Safety Information Sheet

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY

1.1 Product identifier

Trade name:	SSAB STEEL POWDER
Substance name:	Iron metal
Chemical / technical product name:	Iron (metal) powder
REACH Registration No:	01-2119462838-24-0193
EC No:	231-096-4
CAS No:	7439-89-6

1.2 Uses

Relevant identified uses of the substance or mixture:	Material for metal 3D-printing process.
Uses advised against:	The product should only be used according the relevant identified uses specified above. If the product is used for any other purposes, it is recommended to contact SSAB.

1.3 Details of the producer of the material

Producer:	SSAB EMEA AB in Oxelösund, Sweden.

1.4 Details of the supplier of the safety data sheet

Supplier:	SSAB EMEA AB
Address:	613 80 OXELÖSUND, SWEDEN
Telephone No:	+46 155 25 40 00
E-mail:	reach@ssab.com

1.5 Emergency telephone number

Emergencies (24 hours):	112 (the European emergency number)
Health advice and information (24 hours):	+44 (0) 845 4647 (UK only)

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance

2.1.1 CLASSIFICATION ACCORDING TO CLP [REGULATION (EC) NO 1272/2008]

Classification:	The product is not classified as a dangerous substance under the current legislation for classification and labelling of dangerous chemical substances and mixtures.

2.2 Label elements

Substance name:	Iron
CAS No:	7439-89-6
Hazard pictogram(s):	THE PRODUCT IS NOT HAZARDOUS ACCORDING TO THE EUROPEAN LEGISLATION. THE PACKAGING DOES NOT REQUIRE A SYMBOL.
Signal word:	No.
Hazard statement(s):	None.
Precautionary statement(s):	None.

Other labelling: No.

2.3 Other hazards

PBT substance: ☐ YES ☐ NO ☒ NOT APPLICABLE

vPvB substance: ☐ YES ☐ NO ☒ NOT APPLICABLE

Physical hazards: No other known hazards. Not tested specifically for dust explosion.

Health hazards: May cause eye irritation of mechanical means.

Environmental hazards: No other known hazards.

2.4 Authorisation (substance)

Authorisation is not needed for this substance.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS ☐

3.1 Chemical identity of the main constituent(s)

Substance name	**Index No**	**CAS No**	**EC No**	**REACH Registration No**	
Iron	-	7439-89-6	231-096-4	01-2119462838-24-0193	
	Classification[1]			**Conc. (w/w)**	**Other**
	NOT CLASSIFIED[2]			> 94 %	-
Substance name	**Index No**	**CAS No**	**EC No**	**REACH Registration No**	
Chromium	-	7440-47-3	231-157-5	N.A.	
	Classification[1]			**Conc. (w/w)**	**Other**
	NOT CLASSIFIED[2]			< 4 %	-
Substance name	**Index No**	**CAS No**	**EC No**	**REACH Registration No**	
Nickel	028-002-00-7	7440-02-0	231-111-4	N.A.	
	Classification[1]			**Conc. (w/w)**	**Other**
	Skin.Sens.1[3], H317, Carc.2 H351, STOT RE1 H372.			< 2 %	-

1. For a complete explanation of the symbol letters and risk phrases go to section 16 Other information.
2. NOT CLASSFIED. The substance does not fulfil the criteria for being classified as a hazardous substance according to CLP.
3. Alloys containing nickel are classified for skin sensitisation when the release rate of 0.5 µg Ni/cm2/week, as measured by the European Standard reference test method EN 1811, is exceeded.

3.1.1 Description of the main constituent(s)

General description: SSAB steel powder from gas atomization process.

SECTION 4: FIRST AID MEASURES ☐

4.1 Description of first aid measures

General description of the product: Bring this safety information sheet with you to the doctor treating you.

Inhalation: If the substance is inhaled, and symptoms like shortness of breath or other symptoms of illness occur, fresh air and rest is recommended. If simple first aid does not produce a quick recovery, call the emergency number.

Skin contact: Wash with soap and water. In contact with chemical substances exposed clothes and shoes should normally be removed. The product does normally not possess any hazard to the exposed person or to first-aiders.

Eye contact: To prevent eye irritation, rinse immediately with a tempered, soft or low pressure water jet or eye wash for at least 5 minutes. If symptoms persist (intense stinging, pain, light sensitivity, poor vision) continue rinsing and seek medical assistance.

Ingestion:	Drink a couple of glasses of water. If more than a small quantity has been ingested seek medical advice.
Notes for the doctor:	Exposure does generally not possess any hazard to the health.

SECTION 5: FIREFIGHTING MEASURES ☐

5.1 Extinguishing media

Suitable extinguishing media:	The product is not flammable according to N.1 flammable solids test and not self-heating according to N.4 self-heating test. Nevertheless if there is an ongoing metal-fire or another high temperature fire, the following media is recommended; sand, metallic powder extinguisher or carbon dioxide (CO_2). If water spray or foam is used, this shall preferably be in excessive amounts, enough to cool everything down.

5.2 Advice for fire-fighters

General safety measures:	Avoid inhalation of smoke fumes.
Safety measures during firefighting:	Adequate protective equipment should be worn for all fire-fighting.

SECTION 6: ACCIDENTAL RELEASE MEASURES ☐

6.1 Personal precautions, protective equipment and emergency procedures

General safety measures:	Use methods to minimize generation of dust.
Personal protective equipment:	Avoid inhalation of dust and exposure to eyes and skin. Always wear gloves when handling chemical substances.

6.2 Environmental precautions

General safety measures:	None.

6.3 Methods and material for containment and cleaning up

Containment techniques:	Specific containment is normally not necessary.
Methods for cleaning up:	The product is picked up mechanically. It may be necessary to flush contaminated area to prevent dust formation.

6.4 Reference to other sections

Sections 8 and 13:	Information regarding personal protective equipment, see section 8.2 Exposure controls, and regarding waste disposal, see section 13 Disposal considerations.

SECTION 7: HANDLING AND STORAGE ☐

7.1 Precautions for safe handling

General requirements:	Standard industry hygiene applies.
Measures to prevent aerosol and dust generation:	Avoid dust formation. Keep good housekeeping.

7.2 Conditions for safe storage, including any incompatibilities

General conditions for safe storage:	In containers tightly closed. Avoid dust formation.

7.3 Specific end use(s)

Exposure scenario: ☐ YES, see attached ES. ☒ NO

Industry or sector specific guidance: ☐ YES, see below in this section. ☒ NO

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION ☐

8.1 Control parameters

8.1.1 NATIONAL OCCUPATIONAL EXPOSURE LIMITS OR COMMUNITY OCCUPATIONAL EXPOSURE LIMITS

National limit values: ☒ YES, see table below. ☐ NO

Community limit values: ☐ YES, see table below. ☒ NO

Substance name and CAS No	Fraction	Occupational exposure limits			
		Long-term (8 h)		Short-term (15 min)	
		ppm	mg/m³	ppm	mg/m³
Iron oxide, (as Fe), 1309-37-1	- Fume		5		10
Dust (UK)	- Inhalable dust - Respirable dust		10 4		

8.1.2 DN(M)EL / PNEC

8.1.2.1 DN(M)EL

Substance: Iron **Classification:** NOT CLASSIFIED[1]

Exposure - health	DN(M)EL	Exposure group	
		Workers	Others[2]
Chronic (repeated) exposure, inhalation, local effects	DNEL -	10 mg/m³ (inhalable dust) 3 mg/m³ (respirable dust)	10 mg/m³ (inhalable dust) 1.5 mg/m³ (respirable dust)
Chronic (repeated) exposure, oral, systemic effects		Not relevant	0.71 mg/kg bw d

1. NOT CLASSFIED. The substance does not fulfill the criteria for being classified as a hazardous substance according to CLP.
2. Others: comprise include consumers and the general population.

8.2 Exposure controls

8.2.1 APPROPRIATE ENGINEERING CONTROLS

Precautionary measures: Avoid breathing of dust. Exposure limits for iron and general dust, see above.

8.2.2 PERSONAL PROTECTION

Requirements for protection equipment: Regular personal protective clothing should meet recommended standards.

Eye/face protection: With risk of exposure to the eyes, always wear protective glasses [EN 166 (Personal eye-protection - Specifications)].

Skin protection: Always wear gloves when handling chemical substances.

Suitable glove material:

Material	Thickness	Breakthrough time
Usual working leather glove [EN 388 (Protective gloves against mechanical risks)]	-	Not applicable

Body protection: Standard protective clothing.

Respiratory protection: With risk of exposure to the respiratory system, use a dust filter P3 [EN 143 (particle filters)], [EN 140 (Half masks and quarter masks), EN 149 (Filtering half masks to protect against particles)].

8.2.3 ENVIRONMENTAL EXPOSURE CONTROLS

General risk management measures: No specific measures.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Property	Value	Method / Remarks
Physical state:	Solid - heterogeneous material	-
Granulometry:	<150 µm	
Colour as supplied:	Metallic grey	-
Odour:	None	-
pH:	Poor solubility in water	-
Melting point:	1150 - 1538 °C @ 1013 hPa	-
Initial boiling point and boiling range:	2861 °C @ 1013 hPa	-
Flammability (solid):	Negative test result.	RISE, Sweden, 2022-04-04; Fire test of flammable solids according to “Recommendations on the transport of Dangerous Goods”, Manual of Tests and Criteria, Section 33.2.4, Test N.1
Self-heating properties:	Negative test result.	RISE, Sweden, 2022-04-04; Fire test of self-heating substances according to “Recommendations on the transport of Dangerous Goods”, Manual of Tests and Criteria, Section 33.4.6, Test N.4
Density:	7870 kg/m^3 @ 25 °C	-
Bulk density:	4500 - 5000 kg/m^3	-
Solubility in water:	0.015 mg Fe (III)/l @ 25 °C (pH 6) 0.0024 mg Fe (III)/l @ 25 °C (pH 7) 0.00001 mg Fe (III)/l @ 25 °C (pH 8)	ETAP 2010
Partition coefficient: n-octanol/water:	Not applicable	Inorganic substance

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

Reactivity hazards: Even if N.1 and N.4 tests gave a negative result, indicating low reactivity, it is advised to earth all equipment the product make contact with.

10.2 Chemical stability

Stability under normal handling and storage: Stable substance under normal and intended handling conditions in tightly closed containers and normal temperature, pressure etc.

10.3 Hazardous decomposition products

Known/anticipated hazardous decomposition products: May release iron oxides during heating.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

11.1.1 SUBSTANCE - INFORMATION ON RELEVANT HAZARD CLASSES

Acute toxicity:

Ingestion:	Based on available data, the classification CLP criteria are not met, see section 11.2.1 Toxicity data.
Skin contact:	Based on available data, the classification CLP criteria are not met, see section 11.2.1 Toxicity data. Since the substance is practically insoluble in water, and that is has no dermal bioavailability, skin contact is not considered as a relevant exposure route.
Inhalation:	Based on available data, the classification CLP criteria are not met, see section 11.2.1 Toxicity data.
Skin corrosion/irritation:	Based on available data, the classification CLP criteria are not met. Studies on the rabbit (New Zealand White) with Bayferrox VP AC 5122 M and Bayferrox Schwarz 350 fluessig, confirm that the substance has no corrosive or irritating properties (OECD 401).
Serious eye damage/irritation:	Based on available data, the classification CLP criteria are not met. Studies on the rabbit (New Zealand White) with a mixture of 83.5 % Fe_2O_3 and 12 % FeO, and Bayferrox Schwarz 350 fluessig, confirm that the substance has no corrosive or irritating properties OECD 405).
Respiratory or skin sensitisation:	Based on available data, the classification CLP criteria are not met. Skin sensitisation studies on the guinea pig (Maurer optimization test) with iron(III)oxide and experiences from human exposure, indicate that the substance is not a skin sensitizer. Tests on respiratory sensitisation are not relevant as the substance is practically inert and insoluble in water. Nickel metal is classified by the EU as a sensitizer. A mixture containing 1 % or more of a sensitizing substance, should be classified as a sensitizer. Nickel in different steels, is tightly bound into the alloy and will not be bioavailable. The product is not expected to be sensitizing in the form it is placed.
Germ cell mutagenicity:	Based on available data, the classification CLP criteria are not met. Negative results in Ames test OECD 471 and in OECD 476 (In vitro Mammalian Cell Gene Mutation Test) with electrolytic iron and positive results with carbonyl iron. However, the overall conclusion is that the positive studies are considered to be due to phagocytosis.
Carcinogenicity:	Based on available data, the classification CLP criteria are not met. There are no chronic studies available. However, the results from comparative studies with different metals, does not indicate that the substance can cause cancer. Nickel metal is classified by the EU as a carcinogen category 3. A mixture containing 1 % or more of a carcinogen category 3, should be classified as a carcinogen category 3. The development of cancer from nickel exposure, is mainly connected to nickel ions and to high concentrations in critical organs. This is also stressed in the IARC Evaluation of Carcinogenic Risks to Humans regarding the exposure from chromium, nickel and welding operations. IARC classified metallic nickel as carcinogen category 2B. In a reference study on 10 different studies representing ca 80000 nickel workers, no raised cancer risk within the nickel alloy industry was reported, International Committee on Nickel Carcinogenesis in Man (1990). The product is not expected to be carcinogen in the form it is placed on the market.
Reproductive toxicity:	Reproductive studies are missing. Based on the water solubility on available data, the classification CLP criteria are not met. Based on the low oral toxicity and the low bioavailability, the substance is not considered to cause effects on reproduction.

Specific target organ toxicity – single exposure:	Based on available data, the classification CLP criteria are not met. Since the substance is practically inert and insoluble in water, no specific target organ toxicity is expected.
Specific target organ toxicity – repeated exposure:	Based on available data, the classification CLP criteria are not met. See section 11.2.1 Toxicity data. When processing the material in e.g. cutting, sharpening, welding operations, exposure from dangerous substances can arise, see section 8.2 Exposure controls. Repeated or high exposure levels from processing dust may cause illness in the respiratory tract.
Aspiration hazard:	Based on available data, the classification CLP criteria are not met.
CMR properties cat. 1A and 1B:	Based on available data, the classification CLP criteria are not met.

11.2.1 TOXICITY DATA

Substance: Iron **Classification:** NOT CLASSIFIED[1]

Study	**Exposure**		**Species**	**Results**	**Method**	**Rem**
	Exp.route	Dur. time / frequency				
Acute	Oral	-	Rat	LD_{50} 7500 mg/kg bw	-	2
Acute	Oral	-	Rat	LD_{50} 98.6 g/kg bw (male)	OECD 401	3
Subacute	Inhalation	28 d [6 hr/d (5 d/w)]	Rat	6 hr LC50 > 250 mg/m^3	-	4
Subacute	Inhalation	-	Rat	NOAEC 5 mg/m^3	-	5
Subchronic	Oral	-	Rat	LOAEL 26 mg/kg bw d	-	5

1. NOT CLASSFIED. The substance does not fulfill the criteria for being classified as a hazardous substance according to CLP.
2. Electrolytic iron.
3. Rat (Wistar, hanne). Hydrogen reduced iron powder.
4. Rat (Chales River, male). Carbonyl iron.
5. Carbonyl iron.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity - substance

12.1.1 TOXICITY AFTER SHORT AND LONG TERM EXPOSURE

Summary: The substance is not expected to be dangerous for the aquatic or terrestrial environment from short-term or long-term exposure. Acute toxicity to algae and chronic toxicity tests in the aquatic environment are not need.

12.1.2 IMPACT ON SEWAGE TREATMENT PLANTS

Summary: The substance is not expected to be dangerous for wastewater treatment plants. Iron salts are often used in wastewater treatment for effluent control of chemical substances.

12.2 Persistence and degradability

Biotic degradability: Not applicable to inorganic substances.

Abiotic degradability: Not applicable to inorganic substances.

12.3 Bioaccumulative potential

Log P_{ow} and/or BCF value: Bioaccumulation studies are not needed to be conducted due to low bioavailability.

12.4 Mobility in soil

Environmental distribution: Based on the physical and chemical properties, the substance is expected to be distributed to aquatic sediments.

12.5 Results of PBT and vPvB assessment

PBT substance: ☐ YES ☐ NO ☒ NOT APPLICABLE

vPvB substance: ☐ YES ☐ NO ☒ NOT APPLICABLE

12.5.1 ECOLOGICAL DATA

Substance: Iron **Classification:** NOT CLASSIFIED[1]

Study	Species	Results	Method	Rem
Aquatic environment				
Short-term	Fish *(Danio rerio)*	96 hr LC_{LO} ≥ 10 000 mg/l	OECD 203	Iron(II,III) oxide
Short-term	Mayfly *(Leptophlebia marginata L.)*	96 hr EC_{50} 89.5-106.3 mg/l	-	Iron(II) sulphate (two studies)
Microbiological activity in sewage treatment systems				
Short-term	Activated sludge (domestic)	3 hr EC_{50} > 10 000 mg/l	ISO 8192	Iron(II,III) oxide
Short-term	Activated sludge (domestic)	3 hr EC_{50} > 10 000 mg/l	ISO 8192	Iron(II,III) oxide
1. NOT CLASSFIED. The substance does not fulfill the criteria for being classified as a hazardous substance according to CLP.				

SECTION 13: DISPOSAL CONSIDERATIONS ☐

13.1 Disposal considerations

13.1.1 CLASSIFICATION OF WASTE

Hazardous waste: ☐ YES ☒ NO

Waste according to EWC: 17 04 05

Packaging: Handled in plastic containers.

13.1.2 HANDLING OF WASTE

General information: Before handling waste, see section 8 Exposure controls/Personal protection. During use, the substance may have been contaminated with hazardous substances, therefore the user is obliged to classify the waste.

Handling of waste product: Iron is usually disposed of as scrap.

SECTION 14: TRANSPORT INFORMATION ☐

14.1 General information

Dangerous goods: ☐ YES ☒ NO, See section 9.1 Physical properties.

UN No: Not Applicable.

Packaging group: Not Applicable.

Label: Not Applicable.

ADR and IMDG: Not Applicable.

SECTION 15: REGULATORY INFORMATION ☐

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

15.1.1 REGULATIONS/LEGISLATION REGARDING SAFETY, HEALTH AND ENVIRONMENT

General information: The employer shall keep himself up to date with the regulations concerning his business.

Work environment: Example: The Control of Substances Hazardous to Health Regulations 2002 No. 2677. (UK only)

	Example: EH40/2005 Workplace exposure limits. (UK only)
Environment:	Example: The Producer Responsibility Obligations (Packaging Waste) Regulations 1997 No. 648. (UK only)

15.1.2 AUTHORISATIONS AND RESTRICTIONS ACCORDING TO REACH SECTIONS VII AND VIII

Authorisation (substance):	☐ YES	☒ NO
Restriction (substance/mixture):	☐ YES	☒ NO

15.1.3 SPECIAL RULES ON PACKAGING ACCORDING TO CLP [(EC) NO 1272/2008]

Consumer product:	☐ YES	☒ NO
Child-resistant fastening:	☐ YES	☒ NO
Tactile warning of danger:	☐ YES	☒ NO

15.2 Chemical Safety Assessment (CSR)

Chemical Safety Assessment:	☐ YES, mixture	☒ YES, substance(s)	☐ NO

SECTION 16: OTHER INFORMATION ☒

16.1 Indication of changes

Information to the user:	When information related to safety or other relevant topic is updated, this is shown by ticking the section checkbox. Version 1.0, 2022-04-27, new document.

16.2 Abbreviations and acronyms

BW:	**B**ody **w**eight.
CAS No:	**C**hemical **A**bstracts **S**ervice number.
Cat:	Category. Subdivision of a hazard class, used in classification.
CLP:	**C**lassification, **L**abelling and **P**ackaging of chemical substances and mixtures. See section 16.3.
CMR properties:	**C**arcinogenic, **M**utagenic or toxic for **R**eproduction
CSR:	**C**hemical **S**afety **R**eport.
DMEL:	**D**erived **M**inimal **E**ffect **L**evel.
DNEL:	**D**erived **N**o-**E**ffect **L**evel.
EC No:	The EC number, i.e. EINECS, ELINCS or NLP, is the official number of the substance within the European Union.
Einecs:	**E**uropean **In**ventory of **E**xisting Commercial **C**hemical **S**ubstances.
Elincs:	The **E**uropean **Li**st of **N**otified **C**hemical **S**ubstances.
ES:	**E**xposure **S**cenario.
EWC:	The **E**uropean **W**aste **C**atalogue, see Commission decision 2000/532/EC.
Index No:	The Index number is the identification code given to the substance in Part 3 of Annex VI to Regulation (EC) No 1272/2008.
Log Pow:	The potential for bioaccumulation - determined by using the octanol/water partition coefficient - is reported as log “Pow” by the EU, whereas the GHS criteria refer to log “Kow”.
NOAEC:	**N**o **O**bserved **A**dverse **E**ffect **C**oncentration. Inhalation route. The highest concentration tested in an experiment not showing adverse effects. The unit can be mg/L/6h/day.
NOAEL:	**N**o **O**bserved **A**dverse **E**ffect **L**evel. Oral or dermal route. The highest dose tested in an experiment not showing adverse effects. The units are mg/kg bw/day or ppm.

NOEC:	**N**o **O**bserved **E**ffect **C**oncentration. The highest concentration tested in an experiment not showing any effects on the organism. Expressed as concentration (mg/l) or (mg/m^3).
NOEL:	**N**o **O**bserved **E**ffect **L**evel. The highest dose tested in an experiment not showing any effect on the animal. Expressed as daily dose per weight of animal (mg/kg).
OECD:	**O**rganisation for **E**conomic **C**o-operation and **D**evelopment. The OECD Guidelines for the Testing of Chemicals are a collection of internationally agreed test methods.
PBT substance:	**P**ersistent, **b**ioaccumulative and **t**oxic substance.
pH:	pH is a measure of the acidity or basicity of an aqueous solution.
pKa:	The symbol for the acid dissociation constant at logarithmic scale.
PNEC:	**P**redicted **N**o-**E**ffect **C**oncentration.
ppm:	**p**arts **p**er **m**illion
REACH:	**R**egistration, **E**valuation, **A**uthorisation and Restriction of **Ch**emicals. See section 16.3.
vPvB substance:	**V**ery **p**ersistent and **v**ery **b**ioaccumulative substance.
WEL:	**W**orkplace **E**xposure **L**imits.

16.3 Key literature references and sources for data

References:

RISE, Sweden, 2022-04-04; Fire test of flammable solids according to “Recommendations on the transport of Dangerous Goods”, Manual of Tests and Criteria, Section 33.2.4, Test N.1

RISE, Sweden, 2022-04-04; Fire test of self-heating substances according to “Recommendations on the transport of Dangerous Goods”, Manual of Tests and Criteria, Section 33.4.6, Test N.4

REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency.

REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging (CLP) of substances and mixtures.