

1. Identification of the Product and Supplier

Product name: **Elkem Inoculants and Specialist Alloys**
Alinoc®, **Barinoc®**, **Bisnoc™**, **FG FeSi**, **Foundrisil®**, **Lanthanoc™**, **LaSi**,
Reseed®, **SMZ®**, **Ultraseed®**, **Vaxon®**, **Zircinoc® inoculants**, **Elcast®** and
Tenbloc® inserts, **Preseed® preconditioner**, **Topseed® conditioner**.

Product application: Additive to liquid metal in foundries for production of cast iron.

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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
Chemtrec (800) 424-9300

2. Hazards Identification

Classification: The product does not meet the criteria for hazard classification in accordance with the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 10th revision and OSHA's HCS.

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 EC 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 – 6.0
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 – 0.3
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

Eye protection, eye flushing facilities and protective gloves. Ensure good ventilation. Wear a particulate respirator in accordance with 29 CFR 1910.134 or CSA Standard 42 CFR 84, CAN/CSA Z94.4-2018 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.

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.



Occupational Exposure Limits (ACGIH ^{*}), 2016): **ACGIH TLV**

Substance	CAS number	8-hour TWA		15 minute STEL	
		ppm	mg/m ³	ppm	mg/m ³
PNOS ¹⁾ , inhalable fraction	-	-	10	-	-
PNOS, respirable fraction	-	-	3	-	-
Phosphine (PH ₃)	7803-51-2	0.3	-	1	-
Arsine (AsH ₃)	7784-42-1	0.005	-	-	-

^{*}American Conference of Governmental Industrial Hygienists.

1) Particulates (Insoluble or Poorly Soluble) Not Otherwise Specified.

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 OELs 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).

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/m ³
Vapour pressure:	N/A
Vapour density:	N/A
Relative density:	2.5 – 7.3 g/cm ³
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.

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 the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 10th revision, and OSHA's HCS.

Acute effects:

Ingestion: Not applicable. Product is supplied in lumps.

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.

Endocrine disrupting properties: The product is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU)2017/2100 or Commission Regulation (EU)2018/605.

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 the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS), 10th revision, and OSHA's HCS.

PNEC (Predicted No Effect Concentration): N/A

Endocrine disrupting properties: The product is not identified as having endocrine disrupting properties in accordance with the criteria set out in Commission Delegated Regulation (EU)2017/2100 or Commission Regulation (EU)2018/605.

13. Disposal Considerations

The material should be recovered for recycling if possible. Dispose of waste product according to applicable federal, state and local rules for non-hazardous solid waste materials. No special precautions are necessary during repackaging. The product is not a listed RCRA Hazardous Waste (40 CFR 261).

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

A Chemical Safety Assessment (CSA) according to the European REACH regulation has been carried out for FeSi Alloys.

OSHA:	This safety data sheet has been compiled in accordance with the revised Hazard Communication Standard (HCS 2012) and applies GHS classification criteria.
TSCA:	The product is listed in the TSCA (Toxic Substance Control Act) Inventory (CAS # 8049-17-0).
CERCLA:	(Comprehensive Response Compensation, and Liability Act): The product is not listed in 40 CFR 302.4.
RCRA:	(Resource Conservation/Recovery Act): The product is not a listed hazardous waste.
SARA TITLE III:	(Superfund Amendments and Reauthorization Act): 302 (extremely hazardous substance): not listed 311/312 Hazard Categories: Immediate Health, Delayed Health: not listed 313 Reportable Ingredients: None.
CALIFORNIA PROPOSITION 65:	None
IARC:	Ferrosilicon has not been classified as carcinogen to humans.
US-NTP:	The product is not listed in the 2011 Report on Carcinogens (RoC).
WHMIS:	Not classified.
DSL Canada	The substance is specified on the public Portion of the Domestic Substances List (identifier: 8049-17-0).
EU REACH:	Ferrosilicon (CAS # 8049-17-0) has been registered under the European REACH regulation (registration number 01-2119485286-28-0033). The chemical safety assessment is based on the corresponding Chemical Safety Report (CSR).

16. Other Information

According to Chapter 1.5.2 of the UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS) safety data sheets (SDS) are only required for substances and mixtures that meet the harmonized criteria for physical, health or environmental hazards. This product does not meet these criteria.

Indication of changes:

Changes from revision 01 to 02: Contact information in section 1.

Changes from rev. 02 to 03: composition updated (section 3), reference to GHS 10th rev., Superseed removed.

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