

SILICON POWDER 99%

GHS Safety Data Sheet

Version No:4.1.1.1

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

SILICON POWDER 99%

OTHER NAMES

Si, "amorphous silicon", "amorphous silicon powder", "Defoamer S-10", "silicon powder alloying agent", "silicon alloying agent", "aluminium alloying agent", "aluminum alloying agent"

PROPER SHIPPING NAME

SILICON POWDER 99%

PRODUCT USE

Semiconductor in solid state devices (transistors, photovoltaic cells, computer circuitry, rectifiers, etc.); organosilicon compounds; silicon carbide; alloying agent in steels, aluminium, copper, bronze and iron. Also used in cements and special refractories; halogenated silanes; spring steels; deoxidiser in steel manufacture.

SUPPLIER

Company: S D FINE- CHEM LIMITED

Address:

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248, Worli Road,

Mumbai- 400030, India

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Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Eye Irritation Category 2A

Flammable Solid Category 2

Skin Corrosion/Irritation Category 2

STOT - SE Category 3

**EMERGENCY OVERVIEW****HAZARD****WARNING**

Determined by using GHS criteria

H228

Flammable solid.

H315

Causes skin irritation.

H319

Causes serious eye irritation.

H335

May cause respiratory irritation.

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Section 2 - HAZARDS IDENTIFICATION

PRECAUTIONARY STATEMENTS

Prevention

Code

P210

Phrase

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P240

Ground/bond container and receiving equipment.

P241

Use explosion- proof electrical/ventilating/lighting/ ... /equipment

P261

Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.

P264

Wash ... thoroughly after handling.

P271

Use only outdoors or in a well- ventilated area.

P280

Wear protective gloves/protective clothing/eye protection/face protection.

Response

Code

P302+P352

Phrase

IF ON SKIN: Wash with plenty of soap and water.

P304+P340

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P312

Call a POISON CENTER or doctor/physician if you feel unwell.

P332+P313

If skin irritation occurs: Get medical advice/attention.

P337+P313

If eye irritation persists: Get medical advice/attention.

P362

Take off contaminated clothing and wash before re- use.

Storage

Code

P403+P233

Phrase

Store in a well- ventilated place. Keep container tightly closed.

P405

Store locked up.

Disposal

Code

P501

Phrase

Dispose of contents/container to ...

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
silicon	7440-21-3	>95

Section 4 - FIRST AID MEASURES

SWALLOWED

- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

EYE

- If this product comes in contact with the eyes:
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
- DO NOT attempt to remove particles attached to or embedded in eye .
- Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye.
- Seek urgent medical assistance, or transport to hospital.

SKIN

- If skin contact occurs:
- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.

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Section 4 - FIRST AID MEASURES

- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

NOTES TO PHYSICIAN

- Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Metal dust fires need to be smothered with sand, inert dry powders.
- DO NOT USE WATER, CO₂ or FOAM.
- Use DRY sand, graphite powder, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire.
- Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.
- DO NOT use halogenated fire extinguishing agents.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Fight fire from a safe distance, with adequate cover.

FIRE/EXPLOSION HAZARD

- DO NOT disturb burning dust. Explosion may result if dust is stirred into a cloud, by providing oxygen to a large surface of hot metal.
 - DO NOT use water or foam as generation of explosive hydrogen may result. <</>.
- Decomposition may produce toxic fumes of: silicon dioxide (SiO₂).
- Silicon particles in air can cause dust explosions with dust concentrations exceeding 100 g/m³. Both the ignition sensitivity and violence of the explosion increase with decreasing particle size, hydrogen chloride, hydrogen fluoride, metal oxides.
- When aluminium oxide dust is dispersed in air, firefighters should wear protection against inhalation of dust particles, which can also contain hazardous substances from the fire absorbed on the alumina particles.

FIRE INCOMPATIBILITY

- Reacts with acids producing flammable / explosive hydrogen (H₂) gas.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Remove all ignition sources.
- DO NOT touch or walk through spilled material.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.

MAJOR SPILLS

- Clear area of personnel and move upwind.
 - Alert Fire Brigade and tell them location and nature of hazard.
 - DO NOT touch or walk through spilled material.
 - Control personal contact with the substance, by using protective equipment.
- Personal Protective Equipment advice is contained in Section 8 of the MSDS.**

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of overexposure occurs.

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Section 7 - HANDLING AND STORAGE

- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.

SUITABLE CONTAINER

- Bulk bags: Reinforced bags required for dense materials.
 - CARE: Packing of high density product in light weight metal or plastic packages may result in container collapse with product release.
 - Heavy gauge metal packages / Heavy gauge metal drums.
- For low viscosity materials and solids:
Drums and jerricans must be of the non-removable head type.
Where a can is to be used as an inner package, the can must have a screwed enclosure.<</>.

STORAGE INCOMPATIBILITY

- For silicone:
Even though it is a relatively inert element, silicon still reacts with halogens and dilute alkalis, but most acids (except for some hyper-reactive combinations of nitric acid and hydrofluoric acid) do not affect it. Having four bonding electrons however gives it, like carbon, many opportunities to combine with other elements or compounds under the right circumstances. Avoid storage with oxidising agents, alkali carbonates, aluminium and lead oxides, calcium, carbides, fluorides, chlorine and alkali metal alloys.
- Metals and their oxides or salts may react violently with chlorine trifluoride and bromine trifluoride.
- These trifluorides are hypergolic oxidisers. They ignite on contact (without external source of heat or ignition) with recognised fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition.
- The state of subdivision may affect the results.
- Reacts with acids producing flammable / explosive hydrogen (H₂) gas.

STORAGE REQUIREMENTS

- FOR MINOR QUANTITIES:
• Store in an indoor fireproof cabinet or in a room of noncombustible construction.
- Provide adequate portable fire-extinguishers in or near the storage area.

FOR PACKAGE STORAGE:

- Store in original containers in approved flame-proof area.
- No smoking, naked lights, heat or ignition sources.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

- silicon:

CAS:7440- 21- 3

MATERIAL DATA

SILICON POWDER AMORPHOUS:

SILICON:

- The concentration of dust, for application of respirable dust limits, is to be determined from the fraction that penetrates a separator whose size collection efficiency is described by a cumulative log-normal function with a median aerodynamic diameter of 4.0 µm (+-) 0.3 µm and with a geometric standard deviation of 1.5 µm (+-) 0.1 µm, i.e..generally less than 5 µm.

SILICON POWDER AMORPHOUS:

SILICON:

- For silicon
CEL TWA: 5 mg/m³
(CEL = Chemwatch Exposure Limit)
NOTE: The CEL TWA is consistent with the value recommended in the Norwegian ferro-alloy industry (furnace room dust/mixed dust).
- Silicon dust appears to have little adverse effect on the lungs and is not implicated in the genesis of organic disease or in the production of toxic effects.

SILICON:

- For aluminium oxide and pyrophoric grades of aluminium:
Twenty seven year experience with aluminium oxide dust (particle size 96% 1,2 µm) without adverse effects either systemically or on the lung, and at a calculated concentration equivalent to 2 mg/m³ over an 8-hour shift has lead to the current recommendation of the TLV-TWA.

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

The limit should also apply to aluminium pyro powders whose toxicity is reportedly greater than aluminium dusts and should be protective against lung changes.

For aluminium oxide:

The experimental and clinical data indicate that aluminium oxide acts as an "inert" material when inhaled and seems to have little effect on the lungs nor does it produce significant organic disease or toxic effects when exposures are kept under reasonable control.

[Documentation of the Threshold Limit Values], ACGIH, Sixth Edition.

PERSONAL PROTECTION



RESPIRATOR

•Particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent].

HANDS/FEET

■ The selection of the suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:.

- Protective gloves eg. Leather gloves or gloves with Leather facing.

Avoid contact with moisture.

- Wear physical protective gloves, e.g. leather.
- Wear safety footwear.

OTHER

- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

ENGINEERING CONTROLS

■ For large scale or continuous use:

- Spark-free, earthed ventilation system, venting directly to the outside and separate from usual ventilation systems
- Provide dust collectors with explosion vents.

Metal dusts must be collected at the source of generation as they are potentially explosive.

- Avoid ignition sources.
- Good housekeeping practices must be maintained.
- Dust accumulation on the floor, ledges and beams can present a risk of ignition, flame propagation and secondary explosions.
- Do not use compressed air to remove settled materials from floors, beams or equipment.

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Dark brown powder. Insoluble in water, nitric acid and hydrochloric acid. Soluble in a mixture of nitric and hydrofluoric acids and in alkalis. Contains about 20% hydrogen. Also available as black to grey, lustrous, needle-like crystals or octahedral platelets.

Silicon in the cold state is not dangerous. It is prepared and purified in the absence of air, the process taking place in a sealed, gas-tight enclosure.

Crystalline leaflets or lumps of silicon will not burn in air and their transport is not regulated.

Silicon is the most common metalloid. Metalloid, or semi metal is a term used in chemistry when classifying the chemical elements. On the basis of their general physical and chemical properties, nearly every element in the periodic table can be termed either a metal or a nonmetal. However, a few elements with intermediate properties are referred to as metalloids (from the Greek metallon = "metal" and eidos = "sort"). They are sometimes called (and confused with) semiconductors and semimetals. The outer electron orbitals (half filled subshell holding up to eight electrons) have the same structure as in carbon and the two elements are sometimes similar chemically.

Both silicon and (in certain aspects) carbon are semiconductors, readily either donating or sharing their four outer electrons allowing many different forms of chemical bonding. Pure silicon has a negative temperature coefficient of resistance, since the number of free charge carriers increases with temperature. The electrical resistance of single crystal silicon significantly changes under the application of mechanical stress due to the piezoresistive effect.

Silicon is one of the few substances, like water/ice and gallium, which density is higher in liquid than in solid state, so it expands when it freezes.

PHYSICAL PROPERTIES

Solid.

Does not mix with water.

Sinks in water.

State	Divided solid	Molecular Weight	28.09
Melting Range (°C)	1410	Viscosity	Not Applicable
Boiling Range (°C)	2355	Solubility in water (g/L)	Immiscible
Flash Point (°C)	Not applicable	pH (1% solution)	Not applicable.
Decomposition Temp (°C)	Not Applicable	pH (as supplied)	Not applicable
Autoignition Temp (°C)	Not Applicable	Vapour Pressure (kPa)	Not applicable.
Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	2.33
Lower Explosive Limit (%)	Not applicable	Relative Vapour Density (air=1)	Not applicable.
Volatile Component (%vol)	Not applicable.	Evaporation Rate	Not applicable

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

Health hazard summary table:

Acute toxicity	Not applicable
Skin corrosion/irritation	Skin Irrit. 2
Serious eye damage/irritation	Eye Irrit. 2A
Respiratory or skin sensitization	Not applicable
Germ cell mutagenicity	Not applicable
Carcinogenicity	Not applicable
Reproductive toxicity	Not applicable
STOT- single exposure	STOT SE 3
STOT- repeated exposure	Not applicable
Aspiration hazard	Not applicable

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POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.

EYE

- Evidence exists, or practical experience predicts, that the material may cause eye irritation in a substantial number of individuals.
Prolonged eye contact may cause inflammation characterised by a temporary redness of the conjunctiva (similar to windburn).
- Contact with the eye by metal dusts may cause mechanical abrasion or foreign body penetration of the eyeball.

SKIN

- This material can cause inflammation of the skin on contact in some persons.
- The material may accentuate any pre-existing dermatitis condition.
- Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

- The material can cause respiratory irritation in some persons.
The body's response to such irritation can cause further lung damage.
- Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.
- Intratracheal instillation of silicon dust in rabbits produced only slight epithelial lesions.
- Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.
If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.
- Effects on lungs are significantly enhanced in the presence of respirable particles.

CHRONIC HEALTH EFFECTS

- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.
Overexposure to respirable dust may cause coughing, wheezing, difficulty in breathing and impaired lung function. Chronic symptoms may include decreased vital lung capacity, chest infections
Repeated exposures, in an occupational setting, to high levels of fine- divided dusts may produce a condition known as pneumoconiosis which is the lodgement of any inhaled dusts in the lung irrespective of the effect.
Metallic dusts generated by the industrial process give rise to a number of potential health problems. The larger particles, above 5 micron, are nose and throat irritants. Smaller particles however, may cause lung deterioration. Particles of less than 1.5 micron can be trapped in the lungs and, dependent on the nature of the particle, may give rise to further serious health consequences.

TOXICITY AND IRRITATION

- Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound.
Intraperitoneal injection of silicon produced only minor local trauma and foreign body reaction. Parenterally administered elemental silica is considered biologically inert.
Dogs and rats fed 800 mg silicon/kg/day (as the dioxide) for 1 month showed no clinical signs or histological changes. The compound was largely eliminated in the faeces.
The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

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Section 12 - ECOLOGICAL INFORMATION

This material and its container must be disposed of as hazardous waste.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
silicon	No Data Available	No Data Available	No Data Available	No Data Available

Section 13 - DISPOSAL CONSIDERATIONS

■ Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction.
- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION



Labels Required: FLAMMABLE SOLID

HAZCHEM:

1Z

Land Transport UNDG:

Class or division:	4.1	Subsidiary risk:	None
UN No.:	1346	UN packing group:	III
Shipping Name:SILICON POWDER, AMORPHOUS			

Air Transport IATA:

ICAO/IATA Class:	4.1	ICAO/IATA Subrisk:	None
UN/ID Number:	1346	Packing Group:	III
Special provisions:	A54		

Shipping name:SILICON POWDER, AMORPHOUS

Maritime Transport IMDG:

IMDG Class:	4.1	IMDG Subrisk:	None
UN Number:	1346	Packing Group:	III
EMS Number:	F- A, S- G	Special provisions:	32

Limited Quantities: 5 kg
Shipping name:SILICON POWDER, AMORPHOUS

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Section 15 - REGULATORY INFORMATION

REGULATIONS

silicon (CAS: 7440-21-3) is found on the following regulatory lists;

"FisherTransport Information","India Hazardous Wastes (Management, Handling and Transboundary Movement) Rules - Schedule 2: List of Wastes Constituents with Concentration Limits","OECD List of High Production Volume (HPV) Chemicals","Sigma-AldrichTransport Information"

Section 16 - OTHER INFORMATION

■ Classification of the preparation and its individual components has drawn on official and authoritative sources using available literature references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings.

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose

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