

CHEMICAL PRODUCTS SAFETY DATA SHEET

Registered	
SDS reg. № 1 5 0 2 0 0 4 3 . 0 8 . 3 8 6 6 0 Valid from «14» July 2015	until «14» July 2020
Rosstandart (Росстандарт)	
Information and analysis centre "Safety of substances and materials" Federal State Unitary Enterprise "National Research Institute of Standardization of materials and technologies"	Head <u><signed></u> /A.A. Toporkov/ stamp here <i>Official seal:</i> Federal State Unitary Enterprise OGRN 1027700169144 "National Research Institute of Standardization of materials and technologies" INN 7707033677 Information and analysis centre "Safety of substances and materials"

NAME

technical name (according to RD)	FERROSILICON
chemical name (according to IUPAC)	No
trade name	FERROSILICON of grades: FeSi75, FeSi65
synonyms	ФС65, ФС75, ФС45, Ferrosilicium, iron-silicon alloy, ferroalloy with silicon.

OKP Code

0 8 2 1 0 0

HS Code

7 2 0 2 2 1 0 0 0 0

Reference designation and name of the regulatory, technical or information document on the products (GOST, TS, OST, SED, (M)SDS, etc.)

TS 0821-001-15020043-2007 Ferrosilicon.

HAZARD CHARACTERISTICS:

Signal word: Hazardous

Brief (verbal): moderately hazardous substance on impact of human body. Ferrosilicon dust is low-toxic, has moderate fibrogenic effect. Ferrosilicon allocates flammable gas – hydrogen, because of impurities emission of extremely hazardous gases – phosphine and arsine, which are referred to as poisons – is possible. Intensity of gas emission can increase at moisture, at damage of the surface of the material and its crushing. Can cause long-lasting backlash for aquatic life.

Detailed: in 16 attached sections of the safety data sheet.

MAIN HAZARDOUS COMPONENTS	MACw.a., mg/m ³	Class of hazard	№ CAS	№ EC
Ferrosilicon	Not established	3	8049-17-0	N/A
Gases allocating with damping:				
- Hydrogen	Not established	N/A	1333-74-0	215-605-7
- Phosphine	0,1	I	7803-51-2	232-260-8
- Arsine	0,1	I	7784-42-1	232-066-3

APPLICANT: "Bratsk ferroalloys plant" LLC, Bratsk, Irkutsk region
 (name of organisation) (city)

Type of an applicant: manufacturer, supplier, seller, exporter
 (delete as applicable)
 OKPO Code 1 5 0 2 0 0 4 3 3
 Emergency number (3953) 49-59-68, 49-59-18

Director of the organisation applicant:

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(signature)

/ V.G. Prokopets /
 clarification

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Safety data sheet corresponds to UN recommendations ST/SG/AC.10/30 "GHS"

- IUPAC** – International Union of Pure and Applied Chemistry
- GHS** – UN recommendations ST/SG/AC.10/30 "Globally Harmonized System of Classification and Labelling of Chemicals"
- OKP** – Russian Classification of Production
- OKPO** – Russian Classification of Enterprises and Organizations
- HS** – Harmonized System
- № CAS** – substance number in Chemical Abstracts Service register
- № EC** – substance number in European chemicals agency register
- MACw.a.** – Maximum allowable concentration of chemical substance in the air of the working area, mg/m³
- Safety Data Sheet** – safety passport of chemical products (substance, alloy, material, industrial waste)
- Signal word** – a word used for focusing on hazard level of chemical product and chosen in accordance with GOST 31340-2013



1 Identification of chemical production and information on the manufacturer and/or supplier

1.1 Identification of chemical production

1.1.1 Technical name

Ferrosilicon

1.1.2 Short recommendations on application (incl. restrictions on application)

Applied in the metallurgy and foundry industry [2]

1.2 Information about the manufacturer and/or supplier

1.2.1 Full official name of the organization

"Bratsk ferroalloys plant"
Limited liability society

1.2.2 Address (postal and legal)

P.O.B. 46, Bratsk, Irkutsk region, RF, 665716
P 01 11 01 00, Bratsk, Irkutsk region, RF, 665716

1.2.3 Phone number, incl. for emergency consultations and time restriction

(3953) 49-59-68, 49-59-18

1.2.4 Fax

(3953) 49-59-01, 49-59-38, 49-59-34

1.2.5 E-mail

bzf@mechel.com

2 Hazard (hazards) identification

2.1 Hazard level of chemical products in general

(information on hazard classification according to the Law of the Russian Federation (GOST 12.1.007-76) and GHS (GOST 32419-2013, GOST 32423-2013, GOST 32424-2013, GOST 32425-2013))

Moderately hazardous substance on impact on human body.
Classification according to GHS:

Chemical products evolving flammable gas when wet – class 2;

Chemical products with acute toxicity on impact on human body if inhaled – class 2 (due to evolved gas, phosphine, on contact with water);

Chemical products with chronic toxicity for aquatic habitat – class 4 [25, 26].

2.2 Information about warning marking according to GOST 31340-2013

2.2.1 Signal word

«Опасно» (Danger).

2.2.2 Danger symbol



«Flame»

«Skull and crossbones»

2.2.3 Hazard statement (H-phrases)

H261: When wet, evolves flammable gas.

H330: When wet, evolves toxic gas. Lethal if inhaled.

H413: Can cause long-lasting backlash for aquatic life.

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3 Composition (information on components)

3.1 Information about production in general

3.1.1 Chemical name N/A

(according to IUPAC)

3.1.2 Chemical formula FeSi

3.1.3 General characteristics of composition

(incl. range brand; production process)

FeSi

Ferrosilicon is an alloy of iron and silicon with minimum mass content of silicon of 8,0% by weight and maximum – 95% by weight received by restoration [2].

Chemical composition for grades:

FeSi65: Si 63-68%, C no more than 0,2%,

S no more than 0,04%, P no more than 0,05%,

Al no more than 2,0%, Mn no more than 0,4%,

Cr no more than 0,4%, Ti no more than 0,30%

FeSi75: Si no more than 72%, C no more than 0,3%,

S no more than 0,01%, P no more than 0,05%,

Al no more than 2,0%, Ti no more than 0,2% [1].

ΦC45: Si 41-47%, C no more than 0,2%,

S no more than 0,02%,

P no more than 0,05%, Al no more than 2,0%,

Mn no more than 1,0%, Cr no more than 0,5%

ΦC65: Si 63-68%, C no more than 0,1%,

S no more than 0,02%,

P no more than 0,05%, Al no more than 2,5%,

Mn no more than 0,4%, Cr no more than 0,4%

ΦC75: Si 74-80%, C no more than 0,1%,

S no more than 0,02%, P no more than 0,04%,

Al no more than 3,0%, Mn no more than 0,4%,

Cr no more than 0,3% [2].

Granulometric composition: ferrosilicon is delivered in lumps of no more than 25 kilos, in bars of no more than 45 kilos, and in broken sieved particles of the following fractions:

0-4 mm, 4-10 mm, 0-10 mm, 0-20 mm, 4-50 mm,

10-50 mm, 10-100 mm, 10-200 mm, 20-200 mm,

10-315 mm, 0-350 mm [1,2].

3.2. Components

(name, CAS and EC numbers, weight ratio, MAC w.a. or SRLI w.a., classes of hazard, references on data sources)

Table 1

Components (name)	Weight ratio, %	Hygienic requirements in the air of the working area		№ CAS	№ EC
		MAC w.a., mg/m ³	Class of hazard		
Ferrosilicon	100	-/4 (a) (silicon-cupreous alloy)	3 F	8049-17-0	«N/A»

a – aerosol
F – aerosols of preferably fibrogenic action

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4 First aid measures

4.1 Observable symptoms

4.1.1 In cases of poisoning by inhalation (if inhaled)

Asthenia, headache, coughing, cold, disturbance in breath rhythm, choking sensation, cogwheel respiration, pulmonary edema possible [14,22].

If inhaled high concentration – asthenia, coughing, sneezing, headache, interference of respiratory rhythm. Danger of inhalation poisoning is connected with the impact of evolved gas. In mild cases phosphine causes pain in diaphragm shooting up the back, cold sense, later bronchitis. In moderately severe intoxication – fear, chill, vomit, acute choking, precordialgia, short cough, burning pain in nape, entotic sound, absence of appetite, thirst. In severe cases – stun, nervous walk, limb twitching, dilated pupils. Lethal outcome is possible only in a few days, but if the concentration is high, it can happen immediately [22].

Dust can irritate skin integuments [7,14].

4.1.2 In cases of impact on skin

Irritation and dehydration of mucous coat, palpebral edema, smarting in eyes, lacrimation [7,14].

4.1.3 In cases of eye contact

4.1.4 In cases of poisoning by oral route (if swallowed).

The symptoms of poisoning by evolved gases:

By phosphine – in mild cases – pain in diaphragm, shooting up the back, cold sense, later bronchitis; in cases of moderate severity – fear, shivers, vomiting, chest congestion, sharp asphyxia, retrosternal pain, sometimes non-productive cough, burning pain in the back of the head, vertigo, tinnitus, general weakness, coated tongue, absence of appetite, thirst; in severe cases – somnolentia, limbs twitching, mydriasis.

By arsine – general fatigue, asthenia, headache, sickness, vomiting, pain in lumbus and joints, urine of red colour or of meat slops, in severe cases – shiver, temperature rise, yellowness of the skin, of the mouth mucous coat, blood pressure fall, rapid pulse, amount of urine decreases, drowsiness, further convulsions may develop, coma with increasing uremia, possible lethal outcome [4,7].

4.2 Measures to provide first aid treatment to the injured people

4.2.1 In case of intoxication by inhalation

Call the ambulance. Fresh air, rest, horizontal position, raise slightly the lower limbs, warmth, clean clothes [14,22].

- In case of intoxication by gases allocating out of products:

By phosphine – moving away from the contaminated atmosphere, complete rest, warmth, strong sweet tea. Oxygen inhalation, cardiacs. Attention by toxicologist is necessary.

By arsine – moving away from the contaminated atmosphere, complete rest, warmth, strong sweet tea. Oxygen inhalation for many hours, cardiacs. Attention by toxicologist is necessary [4,7].

4.2.2 In cases of impact on skin

Rinse largely with running water [14,22].

4.2.3 In cases of eye contact

Rinse with the jet of cold water for at least 15 minutes with wide-open lids [14,22].

4.2.4 In cases of intoxication by oral route

Drink plenty of water, charcoal, saline purge, milk, after that induce vomiting [14,22].

4.2.5 Contra-indications

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5 Fire-fighting measures

5.1 General characteristics of fire-fighting (according to GOST 12.1.044-89)

The dust of ferrosilicon is inflammable, intent to chemical spontaneous inflammation, can form highly explosive alloys with the air [2]. In contact with water releases flammable gases and large amount of warmth. Some of the released gases (phosphines, silanes) in the air ignite spontaneously or (hydrogen) with the air form highly explosive alloys. In cases of water entry to the tanks with products explosions are possible [2,14].

Ferrosilicon of the particle size more than 3 mm is non-flammable, fire- and explosion proof [2].

For ferrosilicon of particle size 0-3 mm [2]:

5.2 Indicators of fire and explosion hazard (nomenclature of data according to GOST 12.1.044-89)

	FeSi75 (ΦC75)	FeSi65 (ΦC65)	ΦC45
Temperature of spontaneous ignition of aerogel, °C	> 1000	> 1000	-
Lower concentration limit of flame spreading, g/m ³	150	400	1000
Temperature of dust spontaneous ignition, °C	860	> 1000	640
Maximum pressure of dust explosion, kPa	620	40	-
Rate of explosion pressure rise, kPa/sec	26000	6000	-
Minimum ignition energy, mJ	280	-	-

5.3 Hazard caused by combustion products and/or thermal destruction

Burns with formation of toxic gases [14].

5.4 Recommended means for extinguishing fires

When extinguishing ferrosilicon powders it is essential to use dry powder extinguishers of type OP (ОП). It is possible to use dry milled powder slag, chamotte and other similar materials. Extinguishing of ferrosilicon powders can be carried out by inert gas supply in the zone of ignition [14].

5.5 Forbidden means for extinguishing fires

Do not use water and foam! [14].

5.6 Personal protective equipment for firefighting (PPE (Personal Protective Equipment) for firefighters)

Isolating protective suit КИИ-5 (КИХ-5) completed with isolating gas mask ИП-4М (ИП-4М). Without defined samples: full military protective suit Л-1 (Л-1) or Л-2 (Л-2) completed with industrial gas mask with tube V (В). Industrial gas mask of small size ПФМ-1 (ПФМ-1), gloves made of dispersion of butyl rubber, special boots for protection from oil and oilproducts [14].

5.7 Specific characteristics of extinguishing

N/A [14].

6 Measures to prevent and eliminate accidents and emergencies and their consequences

6.1 Measures to prevent harmful effects on people, environment, buildings, constructions, etc. in accidents and emergencies

6.1.1 Necessary actions of general character in emergency

Isolate a danger area within a radius of not less than 200 m. Correct the given distance according to the results of chemical detection. Remove strangers. Take away vehicles in a safe place. Enter into a danger area wearing protective equipment. Take fire safety precautions. Do not smoke. Eliminate sources of fire and sparks. Apply first aid to the injured [14].

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6.1.2 Personal protective equipment: (PPE of emergency team)

Isolating protective suit KIH-5 (КИХ-5) completed with isolating gas mask IP-4M (ИП-4М). Without defined samples: full military protective suit L-1 (Л-1) or L-2 (Л-2) completed with industrial gas mask with tube V (B). Industrial gas mask of small size PFM-1 (ПФМ-1), gloves made of dispersion of butyl rubber, special boots for protection from oil and oil products [14].

6.2 Operations procedure in elimination of accidents and emergencies

6.2.1 Actions in cases of leak, spoil, scattering (incl. precautions providing environment protection)

Do not touch the scattered material. Fence the scattered with earth mound. Prevent a tank and product from water. Do not allow the material getting into pools, basements, sewerage. Cover the scattered material with dry inert material, put into dry tanks and hermetically close [14].

6.2.2 Fire action procedures

Do not use water! Put out only with powder compositions [14].

7 Regulations of storage of chemical products and handling with them in loading and unloading works

7.1 Safety measures in handling with chemical products

7.1.1 Systems of engineering measures

Works connected with unloading, shredding, challenge to the charge of ferrosilicon, should be done with the application of personal protective equipment (see Section 8).

Ferrosilicon must be as dry as possible when transportation, storage and work with it.

7.1.2 Environmental precautions

Gas and dust treatment facilities in the process of product refinement. Exclude the opportunity of impact of ferrosilicon to fishery waters, soil, air.

7.1.3 Recommendations on safe moving and transportation

Ferrosilicon of 5-7 size grade is transported bundled in soft specialized containers MKR (МКР), ferrosilicon in lumps of 25 kilos, in bars and 1-4 size grade is transported bundled in soft specialized containers MKR (МКР) or in bulk.

Transportation of ferrosilicon made in bars of no more than 45 kilos and size of no more than 400 mm, in bars of any mass, size grades with particular size of more than 5 mm up to 315 mm is carried out in open vehicles.

In the process of transportation of ferrosilicon containing particles of size less than 13 mm, in bulk in open rolling stock with lower unloading gates and having in them prevailing structural gaps more than 5 mm there should be taken measures excluding loss. Can be transported in bulk without packaging [1].

7.2 Regulations of storage of chemical products

7.2.1 Conditions and terms of safe storage: (incl. a storage warranty period, shelf life; incongruent substances and materials in storage)

Store away from sources of heating, ignition, humidification. Ferrosilicon is stored in areas (with slope to the edge and drainage canals) under a shed or in closed buildings with natural or artificial ventilation in stocks, bins or bunkers separately under grades [1,2].

Storage warranty period of ferrosilicon: under a shed – 2 years, in closed buildings – 10 years [1].

Oxidizing agents, acids alkali are incongruent in storage [22]. Inflatable container of type "big-bag", according to TS 2297-008-94818830-07 or similar ones, which provide secure from environmental hazard and contamination [1]

7.2.2 Packaging (incl. materials)

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7.3 Safety measures and regulations of storage in household use

In household use it is not applied.

8 Control means of hazardous exposure and personal protective equipment

8.1 Characteristics of the working area coming under the compulsory control (MAC w.a. or SRLI w.a.)

According to GOST 1415-93 control is advised to exercise by:
- similar to silicon dioxide MAC w.a. = $3/1 \text{ mg/m}^3$
- similar to silicon-cuprous alloy MAC w.a. = $1/4 \text{ mg/m}^3$ [1,9,22].

8.2 Support measures of content of harmful substances in allowable concentration

Working areas must have artificial or natural ventilation providing maximum allowable concentration of silicon dust, phosphine, arsine (see 3.3). When working with ferrosilicon it is necessary to apply process procedures with minimum dust formation, availability of dust-catching system.

8.3 Personal protective equipment of the personnel

8.3.1 General recommendations

It is necessary to avoid direct contact with the product. Works, connected with unloading, crushing, mission in challenge to the charge of ferrosilicon, should be carried out with usage of the following personal protective equipment.

All people who work with ferrosilicon should be regularly and preliminarily examined, when hired for a job, according to the Order of Ministry of Healthcare of Russian Federation dated March 14, 1996 №90 (once a year).

8.3.2 Respiratory protection (RPE types)

At little concentrations in the air (at excess of MAC up to 100 times) – independent protective personal kit with forced supply of the purified air in the breathing zone with shell PZU (ПЗУ), PZ-2 (ПЗ-2), dust-fighting respirator "FORT-P" («ФОРТ-П»), general respirator "Snowflake-KU-M" («Снежок-КУ-М»), "Petal" («Лепесток») [14].

8.3.3 Protection equipment (material, type) (work wear, safety footwear, hand safety, eye protection)

To protect eyes – protective glasses, to protect hands – gloves made of cotton, protective clothes – a suit made of cotton, rubber boots [14].

8.3.4 Personal protective equipment in case of household use

Products are not used in household purposes.

9 Physical and chemical properties

9.1 Physical state:

(state of matter, colour, smell)

Firm substance, grey colour, metal luster.

9.2 Main properties characteristics of the chemical products

(temperature index, pH, solvability, index of n-oktanol/water, etc., typical of a certain kind of product)

- melting points: $\sim 1500^\circ\text{C}$ [22]
- autoignition temperature: $\sim 980^\circ\text{C}$ and more (aerogel) [2]
- volatility: non volatile [14]
- solubility in water: Insoluble in water [18].
- density: 6100 kg/m^3 [18,22]

10 Stability and reactivity

10.1 Chemical stability:

(for volatile products indicate the products of decomposition)

Material is stable under normal conditions, hazardous polymerization does not occur. Ferrosilicon with mass content of silicon 50-60 % is exposed to spilling because of lebeauite (an unstable phase $\alpha\text{-FeSi}_2$ transforms into a stable one $\beta\text{-FeSi}_2$ with increase in alloy volume), and impurities of phosphorus, aluminum and calcium in an alloy [5].

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10.2 Reactivity

10.3 Conditions that should be avoided: (incl. hazardous developments in contact with incompatible substances and materials)

Interacts with water [22].

At 1000°C a strong reducing agent in pyrometallurgic process [5].

Ferrosilicon emits a highly explosive gas – hydrogen, because of the impurities extremely explosive gases can be released – phosphine and arsine, which are referred to as poisons. Intensity of gas emission of dry polydisperse powder of fraction 0-3 mm contains 7-30 cm³/kg*h. Hydrogen amount in emitted gases contains more than 92% in volume. Phosphine amount in emitted gases contains 0,8-1,6% in volume [2]. Intensity of gas emission increases as moistures, in case of damage of material surface and its crushing [7].

11 Information about toxicity

11.1 General characteristic of the impact (evaluation of potential health effects and the most typical hazard carrying out)

Moderately hazardous substance in the impact on a human body [1,2].

Acute intoxication is possible due to the evolution of hydrogen phosphide (phosphine) – toxic gas, influencing nervous system, metabolism, affecting blood vessels, respiratory system, liver, kidneys. Prolonged inhalation can be fatal [22].

When wet, ferrosilicon forms hydrogen arsenide (arsine) – toxic gas of hemolytic action. It dissolves in plasma and, circling in human body, it adversely affects internal organs, mainly liver and kidney. In connection with red blood cells it causes hemolysis (destruction) and ferrihemoglobin formation [22].

11.2 Exposure route: (inhalation, oral, in case of skin and eye contact)

- inhalation;
- oral;
- in case of skin and eye contact.

11.3 Target organs, tissues and human systems

Upper respiratory airways, skin, eyes, digestive organs.

11.4 Information about hazardous impacts on health in direct contact with the substance and effects of such impacts: (irritant effect on upper respiratory airways, eyes, skin, including percutaneous action and sensibilization)

The dust of ferrosilicon has a moderate irritant effect on skin and conjunctiva and upper respiratory airways. Emitted gases (phosphine and arsine) have terebrant irritation [7,9,22]. Does not have percutaneous action, has sensitizing action [22]. The dust has fibrogenic action [1,2,9].

11.5 Information about hazardous long- lasting effects of impact on human body: (impact on propagation duty, carcinogenicity, mutagenicity, cumulativeness, and other chronic effects)

Cumulativeness is low [22].
Ferrosilicon does not have gonadotropic, embryotropic, mutagenic, teratogenic and carcinogenic effects [22].

11.6 Indices of acute toxicity; (DL₅₀ (JL₅₀), route of entry (i/g, n/s), kind of an animal; CL₅₀ (JK₅₀), exposure time (h), kind of an animal)

DL₅₀ > 5000 mg/kg (i/g, rats)
DL₅₀ > 20000 mg/kg (n/s, rabbits);
CL₅₀ not reached [22].

12 Information about impact on the environment

12.1 General characteristics of impact on environmental objects

Can pollute waters and soil mechanically. Gases allocating as ferrosilicon moistures can be hazardous very much, especially

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(atmosphere air, waters, soil, including observable features of impact)

for dwellers of the waters [14].

In high concentration, various natural environments can be polluted: atmosphere with foreign smell, changed organoleptic properties of water, destruction of reservoir inhabitants, inhibition of biochemical oxygen demand and plants growth retardation [...]

12.2 Routes of exposure on the environment

In case of non-implementation of regulations of handling, transportation, storage and waste disposal, as a result of emergencies.

12.3 The most important characteristics of impact on the environment

12.3.1 Health standards

(allowable concentrations in the atmosphere air, water, incl. fishery waters, soil)

Table 2 [...]

Components	MAC atm.air or SRLI atm. air, mg/m ³ (LHI ¹ , class of hazard)	MAC water ² , mg/l (LHI, class of hazard)	MAC com.fish ³ , mg/l (LHI, class of hazard)	MAC soil or APC soil, mg/kg (LHI)
Ferrosilicon	SRLI atm.air 0,02/- dust of ferroalloys (iron - 51%, silicon - 47%) /on iron/	0,3 (1) * (iron) org. env. class 3	0,1 tox. class 4 0,05 ** tox. class 2 (iron 1))	Not established
Hydrogen phosphide (phosphine)	MAC atm.air 0,01/0,001 mg/m ³ res. class 2	Not established	Not established	Not established
Arsenide hydrogen (arsine), allocating when wet	MAC atm.air -0,002 res. class 2	Not established	0,05 tox. class 3 0,01 ** tox. class 3 (arsenic 1))	Not established

1) Implying all water-soluble forms.
 * - Bracketed quantity can be established by Chief State Medical Officer on the corresponding location for particular water facilities.
 ** MAC is established for seas or their particular locations.

12.3.2 Ecotoxicity indices

(CL, EC, NOEC for fish, daphnia Magna, algae, etc.)

N/A [7.22].

¹ LHI - Limited harmful index (tox. - toxicological; s.-t. - sanitary-toxicological; org. - organoleptic; refl. - reflective; res. - resorptive; refl.-res. - reflective-resorptive; com.fish. - commercial fishing (change of goods qualities of commercial waters); san. - sanitary).

² Water of water bodies of household and drinking and cultural and general water consumption

³ Water of water bodies which have commercial fishing meaning (including sea)

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12.3.3 Migration and transformation in the environment because of biodestruction and other processes (corrosion, hydrolysis, etc.)

Extremely stable in abiotic conditions. In the environment partially transformed with emission of hydrogen and phosphine polluting the air with the products of transformation. Biologically does not dissolve, chemically is unstable [15,22].

13 Recommendations on waste disposal (rests)

13.1 Safety measures in handling with waste resulting in application, storage, transportation

When working with ferrosilicon waste (spill, dust), one must use personal protective equipment (see Section 8).

13.2 Information about places and ways of deactivation, utilization or liquidation of product waste, including containers (packaging)

Waste is collected by vacuum way or by sweeping into specially designated containers or baskets. Waste can be used directly as ferrosilicon itself or exposed to dumping of industrial waste. Containers from ferrosilicon – designated soft containers MCR – after full release are exposed to dumping of industrial waste.

It is forbidden to use containers from ferrosilicon in household purposes and for food.

13.3 Recommendations on waste disposal resulting in household use

Products are not used in the household purposes.

14 Information about carriage (transportation)

14.1 United Nations number (UN)
(according to UN recommendations on transportation of hazardous cargo)

1408 [27].

14.2 Appropriate outbound name and/or transportation name

Appropriate outbound name: Ferrosilicon with minimum silicon mass content 30% but no more than 90% [27].

Transportation name: Ferrosilicon of grades ... [1, 2].

14.3 Types of applied vehicles

Transported by rail, shipping, motor vehicles, according to the rules of cargo transportation valid for vehicle of a particular type [1].

14.4 Classification of cargo hazard according to GOST 19433-88:

- class

4

- subclass

4.3

- classification number

According to GOST 19433: 4323

(according to GOST 19433-88 and when transported by rail)

When transported by rail: 4363

- drawing number(s) of danger sign(s)

4B – primary

6a – additional

[6,14].

14.5 Cargo hazard classification according to UN Recommendations concerning carriage of dangerous goods by rail:

- class or subclass

4.3

- additional danger

6.1

- UN packing group

III

14.6 Transport marking

Handling mark № 3 "Keep dry" [29]

(handling marks according to GOST 14192-96)

14.7 Emergency cards

Carriage by rail: AK №408 [6]

(carriage by rail, sea and other)

Carriage by sea: F-G, S-N [28]

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15 Information about the national and international legislation

15.1 National legislation

15.1.1 Laws of the Russian Federation

"On the environment protection", "On sanitary and epidemiologic well-being of the population".

15.1.2 Documents regulating requirements on protection of people and environment

N/A

15.2 International conventions and agreements

Not subject to international conventions and agreements.

(if the products are regulated by Montreal Protocol, Stockholm Convention, etc.)

16 Additional information

16.1 Information about redefinition (re-edition) of SDS

SDS reissued in respect of adoption and enactment of GOSTs and standards.

(mark: "SDS is made for the first time" or "SDS is re-registered upon the expiration. The previous SDS reg. № ..." or "Amended paragraphs ... date ...")

The previous SDS reg. № 15020043-08-27799 d/d 27.04.2012

16.2. List of the data sources used at drafting of the safety data sheet⁴

1. TS (/Technical Standards) 0821-001-15020043-2007. "Ferrosilicon".
2. GOST 1415-93 (ISO 5445-80). "Ferrosilicon. Technical requirements and terms of supply". – Moscow: Standards Publishing house.
3. SanRaN 2.1.7.1322-03 "Hygienic requirements to waste disposal and neutralization of production and use". – Moscow: Ministry of Healthcare of the Russian Federation, 2003.
4. Harmful substances in industry. Ref. book edited by N.V. Lazarev and E.N. Levina. – Leningrad: Khimiya, 1976.
5. Gasik M.I. and others. Theory and technology of production of ferroalloys. – Moscow: Metallurgiya, 1998.
6. Rules of transportation of hazardous cargo (addendum 1 and 2) to Agreement of International Goods Transport by Rail (AIGT), 1998.
7. Safety Data Sheet, Ferrosilicon alloys, Elkem ASA, 2004. <http://www.silicon.elkem.com>.
8. Health and safety in chemical industry, edited by G.V. Makarov. – Moscow: Khimiya, 1989.
9. HS (/Hygienic Standards) 2.2.5.1313-03 "Maximum allowable concentrations (MAC) of harmful substances in the air of the working area". HS 2.2.5.2308-07 "Safe reference levels of impact (SRLI) of harmful substances in the air of the working area. Health standards. – Moscow: Russian register of potentially hazardous chemical and biological substances of Ministry of Healthcare of the Russian Federation, 2003.
10. HS 2.1.6.1338-03 "Maximum allowable concentration (MAC) of contaminants in the atmosphere air of communities". HS 2.1.6.2309-07 "Safe reference levels of impact (SRLI) of contaminants in the atmosphere air of communities". Health standards. – Moscow: Russian register of potentially hazardous chemical and biological substances of Ministry of Healthcare of the Russian Federation, 2003.
11. GOST 19433-88 with change 1. "Cargoes hazardous. Classification and marking". – Moscow: Standards Publishing house.
12. List of commercial fishing standards: maximum allowable concentrations (MAC) and safe reference levels of impact (SRLI) of harmful substances for the water of water bodies that have commercial fishing importance. – Moscow: Publishing house VNIRO, 1999r.
13. GOST 12.4.021-75 with change 1. "OSSS (Occupational Safety Standards System). Ventilation systems. General requirements". – Moscow: Standards Publishing house.
14. Safety rules and procedure of abandonment of emergency situations with hazardous cargoes at transportation on railways" accepted by Russian Ministry of Communication lines №IM-407 dated 25.11.96 and Ministry of Emergency situations №9-733/3-2 dated 31.10.96. Moscow: MCL of RF, 1997.

⁴ Sequence numbers of data sources are given in each paragraph of SDS as references



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15. Register on safety of materials. Ferrosilicon. Department of Labor of the USA. Administration on safety and health protection in industries.
16. HS 2.1.5.1315-03 "Maximum allowable concentrations (MAC) of chemical substances in the water of water bodies of household and drinking and cultural and general water consumption". HS 2.1.5.2307-07 "Approximate permissible levels (APL) of chemical substances in the water of water bodies of household and drinking and cultural and general water consumption". Health standards. – Moscow: Russian register of potentially hazardous chemical and biological substances of Ministry of Healthcare of the Russian Federation, 2003.
17. Rules of transportation of hazardous cargo by motor transportation (edited by orders of Ministry of Transport of the Russian Federation №37 dated 11.06.1999 and № 77 dated 14.10.1999). – Saint Petersburg: Publishing house DEAN, 2002.
18. Korolchenko A.Y. Fire and explosion hazard of substances and materials and means for their extinguishing: Guide. Publishing house: in 2 books. – Moscow: Ass. "Pozhnauka", 2000.
19. Ecology and safety. Guide edited by Rybalskiy N.G., v. 2, p.2. – Moscow, VNIPI, 1993.
20. SanRaN 2.1.5.980-00. Hygienic requirements to the protection of surface waters from contamination.
21. GOST 12.1.007-76. "Hazardous substances. Classification and general requirements", publishing house "Standartinform", 2007.
22. Information card of potentially hazardous chemical and biological substance. Ferrosilicon. Certificate of state registration, series AT № 001954 dated 23.04.2001.
23. GOST 31340-2013 "Warning marking of chemical products. General requirements". Moscow: Standartinform, 2014.
24. GOST 12.1.044-89 "FIRE AND EXPLOSION HAZARD OF SUBSTANCES AND MATERIALS" Moscow: State committee of SSR on product quality control and standards. Approved on 12.12.1989.
25. GOST 32419-2013 "Hazard classification of chemical products", "Standartinform", 2014.
26. GOST 32424-2013 "Hazard classification of chemical products of environmental impact", "Standartinform", 2014.
27. Recommendation of carriage of dangerous goods. Standard rules. The eighteenth revised edition. The United Nations Organization, New York and Geneva, 2013.
28. International Maritime Dangerous Goods Code. IMDG. Edition 2006. – Saint Petersburg: ЗАО CNIIMF, 2007.
29. GOST 14192-96. Cargo marking as amended 1-3. – Moscow: Standards Publishing house, 1998.



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