

Product: Lithium Silicon powder

Applicable Product 11-16-134-0;  
Numbers: 4-5; 4-6; 4-7;  
4-8

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## SAFETY DATA SHEET

### Lithium Silicon Powder

#### SECTION 1 - IDENTIFICATION

**Product Identifier/Name:** Lithium Silicon Powder  
**Other Means of Identification:** None  
**Manufacturer Name:** EaglePicher Technologies, PO Box 49, Joplin, MO 64802  
**Emergency Telephone:** CHEMTREC: 1-800-424-9300  
**Recommended use:** Thermal battery ingredient  
**Telephone for information:** 1-417-623-8000  
**Product Identifier/Name:** Lithium Silicon Powder; 11-16-134-0; 4-5; 4-6; 4-7; 4-8

#### SECTION 2 - HAZARD IDENTIFICATION

**Physical hazards:** Substances and Mixtures Which, in Contact with Water, Emit Flammable Gases – Category-1

**Health hazards:** Eye Corrosion/Irritation- Category 1, Skin Corrosion/Irritation- Category 1

**Environmental hazards:** None

**OSHA defined hazards:** Combustible Metals

**Label elements:**



**Signal word:** Danger

**Hazard statements:** H260: In contact with water, releases flammable gases which may ignite spontaneously

H228: Flammable solid

H314: Causes severe skin burns and eye damage

**Precautionary Statements:** \*P223 Do not allow contact with water because of violent reactions and possible flash fire.

P231+P232 Handle under inert gas. Protect from moisture.

P260 Do not breathe dusts

P246 Wash thoroughly after handling

P280 Wear protective gloves/protective clothing/eye protection/face protection

**Response Statements:** P303+P361+P353: IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower  
P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing  
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing  
P310 Immediately call a POISON CONTROL CENTER or doctor/physician  
\*P370+P378: In case of fire: use extinguishing media on basis of NaCl, pulverized limestone, Class D graphite powder. Never use water.

\*Indicates a non-standard phrase to address issues specific to the material.

**Storage**

P402+P404 Store in a dry place. Store in closed container

P405: Store locked up

**Disposal**

P501 Dispose of contents/containers in accordance with local/ regional/ national/ international regulation.

**Supplemental HAZARD Information**

Lithium Silicon Powder may explode when in contact with water. Exposure to moist air may result in fire. Lithium Silicon Powder can react with water to produce flammable hydrogen gas, which may create a fire and explosion hazard. Spontaneous ignition can occur if Lithium Silicon Powder is heated to its melting point. Lithium Silicon Powder dusts may ignite spontaneously in moist air. Lithium Silicon Powder can react with moisture to produce corrosive compounds. NEVER purge open drums with nitrogen before resealing. Store and transport under argon or mineral oil.

**SECTION 3 - COMPOSITION, INFORMATION ON INGREDIENTS**

Chemical Name	C.A.S. Number	Percentage	Classification
Lithium	7439-93-2	43-45%	Eye Corrosion/Irritation – Category 1 Skin Corrosion/Irritation – Category 1 Sub-category B Substances and Mixtures Which, in Contact with Water, Emit Flammable Gases – Category 1 Flammable solids – Category 1 Combustible dust - Yes
Silicon	7440-21-3	55-57%	Does not meet requirements for classification. Silicon dust suspended in air may under certain conditions cause dust explosions.

**SECTION 4 - FIRST AID MEASURES**

**Inhalation:** Move to fresh air. Call a physician if symptoms develop or persist.

**Skin contact:** If solid Lithium Silicon Powder contaminates the skin, brush off as much of the solid product as possible and then immediately begin decontamination with very large volumes of water. Minimum flushing time is 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Seek immediate medical attention.

**Eye contact:** If solid or molten Lithium Silicon Powder enters the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 30 minutes. Seek immediate medical attention.

**Ingestion:** Give one to two glasses of water and induce vomiting. Never induce vomiting or give anything by mouth to an unconscious person.

**Most important symptoms/effects, acute and delayed:** Causes severe skin burns. Causes severe eye damage

**Indication of immediate medical attention and special treatment needed:** Victims of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and SDS to physician or health professional with victim. Warning: decontamination with limited volumes of water may cause a severe reaction that can burn the skin. Decontamination should be done with copious amounts of water to flush off all Lithium Silicon Powder contamination as quickly as possible.

**SECTION 5 - FIRE FIGHTING MEASURES**

<p><b>Flash Point:</b> N/A</p>	<p><b>Flammable Limits in Air % by Volume:</b> N/A</p>	<p><b>Extinguishing Media:</b> Lithium Silicon Powder Silicon Powder is water-reactive; it will also react with carbon dioxide. DO NOT USE WATER, CARBON DIOXIDE OR SAND. Use DRY graphite, soda ash, powdered sodium chloride, or Lith-X.</p>	<p><b>Auto-Ignition:</b> 179° C (354° F)</p>
<p><b>Special Fire Fighting Procedures</b></p>	<p>If heated to its melting point, spontaneous ignition is likely. Lithium Silicon Powder fires burn very hot and are difficult to extinguish. Flammable hydrogen gas and corrosive fumes are produced upon contact with water. Combustion of Lithium Silicon Powder is accompanied by the emission of dense, white, opaque fires that are toxic and may hide the base of the fire. Molten Lithium Silicon will burn in air, oxygen, nitrogen, and carbon dioxide. Molten Lithium Silicon may react violently with concrete or other materials containing moisture.</p>		
<p><b>Unusual Fire and Explosion Hazards</b></p>	<p>For Incipient Fires: If incipient Lithium Silicon Powder fires are to be fought, proper personal protective equipment must be worn. Personal protective equipment must include face shield, head protection, gloves, body protection, and respiratory protection. A minimum of two sets of personal protective equipment shall be available to firefighters if incipient fires are to be fought. The gloves and body protection must be fire-retardant. In the event of fire, cool tanks with water spray. Be aware of a dangerous reaction with water, if the container is ruptured.</p> <p>For Structural Fires: Proper personal protective equipment must be worn by structural firefighters. Proper protective clothing, respiratory protection, and adequate eye protection shall be used by all responding firefighting personnel assigned to a Lithium Silicon fire. Additional eye protection shall be worn by personnel wearing Self-Contained Breathing Apparatus protection to protect against the higher degree of emitted light during a Lithium Silicon Powder fire. Visual protection equivalent to a No. 6 welding lens shall be used. Refer to NFPA 1500, "Standard on Fire Department Occupational Safety and Health Program" for more information.</p> <p>For additional information, refer to NFPA 484 Standard for Combustible Metals, Metal Powders, and Metal Dusts, most recent Edition</p>		

<p><b>Note:</b> Lithium Silicon Powder Silicon Powder fire residues shall be protected to prevent adverse reactions and to prevent the formation of reactive and unstable compounds. Lithium Silicon Powder Silicon Powder fire residues shall be disposed of in accordance with Federal, State, and local regulations.</p>
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## **SECTION 6 - ACCIDENTAL RELEASE MEASURES**

### **Personal Precautions, protective equipment and emergency procedures:**

Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area and protect people. The minimum Personal Protective Equipment recommended for response to non-incident non-fire releases should be Level B: double-gloves (fire resistant gloves over nitrile or rubber gloves), chemical resistant suit and boots, hard-hat, and Self-Contained Breathing Apparatus.

### **Methods and materials for containment and cleanup:**

Lithium Silicon Powder presents an immediate safety hazard since it can react with moisture in the air and start a fire. Cover the released material quickly. Mineral oil can be used to cover Lithium. Recovered Lithium Silicon Powder should be placed under mineral oil, in a suitable container.

**Molten Lithium:** This material ignites easily and reacts violently with concrete, wood, asphalt, sand, asbestos, and all gases except argon or helium. Use dry graphite or Lith-X to cover the released material and allow it to cool. Recovered Lithium Silicon Powder should be placed under mineral oil, in a suitable container.

**Spilled Lithium Silicon Powder in Mineral Oil:** Lithium Silicon Powder covered in mineral oil is less reactive. Solid pieces should be picked up or scooped up and placed under mineral oil. If this is not possible, cover material with dry graphite. Place the absorbed material under mineral oil, in a suitable container.

Place all spill residue in an appropriate container. Dispose of in accordance with U.S. Federal, State, and local or Canadian hazardous waste disposal regulations.

**Environmental Precautions:** Isolate runoff to prevent environmental pollution.

## **SECTION 7 - HANDLING AND STORAGE**

**Precautions for safe handling:** Avoid getting Lithium Silicon Powder ON YOU or IN YOU. Wash thoroughly with soap and large amounts of water after handling Lithium. Avoid creating and breathing airborne dusts of Lithium. Do not eat or drink while handling Lithium.

All employees who handle Lithium Silicon Powder should be trained to handle it safely. Employees should be trained on the information in the SDS before working with Lithium. Keep Lithium Silicon Powder away from sparks, flames, and other ignition sources. Post "No Smoking" signs in use. Use the smallest possible amount of Lithium Silicon Powder in processes and only in designated areas. Surplus Lithium Silicon Powder must be returned to the container and resealed as soon as possible. Have emergency equipment/materials (e.g., dry graphite) available. Ensure containers are properly labeled. Keep containers closed when not in use.

**Conditions for safe storage, including any incompatibilities:** Keep material stored away from exposure to moisture. Store under an inert gas (e.g., helium or argon) or mineral oil. Nitrogen should not be used as the inert gas for storage. On exposure to atmospheres that are not inert to Lithium, the material may undergo an exothermic surface reaction with oxygen or humidity; this may result in a fire. Store containers in a cool, dry location, away from direct sunlight or sources of intense heat. Store away from incompatible materials (see Section for Stability and Reactivity). A detached, fire-resistant building is recommended for storing large quantities. Solid Lithium Silicon Powder shall be stored only on the ground floor. There should be no basement or depression into which

water or molten metal shall be permitted to flow or fall during a fire. The storage area for Lithium Silicon Powder must be isolated from other areas so that water cannot enter by spray or drainage from automatic sprinkler systems or any other water source. Containers of Lithium Silicon Powder should be inspected monthly by individuals who are familiar with Lithium Silicon Powder hazards and are able to recognize the potential problems associated with the hazards. Mark and store empty containers of this product properly. Empty containers may contain residual material; therefore, empty containers must be handled with care.

**For additional information**, refer to NFPA 484 Standard for Combustible Metals, Metal Powders, and Metal Dusts most recent Edition. Local Fire Departments should be notified of the storage of Lithium Silicon Powder on site. Storage and processing areas of Lithium Silicon Powder should be identified with a NFPA 704 placard (diamond) large enough to be seen from a distance.

## **SECTION 8 - EXPOSURE CONTROLS & PERSONAL PROTECTION**

Exposure Limits / Guidelines		
Chemical Name	OSHA Exposure Limits	TLV
Lithium	Not established	Not established
Silicon	Total Dust – 15 mg/m <sup>3</sup> TWA Respirable Fraction – 5 mg/m <sup>3</sup> TWA	ACGIH TLV - 10 mg/m <sup>3</sup>  Particulates Not Otherwise Regulated. Dust from the product is considered to be PNOS. Specific TLVs for the individual substances have not been established or have been withdrawn, respectively.

**Biological limit values:** Not Established for this combination chemicals.

**Engineering Controls:** Engineered controls should be based on a process hazard assessment. Use with adequate ventilation. Mechanical exhaust may be needed. Use dust controls to protect workers from exposures above the PEL. Because of the potential for reaction with water or moist air, stringent control measures such as isolation or enclosure of operations involving this material may be necessary.

**Exposure Controls:** PPE should be based on a Hazard Assessment as required in 29 CFR 1910.132.

**Respiratory Protection:** Respiratory protection is not generally needed when using Lithium Silicon Powder. Maintain airborne contaminant concentrations as low as possible. If exposure could exceed the regulatory exposure limits, use a NIOSH-approved particulate respirator as a backup to engineering controls. Risk assessment should be performed to determine if air-purifying respirators are appropriate.

**Protective Gloves:** Nitrile rubber, NBR 0.11mm thick.

**Eye/Face Protection:** Safety glasses or goggles, Full face protection. Where there is a possibility of eye exposure, provide an eye-wash fountain/safety shower within the immediate work area for emergency use. Locate the eye-wash fountain/safety shower to avoid contact of water with the material.

**Other Protective Equipment:** Protective work clothing. Wear close-toed shoes and long sleeves/pants.

**General Hygiene Considerations:** Protective work clothing. Wear close-toed shoes and long sleeves/pants.

**Protection from Molten Lithium:** Molten Lithium Silicon Powder shall be contained in closed systems that prevent its contact with air or reactive materials. When working with molten Lithium Silicon Powder, it is recommended to wear flame-resistant PPE, foundry-type safety boots, fire-retardant gloves, and a flame-resistant bib.

## **SECTION 9- PHYSICAL AND CHEMICAL PROPERTIES**

BOILING POINT (760 mm Hg)	1342° C (2447.6° F)
VAPOR PRESSURE (mm Hg, 25°C)	N/A
VAPOR DENSITY (air=1)	N/A
VOLATILE BY VOLUME (%)	N/A
EVAPORATION RATE (butyl acetate=1)	N/A
PHYSICAL STATE	N/A
SOLUBILITY IN WATER (% by weight)	Reacts violently releasing flammable gases
PH	N/A
APPEARANCE	Grayish-white Powder, Granules
ODOR	N/A
ODOR THRESHOLD	N/A
MELTING POINT/FREEZING POINT	700 °C (1292 °F)
FLAMMABILITY	Reacts with water to cause fire and explosion
PERCENT VOLATILE	N/A
UPPER/LOWER FLAMMABILITY EXPLOSIVE LIMITS	N/A
RELATIVE DENSITY	N/A
DENSITY	2.50 - 2.90 g/cm <sup>3</sup>
SPECIFIC GRAVITY	0.534
PARTITION COEFFICIENT: (N-OCTANOL/WATER)	N/A
AUTO IGNITION TEMPERATURE	179° C (354° F)
DECOMPOSITION TEMPERATURE	N/A
VISCOSITY	N/A

## **SECTION 10 - STABILITY AND REACTIVITY**

**REACTIVITY:** Water, Acids, Oxidizing agents, Halogens, Interhalogens

**STABLE OR NOT STABLE:** Normally stable

**INCOMPATIBILITY (MATERIAL TO AVOID):** Water, halogenated hydrocarbons, Teflon, carbon dioxide, strong acids, metals (e.g., mercury, iron, nickel), strong oxidizers, alcohols, nitrogen, acid chlorides, flammable materials. Molten lithium silicon powder can attack plastics and rubbers. A reaction with hydrofluoric acid (HF) and nitric acid (HNO<sub>3</sub>) leads to the formation of toxic gases such as silicon tetrafluoride (SiF<sub>4</sub>) or nitrous gases (NO<sub>x</sub>). The product may also react with other acids, but the reaction with alkaline solutions (see above), gives a more violent reaction (exotherm) developing extremely flammable hydrogen (H<sub>2</sub>) gas. Wet product will form

extremely flammable hydrogen gas if added to molten silicon, due to decomposition of water. Reacts violently with water releasing flammable gases.

**HAZARDOUS DECOMPOSITION PRODUCTS:** Hydrogen gas, lithium hydroxide, lithium carbonate, lithium oxide

**CONDITIONS TO AVOID:** Exposure to water. Avoid generating sparks or other ignition sources (e.g. welding) in areas with high dust concentrations. Silicon-particles suspended in air at concentrations above 100 g/m<sup>3</sup> can cause dust explosions. Both ignition sensitivity and the violence of explosion increase with decreasing particle size. Silicon dust with particle diameter > 40 µm probably entails no danger of explosion. Ignition temperature (warm surface) ≥ 800 °C.

Addition of wet material to molten silicon may cause explosions.

## **SECTION 11 - TOXICOLOGICAL INFORMATION**

**Information on likely routes of exposure:** In terms of anticipated occupational overexposure situations for employees, the main health effect from overexposure would be irritation or burns of contaminated skin and eyes that have been contaminated with solid Lithium Silicon Powder (which reacts with moisture to produce corrosive compounds including Lithium Silicon Powder hydroxide) or the molten metal.

**Inhalation:** Lithium Silicon Powder dust can react with the moisture in the mucous membranes and lungs to form corrosive compounds resulting in severe irritation and damage the tissue of the nose, mouth, throat and upper respiratory system. Symptoms of such overexposure can include sore throat, coughing, shortness of breath, and labored breathing.

**Contact with Skin or Eyes:** When Lithium Silicon Powder encounters moisture (including moisture on the skin), Lithium Silicon Powder will produce caustic materials which can irritate, redden, and damage contaminated skin or eye tissue. Contact with the eyes may cause corneal damage or blindness. Contact with skin can cause burns that are slow to heal and may leave scars. Prolonged or repeated skin contact may cause dermatitis (dry, red skin). Contact with molten Lithium Silicon Powder can cause thermal burns.

**Skin Absorption:** Skin absorption is not a significant route of exposure for Lithium.

**Ingestion:** Ingestion of Lithium Silicon Powder is not anticipated to be a significant route of occupational exposure. If Lithium Silicon Powder is swallowed, it can severely burn the mouth, throat, and gastrointestinal tissues. Symptoms of such overexposure can include abdominal pain, nausea, and vomiting. Severe overexposures via ingestion can be fatal due to internal tissue damage.

**Chronic:** Prolonged or repeated skin contact may cause dermatitis (dry, red skin). Lithium Silicon Powder poisoning may result in kidney and central nervous system effects.

**Target Organs:** **Acute:** Eyes, skin, mucous membranes. **Chronic:** Skin, Nervous System, Kidney, thyroid

**Silicon dust/fines and fumes:** Low health risk by inhalation. Generally considered to be biologically inert (milling, cutting, grinding).

**Silicon (inert dusts):** Chronic overexposures: Can cause chronic bronchitis and narrowing of airways.

**Toxicity data:** The following data are for Lithium:

LD<sub>50</sub> (oral rat) >210 mg/kg.

**Carcinogenicity:** Lithium Silicon Powder is not listed as a carcinogen or suspected carcinogen by IRC, NTP, OSHA or ACGIH.

**Sensitization:** Lithium Silicon Powder is not known to be a skin or respiratory sensitizer.

**Reproductive Toxicity Information:**

Mutagenicity: Lithium Silicon Powder is not reported to produce mutagenic effects in humans, however, some Lithium Silicon Powder compounds have tested positive for mutagenicity in some test systems.

Embryotoxicity: Lithium Silicon Powder is not reported to produce embryotoxic effects in humans.

Teratogenicity: Lithium Silicon Powder is not reported to produce teratogenic effects in humans, however, some Lithium Silicon Powder compounds have been reported to cause teratogenic effects in humans when administered therapeutically (for medical purposes) and in laboratory animal tests.

Reproductive Toxicity: Lithium Silicon Powder is not reported to produce adverse reproductive effects in humans, however, some Lithium Silicon Powder compounds have been shown to affect fertility in tests with laboratory animals.

ACGIH Biological Exposure Indices (BEIs): Currently, there are no ACGIH Biological Exposure Indices (BEIs) determined for Lithium.

## **SECTION 12 - ECOLOGICAL INFORMATION**

All work practices must be aimed at eliminating environmental contamination. Lithium Silicon Powder will react with water, moist air, and carbon dioxide in the atmosphere to form stable Lithium Silicon Powder salts. The effects on exposed animals would primarily be irritation and chemical burns of contaminated tissue. The main effect on plants would be the increase in salinity and alkalinity of contaminated soils if large volumes of Lithium Silicon Powder is released. Releases of large quantities of Lithium Silicon Powder can be detrimental to an aquatic environment by altering the salinity and alkalinity of a body of water.

**Acute Aquatic Toxicity:** Lithium Silicon Powder will react with water to form Lithium Silicon Powder hydroxide, which will increase the pH of the solution and kill or damage aquatic life. The following aquatic toxicity data are available for Lithium Silicon Powder Hydroxide:  
LC50 rainbow trout 62.21 mg/L/96 hr, NOEC fathead minnow 0.7 mg/L (OECD 210).  
EC50 Daphnia magna 60 mg/L/48 hr, NOEC 4 mg/L (OECD 211) ErC50 green algae 153.44 mg/L/72 hr, EbC50 green algae 41.62 mg/l/72hr NOEC 10 mg/L (OECD 201)  
EC50 (respiration inhibition) bacteria 180 mg/l.

**Degradability:** Biodegradation does not apply to inorganic substances.

**Log Bioconcentration Factor (Bcf):** No data currently available.

**Log Octanoic After Partition Coefficient:** No data currently available.



**SECTION 13- DISPOSAL CONSIDERATIONS**

Dispose in accordance with the applicable regulations in country and state. Disposal should be performed by licensed professional disposal firms knowledgeable in Federal, State or Local requirements of hazardous waste treatment and hazardous waste transportation.

**SECTION 14- TRANSPORT INFORMATION****DOT**

**UN number:** 1417  
**UN proper shipping name:** UN 1417, Lithium Silicon, 4.3, II.  
**Transport hazard class:** 4.3  
**Packing group:** II  
**ERG number:** 138

**IATA/ICAO**

**UN number:** 1417  
**Proper Shipping Name:** UN 1417 Lithium Silicon  
**Transport Description:** UN 1417, Lithium Silicon, 4.3, II  
**IATA/ICAO Class:** 4.3  
**Packing Group:** II  
**ERG Code:** 4W  
**Passenger and Cargo Aircraft:** PI 483, Max Net Qty/Pkg – 15 Kg  
**Cargo Aircraft Only:** PI 490, Max Net Qty/Pkg – 50 Kg

**SECTION 15- REGULATORY INFORMATION**

**U.S. SARA REPORTING REQUIREMENTS:** Lithium Silicon Powder is not subject to the reporting requirements of the Comprehensive Environmental Response, Compensation, and Liability Act and Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

**CERCLA SECTION 103 (40 CFR 302.4) Listed CERCLA Hazardous Substance:** No

**SARA SECTION 302 (40 CFR 355.30) Extremely Hazardous Substance:** 4.3 Substances which, in contact with water, emit flammable gases.

**SARA SECTION 304 (40 CFR 355.40) RQ-CERCLA or SARA 302:** No

**SARA SECTION 313 (40 CFR 372.65): Toxic Chemical Release Inventory (TRJ/Form R):** No

**U.S. SARA THRESHOLD PLANNING QUANTITY:** There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs. (4,540 kg) may apply, per 40 CFR 370.20.

**U.S. CERCLA REPORTABLE QUANTITY (RQ):** Not applicable.

**U.S. TSCA INVENTORY STATUS:** Lithium Silicon Powder is listed on the TSCA Inventory.

**U.S. TSCA 12(b) EXPORT NOTIFICATION:** TSCA 12(b) Notification is not required, per 40 CFR 707, for Lithium.

**OTHER U.S. FEDERAL REGULATIONS:** Not applicable.

**Other Federal regulations**

US Massachusetts RTK – Substance List: Lithium

US New Jersey Worker and Community Right To Know Act: Lithium

US Pennsylvania Worker and Community Right To Know Law: Lithium

US California Proposition 65: No

**SECTION 16- OTHER INFORMATION**

**This SDS is intended to provide a summary of our knowledge and guidance regarding the use of this chemical. The information contained here has been compiled from sources considered by EaglePicher Technologies, LLC to be dependable and is accurate to the best of the Company's knowledge. It is not meant to be an all-inclusive document on worldwide hazard communication regulations. This information is offered in good faith. Each user of this material needs to evaluate the conditions of use and design the appropriate protective mechanisms to prevent employee exposures, property damage or release to the environment. EaglePicher Technologies, LLC assumes no responsibility for injury to the recipient or third persons or for any damage to any property resulting from misuse of the chemical.**