ཨོ་རྒྱན་ཁེ་རོ་ཨལ་ཡོས་པི་ལིཝ་ཚྲོང་སྡེ་ཚན་འཛིན།
UGEN FERRO ALLOYS PVT. LTD.
PHUENTSHOLING : BHUTAN

MATERIAL SAFETY DATA SHEET
for
Ferrosilicon (FeSi) Grade: Si 70% Min

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Substance/Mixture Identifier

Substance Name:	Reaction mass of iron, iron disilicide, iron silicide and silicon
Chemical Name:	912-631-7 / FeSi: Reaction mass of iron, iron disilicide, iron silicide and silicon
Synonyms:	FeSi
Trade Name:	Ferroslicon (FeSi); Grade: Si 70% Min, Size 10-50mm
Molecular Weight:	Not Applicable

Identified Uses of the Substance/Mixture

Brief Description:	Metal alloy component
Uses Advised Against:	None

Please, check the identified uses in Table 1 as an Appendix to this Safety Data Sheet.

Details of the Supplier of Safety Data Sheet

Name:	M/s. Ugen Ferro Alloys Pvt. Ltd.,
Head Office Address:	Dekilingka Apartment, 1st Floor, Room No. 201 & 202, Pelkhil Lam, Post Box No. 126, Phuentsholing; Chukha; Bhutan.
Factory Address:	Plot No. L4; Pasakha Industrial Estate, Pasakha, Chukha, Bhutan.
Phone No.:	+975-5-253971
Fax No.:	+975-5-253970
E-mail:	ufalbhutan@gmail.com
E-mail of person responsible for MSDS:	manojsharmamdt@gmail.com

Emergency Telephone Number

European Emergency No.:	112
Emergency Phone No. at the Company:	+97577101125
Available Outside Office Hours:	+919733143763

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2. HAZARDS IDENTIFICATION

Classification of the Substance

Classification of the Substance According to Regulation CLP / GHS

The substance does not meet the criteria for classification under Regulation EC 1272/2008.

Label Elements

Labelling According to Regulation CLP / GHS

The substance does not meet the criteria for classification under Regulation EC 1272/2008.

Signal word: None

Other Hazards

The substance does not meet the criteria for classification as PBT or vPvB substance.

Contact of ferrosilicon with water may result in formation of toxic gases.

Formation of toxic gases in unventilated or wet transporting or storage places may represent a human health hazard due to possible poisoning.

Contact of ferrosilicon with water, unventilated places or inhalation of dust from ferrosilicon and thereby formation of toxic gases in lungs may represent a hazard to human health.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Description: The registered substance is present in the form of alloy.

Degree of purity: < = 95.1 % (w/w)

Constituents

Chemical Name		Material Test Report	Specification Limit
FeSi; HNS CODE 72022100			-
Individual Elements	Fe°	27.46	27-28
	Si°	70.92	70-72
	Al	1.16	1.5
	C	0.100	0.15
	P°	0.035	0.05
	S	0.020	0.05

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Impurities

No impurities relevant for classification and labelling

4. FIRST-AID MEASURES

Description of First-aid Measures

General Information:	Not anticipated to cause any harm if in contact with clothing, skin, or eye. However, in case of accident or unwellness, immediately seek medical advice.
Inhalation:	Mechanical irritation caused by dust in the airways: Remove person from dust-exposed area.
Skin contact:	Wash skin with water and/or a mild detergent.
Eye contact:	Rinse eyes with water/saline solution. See a physician upon persistent discomfort.
Ingestion:	Remove source of for further ingestion. See inhalation.

Most Important Symptoms

Symptoms of poisoning:	Nausea, vomiting, diarrhea, asthenia.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

FeSi lumps or granules are not combustible. Use dry sand, CO_2, or dry powder to extinguish the surrounding fire.

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media

Do not use water.

Special Hazards Arising From the Substance or Mixture

Flammability test under REACH (EC guideline) show FeSi to be non flammable.

Although UN- test on flammability in contact with water was negative, wet material added to molten (hot) ferrosilicon may cause explosions due to formation of flammable hydrogen gas.

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

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Advice for Fire Fighters

At unventilated places use breath apparatus. Use extinguishing measures that are appropriate to local circumstances ant the surrounding environment.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions, Protective Equipment, and Emergency Procedures

For non-emergency personnel

Use personal protective equipment (see section 8).

For emergency personnel

Ensure adequate ventilation and ventilate closed spaces before entering.

Avoid generation of dust.

Isolate hazard area and keep unprotected persons away.

Avoid inhalation: ensure that sufficient ventilation or suitable respiratory protective system is used, wear suitable protective equipment. (see section 8)

Avoid humidification.

Environmental Precautions

The preparation is not considered an environmental hazard based on the available studies. However it is advisable to keep away from drains as large quantities could clog drains.

Methods and Material for Containment and Cleaning up

Keep material dry.

Avoid generation of dust.

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

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

Reference to Other Sections

For more information on exposure controls or personal protection, please, see section 8.

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7. HANDLING AND STORAGE

Handling

Avoid generation of dust. Wear protective clothing, gloves, and goggles. Wear suitable respiratory protection where applicable

Avoid generating sparks or other ignition sources (e.g. welding) in areas with high dust concentrations.

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

Avoid reactions with acids like hydrofluoric acid (HF) and nitric acid (HNO_3) leading that lead to the formation of toxic gases.

Storage

Keep dry and in a well ventilated place and away from acids and bases.

Specific End Uses

Please, check the identified uses in Table 1 mentioned in Appendix to this Safety Data Sheet.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters

Occupational Exposure Limit (OEL): 4 mg/m^3 inhalable dust of ferrosilicon

Long-term Derived No Effect Level (DNEL): 0.3 mg/m^3 respirable dust of ferrosilicon can be achieved by controlling exposure below OEL level

PNEC $_{water}$:	not suitable for ferrosilicon due to its low solubility.
PNEC $_{soil}$:	Low expected exposure to soil from production of FeSi and current known downstream uses. No direct application to soil. A PNEC soil derived applying calculation method and known effects data of the metallic constituents gave indicative PNEC soil value 680 mg/kg dw.
PNEC $_{sediment}$:	Low expected exposure to sediments from production of FeSi and current known downstream uses.

Exposure Controls

To control potential exposures a generation of dust should be avoided. An appropriate protective equipment is recommended. With visible raising of dust from ferrosilicon, working and safety measures that constrain raising of fine-grained dust above 4 mg/m^3 should be implemented.

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Appropriate Engineering Controls

Regularly measure occupational exposure limit. If user operations generate dust, use local exhaust ventilation or other controls to keep airborne dust levels below exposure limits.

Individual Protection Measures

Eye/Face Protection

Wear protective goggles.

Skin Protection

Wear protective clothes, gloves and use a hand protective cream.

Respiratory Protection

Wear protective respiratory system.

Environmental Exposure Controls

Emissions from ventilation or work place process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. Concentration below 4 mg/m^3 does not pose a threat to environment.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on Basic Physical and Chemical Properties

Appearance:	Grey, solid, material in varying sizes: lumps, ingots, granules or powder
Odour:	Odourless, contact with water leads to formation of gases which have an odour of garlic
Odour threshold:	Does not apply, substance is odourless
pH:	not applicable
Boiling point:	not applicable (solid with a melting point > 300°C)
Melting/freezing point:	1,220 – 1,400 °C at 101.3 kPa
Flash point:	not applicable (substance inorganic and solid not a liquid)
Flammability:	non flammable (EU method A.16)
Explosive properties:	not applicable (no chemical groups with explosive properties present in the molecule)
Oxidizing properties:	not applicable (substance incapable of reacting exothermically with combustible materials)
Vapour pressure:	not applicable (melting point > 300°C)

Relative density:	2.5 – 7.5 g/cm^3
Solubility in water:	OECD T/D screening test: ≤ 0.02 mg Si/l and ≤ 0.04 mg Fe/l at pH 6 (21.5 °C), ≤ 0.09 mg Si/l and ≤ 0.02 mg Fe/l at pH 8 (21.5 °C) OECD 105: ≤ 0.01 mg Si/l at pH 5.8-5.9 (20 °C) ferrosilicon particles, diameter < 1 mm
Partition coefficient n-octanol/water (log value):	not applicable (substance inorganic)
Viscosity:	not applicable (substance solid not liquid at ambient temperature)
Self-ignition temperature:	> 400°C, no signs of combustion (EU method A.16)
Dissociation constant:	cannot dissociate due to lack of relevant functional groups
Surface tension:	substance is not surface active
Stability in organic solvents:	not applicable (substance inorganic)

Other Information

Formation of gases:	in contact with water

10. STABILITY AND REACTIVITY

Reactivity

For this substance there is no specific test data available.

Chemical Stability

The substance is chemically stable under recommended conditions of storage, use, and temperature. **Material has been in open air for more than 3 days since production.**

Possibility of Hazardous Reactions

No hazardous reactions when handled and stored according to provisions

Conditions to Avoid

Avoid contact of molten material with water. Adding water to molten material may cause severe explosion.

Avoid contact with water. A contact with water may lead to a formation of toxic gases which can be harmful to human health.

Avoid reactions with acids like hydrofluoric acid (HF) and nitric acid (HNO_3) leading that lead to the formation of toxic gases.

Incompatible Materials

Water, hydrofluoric acid (HF), nitric acid (HNO_3), acids in general

Hazardous Decomposition Products

Does not decompose when used for intended uses

11. TOXICOLOGICAL INFORMATION

Toxicity Endpoints	Outcome of the Effects Assessment
Toxic-kinetics	Poor solubility and low dissolution of metal components in ferrosilicon, hazard assessment of ferrosilicon can be based on toxicity of silicon and silica, taking into account the impact of slightly soluble strontium and barium.
Acute Toxicity	Ferrosilicon is not acutely toxic. Nonhuman information: Oral: LD_{50} > 5,000 mg/kg bw synthetic amorphous silica (OECD 2004b, rat and mouse) LD_{50} > 400 – 800 mg/kg bw barium carbonate (WHO (1999), rat) Inhalation: LC_{50} (4 h) > 2.08 mg/l air, synthetic amorphous silica (OECD 2004b, rat) Dermal: LD_{50} > 2,000 mg/kg bw strontium compounds (WHO (2010), rat) LD_{50} > 5,000 mg/kg bw silicon dioxide (Woltjen R, Calkins JE (1978a – d) Classification for acute toxicity is not warranted.
Skin Corrosion/Irritation	Nonhuman information: Ferrosilicon is not irritating to skin (several animals). Ferrosilicon is unlikely a skin irritant. No classification or further testing is proposed. Naturally, like any other dusts, the dusts of ferrosilicon may also cause mechanical irritation of the skin. Classification for irritation/corrosion is not warranted.
Serious Eye Damage/Irritation	Nonhuman information: Ferrosilicon is not irritating to eye (rabbit). Ferrosilicon is unlikely an eye irritant. No classification or further testing is proposed. Naturally, like any other dusts, the dusts of ferrosilicon may also cause mechanical irritation of the eye.
Respiratory or Skin Sensitization	No data available. Ferrosilicon is considered not to be a skin or respiratory tract sensitizer. Classification for sensitization is not warranted.
Germ Cell Mutagenicity	Ferrosilicon is not genotoxic.

	Nonhuman information: Bacterial reverse mutation assay (Ames test, OECD 471): negative Mammalian cell gene mutation (OECD 476): negative *In vitro* mammalian chromosome aberration test (OECD 473): negative Chromosome aberration assay (OECD 475): negative Dominant lethal assay (OECD 478): negative Negative data on amorphous silica *in vitro* and *in vivo*, negative *in vitro* data on calcium silicate. Other main constituents, whose bulk concentration exceeds the classification cut-off limits of 0.1% (cat 1A and B) and 1% (cat 2) and which are dissolved at relevant amounts in artificial biological fluids during one-week incubation (strontium, barium) are not classified as mutagenic, and according to available evidence do not raise concerns for genotoxic effects. Classification for genotoxicity is not warranted.
Carcinogenicity	Ferrosilicon is not carcinogenic. Human epidemiological data from ferrosilicon/silicon manufacturing do not show an increased incidence of cancer attributed to ferrosilicon exposure. Amorphous silica and calcium silicate have not shown carcinogenic responses in animal tests. Also other main constituents, which are dissolved from ferrosilicon in higher amounts than from synthetic amorphous silica particles in artificial biological fluids have not classified as carcinogens. Classification is not warranted.
Toxicity for Reproduction	Ferrosilicon is not toxic for reproduction. Nonhuman information: Chronic toxicity studies (OECD 452) mouse and rat: negative NOAEC 10 mg/m^3 air nominal, rat: no evidence of carcinogenicity Human epidemiological data from ferrosilicon/silicon manufacturing do not show an increased incidence of cancer attributed to ferrosilicon exposure. Amorphous silica and calcium silicate have not shown carcinogenic responses in animal tests. Also other main constituents, which are dissolved from ferrosilicon in higher amounts than from synthetic amorphous silica particles in artificial biological fluids have not classified as carcinogens. Classification is not warranted.
Specific Target Organ Toxicity (Single Exposure)	Based on available data the classification criteria are not met.
Specific Target Organ Toxicity (Repeated Exposure)	Ferrosilicon is not toxic via repeated doses. Toxicity of FeSi via oral route: Studies show that amorphous silicon dioxide does not cause systemic organ toxicity after ingestion; therefore, silicon released from ferrosilicon is unlikely to cause any effects. The release of components from ferrosilicon according to dissolution studies is in comparison to synthetic amorphous silica very limited and is unlikely to affect the repeated dose toxicity of ferrosilicon. Toxicity of FeSi via dermal route: not enough number of studies. Toxicity of FeSi via inhalation: Increased incidence of COPD among

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	FeSi/silicon metal workers cannot be attributed to ferrosilicon but rather to general dust exposure. The lung effects of amorphous silicon dioxide are likely to be affected by particle characteristics, such as surface area. These effects were seen at levels of 5 – 9 mg/m^3, but were mostly reversible. Amorphous silicon dioxide has a limit value of 4 mg/m^3 derived by German MAK commission (DFG 1991). However, experimental results of toxicity for amorphous silicon dioxide are likely to overestimate the inhalation hazard of FeSi due to the other characteristics of particles used in these studies when compared with FeSi. Classification for repeated dose toxicity is not warranted.
Aspiration Hazard	Data lacking.

12. ECOLOGICAL INFORMATION

Toxicity

Acute/Prolonged Toxicity to Fish

Short-term toxicity: This information is not available. Short-term fish test results (OECD 203/C.1) were needed to fulfill the information requirement. Short-term effects in fish are unlikely at the level of solubility of FeSi grades.

Long-term toxicity : Study is scientifically unjustified due to low solubility of FeSi grades.

Acute/Prolonged Toxicity to Aquatic Invertebrates

Short-term toxicity: High loadings and short test duration often raise problems with physical effects causing behavioural effects and immobility in test species. Short-term, high-load testing is not seen as important or necessary for FeSi alloys.

Long-term toxicity: EC_{50} not known, daphnia magna reproduction test (OECD 211) ongoing

Acute/Prolonged Toxicity to Aquatic Plants

Growth inhibition study with algae/cyanobacteria technically not feasible due to low solubility of FeSi grades.

Acute/Prolonged Toxicity to Sediment Organisms

This information is not available. For classification and labeling purposes sediment tests are not necessary. Only FeSi powders and lower end size grains may trigger further testing.

Acute/Prolonged Toxicity to Soil Macro-organisms

This information is not available. Based on existing exposure and effects information, it is currently not seen necessary to conduct any targeted ecotoxicological testing of FeSi.

Acute/Prolonged Toxicity to Terrestrial Plants

This information is not available. Based on existing exposure and effects information, it is currently not seen necessary to conduct any targeted ecotoxicological testing of FeSi.

Acute/Prolonged Toxicity to Soil Micro-organisms

Justification for test waiving is based on current information on use of FeSi alloys. Exposure of FeSi alloys directly to soil compartment is expected to be low. If direct or indirect exposure of the substance to soil cannot be ruled out, the results of tests may be necessary.

Acute/Prolonged Toxicity to Aquatic Micro-organisms

Study is scientifically unjustified due to low solubility of FeSi grades.

Acute/Prolonged Toxicity to Birds

This information is not available. The solubility/bioavailability of FeSi is low and based on the already existing exposure and effects information; it is currently not seen necessary to conduct any targeted ecotoxicological testing of FeSi.

General Conclusion

A preliminary PNEC aqua (freshwater) has been derived based on read across information from FeSi constituent metals applying precautionary principles. PNEC will be finalized after the standard long term test results are available. Solubility of FeSi in 7 day dissolution test was 0.3 % max (alt pH 7.2 and 1.5) (KTH 2010). Highest solubilities were measured for Si, Fe, Sr and Ba and small amounts of Cu, Zn, Pb.

Environmental Distribution

FeSi in particulate form is immobile in soil and sediment. Adsorption/desorption behaviour of dissolved FeSi constituents is governed mainly by inorganic soil and sediment materials. Each constituent behaves in a characteristic way, depending highly on local environmental conditions. Generally, the adsorption of these constituents in organic materials is weak and therefore less important.

Silicon:

Normally Si in the environment is always bound primarily with oxygen as silica/silicic acid. Silicon present in FeSi alloys exists both in Si (0) and Si (IV) oxidation states/forms. The released form is expected to be in the Si(IV) oxidation state. Si(IV) in fresh water or seawater can occur in a number of chemical species, dissolved monomeric Si(OH) 4, dimerized, trimerized, colloidal or in the form of aggregated colloids of different physical size or entirely as insoluble particulate matter. Saturated monomeric concentration range upper limits are ca. 60-140 mg/l (temperature controlled).

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Iron:

Dissolved iron is present in the environment in two oxidation states Fe (II/III) with Fe(II) easily oxidizing to Fe(III). Normally Fe (III) reacts with water (hydrolysis) to form colloidal and insoluble ferric hydroxide $Fe(OH)_3$ which in typical aquatic environmental conditions slowly precipitates to sediments. Formation of ferric hydroxide at pH levels above 5.0 limits the presence of iron in aqueous systems. Heavy metals and organic matter may be strongly adsorbed to Fe precipitates. Fe (III) forms precipitates with phosphate. Iron ions, especially Fe(II) ions may be also adsorbed to dissolved organic material and some dissolved iron in natural waters may be present as soluble organic-complexes.

Persistence and Degradation

Not relevant for inorganic substances.

Potential for Bioaccumulation

For aquatic bioaccumulation the study is scientifically unjustified. General intrinsic tendency of soluble silica to bio-concentrate in plants is low. Silicon is not known to be bio concentrated or bio accumulated to soil dwelling organisms at harmful levels. Terrestrial bioaccumulation of Fe and other relevant FeSi metal constituents is regarded low. These elements are known not to bio-magnify in terrestrial food web.

Results of PBT and vPvB Assessment

Substance is not classified as PBT or vPvB substance.

Other Adverse Effects

No other adverse effects are identified.

13. DISPOSAL CONSIDERATIONS

Dispose of ferrosilicon should be in accordance with local and national legislation. Unused contents should be consumed at the user's side.

14. TRANSPORT INFORMATION

Basic Transport Information

Proper Shipping Name: Ferrosilicon

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FeSi 65-70 % is not subject to RID/ADR standards about transport of dangerous goods according to 2.2.43.1.7 based on results of testing under Manual of Test and Criteria Part III - 33.4 (Classification Certificate No. 044/IPO-BC/2011). Ferrosilicon is not classified under Class 4.3.

FeSi 65-70 % is subject to IMDG (sea transport) and ICAO-TI/IATA-DGR (air transport) standards about transport of dangerous goods, and thus ferrosilicon is classified under Class 4.3.

IMDG and ICAO-TI/IATA-DGR

Shipping Name:	Ferrosilicon
UN No.:	1408
Hazard Class:	4.3
Packing Group:	III

Special Precautions for User

Avoid contact with water during transportation. Ferrosilicon is transported in big bags or containers. For loosely loaded ferrosilicon use covered trucks to prevent it from mixing with water.

15. REGULATORY INFORMATION

UN GHS - UN Globally Harmonized System of Classification and Labeling of Chemicals (GHS):
"According to Chapter 1.5.2 of the UN Globally Harmonized System of Classification and Labeling 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

RID/ADR standards about transport of dangerous goods according to 2.2.43.1.7 based on results of testing under Manual of Test and Criteria Part III - 33.4 (Classification Certificate No. 044/IPO-BC/2011). Ferrosilicon is not classified under Class 4.3.

EU CLP – Classification Labeling and Packaging Regulation:

According to 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/special preparations that meet the harmonized criteria for physical, health or environmental hazards. Since this product does not meet these criteria, a SDS according to 453/2010/EC is not issued. In order to communicate relevant HSE-(health, safety and environmental) information, this product safety information (PSI) is provided instead.

EU REACH – Registration, Evaluation and Authorization of Chemicals:

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." The assessment of chemical safety was performed for the substance. This substance does not require authorization according to REACH regulation.

With regard to ferrosilicon there are no special regulations, restrictions and prohibitions.

16. OTHER INFORMATION

These data are based on our current knowledge but do not constitute a guarantee for any specific product features and do not establish a legally valid contractual relationship.

16.1 List of Abbreviations

COPD:	chronic obstructive pulmonary disease
DNEL:	derived no-effect level
EC_{50}:	median effective concentration
LC_{50}:	median lethal concentration
LD_{50}:	median lethal dose
NOAEC:	no observable adverse effect concentration
NOEC:	no observable effect concentration
OEL:	occupational exposure limit
PBT:	persistent, bioaccumulative, toxic chemical
PNEC:	predicted no-effect concentration
T/D test:	test on dissolution of substance
vPvB:	very persistent, very bioaccumulative chemical

16.3 Key References

This safety data sheet is prepared according to Chemical Safety Report issued September 9th, 2010.

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Bhutan

APPENDIX

Table 1 Identified Uses of the Substance/Mixture (Uses by Workers in Industrial Settings)

Confidential	IU No.	Identified Use (IU) name	Substance supplied to that use	Use descriptors
	1	Production of FeSi by smelting process in an electric arc furnace (carbothermic reduction of quartz)	as such (substance itself)	**Process category (PROC):** PROC 3, 4, 5, 8a, 8b, 9, 14, 21, 22, 23 **Market sector by type of chemical product:** PC 7: Base metals and alloys **Environmental release category (ERC):** ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 14: Manufacture of basic metals, including alloys SU 0: Other: NACE code: C24.1 Manufacture of basic iron and steel and of ferro-alloys n.e.c. **Subsequent service life relevant for that use?:** yes
	2	Addition to prepare: steel or special steel (incl. high permeability steel), alloy bath to be included in steel, alloy matrix or alloy powder by atomisation.	as such (substance itself)	**Process category (PROC):** PROC 1, 3, 4, 5, 8a, 8b, 9, 13, 14, 21, 22, 23, 24, 25, 26, 27a, 27b **Market sector by type of chemical product:** PC 7: Base metals and alloys **Environmental release category (ERC):** ERC 3: Formulation in materials ERC 5: Industrial use resulting in inclusion into or onto a matrix ERC 12a: Industrial processing of articles with abrasive techniques (low release) ERC 12b: Industrial processing of articles with abrasive techniques (high release) **Sector of end use (SU):** SU 14: Manufacture of basic metals, including alloys SU 0: Other: NACE code: C24, C24.1 manufacture of basic metal, manufacture of basic iron, steel and ferro-alloys n.e.c. SU 15: Manufacture of fabricated metal products, except machinery and equipment **Subsequent service life relevant for that use?:** yes
	3	Used in Electric arc furnace & secondary metallurgy / Used in CASOB process (Composition Adjustment by Sealed argon bubbling-Oxygen Blowing)	as such (substance itself)	**Process category (PROC):** PROC 2 **Market sector by type of chemical product:** PC 7: Base metals and alloys **Environmental release category (ERC):** ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 14: Manufacture of basic metals, including alloys **Subsequent service life relevant for that use?:** yes

		alloying of steel melts: stainless steel industry.	(substance itself)	PROC 3, 4, 5, 8a, 8b, 9, 22, 23, 25 **Market sector by type of chemical product:** PC 7: Base metals and alloys **Environmental release category (ERC):** ERC 3: Formulation in materials ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 0: Other: NACE code: C24+C24.1+C25 to C33 manufacture of basic iron, steel and ferroalloys/ metal products/computer, electronic and optical products/machinery and equipment n.e.c./electrical products /motor vehicles/furniture/ Repair and install of machinery equip. SU 14: Manufacture of basic metals, including alloys **Subsequent service life relevant for that use?:** yes **Article category related to subsequent service life (AC):** AC 7: Metal articles
	5	Alloying of cast iron charges and melts (Iron foundries);Treatment and inoculation of molten iron and iron foundries; pig iron production	as such (substance itself)	**Process category (PROC):** PROC 4, 5, 7, 8a, 8b, 9, 10, 12, 15, 20, 22, 23, 26 **Market sector by type of chemical product:** PC 7: Base metals and alloys PC 14: Metal surface treatment products, including galvanic and electroplating products **Environmental release category (ERC):** ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 14: Manufacture of basic metals, including alloys SU 0: Other: NACE code: C24.5, Casting of metals **Subsequent service life relevant for that use?:** yes **Article category related to subsequent service life (AC):** AC 1: Vehicles AC 2: Machinery, mechanical appliances, electrical/electronic articles AC 7: Metal articles
	6	Silicothermic reduction of refractory metals (Cr, V, Mo) and others (Nb, W)	as such (substance itself)	**Process category (PROC):** PROC 3, 4, 5, 8a, 8b, 9, 22, 23, 25 **Market sector by type of chemical product:** PC 7: Base metals and alloys **Environmental release category (ERC):** ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 14: Manufacture of basic metals, including alloys SU 0: Other: NACE code: C 24.1 **Subsequent service life relevant for that use?:** yes
	7	Used as raw material in the production of FeSiMn or FeSi	as such (substance itself)	**Process category (PROC):** PROC 3, 4, 5, 8a, 8b, 9, 20, 22 **Market sector by type of chemical product:** PC 7: Base metals and alloys **Environmental release category (ERC):**

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				ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 14: Manufacture of basic metals, including alloys SU 0: Other: NACE code: C24.1+27.1, manufacture of basic iron and steel and ferro-alloys n.e.c. / electric motors generators, transformers and elec. distribution and control apparatus. **Subsequent service life relevant for that use?:** yes **Article category related to subsequent service life (AC):** AC 7: Metal articles AC 2: Machinery, mechanical appliances, electrical/electronic articles
	8	Used as metal surface treatment	as such (substance itself)	**Process category (PROC):** PROC 2, 3, 4, 5, 17, 18, 20, 21, 22, 23, 24, 25 **Market sector by type of chemical product:** PC 14: Metal surface treatment products, including galvanic and electroplating products **Environmental release category (ERC):** ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 14: Manufacture of basic metals, including alloys SU 0: Other: NACE code: C24 **Subsequent service life relevant for that use?:** yes **Article category related to subsequent service life (AC):** AC 7: Metal articles
	9	Used in the production of magnesium from dolomite using the Pidgeon Process in Electric furnaces; Used as a chemical in BOF (converters) metallic charge (steel industry); Used as metal filler	as such (substance itself)	**Process category (PROC):** PROC: 3, 4, 5, 8a, 8b, 9, 22, 23, 25 **Market sector by type of chemical product:** PC 7: Base metals and alloys **Environmental release category (ERC):** ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 14: Manufacture of basic metals, including alloys SU 0: Other: NACE code: C24 **Subsequent service life relevant for that use?:** yes

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	10	FeSi fines used for the production of refractory products, Manufacturing of exothermic products	as such (substance itself)	**Process category (PROC):** PROC: 3, 4, 5, 8a, 8b, 9, 22, 23, 25 **Market sector by type of chemical product:** PC 7: Base metals and alloys PC 14: Metal surface treatment products, including galvanic and electroplating products **Environmental release category (ERC):** ERC 3: Formulation in materials ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 0: Other: NACE code: C23.20 manufacture of refractory product + C24, manufacture of basic metals SU 14: Manufacture of basic metals, including alloys **Subsequent service life relevant for that use?:** yes
				Article category related to subsequent service life (AC): AC 7: Metal articles AC 01: Other (non intended to be released): refractory products
	11	Treatment and inoculation of molten iron and iron foundries. Manufacture of FeSi bricks, Used as powder in the production of cored wires.	as such (substance itself)	**Process category (PROC):** PROC: 4, 5, 8a, 8b, 9, 20, 22, 25 **Market sector by type of chemical product:** PC 7: Base metals and alloys **Environmental release category (ERC):** ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 15: Manufacture of fabricated metal products, except machinery and equipment SU 0: Other: NACE code: C24 **Subsequent service life relevant for that use?:** yes **Article category related to subsequent service life (AC):** AC 7: Metal articles
	12	Used in arc welding	as such (substance itself)	**Process category (PROC):** PROC: 5, 9, 25 **Market sector by type of chemical product:** PC 38: Welding and soldering products (with flux coatings or flux cores.), flux products **Environmental release category (ERC):** ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 17: General manufacturing, e.g. machinery, equipment, vehicles, other transport equipment SU 0: Other: NACE code: C24 **Subsequent service life relevant for that use?:** yes

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	13	Used as flotation agent for metal separation by dense-media process and production of welding products	as such (substance itself)	**Process category (PROC):** PROC: 26 **Market sector by type of chemical product:** PC 0: Other: flotation agent **Environmental release category (ERC):** ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles **Sector of end use (SU):** SU 2a: Mining (without offshore industries) SU 0: Other: NACE code: B7.2.9, Mining of other non-ferrous metal ores. + flotation agent **Subsequent service life relevant for that use?:** no
	14	Formulation in Foundry industry	as such (substance itself)	**Process category (PROC):** PROC: 5, 8b, 9 **Environmental release category (ERC):** ERC 5: Industrial use resulting in inclusion into or onto a matrix **Sector of end use (SU):** SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys) **Subsequent service life relevant for that use?:** yes
	15	Used as flotation agent for metal separation by dense-media process	as such (substance itself)	**Process category (PROC):** PROC: 26 **Market sector by type of chemical product:** PC 0: Other: flotation agent **Environmental release category (ERC):** ERC 4: Industrial use of processing aids in processes and products, not becoming part of articles **Sector of end use (SU):** SU 10: Formulation [mixing] of preparations and/or re-packaging (excluding alloys) **Subsequent service life relevant for that use?:** no

Approved by:

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