

FERROSILICON (FeSi)

Ferrosilicon is not classified as hazardous under the CLP Regulation (1272/2008/EC) or as dangerous under the Dangerous Substances Directive (67/548/EEC), is not persistent bio accumulative and toxic (PBT) or very persistent and very bio accumulative (vPvB) as defined in Annex XIII of the REACH Regulation, and is not included in the ECHA candidate list of substances of very high concern.

Therefore provision of a Safety Data Sheet (SDS) according to Regulation 453/2010 is not mandatory. This Product Safety Information (PIS) is a voluntary presentation of certain information that may assist the user in the handling of Ferrosilicon.

1 IDENTIFICATION OF SUBSTANCE AND COMPANY

1.1 Product Identifier

- Ferrosilicon (FeSi)
- Iron silicon alloy
- Iron silicide/disilicide

Reach Reference No	01-2119485286-28-0065
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Ferrosilicon is registered under REACH as a “multi-constituent substance” as reaction mass of iron and iron silicide and iron disilicide and silicon with a provisional list number 912-631-7. For classification purposes, Ferrosilicon is assessed as an entity and not as a mixture.

	MCS	Ferro silicon	Iron silicide	Iron disilicide	Silicon	Iron
CAS number	912-631-7	8049-17-0	12022-95-6	12022-99-0	7440-21-3	7439-89-6
EC number	-	-	234-670-2	234-671-8	231-130-8	231-096-4

1.2 Relevant identified uses of the substance and uses advised against

This product is used as raw material for the manufacture of steel, alloys or special steel, for deoxidation and alloying of steel melts in the stainless steel industry, for silicothermic reduction of refractory metals and in the foundry industry.

No uses advised against.

1.3 Details of supplier/ manufacturer

Vargön Alloys AB

468 80 Vargön

+46 521 27 73 00

www.vargonalloys.se

1.3.1 Name of contact person

Evalotta Stolt

Environment and Quality manager

+46 521 27 73 37

1.4 Emergency telephone number

As the substance is not hazardous as such there is no need for emergency numbers. However if there will be an accident call your local emergency hotline.

112 is the emergency number throughout Europe.

2 HAZARDS IDENTIFICATION

2.1 Classification of the substance

This product does not meet the criteria for hazard classification requirements of the current European legislation on classification and labelling that are applicable for substances.

2.2 Label elements

This product is not hazardous. Labelling is not required.

2.3 Other Hazards

If the material comes into contact with water or moist air, explosive and toxic gases (phosphine and/or arsine) may be generated. These gases can, when inhaled in small quantities cause headache, nausea and vomiting. In greater doses lung damage can occur.

Ferrosilicon particles may under certain conditions cause dust explosions.

Use appropriate protective equipment; eye-protection and gloves when handling the material directly and suitable respiratory protection where dust occurs.

3 COMPOSITION INFORMATION ON INGREDIENTS

3.1 Substances

Component	CAS Nr	EINECS/ELINCS	Amount (%)	Symbol	R-Phrases
Silicon	7440-21-3	231-130-8	40-80	Si	None
Iron	7439-89-6	231-096-4	20-30	Fe	None
Aluminium	7429-90-5	231-072-3	0,5-2	Al	None
Carbon	7440-44-0	231-153-3	0,03-1,0	C	None
Phosphorus	7723-14-0	231-768-7	0,01-0,05	P	None
Sulphur	7704-34-9	231-722-6	0,002-0,025	S	None
Calcium	7440-70-2	231-179-5	0,05-0,3	Ca	None

Other Components:

Remaining components of this product are proprietary, non-hazardous and/or are present at concentrations below reportable limits.

Additional Information:

Amounts indicated are typical and do not represent a specification.

4 FIRST AID MEASURES

4.1 Description of first aid measures

Move the person to fresh air - if respiratory problem persists or if you suspect poisoning of toxic gases seek medical attention.

4.1.1 Inhalation

If mechanical irritation is caused by dust in the airways move the person to fresh air - if respiratory problem persists, seek medical attention.

4.1.2 Skin contact

Wash skin carefully with water and soap, then rinse the skin with water.

4.1.3 Eye contact

If mechanical irritation is caused by dust in the eyes, rinse eyes with plenty of water to remove dust. Seek medical attention if discomfort persists. Do not rub the eyes.

4.2 Most important symptoms and effects, both acute and delayed

Over exposure to Ferrosilicon dust may cause irritation symptoms like coughing and sore throat, reddening and heavy watering of the eyes. Skin contact may cause itching of the skin and dehydration.

4.3 Indication of any immediate medical attention and special treatment needed

No relevant information has been identified.

5 FIRE-FIGHTING MEASURES

5.1 Extinguishing media

Ferrosilicon in lumpy pieces is not combustible.

5.2 Special hazards arising from the substance or mixture

Ferrosilicon is not combustible. Wet material added to hot molten ferrosilicon may cause explosions due to formation of flammable hydrogen gas. Ferrosilicon particles may under certain conditions cause dust explosions.

5.3 Advice for fire-fighters

Ferrosilicon in lumpy pieces is not combustible.

6 ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Eye protection and respirators should be worn where dust is a potential hazard. Gloves should be worn when handling this material because of the risk of contact with sharp particles.

6.2 Environmental precautions

Do not pour water on the scattered material or in the containers. Dispose in a way approved by the competent local authorities. Dry material can normally be re-used.

6.3 Methods and material for containment and cleaning up

Collect spillage in a closed container. Avoid excessive dust generation.

Damp or wet material must be kept away from dry and not stored in closed containers.

Ferrosilicon in the form of dust should be vacuumed by using a spark proof vacuuming system rather than swept up.

7 HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid generation of dust. Protective equipment, gloves and goggles, should be worn when handling the material. Suitable respiratory protection should be worn where dust occurs.

If the material comes into contact with water or humid atmosphere explosive and toxic gases may be generated.

Avoid generating sparks or other ignition sources in areas with high dust concentrations.

Addition of wet material to molten ferrosilicon may cause explosions due to formation of flammable hydrogen gas.

Avoid reaction with acids like hydrofluoric acid (HF) and nitric acid (HNO₃) which could lead to formation of toxic gases.

7.2 Conditions for safe storage, including any incompatibilities

The product is stable in storage and should be kept dry in well ventilated place. Keep away from acids and bases.

7.3 Specific end use(s)

See section 1.2 above

8 EXPOSURE CONTROL / PERSONAL PROTECTION

8.1 Control parameters

8.1.1 National limit values

Users must always consult their national or regional regulatory authorities for advice on the current legal limits applicable to them. They should further check whether these limits are legally binding or only recommended guidelines.

Frequently used limit values for inhalable dust in Europe is

- eight hours 10 mg/m³
- short term 20 mg/m³ (Austria, Denmark and Germany)

National limit values for Sweden (AFS 2005:17)

Substance	CAS-nr	Limit value - NGV (8 hours)	Short term limit value - KTV (15 min)
Dust, total	-	10 mg/m ³	-
Dust, respirable	-	5 mg/m ³	-
Phosphorous tri hydride (Phosphine, PH ₃)	7803-51-2	0,4 mg/m ³	1,4 mg/m ³
Arsenic trihydride (Arsine, AsH ₃)	7784-42-1	0,05 mg/m ³	-

8.1.2 DNEL and PNEC

Proposal of DNEL (<i>Derived No Effect Level</i>)		PNEC (<i>Predict No Effect Concentration</i>)
Inhalable	Respirable	
4 mg/m ³	0,3 mg/m ³	Not relevant

8.2 National Exposure controls

8.2.1 Appropriate engineering controls

Use local exhaust ventilation for dusty operations.

8.2.2 Individual protection measures, such as personal protective equipment

Always wash the hands after finishing work.

8.2.3 Eye/face protection

Goggles / face shield if dust is a hazard.

8.2.4 Skin

Long sleeves overalls; gloves for hands, where applicable.

8.2.5 Respiratory

If exposure is above the Occupational Health limits, suitable respiratory protection equipment approved by national authorities should be used.

8.2.6 Thermal hazards

Not identified.

8.2.7 Environmental exposure controls

Do not wash spilled materials into drainage system, material may block drains. The limit values for particles (PM 2,5 and PM 10) of the Ambient Air Directive 1999/30/EC and its further amendments have to be implemented.

9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Metallic silver grey lumps or fine material
Odour	No odour
Odour threshold	Not applicable as there is no odour
pH	Not relevant
Melting point	1220-1400 °C (101,3 kPa)
Boiling point	Not relevant
Flash point	Not relevant
Evaporation rate	Not relevant
Flammability	Not flammable
Upper/lower flammability or explosive limits	Lowest explosive limits +/- 60 mg/m ³
Vapour pressure	Not relevant
Vapour density	Not relevant
Relative density	2,5 – 7,3 g/cm ³
Water solubility	≤ 0,01 mg Si/l at pH 5,8-5,9 (20 °C) 15 mg Si/l at pH 5,8 (OECD 105)
Partition coefficient: n-octanol/water	Not relevant
Auto-ignition temperature	>400 °C; no signs of combustion (EU Method A.16)
Decomposition temperature	Not relevant
Viscosity;	Not relevant
Explosive properties;	No explosive properties
Oxidising properties	Not oxidizing properties

10 STABILITY AND REACTIVITY

10.1 Reactivity

The product can react with moisture and ferrosilicon particles suspended in air may under certain conditions cause dust explosions.

10.2 Chemical stability

The product is chemically stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

10.3 Possible hazardous reactions

Wet material added to hot molten ferrosilicon may cause explosions due to formation of flammable hydrogen gas.

Ferrosilicon particles suspended in air may under certain conditions cause dust explosions.

Formation of flammable and toxic gases may present hazard in confined, poorly ventilated spaces especially at elevated temperatures. Highly flammable hydrogen gas (H₂) and the highly flammable and very toxic gases phosphine and arsine (garlic-like smell), both heavier than air, may be formed if Ferrosilicon comes in contact with water, moisture, acids or bases. A reaction with hydrofluoric acid (HF) or nitric acid (HNO₃) leads to the formation of toxic gases such as silicon tetrafluoride (SiF₄) or nitrous oxide gases (NO_x).

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

10.4 Conditions to avoid

Avoid dust generating activities and avoid generating sparks and other ignition sources in areas with high dust concentrations.

10.5 Incompatible materials

Avoid contact with moisture and water and mixing with oxidant products or strong acid or bases.

10.6 Hazardous decomposition products

Se 10.3 and 10.5 above

11 TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Ferrosilicon is not classified as hazardous under the CLP Regulation (1272/2008/EC) or as dangerous under the Dangerous Substances Directive (67/548/EEC).

a. Acute toxicity

Fine dust may cause irritation and dehydration of mucous membrane. Smoking increases the risks. If the dust stays in the in trachea and/or the oesophagus formation of toxic gases (phosphine and arsine) may occur. The toxic mechanism of phosphine is not clarified; the gas

is irritating exposed membranes, inhibits the central nervous system and may cause pulmonary oedema. Acute poisoning of phosphine is transitory with for instance head ache, sickness, stomach pain, cough and respiratory distress.

b. Skin corrosion/irritation

Skin contact may cause itching of the skin and dehydration.

c. Serious eye damage/irritation

This product may cause irritation symptoms of the eyes like reddening and heavy watering.

d. Respiratory or skin sensitization

No data are available on the sensitising potential of Ferrosilicon. There are no data indicating a need for Ferrosilicon to be classified as sensitising.

e. Chronic effects

There is no chronic effects vid normal use of the product.

f. STOT-single exposure

Based on available data, the classification criteria are not met.

g. STOT-repeated exposure

NOAEC; 1,3 mg/m³/rat

Based on available data, the classification criteria are not met.

12 ECOLOGICAL INFORMATION

12.1 Toxicity

Based on available data, the environmental hazard classification criteria are not met.

12.2 Persistence and degradability

Ferrosilicon is an inorganic substance and is not biodegradable. The solubility in water is low.

12.3 Bio accumulative potential

No or very low potential for bio concentration and bioaccumulation.

12.4 Mobility in soil

Ferrosilicon is immobile in soil and sediment. Dissolved silica (and silicon) and all the metals within Ferrosilicon are poorly volatile substances and partitions predominantly in the aquatic or soil or sediment compartments.

12.5 Results of PBT and vPvB assessment

Ferrosilicon is an inorganic material and it is not classifiable as a PBT/vPvB substance. Ferrosilicon is not known to contain any >0,1 % or any <0,1 % PBT/vPvB impurities.

13 DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Ferrosilicon is not listed as hazardous waste in the European List of Waste (Commission Decision 2000/53 of 3 May 2000 and further amendments).

Disposal of waste should be undertaken by a licensed waste contractor in accordance with appropriate national and local regulations.

14 TRANSPORTATION INFORMATION

14.1 UN number

UN number 1408

14.2 UN proper shipping name

Ferrosilicon (kiseljärn) with 30 % or more but less than 90 % silicon.

14.3 Transport hazard class

Default classification 4.3

Ferrosilicon produced at Vargön Alloys has been tested according to the "United Nations Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria, Part III 33.4.1.4". There was no emission of gases in contact with water. This material is therefore not classified as Dangerous Goods, class 4.3, and is not subjected to ADR or IMDG-code regulations.

If the chemical or physical properties of a substance covered by this description are such that, when tested, it does not meet the established defining criteria for the class or division listed in column 3, or any other class or division, it is not subject to the provisions of this Code except in the case of marine pollutant where 2.10.3 applies;

IMGD	Not assigned to class 4.3
ICAO/IATA	Not assigned to class 4.3
ADR/RID ¹⁾	Not assigned to class 4.3

14.4 Packing group

Packaging group; III

14.5 Environmental hazards

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

14.6 Special precautions for user

Avoid dust generating activities and avoid generating sparks and other ignition sources in areas with high dust concentrations. The product can react with moisture and ferrosilicon particles suspended in air may under certain conditions cause dust explosions.

15 REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This Product Safety Information is prepared in compliance with

- Regulation (EC) No 1907/2006 for Registration, Evaluation, Authorisation of Chemicals (REACH) and its amendments.
- Regulation (EC) No 1272/2008 on the classification, labelling and packaging of substances and mixtures (CLP).
- Commission 453/2012/EC amending Regulation (EC) No 1907/2006 (SDS)
- Commission decision 2000/53 of 3 May 2000 establishing a list of waste pursuant (European List of Wastes)
- Directive 2008/50/EC on ambient air quality and cleaner air in Europe

15.2 Chemical Safety Assessment

Chemical safety assessment for the Ferrosilicon alloys (reaction mass of iron, silicon, iron silicide and iron disilicide) has been carried out.

16 OTHER INFORMATION

Other references:

- FeSi Chemical Safety Report
- ECHA 20120 Guidance on the compilation of safety data sheets
- Lillicrap A., Assessment of the transformation/Dissolution (T/D) Data Generated for FeSi Norwegian Institute for Water Research Lab. Testing Report nr 6025-20120, Serial nr O-10158 of March 2011.

Additional advice on specific questions can be obtained from Vargön Alloys AB