

1. Identification of the Product and Supplier

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|----------------------------|---|
| Product name: | Elkem Inoculants and Specialist Alloys <i>Alinoc®</i> , <i>Barinoc®</i> , <i>Bisnoc™</i> , <i>FG FeSi</i> , <i>Foundrisil®</i> , <i>Lanthanoc™</i> , <i>LaSi</i> , <i>Reseed®</i> , <i>SMZ®</i> , <i>Superseed®</i> , <i>Superseed® Extra</i> , <i>Ultraseed®</i> , <i>Vaxon®</i> , <i>Zircinoc® inoculants</i> , <i>Elcast®</i> and <i>Tenbloc® inserts</i> , <i>Preseed® preconditioner</i> , <i>Topseed® conditioner</i> . |
| Product application: | Additive to liquid metal in foundries for production of cast iron. |
| Address/Phone No.: | Elkem ASA Silicon Products P.O. Box 334 Skøyen, N-0213 Oslo, Norway Telephone: + 47 22 45 01 00 Telefax: + 47 22 45 01 11 https://www.elkem.com/silicon-products/iron-foundries/sds.efp@elkem.no |
| REACH registration number: | 01-2119485286-28-0033 |
| REACH and CLP helpdesk: | https://echa.europa.eu/support/helpdesks/ |
| Emergency Phone No: | https://poisoncentres.echa.europa.eu/home USA: Poison Help (AAPCC): 1-800-222-1222 & PoisonHelp.org United Kingdom: Contact your GP or NHS 111 on 111 (for 24 hour health advice). |

2. Hazards Identification

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| Classification: | The product does not meet the criteria for hazard classification in accordance with Regulation (EC) No 1272/2008 (CLP) and the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 6 th revision. |
| Hazard pictogram: | N/A (not applicable) |
| Signal word: | N/A (not applicable) |
| Hazard statements: | N/A (not applicable) |
| Precautionary statements: | N/A (not applicable) |

Flammable and noxious gases may be formed in contact with moisture, acids or bases. See section 10 and 11.
FeSi-dust suspended in air may under certain conditions cause dust explosions. See section 10.

3. Composition/Information on ingredients

Synonyms/Trade names: FeSi-alloys, Ferrosilicon alloys, FeSi75.
IUPAC-name: Ferrosilicon
CAS No.: 8049-17-0
Provisional list number (ECHA): FeSi is registered under REACH as a "multi-constituent substance" as reaction mass of iron and iron disilicide and iron silicide and silicon" with number 912-631-7. For hazard classification purposes, a CSA according to REACH has been carried out for FeSi Inoculants.

Chemical composition¹⁾:

| Element | Symbol | CAS No. | EINECS No. | Weight % |
|-----------|--------|-----------|------------|----------|
| Silicon | Si | 7440-21-3 | 231-130-8 | 35 – 80 |
| Aluminium | Al | 7429-90-5 | 231-072-3 | 0 – 5.0 |
| Bismuth | Bi | 7440-69-9 | 231-177-4 | 0 – 5.0 |
| Barium | Ba | 7440-39-3 | 231-149-1 | 0 – 6.0 |
| Calcium | Ca | 7440-70-2 | 231-179-5 | 0 – 2.5 |
| Cerium | Ce | 7440-45-1 | 231-154-9 | 0 – 9.0 |
| Lanthanum | La | 7439-91-0 | 231-099-0 | 0 – 5.0 |
| Magnesium | Mg | 7439-95-4 | 231-104-6 | 0 – 2.5 |
| Manganese | Mn | 7439-96-5 | 231-105-1 | 0 – 4.5 |
| Oxygen | O | 7782-44-7 | 231-956-9 | 0 – 1.5 |
| Strontium | Sr | 7440-24-6 | 231-133-4 | 0 – 1.5 |
| Sulphur | S | 7704-34-9 | 231-722-6 | 0 – 1.5 |
| Zirconium | Zr | 7440-67-7 | 231-176-9 | 0 – 5.0 |
| Titanium | Ti | 7440-32-6 | 231-142-3 | 0 – 0.2 |
| Copper | Cu | 7440-50-8 | 231-159-6 | < 0.1 |
| Chromium | Cr | 7440-47-3 | 231-157-5 | 0 – 0.3 |
| Carbon | C | 7440-44-0 | 231-153-3 | < 0.05 |
| Iron | Fe | 7439-89-6 | 231-096-4 | Balance |

1) See Product Data Sheet or product certificate for exact composition of individual products.

4. First Aid Measures

Inhalation: Irritation caused by dust: Fresh air. See a physician on persistent feeling of discomfort.
Phosphine/arsine intoxication: Seek medical attention. See section 11.
Skin contact: Wash skin with water and/or a mild detergent.
Eye contact: Rinse eyes with water/saline solution. See a physician on persistent feeling of discomfort.
Ingestion: Remove the person affected from dust-exposed area. See inhalation.

5. Fire Fighting Measures

Extinguishing media: Dry sand, CO₂ or dry powder.

FeSi in the form of dry granules is not combustible.

FeSi dust suspended in air may under certain conditions cause dust explosions. See section 10.

6. Accidental Release Measures

Material in the form of dust should be collected in suitable containers. Damp product must be kept away from dry, and must not be collected and stored in closed containers. Dry dust can be vacuumed or swept up.

7. Handling and Storage

Handling: Avoid handling that generates dust build-up. Avoid inhalation of dust. See section 8. Avoid ignition sources (e.g. welding) in areas with high dust concentrations. Addition of wet material to molten metal may cause explosions. See section 10.

Storage: FeSi must be kept in a dry and well-ventilated place, and away from acids and bases.

Inadequate ventilated containers:

It is advisable to allow 15 minutes of natural venting with fully open doors so that fresh air can freely enter the container before starting to unload/strip the containers.

Opening of containers should preferably be done outdoors, but only under conditions whereby the product is kept dry.

In case there is a need for immediate stripping (i.e. less than 15 minutes waiting), always wear a full face mask respirator with gas/vapour filter according to standard EN 14387 during the unloading period.

8. Exposure Controls/Personal Protection

A. Occupational exposure controls

Eye protection, eye flushing facilities and protective gloves. Ensure good ventilation. Wear a particulate respirator according to EN 149 FFP2S or FFP3S in areas of inadequate ventilation. If exposure to phosphine and arsine is suspected (see section 10) in areas of poor ventilation (e.g. storage holds, bunkers etc.), a self-contained breathing apparatus or an air fed respirator should be worn.

For opening and immediate stripping of inadequate ventilated containers, always wear an rpe as stated in section 7.



Workplace Exposure Limits (HSE, EH40/2005)

Table 1: List of approved workplace exposure limits (as consolidated with amendments, December 2011):

| Substance | CAS number | 8 hour TWA | | 15 minute STEL | |
|----------------------------------|------------|------------|-------------------|----------------|-------------------|
| | | ppm | mg/m ³ | ppm | mg/m ³ |
| Inhalable dust | - | - | 10 | - | - |
| Respirable dust | - | - | 4 | - | - |
| Phosphine gas (PH ₃) | 7803-51-2 | 0.1 | 0.14 | 0.2 | 0.28 |
| Arsine gas (AsH ₃) | 7784-42-1 | 0.05 | 0.16 | - | - |

EU OEL: Commission Directive 2006/15/EC

Indicative occupational exposure limit values:

| Substance | CAS number | 8 hour | | 15 minute | |
|-----------|------------|--------|-------------------|-----------|-------------------|
| | | ppm | mg/m ³ | ppm | mg/m ³ |
| Phosphine | 7803-51-2 | 0.1 | 0.14 | 0.2 | 0.28 |

Elkem has devised a "Procedure for sampling, measuring and reporting of phosphine (PH₃), arsine (AsH₃) and airborne particulates" of the workplace atmosphere (1994). The low occupational exposure limit for arsine gas is due to the evidence for carcinogenicity in humans of inorganic arsenic compounds in general (IARC). The OEL for dust does not cover possible arsine/phosphine absorption from dust deposited on mucous membranes.

DNEL (Derived No Effect Level):

4 mg/m³, proposal for inhalable FeSi particles (determined as Si).

0.3 mg/m³, proposal for respirable FeSi particles (determined as Si).

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B. Environmental exposure controls

Target value and limit value for PM₁₀ and PM_{2.5} (Directive 2008/50/EC):

| | Averaging period | Limit value | |
|-------------------|------------------|------------------------|----------------|
| PM ₁₀ | One day | 50 µg/m ³ ★ | |
| PM ₁₀ | Calendar year | 40 µg/m ³ | |
| PM _{2.5} | Calendar year | 25 µg/m ³ | |
| PM _{2.5} | Calendar year | 20 µg/m ³ | 1 January 2020 |

★ Not to be exceeded more than 35 times a calendar year.

9. Physical and Chemical Properties

Appearance:

Colour: Grey.
Form: Metallic granules in different size ranges within 0 – 10 mm.
Ingots in various sizes.

Odour: Odourless

Odour threshold: N/A

pH: See solubility

Melting point/freezing point: 1220 – 1400 °C (101.3 kPa)

Initial boiling point and boiling range: N/A

Flash point: N/A

Evaporation rate: N/A

Flammability (solid): No ignition.

Upper/lower flammability

or explosive limits: Lowest explosive limit is +/- 60 mg/m³

Vapour pressure: N/A

Vapour density: N/A

Relative density: 2.5 – 7.3 g/cm³

Solubility(ies): 15 µg Si/L at pH 5.8 (OECD 105), diameter < 1 mm

Partition coefficient: n-octanol/water: N/A

Auto-ignition temperature: > 400 °C (EU Method A.16)

Viscosity: N/A

Explosive properties: N/A

Oxidising properties: N/A

10. Stability and Reactivity

Conditions to avoid:

Avoid generating sparks and other ignition sources (e.g. welding) in areas with high dust concentrations. FeSi-particles suspended in air at concentrations above 100-300 g/m³ can cause dust explosions. For a given particle size, the ignition sensitivity and the violence of explosion decrease with decreasing Si/Fe ratio. Dust with Si/Fe ratio ≤ 2 and particle diameter > 10 µm, is considered not to represent any danger of explosion. Addition of wet material to molten metal may cause explosions.

Materials to avoid:

Water/humidity, acids and bases.

Hazardous decomposition products:

Highly flammable hydrogen gas (H₂) and the highly flammable and very toxic gases phosphine (PH₃) and arsine (AsH₃) (garlic-like smell), may be formed if FeSi gets in contact with moisture, acids or bases. A prerequisite for phosphine and arsine gas formation is the presence of reactive phosphides or arsenides, such as e.g. Ca₃P₂ or Ca₃As₂ at the alloy phase-boundaries inside the alloy. Very low levels of P (< 0.02 %) and As (< 0.0005 % detection limit) in FeSi, in combination with rapid solidification that limits segregation of the alloying elements, effectively minimize the formation of such compounds and thus the probability of gas formation.

Phosphine (PH₃) and arsine (AsH₃) are both heavier than air and may concentrate at the bottom of closed containers. Densities (25 °C, 1 atm), PH₃: 1.379 g/L, AsH₃: 1.321 g/L, air: 1.225 g/L.

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Phosphine (PH₃) gas may accumulate in inadequate ventilated/closed containers during shipment and storage, and in these cases special measures are needed during initial opening and unloading of containers (see sections 7 and 8).

A reaction with hydrofluoric acid (HF) or nitric acid (HNO₃) leads to the formation of toxic gases such as silicon tetrafluoride (SiF₄) or nitrous gases (NO_x).

Wet product will form highly flammable hydrogen gas if added to molten metal, due to decomposition of water.

11. Toxicological Information

The product does not meet the criteria for hazard classification according to Regulation (EC) No1272/2008 (CLP) and the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 6th revision.

Acute effects:

Inhalation: Finely divided dust may irritate and dehydrate mucous membranes.

Phosphine/arsine may be absorbed from dust deposited on mucous membranes.

Containers: Phosphine/arsine may be inhaled inside and close to newly opened inadequate ventilated containers.

Phosphine irritates exposed mucous membranes, depresses the central nervous system (CNS) and can cause oedema of the lungs. Acute, non-fatal poisoning with phosphine gives temporary effects, among others headache, malaise, vomiting, stomach pains, cough, and difficulty in breathing.

Skin contact: Dust may irritate the skin.

Eye contact: Dust may irritate and lead to dryness.

Chronic effects:

No adverse chronic effects of this product expected, based on both practical experience and review of available scientific literature. Historic, epidemiological studies covering cohorts of workers in the Norwegian ferro-alloy industry have been carried out as demonstrated by the list of reference literature, showing there is no cancer risk from this product.

12. Ecological Information

The product is not characterised as dangerous for the environment.

MOBILITY: The alloy has poor mobility under normal environmental conditions.

PERSISTENCE: Not relevant for the elements in the alloy.

BIOACCUMULATION: Not relevant, due to low mobility and non-dispersive use.

ECO-TOXICITY: The product does not meet the classification criteria for eco-toxicological endpoints in accordance with Regulation (EC) 1272/2008 (CLP) and the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 6th revision.

PNEC (Predicted No Effect Concentration): N/A

13. Disposal Considerations

The material should be recovered for recycling where possible.

The product does not meet the classification criteria for eco-toxicological endpoints in accordance with Regulation (EC) 1272/2008 (CLP).

Prior to disposal of large quantities of this material, advice should be sought from the nearest Environment Agency.

14. Transport Information

UN no.: 1408
IMDG-code¹⁾: Not assigned to class 4.3*
ICAO/IATA¹⁾: Not assigned to class 4.3
ADR/RID¹⁾: Not assigned to class 4.3

* Substances which in contact with water emit flammable gases.

¹⁾ Consignments of ferrosilicon with a chemical analysis as described in section 3 has been tested according to "United Nations Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria Part III - 33.4.1.4" and has passed the test. Consequently, the product is not classified as a Class 4.3 product.

FeSi is not considered to cause harm to aquatic organisms (Lillicrap, 2011). FeSi is not a marine pollutant.

15. Regulatory Information

The text of this Product Safety Information is prepared in compliance with:

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) and subsequent amendments.
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

A Chemical Safety Assessment (CSA) according to REACH has been carried out for FeSi alloys.

16. Other Information

According to Chapter 1.5.2 of the UN Globally Harmonized System of classification and labelling of chemicals (GHS), Article 58 (2)(a), and Article 59(2)(b) of (EC) No 1272/2008 (CLP), which amends REACH article 31(1), safety data sheets (SDS) are only required for substances and mixtures that meet the harmonized criteria for physical, health or environmental hazards. Since this product does not meet these criteria, a SDS according to (EU) 2015/830 is not issued. In order to communicate relevant HSE-(health, safety and environmental) information, this product safety information (PSI) is provided instead.

REACH article 31(7) requires relevant exposure scenarios from the Chemical Safety Report (CSR) to be annexed to the SDS. However, according to REACH Annex I, section 0. (Introduction), subsection 0.6. no 4 and 5, exposure scenarios are only required for hazard-classified substances or mixtures. Since this product is not hazard-classified according to CLP, there is no requirement for exposure scenarios.

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