SAFETY DATA SHEET (SDS)

According to Regulation (EC) No. 1907/2006 Art. 31

Creation date: 2025-Dec-01
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Version: 1.0

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product Name:	Iron 99.7% HVOF 20-45 µm
Grain Size:	20–45 µm
EC No:	231-096-4
CAS No:	7439-89-6
REACH Registration No.:	01-2119462838-24-xxxx

1.2 Relevant identified uses of the substance and uses advised against
Identified uses:

- Thermal Spray Coatings (HVOF, Cold Spray)

Uses advised against:

- All other uses are advised against

1.3 Details of the supplier of the SDS
Company Name: Ultra Metal Powders Sp. z o. o.
Address: Ul. Marsz. Józefa Piłsudskiego 74 lok. 320, 50-020 Wrocław, Poland
Phone: +48 733 500 574
Email of competent person: mateusz.skalon@umpowders.com

1.4 Emergency telephone number
Emergency number: +48 (0) 42 631 47 24 (Poison Information Center, Łódź, Poland)

Available Mon–Fri 8:00–17:00 (CET)

SECTION 2: Hazards identification

2.1 Classification of the substance

Classification according to Regulation (EC) No 1272/2008 (CLP):

The substance is not classified as hazardous according to Regulation (EC) No 1272/2008.

However, fine iron powder may pose a dust explosion hazard and cause mechanical irritation to eyes, skin, and respiratory tract.

No specific hazard categories apply.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP):

No hazard pictogram, signal word, or hazard statements required.

Supplemental information:

Dust may form explosive mixtures with air.

Inhalation of excessive concentrations of metallic dust may cause mechanical irritation or transient respiratory effects.

2.3 Other hazards

- The material is not classified as PBT (Persistent, Bioaccumulative or Toxic) or vPvB (very Persistent, very Bioaccumulative).
- Iron powder is combustible when finely divided and may ignite if exposed to sparks or high heat.
- Contact with strong oxidizing agents may cause reactions.

SECTION 3: Composition/information on ingredients

3.1 Substances

Name of substance	Iron powder
Molecular formula	Fe
Molar mass	55,85 g /mol
REACH Reg. No	01-2119462838-24-xxxx

CAS No	7439-89-6
EC No	231-096-4
Index No	-
Concentration	>99.7%
Classification (Regulation (EC) No 1272/2008):	The substance is not classified as hazardous.

SECTION 4: First aid measures

4.1 Description of first aid measures

General instructions
Ensure personal protection before assisting others. In case of uncertainty or persistent symptoms, seek medical attention.

In case of inhalation
Move the affected person to fresh air. Keep at rest and seek medical attention if symptoms such as coughing or shortness of breath occur.

In case of skin contact
Wash thoroughly with water and mild soap. Remove contaminated clothing. Seek medical attention if irritation or discomfort persists.

In case of eye contact
Rinse immediately with plenty of water for at least 10–15 minutes, keeping eyelids open. If irritation persists, seek medical advice.

If swallowed
Rinse mouth with water. Do not induce vomiting. Seek medical advice if large amounts have been ingested or if symptoms occur.

4.2 Most important symptoms and effects, both acute and delayed

- Dust inhalation may cause mechanical irritation of the respiratory tract.
- Prolonged or repeated exposure to high concentrations of iron dust may cause benign pneumoconiosis (“siderosis”).
- Mechanical irritation to eyes and skin may occur.

4.3 Indication of any immediate medical attention and special treatment needed

No specific antidote known. Treat symptomatically based on clinical findings.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media

Iron in bulk form is not readily flammable. However, fine iron powder or dust may form explosive or combustible mixtures with air.
Use dry sand, graphite, sodium chloride, or a Class D fire extinguisher suitable for metal fires.

Unsuitable extinguishing media

Do not use water, foam, or carbon dioxide on burning metal. Contact with water may produce hydrogen gas and increase fire intensity.

5.2 Special hazards arising from the substance

Fine iron powder may ignite spontaneously when exposed to open flames, sparks, or high heat.

Thermal decomposition or fire may produce iron oxides (FeO, Fe_2O_3, Fe_3O_4) and hydrogen gas in the presence of moisture.

Dust clouds can form explosive mixtures with air.

5.3 Advice for firefighters

Wear full protective clothing and a self-contained breathing apparatus (SCBA).

Avoid using water; isolate the area and allow fire to burn out under controlled conditions if safe to do so.

Prevent firefighting runoff from entering drains or waterways.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Avoid dust formation and sources of ignition.
Wear appropriate personal protective equipment (PPE), including gloves, safety goggles, and dust masks or respirators (see Section 8).
Ensure adequate ventilation. Avoid inhalation and contact with skin or eyes.

6.2 Environmental precautions

Prevent the release of material into drains, soil, or watercourses.
Iron powder is not classified as environmentally hazardous, but large releases may affect aquatic systems by sedimentation.

6.3 Methods and materials for containment and cleaning up

Collect spilled material mechanically.

Use a non-sparking, explosion-proof vacuum cleaner or HEPA-filtered industrial vacuum designed for metal powders.

Avoid generating airborne dust.

Do not use water for cleanup due to potential hydrogen gas formation.

Store recovered material in properly labeled, sealed containers for reuse or disposal.

6.4 Reference to other section

For information on safe handling, see section 7.
For information on personal protection, see section 8.
For information on disposal, see section 13

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Wear suitable personal protective equipment (see Section 8).
Avoid creating and inhaling dust. Use only in well-ventilated areas or under local exhaust ventilation.
Keep away from open flames, sparks, and sources of heat — fine iron powder may form explosive dust-air mixtures.
Prevent electrostatic discharge.
Do not eat, drink, or smoke while handling the product.

Wash hands and exposed skin thoroughly after handling.
Contaminated clothing should be removed and washed before reuse.

7.2 Conditions for safe storage, including any incompatibilities

Store in tightly closed, clearly labeled containers in a cool, dry, and well-ventilated area.
Keep away from oxidizing agents, acids, and moisture.
Avoid exposure to water, as hydrogen gas may be released upon contact.
Protect from mechanical shock and static discharge.
Storage class (TRGS 510): LGK 11 – Combustible solids.

7.3 Specific end uses

See Section 1.2 – Iron powder intended for use in additive manufacturing, thermal spray coatings, and powder metallurgy applications.

SECTION 8: Exposure controls/personal protection

8.1 Parameters to be monitored

Parameter	CAS No.	Exposure Limit (TWA)	Short-term Exposure Limit (STEL)	Remarks	Source
Inhalable dust (E-dust)	7439-89-6	PL: 5 mg/m³	—	Total inhalable dust	Polish Regulation on MACs (Dz.U. 2021, poz. 2088)
Respirable dust (A-dust)	7439-89-6	PL: 2.5 mg/m³	—	Respirable fraction	Polish Regulation on MACs
Iron oxide fume (Fe_2O_3, Fe_3O_4)	1309-37-1	EU: 1 mg/m³ (as Fe)	—	For welding or high-temperature operations	SCOEL / EU Directive 2000/39/EC

8.2 Exposure controls

Protective and hygienic measures
Observe standard industrial hygiene practices.
Avoid generation of dust. Wash hands and exposed areas thoroughly after handling. Do not eat, drink, or smoke in work areas.

Respiratory protection
If exposure limits are exceeded or during dust-generating operations, wear an approved particulate filter mask (type P2 or P3) according to EN 143/EN 149.

Hand protection
Wear protective gloves resistant to mechanical hazards (EN 388). Nitrile or leather gloves are suitable depending on handling conditions.

Eye protection
Wear safety goggles or face shield (EN 166) to protect against dust particles.

Skin and body protection
Wear protective clothing suitable for preventing dust contact. Use antistatic footwear and clothing in areas where dust clouds may form.

Environmental exposure controls
Prevent release of iron powder to the environment. Collect spills immediately to avoid dust dispersion. Dispose of waste according to Section 13.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Property	Value
Appearance	Grey metallic powder
Physical state	Solid, spherical particles 20–45 µm
Odour	Odourless
Odour threshold	Not applicable
pH (in water)	Not applicable
Melting point	~1538 °C
Boiling point	~2862 °C
Flash point	Not applicable
Flammability	Not flammable as bulk solid; fine powder may be combustible
Explosion limits	Not explosive in solid form. Explosive properties may change if dusts or powders of the material get into the air

Property	Value
Vapour pressure	Negligible
Relative density (bulk)	~7.8 g/cm³ as solid metal; ~3.5–4.5 g/cm³ as powder (depending on morphology)
Solubility in water	Insoluble
Partition coefficient (logKow)	Not applicable
Auto-ignition temperature	>300 °C (fine powder may ignite spontaneously at elevated temperatures)
Decomposition temperature	Not applicable

9.2 Other information

Dust can form explosive mixtures with air under certain conditions.

When heated in air, iron forms iron oxides (FeO, Fe_2O_3, Fe_3O_4).

Thermal conductivity: ~80 W/m·K (at 20 °C).

Electrical resistivity: ~0.10 μΩ·m (at 20 °C).

SECTION 10: Stability and reactivity

10.1 Reactivity

Iron powder is not reactive under normal ambient conditions and intended use. However, finely divided iron may react exothermically with oxygen, moisture, or oxidizing agents, particularly at elevated temperatures.

10.2 Chemical stability

The product is chemically stable under normal storage and handling conditions. When exposed to air and humidity, a thin layer of iron oxide may gradually form on the surface.

10.3 Possibility of hazardous reactions

- Contact with strong oxidizing agents, acids, or moisture can generate heat and hydrogen gas.
- Fine powder may oxidize rapidly in air and ignite under certain conditions.
- No hazardous polymerization expected.

10.4 Conditions to avoid

Avoid exposure to:

- Moisture and water (risk of hydrogen gas formation)
- Sparks, open flames, or strong heat sources
- Airborne dust accumulation or electrostatic discharge

10.5 Incompatible materials

- Oxidizing agents: nitric acid, hydrogen peroxide, chlorine, bromine, peroxides
- Acids: sulfuric acid, hydrochloric acid (may release hydrogen gas)
- Halogens and nitrates
- Moisture (can promote corrosion and hydrogen evolution)

10.6 Hazardous decomposition products

At elevated temperatures or in fire conditions, iron oxides (FeO, Fe_2O_3, Fe_3O_4) may form.
Reaction with acids or water may produce hydrogen gas, which is flammable.

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SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity:
Based on available data, the classification criteria are not met.
Metallic iron is considered of low acute toxicity. Ingestion of large quantities may cause gastrointestinal discomfort.

Skin corrosion/irritation:
Based on available data, the classification criteria are not met.
Prolonged contact with fine powder may cause mechanical irritation but not chemical burns.

Serious eye damage/irritation:
Based on available data, the classification criteria are not met.
Dust particles may cause mechanical irritation or redness of the eyes.

Respiratory or skin sensitisation:
Based on available data, the classification criteria are not met.
No sensitising effects known for metallic iron. Excessive dust exposure may cause transient respiratory irritation.

Germ cell mutagenicity:
Based on available data, the classification criteria are not met.
No evidence of mutagenic effects for metallic iron.

Carcinogenicity:
Based on available data, the classification criteria are not met.
Metallic iron is not classified as a carcinogen under Regulation (EC) No 1272/2008.

Reproductive toxicity:
Based on available data, the classification criteria are not met.
No known reproductive or developmental toxicity for metallic iron.

STOT (single or repeated exposure):
Based on available data, the classification criteria are not met.
Long-term inhalation of high concentrations of iron oxide dust (as Fe_2O_3) may lead to benign pneumoconiosis (siderosis) without functional lung impairment.

Aspiration hazard:
Based on available data, the classification criteria are not met.
Metallic powder is a solid and does not present an aspiration hazard.

SECTION 12: Ecological information

12.1 Toxicity

Based on available data, metallic iron is not classified as hazardous to the aquatic environment.
Insoluble metallic iron shows very low bioavailability and minimal acute or chronic toxicity to aquatic organisms.
Excessive release may cause local effects such as increased turbidity or sedimentation.

12.2 Persistence and degradability

Iron is an elemental metal and therefore not biodegradable.
When released into the environment, it gradually oxidizes to iron oxides or hydroxides, which are naturally occurring and stable mineral forms.

12.3 Bioaccumulative potential

Bioaccumulation is not expected due to the low solubility of metallic iron and the essential biological role of trace iron in living organisms.

12.4 Mobility in soil

Low mobility under normal environmental conditions.
Insoluble metallic iron will remain mainly in the solid phase; mobility may increase under strongly acidic or oxidizing conditions.

12.5 Results of PBT and vPvB assessment

The substance does not meet the criteria for PBT (Persistent, Bioaccumulative, Toxic) or vPvB (very Persistent, very Bioaccumulative) according to Annex XIII of REACH.

12.6 Endocrine disrupting properties

No data indicate any endocrine-disrupting potential for metallic iron.

12.7 Other adverse effects

No known significant environmental effects.
Large particulate releases may cause physical sedimentation in aquatic systems.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product disposal:
Iron powder is not classified as hazardous waste under Directive 2008/98/EC.
Where possible, recover or recycle material through metal reclamation or re-melting processes.
If recycling is not feasible, dispose of in accordance with local, regional, or national regulations.
Avoid disposal together with household waste. Do not allow material to enter drains or the environment.

Recommended waste code (EWC):
12 01 05 — *ferrous metal dust and particles*
(Actual code should be assigned based on specific industrial application.)

Contaminated packaging:
Empty containers may contain residue and should be handled with care.
Clean, dry containers may be recycled.
Contaminated packaging should be disposed of in accordance with local regulations.

Additional information:

- Prevent dispersion of fine powders during waste handling.
- Do not dispose of iron powder by washing into sewers or natural waterways.
- Consider recovery via specialized metal recycling facilities whenever possible.

SECTION 14: Transport information

14.1 UN number

Not applicable. The substance is **not classified as dangerous** for transport under ADR/RID, IMDG, or IATA regulations.

14.2 UN proper shipping name

Not applicable.

14.3 Transport hazard class(es)

Not applicable.
Iron powder (non-pyrophoric, non-water-reactive) is **not assigned a hazard class**.

14.4 Packing group

Not applicable.

14.5 Environmental hazards

Not classified as environmentally hazardous according to transport regulations.

14.6 Special precautions for user

- Avoid creating dust clouds during loading and unloading.
- Prevent contact with strong oxidizers or moisture.
- Ensure packaging is closed, dry, and clearly labeled.

14.7 Maritime transport in bulk according to IMO instruments

Not applicable. Product is not intended for bulk transport under MARPOL Annex II or the IBC Code.

Additional information:
Transport as a **non-hazardous solid** in sealed, moisture-proof containers.
In case of finely divided (<20 µm) or pyrophoric iron powder, consult relevant special transport provisions (UN 3089, *Metal powders, flammable, n.o.s.*), which do **not apply** to this grade (20–45 µm).

SECTION 15: Regulatory information

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

EU regulations:

- Classification and labelling according to Regulation (EC) No 1272/2008 (CLP): Not classified as hazardous.
- Registration under Regulation (EC) No 1907/2006 (REACH): Registered substance — REACH Registration No.: 01-2119462838-24-xxxx.
- Not listed under Annex XIV (Authorisation List) or Annex XVII (Restrictions) of REACH.
- Does not meet criteria for PBT or vPvB substances under Annex XIII of REACH.
- Not identified as a Substance of Very High Concern (SVHC).

Other EU directives and regulations:

- Complies with Directive 2008/98/EC on waste (Waste Framework Directive).
- Not subject to Regulation (EU) 2019/1021 (Persistent Organic Pollutants).
- Not subject to Regulation (EU) 649/2012 (Prior Informed Consent for certain hazardous chemicals).

National regulations (Poland):

- Listed in the Polish List of Harmonized Occupational Exposure Limits (Regulation on MACs, Dz.U. 2021, poz. 2088).
- Complies with Polish Waste Catalogue (EWC 12 01 05 – ferrous metal dust and particles).

15.2 Chemical safety assessment

A Chemical Safety Assessment (CSA) has been carried out for this substance as part of its REACH registration.

SECTION 16: Other information

16.1 Indication of changes

This Safety Data Sheet has been adapted from a version originally prepared for copper powder and updated to describe Iron powder 99.7% (20–45 µm) used in additive manufacturing and coating applications.
All sections revised for substance-specific data and REACH/CLP compliance.

16.2 Abbreviations and acronyms

- ADR – European Agreement concerning the International Carriage of Dangerous Goods by Road
- CAS – Chemical Abstracts Service
- CLP – Classification, Labelling and Packaging Regulation (EC) No 1272/2008
- CSA – Chemical Safety Assessment
- ECHA – European Chemicals Agency
- EC No. – European Community number
- EWC – European Waste Catalogue
- GHS – Globally Harmonised System
- IATA – International Air Transport Association
- IMDG – International Maritime Dangerous Goods Code
- PBT – Persistent, Bioaccumulative and Toxic
- REACH – Registration, Evaluation, Authorisation and Restriction of Chemicals
- vPvB – very Persistent and very Bioaccumulative
- TWA – Time Weighted Average

16.3 Key literature and data sources

- ECHA Substance Information dossier for Iron (CAS 7439-89-6)
- Regulation (EC) No 1272/2008 (CLP)

- Regulation (EC) No 1907/2006 (REACH)
- Directive 2008/98/EC on Waste
- SCOEL and Polish occupational exposure limit values

16.4 Training advice

Ensure personnel handling the material are trained in safe handling of metal powders, including dust explosion prevention and use of PPE.

16.5 Disclaimer

The information contained in this document is based on current knowledge and EU regulatory requirements.
It describes the product with respect to safety requirements only and does not constitute a guarantee of specific properties.
Users are responsible for ensuring suitability and compliance of the product for their particular application.