

این محصول با ضوابط استاندارد ملی 13278 ، استاندارد آمریکایی ASTM C1240 اروپایی EN 13263 و ژاپنی JIS6207 انطباق دارد.



## اخذ گواهینامه فنی مرکز تحقیقات راه ، مسکن و شهرسازی

محصول پودر میکروسیلیکای تولیدی شرکت صنایع فرو آلیاژ ایران با ضوابط فنی مورد قبول این مرکز انطباق دارد و با رعایت دستورالعمل اجرایی مربوطه به منظور استفاده در بتن ، ملات و ملات دوغابی ( Grout ) قابل قبول می باشد.

## ترکیب شیمیایی ( درصد وزنی عناصر )

SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	C	Na <sub>2</sub> O	K <sub>2</sub> O	MgO	S	CaO	P	LOI	pH
۹۰-۹۵	۰/۶-۱/۲	۱/۲-۱/۸	۰/۸-۲	۰/۳-۰/۶	۰/۴-۰/۸	۰/۶-۱/۲	۰/۰۴-۰/۰۸	۰/۵-۱/۰	۰/۰۴-۰/۰۶	۱/۵-۲/۵	۰/۸-۹/۵

## خواص فیزیکی

نقطه ذوب °C	دانسیتیه فله ای kg/m <sup>3</sup>	وزن مخصوص gr/cm <sup>3</sup>	ساختار	شکل ذرات	اندازه ذرات	سطح ویژه m <sup>2</sup> /gr
۱۲۳۰	۳۱۰-۳۵۰	۲/۲	آمورف	کروی	< ۱ μm	۱۵-۳۰

## کاربرد های عمده

- ۱ - در صنایع سیمان و بتن
- ۲ - در صنایع نسوز
- ۳ - در صنایع شیمیایی و پلیمر
- ۴ - در صنایع نفت و گاز

**بسته بندی** کیسه های بزرگ (Big Bag) ۷۵۰ کیلو گرمی / کیسه های ۴۰ کیلو گرمی / فله (بونکر)



**خواص فیزیکی و شیمیایی پودر میکروسلیکای تولیدی شرکت صنایع فرو آلیاژ ایران  
و مقایسه آن با استانداردهای مختلف**

میکروسلیکای تولیدی شرکت صنایع فرو آلیاژ ۱۳۸۸-۱۳۹۵	JIS A 6207 2016 (ژاپن)	EN 13263 2005 (اتحادیه اروپا)	ASTM C1240 2015 (آمریکا)	استاندارد ترکیب شیمیایی
۹۰-۹۵	حداقل ۸۵٪	حداقل ۸۵٪	حداقل ۸۵٪	دی اکسید سیلیسیم (SiO <sub>2</sub> )
۰/۶-۱/۲	حداکثر ۱/۵٪	حداکثر ۱/۵٪	-	اکسید آلومینیوم (Al <sub>2</sub> O <sub>3</sub> )
۱/۲-۱/۸	حداکثر ۲٪	حداکثر ۲٪	-	اکسید آهن (Fe <sub>2</sub> O <sub>3</sub> )
۱/۱-۱/۲	حداکثر ۲٪	حداکثر ۲٪	-	مجموع اکسیدهای کلسیم و منیزیم (CaO + MgO)
۰/۷-۰/۹	حداکثر ۲٪	حداکثر ۲٪	-	مجموع اکسیدهای سدیم و پتاسیم (Na <sub>2</sub> +0.658k <sub>2</sub> o)
۰/۸-۲/۰	-	-	-	کربن (C)
۰/۰۵-۰/۰۷	حداکثر ۰/۱٪	حداکثر ۰/۳٪	-	کلر (Cl)
۸/۴۷	۴-۸/۵	-	-	اسیدیته (pH)
۱/۵-۲/۵	حداکثر ۵٪	حداکثر ۴٪	حداکثر ۶٪	افت سرخ شدن (LOI)

میکروسلیکای تولیدی شرکت صنایع فرو آلیاژ ۱۳۸۸-۱۳۹۵	JIS A 6207 2000 (ژاپن)	EN 13263 2006 (اتحادیه اروپا)	ASTM C1240 2010 (آمریکا)	استاندارد خواص فیزیکی
۱۵-۳۰	حداقل ۱۵	۱۵-۳۵	حداقل ۱۵	سطح ویژه (m <sup>2</sup> /gr)
۳۱۰-۳۵۰	-	-	-	چگالی توده ای (Kg/m <sup>3</sup> )
۰/۸-۱/۰	-	-	حداکثر ۱۰	درصد باقیمانده روی الک ۴۵ میکرون
۱۱۰-۱۱۵	حداقل ۹۵٪	-	حداقل ۱۰۵٪	اندیس پوزولانی ۷ روزه



# Product Safety Information (MSDS)

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## Silica Fume

### 1. Identification of the Product and Supplier

- Product name: **Silica Fume**
- Synonyms/Trade names: **Microsilica, Silica Powder, Amorphous silica, Silicon Dioxide Powder, Condensed SiO<sub>2</sub> – Fume**
- CAS Number: **69012-64-2**
- Product application: **Concrete Additive, Refractory Applications, Strengthening Agent**
- Address/Phone No.: **Iran Ferroalloy Industries Co. (IFI)**  
P.O. Box 15178/3169  
Tel: (+98 21) 88 77 93 30 – 88 78 70 33 – 88 77 42 71  
Fax: (+98 21) 88 88 20 43  
[www.iranferroalloys.com](http://www.iranferroalloys.com)
- Contact person: **Alaleh Shahani**, e-mail: [export@iranferroalloys.com](mailto:export@iranferroalloys.com)

### 2. Composition/Information on ingredients

Element	Symbol	CAS No.	Weight%
Silicon Dioxide	SiO <sub>2</sub>	69012-64-2	> 85
Carbon	C	7440-44-0	< 3
Sodium Oxide	Na <sub>2</sub> O	1344-28-1	< 1.5
Aluminum Oxide	Al <sub>2</sub> O <sub>3</sub>	1313-59-3	< 2
Potassium Oxide	K <sub>2</sub> O	12136-45-7	< 2
Magnesium Oxide	MgO	1309-48-4	< 2
Calcium Oxide	CaO	1305-78-8	< 1

\* The product may contain small amounts of crystalline quartz (< 0.5 %). The amount of respirable crystalline silica (quartz, cristobalite) in the product determined by X-ray diffraction is below 0.1 % and does not trigger any hazard classification.

### 3. Hazards Identification

Silica Fume is generally considered a nuisance dust of low toxicity. Use and handling of Silica Fume does not represent a health risk when normal safety rules are observed. Silica Fume when handled and stored in accordance with this document is unlikely to cause harmful effects. It is possible for Silica Fume to contain trace amounts (<0.5%) of crystalline silica, which has been shown to cause silicosis, and has been identified by IARC and NTP as a possible human carcinogen.

\* The product is unlikely to cause harmful effects when handled and stored as advised. See section 7.

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### **4. First Aid Measures**

▪ **INHALATION:**

Remove exposed person from dusty area in fresh air.

▪ **SKIN CONTACT:**

Wash contaminated skin with water and / or a mild detergent.

▪ **EYE CONTACT:**

Rinse eyes with water / saline solution. If discomfort persists, obtain medical attention.

▪ **INGESTION:**

Not Applicable

### **5. Fire Fighting Measures**

▪ **Flammability**

Non flammable. May evolve toxic gases if strongly heated. Not expected to evolve hazardous decomposition products. Fire and explosion Treat as per requirements for surrounding fires. Evacuate area and contact emergency services. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

▪ **Extinguishing**

Use an extinguishing agent suitable for the surrounding fire.

### **6. Accidental Release Measures**

▪ **Personal precautions**

Wear Personal Protective Equipment (PPE) as detailed in section 8 of the SDS.

▪ **Environmental precautions**

Prevent product from entering drains and waterways.

▪ **Methods of cleaning up**

Moisten with water to prevent a dust hazard and place in sealable containers for disposal.

### **7. Handling and Storage**

▪ **Storage**

Store in a well ventilated area, removed from incompatible substances and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Bulk material should be stored in a manner that minimises dust generation.

▪ **Handling**

Keep away from hydrofluoric (HF). Not to be stored at temperatures near to or below 0°C..Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.



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## 8. Exposure Controls/Personal Protection

Avoid inhalation of dust. Eye protection, eye flushing facilities and protective gloves are recommended. Ensure adequate ventilation. Wear an appropriate particulate respirator in accordance with 29 CFR 1910.134 or CSA Standard Z94.4-M1982 for dust exposure that may exceed exposure limits. If adequate ventilation is not possible, a self-contained breathing apparatus or an air supplied respirator is recommended.

### Workplace Exposure Limits (HSE, EH40/2005)

Substance	CAS number	8 hour TWA		15 minute STEL	
		ppm	mg/m <sup>3</sup>	ppm	mg/m <sup>3</sup>
PNOS*	-	-	3	-	-
Quartz (respirable dust)	14808-60-7	-	0.025	-	-
Cristobalite	14464-46-1	-	0.025	-	-

\* Particulates (Insoluble or Poorly Soluble) Not Otherwise Specified. Amorphous silica fume is considered to be PNOS. Specific TLVs for the individual substances have not been established or have been withdrawn, respectively.

#### Biological limits

No biological limit allocated.

#### Engineering controls

Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended. Maintain dust levels below the recommended exposure standard.

#### PPE

##### Eye / Face

Wear dust-proof goggles.

##### Hands

When using large quantities or where heavy contamination is likely, wear leather or cotton gloves.

##### Body

Not required under normal conditions of use.

##### Respiratory

Wear a Class P2 (Particulate) respirator.



## 9. Physical and Chemical Properties

#### Appearance

Fine white to dark grey powder

#### Odour

Odourless

#### Flammability

Non flammable

#### Flash point

Not relevant

#### Boiling point

Not available

#### Melting point

1550 to 1570°C

#### Evaporation rate

Not available

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<b>Vapour density</b>	Not available
<b>Specific gravity</b>	2.2 to 2.3
<b>Solubility (water)</b>	Insoluble
<b>Vapour pressure</b>	Not available
<b>Upper explosion limit</b>	Not relevant
<b>Lower explosion limit</b>	Not relevant
<b>Partition coefficient</b>	Not available
<b>Autoignition temperature</b>	Not available
<b>Decomposition temperature</b>	Not available
<b>Viscosity</b>	Not available
<b>Explosive properties</b>	Not available
<b>Oxidising properties</b>	Not available
<b>Odour threshold</b>	Not available
<b>% Volatiles</b>	Not available
<b>Density</b>	150 to 700 kg/m <sup>3</sup>
<b>Particle size, mean</b>	015 (less than 0.1% of primary particles > 45µm)

### 10. Stability and Reactivity

#### Conditions to avoid:

**Chemical stability** Stable under recommended conditions of storage.

**Conditions to avoid** Avoid heat, sparks, open flames and other ignition sources.

**Material to avoid** Incompatible with hydrofluoric acid (may evolve toxic silicon tetrafluoride gas).

**Hazardous Decomposition** The product reacts with hydrofluoric acid (HF) forming toxic gas (SiF<sub>4</sub>). Heating the product above 1000 °C can result in the formation of crystalline SiO<sub>2</sub>-modifications as cristobalite / tridymite which may cause pulmonary fibrosis (silicosis).

#### Products

**Hazardous Reactions** Polymerization will not occur.

### 11. Toxicological Information

**Health Hazard Summary** Irritant. Use safe work practices to avoid eye or skin contact and inhalation. Over exposure to amorphous silica does not cause silicosis, however there is a risk of pulmonary fibrosis associated with the crystalline silica contaminant. Crystalline silica is classified as carcinogenic to humans (IARC Group 1). Due to the low levels present, adverse health effects may be reduced.

**Eye** Irritant. Contact may result in irritation, lacrimation, pain and redness.

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<b>Inhalation</b>	Irritant. Over exposure to dust may result in mucous membrane irritation of the respiratory tract. Chronic exposure to crystalline silica may result in silicosis (lung fibrosis). Crystalline silica is classified as carcinogenic to humans (IARC Group 1). However, chronic health effects are not anticipated with normal use due to the low levels present. Symptoms may be delayed until several hours after exposure.
<b>Skin</b>	Irritant. Contact may result in irritation, redness, pain and rash.
<b>Ingestion</b>	Low toxicity. Ingestion of large quantities may result in nausea, vomiting and gastrointestinal irritation.
<b>Toxicity data</b>	No LD50 data available for this product.

## 12. Ecological Information

**SILICA FUME IS NOT CHARACTERIZED AS DANGEROUS FOR THE ENVIRONMENT.**

<b>ECO-Toxicity</b>	The product does not meet the classification criteria for ecotoxicological endpoints in accordance with the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS, 5 <sup>th</sup> revision).
<b>Persistence and degradability</b>	Not relevant for inorganic substances.
<b>Bioaccumulative potential</b>	Not relevant.
<b>Mobility in soil</b>	The product is not mobile under normal environmental conditions .
<b>Other adverse effects</b>	The main component/s of this product are not anticipated to cause any adverse effects to plants or animals.

## 13. Disposal Considerations

<b>Waste disposal</b>	Reuse where possible. No special precautions are normally required when handling this product.
<b>Legislation</b>	Dispose of in accordance with relevant local legislation.

## 14. Transport Information

**NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE, IMDG OR IATA**

**DOT (DEPARTMENT OF TRANSPORTATION):**

<b>UN Number:</b>	None Allocated
<b>Shipping Name:</b>	None Allocated
<b>Hazard Class:</b>	None Allocated
<b>I.D. Number and Initials:</b>	None Allocated
<b>Packing Group:</b>	None Allocated
<b>Label(s):</b>	None Allocated

## 15. Regulatory Information

<b>OSHA:</b>	This safety data sheet has been compiled in accordance with the revised Hazard Communication Standard (HCS 2012) and applies GHS classification criteria. Amorphous silica fume can be considered a nuisance dust and is as such outside the scope of the revised HCS (29 CFR 1910.1200 section (b)(6)(x)).
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<b>TSCA:</b>	The product is listed in the TSCA (Toxic Substance Control Act) Inventory (ID 51143, CAS # 69012-64-2).
<b>CERCLA:</b>	(Comprehensive Response Compensation, and Liability Act): The product is not listed in 40 CFR 302.4.
<b>RCRA:</b>	(Resource Conservation/Recovery Act): The product is not a listed hazardous waste.
<b>SARA TITLE III:</b>	(Superfund Amendments and Reauthorization Act): 311/312 Hazard Categories: Immediate Health, Delayed Health. 313 Reportable Ingredients: None.
<b>CALIFORNIA PROPOSITION 65:</b>	This product contains < 0.1 % Crystalline Silica (CAS# 14808-60-7), a chemical known to the state of California to cause cancer.
<b>IARC:</b>	Amorphous silica is not classifiable as to its carcinogenicity to humans (Group 3).
<b>US-NTP:</b>	The product is not listed in the 2011 Report on Carcinogens (RoC).
<b>WHMIS:</b>	not classified.
<b>DSL Canada:</b>	The substance is specified on the public Portion of the Domestic Substances List (identifier: 69012-64-2).

### HAZARD RATING SYSTEM:

#### Hazardous Material Identification System (HMIS)

HEALTH = 1

FLAMMABILITY = 0

REACTIVITY = 0

PERSONAL PROTECTION = 0

## 16. Other Information

The information presented in this Material Safety Data Sheet relates to this specific material. It may not be valid for this material if used in combination with any other materials or in any process. It is the user's responsibility to verify the suitability and completeness of this information for the particular use intended.