume

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many of the items we use in our daily life. In this section we have chosen some of the applications that demonstrate the versatility of the product. From High Performance Concrete (HPC) in construction projects to filler in lawn care products it is rather amazing how far this “smoke” by-product has evolved.

5.1. Concrete and related construction industry



The earliest applications for the silica fume is determined as one of additional materials of the concrete and related construction industry depending on the high-strength silica fume concrete were in columns for high-rise structures. As concrete strength increases column size can be reduced and reinforcing steel designs in the columns can be simplified. Smaller columns equates to more overall floor space available to the owner of the structure and a significant cost advantage, particularly in urban settings.

Cast in place parking garages also moved quickly to incorporate High Performance Concrete into the structures. From a design standpoint it's used for many of the same reasons as high-rise structures. However in this case service may be the most important factor, which is greatly affected by the parking decks susceptibility to chloride attack. The problem is caused by salt in the melting snow. Salt laden snow builds up on cars during driving in the inclement weather, when these cars eventually park in a garage the snow and salt melts leaving puddles of salt enriched water to seep into the concrete eventually attacking the reinforcing steel and causing deterioration of the concrete. By using High Performance Concrete designers have found that the situation can be mitigated due the decreased porosity and increased durability of the HPC concrete.

Nuclear waste storage facilities because of their massive size and complex design have found silica fume concrete as a valuable component. By adding silica fume to the concrete during the placement of these structures, designers have been able to achieve high early strength for form stripping, long life, and controlled temperature gain for the concrete.

5.2. Refractory and Ceramic Industry



The silica fume is determined as one of refractory material which is widely used in the refractory industry. Concerning about its physical properties and chemical components which cause that become one of key materials in the refractory industry. Meanwhile, the silica fume is also one of raw materials in the ceramic industry depending on its good performance of the quality especially about the type of grain and its good fluidity.

Marine applications are another area where resistance to chloride penetration is critical. Direct salt-water contact as well as airborne sea salts effect structures such as; Pilings for bridges, wharfs, piers, break walls, and bridge decks. This structure would have been better prepared to resist the aggressive salt environment if silica fume HPC concrete was used in the construction..

Concrete roofing tiles and siding is an application that has embraced silica fume. A few years ago, the Japanese export market grew substantially. They had become very conscious of the harmful effects of the asbestos that was an integral part of these construction products in their country and needed to remove it. Research determined that silica fume would impart the same properties to these construction products as did the asbestos and a new market was opened.

5.3. Cement Industry

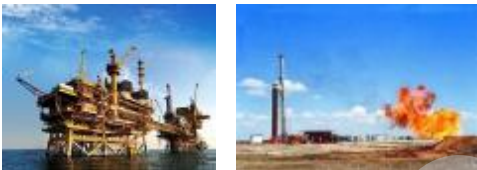


The silica fume now has become one of materials in the cement producing industry which can be much helpful to improve the cement quality and performance.

Shotcrete applications such as tunnels, mines, tanks, repairs and domes use large quantities of silica fume. The increased cohesion from silica fume allows for greater application thickness, particularly overhead, significant reduction in rebound and increased flexural strength. In the construction industry, shotcreting can be either wet or dry. Dry shotcreting is gunning in refractory terminology and wet shotcreting is shotcreting. The equipment is the same for both industries as are the installation techniques. Usually wet shotcreting is the installation method of choice because the water is precisely controlled when added to the dry mix in the transit truck, not at the nozzle tip by the applicator as with gunning. In addition there is less rebound with wet mix which translates into a faster installation. Coupled together no rebound and the nozzle man not in control of the water addition, means a more consistent installation.

In the tidal repair of piles and seawalls, the improved cohesion of the shotcrete to itself means greater resistance to washout. Silica fume provides higher bonding strength for rehabilitation projects. Lower permeability plus proper air entrainment results in better freeze thaw durability. Silica fume concrete's high electrical resistivity mitigates reinforcing steel corrosion in chloride rich environments. Bridge columns are a good example of concrete deterioration from the use of road salts.

5.4. Oil-well drilling industry



Oil well grouting is another area where silica fume is used extensively. In both primary oil well grouting, when the grouting is used as a hydraulic seal in the well bore and secondary grouting such as leak repairs, sealing splits, and closing depleted zones. The addition of silica fume to the oil well grout produces a blocking effect that prevents gas migration. Silica fume's ability to decrease the permeability of the grout, slows or stops gas leakage from the well. Increased strength of the cured slurry provides greater durability of the installation and the addition of silica fume to the slurry, improves its flow, so the installation is more effective.

Meanwhile, the silica fume can be used as an additional material for the special cement in the drilling industry.

5.5. Chemical Industry



The silica fume are widely used in the chemical industry such as rubber, plastics, dope, fertilizer and so on.

Many chemical plants use silica fume in their concrete for the reduction in permeability and increased durability. They find that this concrete is much more resistant to attack by acids or other aggressive chemicals. Slowing down the rate of deterioration or time between repairs in extremely aggressive chemical processing areas. Additional benefits also come from the higher strength and increased abrasion resistance. Rubber and plastic industries also consume silica fume. It is an essential part of the "rubber compound" used to make tires. Silica fume is also a critical compound for the companies making golf balls and for many other plastic and polymer producers. Silica fume adds to the tensile strength and elongation of these rubber products.

Fertilizers use silica fume along with the weed and feed in order to provide added volume to the fertilizer. It helps in the pelletizing process, provides strength to the fertilizer pellets and causes no harm to your lawn, pets or children. It can also be found in some granulated herbicides.

5.6. Heat Insulator and High molecular polymer Industry



Another interesting use for silica fume is in the manufacture of “dry wall”. Gypsum based wallboard comes in many forms. The standard grade is used in most of the rooms of your house; a water resistant board used in bathrooms and laundry rooms; and a fire retardant grade used around furnaces and hot water heaters. We have been told that silica fume aids in the flow ability of these products during production. But the main use of silica fume is in the fire retardant grades because of its heat resistance capabilities. Meanwhile, the silica fume is also to be used as one of materials for producing of high molecular polymer products instead of hydrated silica, talc, asbestos and so on.

6. Contact information

If you have any more enquiry or comments for above mentioned specifications and related information, then please contact us as per the follow information:

Sales Hotline: 4008-900-668

Tel: (86-10) 82070681;82070682;82070683

Fax: (86-10) 82070690; 82079576

E-Mail: sales@sinosi.org or sales@sinosi.com

7. Special Note

You are kindly informed that we, Sinosi Group, have the right to adjust, improve and amend any of above items and related terms and conditions without any prior notice due to technical improvement and request per the government laws and regulations. Your kind understanding and cooperation will be appreciated.