

## Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH)  
Issue date: 23/9/2021 Revision date: 4/8/2021 Supersedes version of: 02/01/2021 Version: 6.1

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

#### 1.1. Product identifier

Product form	: Mixture
Name	: GE+ 17-4PH, Stainless Steel 17-4PH DMLM powder (CL 92PH)
Trade name	: GE+ 17-4PH, Stainless Steel 17-4PH DMLM powder (CL 92PH)
Product code	: GEAPS004-XX (91328)
Type of product	: Alloy, Typical Laser DMLM Powder Particle Size Distribution covered: lower limit: 0/5/10/15 to upper limit: 45/53/63 microns.
Product group	: Metal Alloy powders

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

##### 1.2.1. Relevant identified uses

Main use category	: Industrial use
Use of the substance/mixture	: Raw material for 3D-printing and Powder Metallurgy Uses (HIP, MIM Additive Manufacturing). For Industrial, Research & Development (R&D) or Laboratory Use Only (Reserve Only to Trained personnel).
Function or use category	: 55/999 Others

##### 1.2.2. Uses advised against

Restrictions on use	: Other uses than the identified uses indicated above.
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#### 1.3. Details of the supplier of the safety data sheet

##### Supplier

GE Additive / AP&C Advanced Powders and Coatings Inc. Inc.  
3765 La Vérendrye, suite 110  
CA- J7H 1R8 Boisbriand, Québec  
Canada  
T +1 450.434.1004  
[GEAdd.SDS@ge.com](mailto:GEAdd.SDS@ge.com) - [www.advancedpowders.com](http://www.advancedpowders.com)

##### Distributor

GE Additive / Arcam AB  
Designvägen, 2  
SE- 435 33 Mölnlycke  
Sweden  
T +46 (0)31 710 32 00 - F +46 (0)31 710 32 01

##### Distributor

GE Additive / Concept Laser GmbH GmbH  
An der Zeil, 8  
DE- 96215 Lichtenfels  
Germany  
T +49 (0)9571 1679 0

#### 1.4. Emergency telephone number

Emergency number	: For Chemical Emergency Call INFOTRAC (Canada additional: CANUTEC +1 613.996.6666) 24hr/day 7days/week Within USA and Canada: 1-800-535-5053 Outside USA and Canada: +1-352-323-3500 (collect calls accepted)
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### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

##### Classification according to Regulation (EC) No. 1272/2008 [CLP]

Skin sensitisation, Category 1	H317
Carcinogenicity, Category 2	H351
Specific target organ toxicity — Repeated exposure, Category 2	H373
Full text of H- and EUH-statements: see section 16	

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### Adverse physicochemical, human health and environmental effects

Suspected of causing cancer. Causes damage to organs through prolonged or repeated exposure. May cause an allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause long lasting harmful effects to aquatic life. May cause damage to organs through prolonged or repeated exposure.

### 2.2. Label elements

#### Labelling according to Regulation (EC) No. 1272/2008 [CLP]

Hazard pictograms (CLP)



GHS07

GHS08

Signal word (CLP)

: Warning

Contains

: nickel, powder, particle diameter < 1 mm

Hazard statements (CLP)

: H317 - May cause an allergic skin reaction.  
H351 - Suspected of causing cancer.  
H373 - May cause damage to organs through prolonged or repeated exposure.

Precautionary statements (CLP)

: P201 - Obtain special instructions before use.  
P261 - Avoid breathing dust, fume.  
P280 - Wear protective clothing, eye protection, face protection, protective gloves.  
P308+P313 - IF exposed or concerned: Get medical advice/attention.  
P314 - Get medical advice/attention if you feel unwell.  
P321 - Specific treatment (see supplemental first aid instruction on this label).

Extra phrases

: Restricted to professional users.  
For use in industrial installations only.

### 2.3. Other hazards

Other hazards which do not result in classification

: Potential dust explosion hazard. Dust may form explosive mixture in air. Dust clouds may form weak explosive mixtures with air. Handling and/or processing of this material may generate a dust which may form flammable or explosive mixture with air. Such dust can also cause mechanical irritation of the eyes, skin, nose and throat. May form potentially combustible dust concentrations when suspended in air or other oxidizing medium.

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Not applicable

### 3.2. Mixtures

Comments

: The powders declared herein are considered "mixtures" from a GHS SDS point of view, but are in reality "alloyed powders" (so not a "mixture" of different "elemental" powders). The GHS & SDS structure forces us to use such "mixture" categorization. See the Notes below the table for more details.

Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
iron, powder	CAS-No.: 7439-89-6 EC-No.: 231-096-4	69.5 – 79	Flam. Sol. 2, H228
chromium substance with national workplace exposure limit(s) (AT, BE, BG, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GI, GR, HR, HU, IE, IT, LT, LU, LV, MT, NL, PL, PT, RO, SE, SI, SK, NO, CH); substance with a Community workplace exposure limit	CAS-No.: 7440-47-3 EC-No.: 231-157-5	15 – 17.5	Not classified

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Name	Product identifier	%	Classification according to Regulation (EC) No. 1272/2008 [CLP]
copper, powder substance with national workplace exposure limit(s) (AT, BE, BG, CZ, DK, EE, ES, FI, FR, GB, HR, HU, IE, LV, NL, PL, PT, RO, SE, SK, NO, CH)	CAS-No.: 7440-50-8 EC-No.: 231-159-6	3 – 5	Aquatic Acute 1, H400 Aquatic Chronic 3, H412
nickel, powder, particle diameter < 1 mm substance with national workplace exposure limit(s) (AT, BE, BG, CZ, DE, DK, EE, ES, FI, FR, GB, HR, HU, IE, LT, LV, PL, PT, SE, SI, CH)	CAS-No.: 7440-02-0 EC-No.: 231-111-4 EC Index-No.: 028-002-01-4	3 – 5	Skin Sens. 1, H317 Carc. 2, H351 STOT RE 1, H372 Aquatic Chronic 3, H412
silicon, powder, amorphous substance with national workplace exposure limit(s) (BE, DK, EE, FR, GB, GR, HR, IE, SK, NO, CH)	CAS-No.: 7440-21-3 EC-No.: 231-130-8	≤ 1	Flam. Sol. 2, H228
manganese, powder substance with national workplace exposure limit(s) (AT, BE, CZ, DE, DK, EE, ES, FI, FR, GB, HR, HU, IE, LV, NL, PL, PT, SE, SI, SK, NO, CH); substance with a Community workplace exposure limit	CAS-No.: 7439-96-5 EC-No.: 231-105-1	≤ 1	Flam. Sol. 1, H228
niobium, solid substance with national workplace exposure limit(s) (AT, DK)	CAS-No.: 7440-03-1 EC-No.: 231-113-5	≤ 0.45	Not classified
tantalum, powder substance with national workplace exposure limit(s) (AT, BE, BG, DK, FI, FR, GB, GR, HR, IE, PL, RO, SK, CH)	CAS-No.: 7440-25-7 EC-No.: 231-135-5	≤ 0.45	Flam. Sol. 1, H228
Carbon (C) substance with national workplace exposure limit(s) (AT, GB, PL)	CAS-No.: 7440-44-0 EC-No.: 231-153-3	≤ 0.07	Acute Tox. 4 (Oral), H302
Sulfur substance with national workplace exposure limit(s) (LT, LV, RO)	CAS-No.: 7704-34-9 EC-No.: 231-722-6 EC Index-No.: 016-094-00-1	≤ 0.03	Skin Irrit. 2, H315

### Comments

: The substances identified as "constituents" are chemical compounds that are typically present in the UVCB substance. Their presence may be relevant for hazard classification, or other health / environmental reasons (i.e. OELs)  
The substances identified above and forming the mixture are all purposely selected to be in powder form, when available. The Table is primarily indicative of individual elements identification, classification and % in the alloyed powders. The final products are classified in the SDS, section 2. Per our metal powder SDS authoring process, we always use the powder form of a given chemical element in sect. 3, when it is available from our recognized external chemical database. This is to ensure all risk inherent to the powder form of any substance is taken into account as a baseline. Only scientific evidence and/or test data can in the end determine the final product classification and "declassify" it, if applicable. This process assures a maximum safety level for all users.

Full text of H- and EUH-statements: see section 16

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

#### First-aid measures general

: IF exposed or concerned: Get medical advice/attention. Call a poison center or a doctor if you feel unwell.

#### First-aid measures after inhalation

: Remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a poison center or a doctor.

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First-aid measures after skin contact	: Wash skin with plenty of water. Take off contaminated clothing. If skin irritation or rash occurs: Get medical advice/attention.
First-aid measures after eye contact	: Rinse eyes with water as a precaution.
First-aid measures after ingestion	: Call a poison center or a doctor if you feel unwell.

### 4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects	: May cause damage to organs through prolonged or repeated exposure. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause respiratory irritation.
Symptoms/effects after inhalation	: May cause allergy or asthma symptoms or breathing difficulties if inhaled. Dust of the product, if present, may cause respiratory irritation after an excessive inhalation exposure. Inhalation may cause irritation (cough, short breathing, difficulty in breathing).
Symptoms/effects after skin contact	: May cause an allergic skin reaction.
Symptoms/effects after eye contact	: May cause eye irritation. Dust from this product may cause eye irritation.
Symptoms/effects after ingestion	: May cause irritation to the digestive tract.

### 4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

Suitable extinguishing media	: Dry Sand, Class D extinguisher, Limestone, Unpressurized Water with local Safety Office/Fire Department approved metal fire additive (e.g. surfactants) Use fire extinguishing methods suitable to surrounding conditions. Dry Sand, Class D extinguisher, Limestone. Use fire extinguishing methods suitable to surrounding conditions.
Unsuitable extinguishing media	: Any media not listed as suitable (above) and/or not approved by local authorities.). Water (without local Safety Office/Fire Department approved additive). Any media not listed as suitable (above) and/or not approved by local authorities.). Water (without local Safety Office/Fire Department approved additive).

### 5.2. Special hazards arising from the substance or mixture

Fire hazard	: May form combustible dust concentrations in air. In finely divided state: increased fire hazard. In case of fire and/or explosion do not breathe fumes.
Explosion hazard	: Risk of dust explosion.
Hazardous decomposition products in case of fire	: Toxic fumes may be released.

### 5.3. Advice for firefighters

Precautionary measures fire	: Minimize generation of dust which may be combustible. Keep container tightly closed and away from heat, sparks and flame. This product is not to be used under conditions of poor ventilation.
Firefighting instructions	: Do not enter fire area without proper protective equipment, including respiratory protection. Eliminate all ignition sources if safe to do so. In case of major fire and large quantities: Evacuate area. Fight fire remotely due to the risk of explosion. Take account of environmentally hazardous firefighting water. Prevent fire fighting water from entering the environment.
Protection during firefighting	: Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Complete protective clothing. Wear appropriate protective equipment and self-contained breathing apparatus (SBCA).

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

General measures	: Avoid generating dust. Avoid breathing dust. Eliminate every possible source of ignition. No open flames. No smoking. Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment.
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### 6.1.1. For non-emergency personnel

Emergency procedures : Ventilate spillage area. Do not breathe dust/fume/gas/mist/vapours/spray. Avoid contact with skin and eyes. Avoid contact with skin, eyes and clothing. Do not touch or walk on the spilled product. Only qualified personnel equipped with suitable protective equipment may intervene. See section 8 of the SDS for more information on personal protective equipment.

### 6.1.2. For emergency responders

Protective equipment : Do not attempt to take action without suitable protective equipment. For further information refer to section 8: "Exposure controls/personal protection".

## 6.2. Environmental precautions

Avoid release to the environment. Prevent entry to sewers and public waters. Do not allow to enter drains or water courses.

## 6.3. Methods and material for containment and cleaning up

For containment : Powdered form: no compressed air for pumping over spills. Collect spillage. Do not touch or walk on the spilled product. Do not use compressed air for pumping over spills. Do not push powder long distances across the floor. Keep in small piles away from each other.

Methods for cleaning up : Mechanically recover the product. Notify authorities if product enters sewers or public waters.

Other information : Dispose of materials or solid residues at an authorized site.

## 6.4. Reference to other sections

For further information refer to section 13. For further information refer to section 8: "Exposure controls/personal protection".

## SECTION 7: Handling and storage

### 7.1. Precautions for safe handling

Additional hazards when processed : Dust may form flammable and explosive mixture with air. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

Precautions for safe handling : Ensure good ventilation of the work station. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear personal protective equipment. Do not breathe dust/fume/gas/mist/vapours/spray. Avoid contact with skin and eyes. Maintain a supply of "coarse" (rock-type) salt and/or "Class D" (for metal fires) fire extinguisher located near processing and storage areas. Keep work areas clean and free of waste. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ground/bond container and receiving equipment. Limit quantities of product at the minimum necessary for handling and limit the number of exposed workers. Floors, walls and other surfaces in the hazard area must be cleaned regularly. Provide local exhaust or general room ventilation to minimize exposure to dust. Do not breathe dust/fume/gas/mist/vapours/spray. When plastic liners are present in pails and are the primary powder barrier bag, it is not recommended to handle powder only in those liners. The powder should at all times be handled within their liners & pails (as shipped/received). This to prevent powder leaks and safely carry the powder (in case of damaged bag during transport, etc.).

Hygiene measures : Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product. Always wash hands after handling the product. Separate working clothes from town clothes. Launder separately. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reuse.

### 7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Comply with applicable regulations. Keep in a cool, well-ventilated place away from heat. Ensure adequate ventilation, especially in confined areas. Store in tightly closed, leak-proof containers. Store in a well-ventilated place. Keep container tightly closed. Ground/bond container and receiving equipment. Maintain air gap between stacks/pallets.

Storage conditions : Store locked up. Store in a well-ventilated place. Keep cool. Protect from sunlight. Keep away from ignition sources. Store away from other materials.

Incompatible products : Oxidizing agent. Strong acids. Strong bases.

Incompatible materials : combustible materials. Heat sources. Sources of ignition.

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Heat and ignition sources	: KEEP SUBSTANCE AWAY FROM: heat sources. ignition sources.
Information on mixed storage	: KEEP SUBSTANCE AWAY FROM: oxidizing agents. combustible materials. (strong) acids. (strong) bases. moisture.
Storage area	: Store away from heat.
Packaging materials	: Keep only in the original container in a cool, well-ventilated place away from combustible materials.

### 7.3. Specific end use(s)

No additional information available

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

#### 8.1.1 National occupational exposure and biological limit values

nickel, powder, particle diameter < 1 mm (7440-02-0)	
<b>EU - Indicative Occupational Exposure Limit (IOEL)</b>	
Local name	Nickel metal
Remark	(Year of adoption 2011)
Regulatory reference	SCOEL Recommendations
<b>EU - Biological Limit Value (BLV)</b>	
Local name	Nickel and nickel compounds
Regulatory reference	SCOEL List of recommended health-based BLVs and BGVs
<b>Austria - Occupational Exposure Limits</b>	
Local name	Nickel (Stäube von Nickelmetall, Nickelsulfid und sulfidischen Erzen, Nickeloxide und Nickelcarbonat) und Stäube von Nickelverbindungen und Nickellegierungen
TRK (OEL TWA)	0.5 mg/m <sup>3</sup> (als Ni berechnet, E)
TRK (OEL STEL)	2 mg/m <sup>3</sup> (als Ni berechnet, E, 4x 15(Miw) min)
Remark	Sah. Krebs erzeugend: III A1
Regulatory reference	BGBI. II Nr. 156/2021
<b>Austria - Biological limit values</b>	
Local name	Nickel
BLV	7 µg/l Parameter: Nickel - Untersuchungsmaterial: Harn
Remark	Eignung mit vorzeitiger Folgeuntersuchung: Bei Überschreiten des Grenzwertes für Nickel im Harn. Bei Vorliegen einer wesentlichen Beeinträchtigung der Lungenfunktion. Diese ist anzunehmen, wenn nach mehrmaliger Messung der beste gemessene Wert den für den/die Untersuchte/n maßgebenden Sollwert um 20% unterschreitet, bzw. den MEF50-Sollwert um 50% unterschreitet. Eine vorzeitige Folgeuntersuchung ist jedoch nicht erforderlich, wenn im Vergleich zu Vorbefunden der altersabhängige physiologische Abfall der 1 Sekundenkapazität (FEV1) von 40 ml/Jahr nicht überschritten wird oder aus der Beurteilung des Kurvenverlaufes der Forcierten Vitalkapazität (FVC) eine eingeschränkte Mitarbeit des Untersuchten/der Untersuchten ersichtlich ist. Der Zeitabstand zwischen den Untersuchungen beträgt bei Eignung: ein Jahr; bei Eignung mit vorzeitiger Folgeuntersuchung: sechs Monate.
Regulatory reference	Verordnung über die Gesundheitsüberwachung am Arbeitsplatz 2017 (VGÜ 2017)
<b>Belgium - Occupational Exposure Limits</b>	
Local name	Nickel (métal) # Nikkel (metaal)
OEL TWA	1 mg/m <sup>3</sup>

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<b>nickel, powder, particle diameter &lt; 1 mm (7440-02-0)</b>	
Regulatory reference	Koninklijk besluit/Arrêté royal 19/11/2020
<b>Bulgaria - Occupational Exposure Limits</b>	
Local name	Никел
OEL TWA	0.05 mg/m <sup>3</sup> (метал и съединения (като никел))
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
<b>Bulgaria - Biological limit values</b>	
Local name	Никел метал, разтворими съединения, никелов сулфат, никелов хром-фосфат (като никел)
BLV	45 µg/l Биомаркер за експозиция/биомаркер за ефект: никел - Биологична среда: урина - Време на пробовземане: След няколко работни смени - Специфични ефекти: Няма
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
<b>Croatia - Occupational Exposure Limits</b>	
Local name	Nikal
GVI (OEL TWA) [1]	0.5 mg/m <sup>3</sup>
Remark	Alergen koža (tvar koja može izazvati alergijsku reakciju na koži (H317))
Regulatory reference	Pravilnik o izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN 1/2021)
<b>Croatia - Biological limit values</b>	
Local name	Nikal (topljivi spojevi)
BLV	0.17 µmol/l Karakteristični pokazatelj: nikal - Biološki uzorak: plazma - Vrijeme uzorkovanja: na kraju radne smjene 10 µg/l Karakteristični pokazatelj: nikal - Biološki uzorak: plazma - Vrijeme uzorkovanja: na kraju radne smjene 15.4 µmol/mol creatinine Karakteristični pokazatelj: nikal - Biološki uzorak: mokraća - Vrijeme uzorkovanja: na kraju radne smjene 8 µg/g creatinine Karakteristični pokazatelj: nikal - Biološki uzorak: mokraća - Vrijeme uzorkovanja: na kraju radne smjene
Regulatory reference	Pravilnik o izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN 91/2018)
<b>Czech Republic - Occupational Exposure Limits</b>	
Local name	Nikl
PEL (OEL TWA)	0.5 mg/m <sup>3</sup>
NPK-P (OEL C)	1 mg/m <sup>3</sup>
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
<b>Czech Republic - Biological limit values</b>	
Local name	Nikl
BLV	0.04 mg/g creatinine Ukazatel: Nikl - Biološki uzorak: moči - Doba odběru: nerozhoduje 0.077 µmol/mmol Creatinine Ukazatel: Nikl - Biološki uzorak: moči - Doba odběru: nerozhoduje
Regulatory reference	Vyhláška č. 107/2013 Sb. (kterou se mění vyhláška č. 432/2003 Sb.)

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<b>Denmark - Occupational Exposure Limits</b>	
Local name	Nikkel, pulver og støv
OEL TWA [1]	0.05 mg/m <sup>3</sup> beregnet som Ni
Regulatory reference	BEK nr 1426 af 28. juni 2021
<b>Estonia - Occupational Exposure Limits</b>	
Local name	Nikkel, metall
OEL TWA	0.5 mg/m <sup>3</sup>
Remark	S (Sensibiliseeriv aine)
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 17.10.2019, 2); Vabariigi Valitsuse 10. märtsi 2019. a määruse nr 84
<b>Finland - Occupational Exposure Limits</b>	
Local name	Nikkeli, metalli
HTP (OEL TWA) [1]	0.01 mg/m <sup>3</sup> Ni, alveolijae
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
<b>Finland - Biological limit values</b>	
Local name	Nikkeli, metalli
BLV	0.1 µmol/l Parametri: Virtsan nikkeli - Näytteenottoajankohta: Työvuoron päätyttyä työviikon tai altistumisjakson loputtua
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
<b>France - Occupational Exposure Limits</b>	
Local name	Nickel (métal)
VME (OEL TWA)	1 mg/m <sup>3</sup>
Remark	Valeurs recommandées/admises; substance classée cancérogène de catégorie 2
Regulatory reference	Circulaire du Ministère du travail (réf.: INRS ED 984, 2016)
<b>Germany - Occupational Exposure Limits (TRGS 900)</b>	
Local name	Nickel und Nickelverbindungen
AGW (OEL TWA) [1]	0.03 mg/m <sup>3</sup> (E)
Peak exposure limitation factor	8(II)



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nickel, powder, particle diameter < 1 mm (7440-02-0)	
Remark	AGS - Ausschuss für Gefahrstoffe; Sh - Hautsensibilisierender Stoff; Y - Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden; 10 - Der Arbeitsplatzgrenzwert bezieht sich auf den Elementgehalt des entsprechenden Metalls; 24 - Für als Carc 1A oder 1B eingestufte Nickelverbindungen siehe TRGS 910 und TRGS 561. Eine Beurteilung anhand des AGW für Nickelmetall kann dann erfolgen, wenn ausschließlich Nickelmetall vorliegt. Sofern bei Tätigkeiten nickelhaltige Stäube entstehen, bei denen nur eine Oberflächenoxidation zu unterstellen ist, sind diese wie nickelmetallhaltige Gemische zu behandeln. Bei Anwendung von thermischen Verfahren in Gegenwart von Luftsauerstoff ist grundsätzlich eine Bildung von oxidischen Nickelverbindungen anzunehmen. Dies ist beispielsweise beim Schweißen (Elektroden oder Draht) und thermischen Schneiden mit bzw. von Legierungen, beim Metallspritzen von Legierungen, beim Schmelzen und Gießen von Legierungen und beim Schleifen und Trennen von Legierungen mit "Funkenbildung" der Fall. Weitere Empfehlungen sowie Beispiele für Arbeitsverfahren, bei denen der AGW bzw. die ERB zur Beurteilung herangezogen werden können, enthält die IFA-Arbeitsmappe (Kennzahl 0537); 31 - Die arbeitsmedizinisch-toxikologische Ableitung des Wertes basiert auf einer Plausibilitätsbetrachtung. Auf die Werte für den A-Staub für Nickelmetall in dieser TRGS und für Nickelverbindungen in der TRGS 910 wird hingewiesen
Regulatory reference	TRGS900
<b>Hungary - Biological Exposure Indices</b>	
Local name	Nikkel
BEI	0.003 mg/l Biológiai expozíció (hatás) mutató: nikkel - Biológiai minta: vizeletben - Mintavétel ideje: mhv., m.v. (munkahét végén, műszak végén) 0.051 µmol/l Biológiai expozíció (hatás) mutató: nikkel - Biológiai minta: vizeletben - Mintavétel ideje: mhv., m.v. (munkahét végén, műszak végén)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
<b>Ireland - Occupational Exposure Limits</b>	
Local name	Nickel
OEL TWA [1]	0.5 mg/m <sup>3</sup>
Regulatory reference	Chemical Agents Code of Practice 2021
<b>Ireland - Biological limit values</b>	
Local name	Nickel
BLV	3 µg/l Parameter: Ni - Medium: urine - Sampling time: After several consecutive working shifts
Regulatory reference	Biological Monitoring Guidelines (HSA, 2011)
<b>Latvia - Occupational Exposure Limits</b>	
Local name	Niķelis, niķeļa oksīdi, sulfīdi un savienojumu maisījumi (pēc Ni)
OEL TWA	0.05 mg/m <sup>3</sup>
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325 (Grozījumi Ministru kabineta 2011. gada 1. februārī noteikumiem Nr. 92)
<b>Latvia - Biological Exposure Indices</b>	
Local name	Niķelim un tā neorganiskajiem savienojumiem
BEI	3 µg/l Niķelim urīnā
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325 (Grozījumi Ministru kabineta 2021. gada 18. februārī noteikumiem Nr. 110)

# GE+ 17-4PH, Stainless Steel 17-4PH DMLM powder (CL 92PH)

## Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH)

<b>nickel, powder, particle diameter &lt; 1 mm (7440-02-0)</b>	
<b>Lithuania - Occupational Exposure Limits</b>	
Local name	Nikelis
IPRV (OEL TWA)	0.5 mg/m <sup>3</sup>
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
<b>Poland - Occupational Exposure Limits</b>	
Local name	Nikiel i jego związki, z wyjątkiem tetrakarbonylku niklu (niklu karbonylku)
NDS (OEL TWA)	0.25 mg/m <sup>3</sup> w przeliczeniu na Ni
Regulatory reference	Dz. U. 2018 poz. 1286
<b>Portugal - Occupational Exposure Limits</b>	
Local name	Níquel, expresso em Ni Elementar
OEL TWA	1.5 mg/m <sup>3</sup> I (Fração inalável)
Remark	A5 (Agente não suspeito de ser carcinogénico no Homem)
Regulatory reference	Norma Portuguesa NP 1796:2014
<b>Slovenia - Occupational Exposure Limits</b>	
Local name	nikelj – kovina
OEL TWA	0.006 mg/m <sup>3</sup>
OEL STEL	0.048 mg/m <sup>3</sup>
Remark	Y (Snovi, pri katerih ni nevarnosti za zarodek ob upoštevanju mejnih vrednosti in bat vrednosti), EKA (Zveza med koncentracijo rakotvornih snovi v zraku na delovnem mestu in količino snovi in/ali njenih metabolitov v organizmu)
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
<b>Spain - Occupational Exposure Limits</b>	
Local name	Níquel metal
VLA-ED (OEL TWA) [1]	1 mg/m <sup>3</sup>
Remark	Sen (Sensibilizante), r (Esta sustancia tiene establecidas restricciones a la fabricación, la comercialización o el uso en los términos especificados en el "Reglamento (CE) nº 1907/2006 sobre Registro, Evaluación, Autorización y Restricción de sustancias y preparados químicos" (REACH) de 18 de diciembre de 2006 (DOUE L 369 de 30 de diciembre de 2006). Las restricciones de una sustancia pueden aplicarse a todos los usos o sólo a usos concretos. El anexo XVII del Reglamento REACH contiene la lista de todas las sustancias restringidas y especifica los usos que se han restringido).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2021. INSHT
<b>Sweden - Occupational Exposure Limits</b>	
Local name	Nickel, metall
NGV (OEL TWA)	0.5 mg/m <sup>3</sup> totaldamm
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
<b>United Kingdom - Occupational Exposure Limits</b>	
Local name	Nickel
WEL TWA (OEL TWA) [1]	0.5 mg/m <sup>3</sup>
Remark	Sk (Can be absorbed through the skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity), Carc (Capable of causing cancer and/or heritable genetic damage (nickel oxides and sulphides)), Sen (Capable of causing occupational asthma (nickel sulphate))

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<b>nickel, powder, particle diameter &lt; 1 mm (7440-02-0)</b>	
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
<b>Switzerland - Occupational Exposure Limits</b>	
Local name	Nickel, métal / Nickel, Metall
MAK (OEL TWA) [1]	0.5 mg/m <sup>3</sup> (i) / (e)
Critical toxicity	Peau, Fibpulm / Haut, Lungenfibrose
Notation	S, C2, B / S, C2, B
Remark	HSE, NIOSH, BG
Regulatory reference	www.suva.ch, 01.01.2021
<b>Switzerland - BAT</b>	
Local name	Nickel, métal / Nickel, Metall
BAT	45 µg/l (766.6 nmol/l; Paramètre biologique: Nickel; Substrat d'examen: Urine; Moment du prélèvement: Fin de l'exposition, de la période de travail. Exposition de longue durée: après plusieurs périodes de travail.) / (766.6 nmol/l; Biologischer Parameter: Nickel; Untersuchungsmaterial: Urin; Probennahmezeitpunkt: Expositionsende, bzw. Schichtende. Bei Langzeitexposition: nach mehreren vorangegangenen Schichten.)
Remark	Paramètre non spécifique. / Nicht spezifischer Parameter.
Regulatory reference	Ordonnance 832.30 (OPA), article 50 al. 3, www.suva.ch/valeurs-limites / Verordnung 832.30 (VUV), Art. 50 Abs. 3, www.suva.ch/grenzwerte
<b>USA - ACGIH - Occupational Exposure Limits</b>	
Local name	Nickel, elemental
ACGIH OEL TWA	1.5 mg/m <sup>3</sup> (Inhalable fraction)
Remark (ACGIH)	TLV® Basis: Dermatitis; pneumoconiosis. Notations: A5 (Not Suspected as a Human Carcinogen)
Regulatory reference	ACGIH 2021
<b>USA - ACGIH - Biological Exposure Indices</b>	
Local name	NICKEL AND INORGANIC COMPOUNDS
BEI	5 µg/l Parameter: Nickel - Medium: urine after exposure to elemental Nickel and poorly soluble compounds - Sampling time: Post-shift at end of workweek - Notations: B 30 µg/l Parameter: Nickel - Medium: urine after exposure to soluble compounds - Sampling time: Post-shift at end of workweek - Notations: B
Regulatory reference	ACGIH 2021
<b>chromium (7440-47-3)</b>	
<b>EU - Indicative Occupational Exposure Limit (IOEL)</b>	
Local name	Chromium metal
IOEL TWA	2 mg/m <sup>3</sup>
Regulatory reference	COMMISSION DIRECTIVE 2006/15/EC
<b>Austria - Occupational Exposure Limits</b>	
Local name	Chrommetall, anorganische Chrom(II)- und anorganische Chrom(III)-Verbindungen (unlöslich)
MAK (OEL TWA)	2 mg/m <sup>3</sup>
Remark	Sh (für Cr(III)-Verbindungen)
Regulatory reference	BGBl. II Nr. 156/2021

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according to Regulation (EC) No. 1907/2006 (REACH)

chromium (7440-47-3)	
<b>Belgium - Occupational Exposure Limits</b>	
Local name	Chrome métal et composés inorganiques (à l'exception des composés Cr VI) # Chroom (metaal) en anorganische verbindingen (met uitzondering van Cr VI verbindingen )
OEL TWA	0.5 mg/m <sup>3</sup>
Regulatory reference	Koninklijk besluit/Arrêté royal 19/11/2020
<b>Bulgaria - Occupational Exposure Limits</b>	
OEL TWA	2 mg/m <sup>3</sup>
<b>Croatia - Occupational Exposure Limits</b>	
Local name	Krom, metal (kao Cr)
GVI (OEL TWA) [1]	2 mg/m <sup>3</sup>
Regulatory reference	Pravilnik o izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN 1/2021)
<b>Croatia - Biological limit values</b>	
Local name	Krom (VI) topljivi spojevi
BLV	10 µmol/mol creatinine Karakteristični pokazatelj: krom - Biološki uzorak: mokraća - Vrijeme uzorkovanja: jednokratni uzorak na kraju smjene 5 µg/g creatinine Karakteristični pokazatelj: krom - Biološki uzorak: mokraća - Vrijeme uzorkovanja: jednokratni uzorak na kraju smjene
Regulatory reference	Pravilnik o izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN 91/2018)
<b>Cyprus - Occupational Exposure Limits</b>	
OEL TWA	2 mg/m <sup>3</sup>
<b>Czech Republic - Occupational Exposure Limits</b>	
Local name	Prach z chromu
PEL (OEL TWA)	0.5 mg/m <sup>3</sup> (dust)
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
<b>Denmark - Occupational Exposure Limits</b>	
Local name	Chrom, pulver og opløselige chromi- og chromosalte
OEL TWA [1]	0.5 mg/m <sup>3</sup> (Grænseværdie (langvarig), powder)
Regulatory reference	BEK nr 1426 af 28. juni 2021
<b>Estonia - Occupational Exposure Limits</b>	
Local name	Kroom (metall) ja tema anorgaanilised ühendid, v.akroomhape ja kromaadid (arvutatud kroomile)
OEL TWA	2 mg/m <sup>3</sup>
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 17.10.2019, 2); Vabariigi Valitsuse 10. märtsi 2019. a määruse nr 84
<b>Finland - Occupational Exposure Limits</b>	
Local name	Kromi, metalli
HTP (OEL TWA) [1]	0.005 mg/m <sup>3</sup> (arvo-8h)
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveystiete)
<b>Finland - Biological limit values</b>	
Local name	Kromi-(VI) ja sen yhdisteet

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chromium (7440-47-3)	
BLV	0.2 µmol/l Parametri: Virtsan kromi - Näytteenottoajankohta: Työvaiheen tai työvuoron päätyttyä työviikon tai altistumisjakson loputtua
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
France - Occupational Exposure Limits	
Local name	Chrome (métal), composés de chrome inorganiques (II) et composés de chrome inorganiques (insolubles) (III)
VME (OEL TWA)	2 mg/m <sup>3</sup>
Remark	Valeurs réglementaires indicatives
Regulatory reference	Circulaire du Ministère du travail (réf.: INRS ED 984, 2016)
France - Biological limit values	
BLV	0.01 mg/g creatinine (BEI, Medium: urine -Time: augmented during shift -Parameter: Total Chromium (Background noise on non-exposed subjects (soluble aerosol)) 0.03 mg/g creatinine (BEI, (Medium: urine -Time: end of shift at end of workweek -Parameter: Total Chromium (Background noise on non-exposed subjects (soluble aerosol))
Germany - Occupational Exposure Limits (TRGS 900)	
Local name	Chrom und anorganische Chrom(II) und (III)-Verbindungen
AGW (OEL TWA) [1]	2 mg/m <sup>3</sup> (E)
Peak exposure limitation factor	1(I)
Remark	10 - Der Arbeitsplatzgrenzwert bezieht sich auf den Elementgehalt des entsprechenden Metalls; EU - Europäische Union (Von der EU wurde ein Luftgrenzwert festgelegt: Abweichungen bei Wert und Spitzenbegrenzung sind möglich)
Regulatory reference	TRGS900
Gibraltar - Occupational Exposure Limits	
OEL TWA	2 mg/m <sup>3</sup>
Greece - Occupational Exposure Limits	
Local name	Χρώμιο (μεταλλικό)
OEL TWA	1 mg/m <sup>3</sup>
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Hungary - Occupational Exposure Limits	
Local name	KRÓM (fém), SZERVETLEN KRÓM (II) és KRÓM (III) VEGYÜLETEK (nem oldható)
AK (OEL TWA)	2 mg/m <sup>3</sup>
OEL chemical category	Sensitizer
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
Hungary - Biological Exposure Indices	
Local name	Króm
BEI	0.01 mg/g creatinine Biológiai expozíciós (hatás) mutató: króm - Biológiai minta: vizeletben - Mintavétel ideje: m.v. (műszak végén) 0.022 µmol/mmol Creatinine Biológiai expozíciós (hatás) mutató: króm - Biológiai minta: vizeletben - Mintavétel ideje: m.v. (műszak végén)
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről

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<b>chromium (7440-47-3)</b>	
<b>Ireland - Occupational Exposure Limits</b>	
Local name	Chromium metal
OEL TWA [1]	2 mg/m <sup>3</sup> (8h ref)
OEL STEL	6 mg/m <sup>3</sup> (calculated, 15 min ref)
Regulatory reference	Chemical Agents Code of Practice 2021
<b>Ireland - Biological limit values</b>	
Local name	Chromium VI and water soluble compounds
BLV	25 µg/l Parameter: total chromium - Medium: urine - Sampling time: End of shift at end of workweek - Notations: B (Background) 10 µg/l Parameter: total chromium - Medium: urine - Sampling time: Increase during shift
Regulatory reference	Biological Monitoring Guidelines (HSA, 2011)
<b>Italy - Occupational Exposure Limits</b>	
OEL TWA	0.5 mg/m <sup>3</sup>
<b>Latvia - Occupational Exposure Limits</b>	
OEL TWA	2 mg/m <sup>3</sup> (Medium: urine -Time: change of shift -Parameter: Chromium (reference value for total Chromium concentration for occupationally unexposed population in blood <0.5µg/L, and in urine 0.5 g/L)
<b>Latvia - Biological Exposure Indices</b>	
BEI	10 µg/g creatinine
<b>Lithuania - Occupational Exposure Limits</b>	
IPRV (OEL TWA)	2 mg/m <sup>3</sup>
<b>Luxembourg - Occupational Exposure Limits</b>	
OEL TWA	2 mg/m <sup>3</sup>
<b>Malta - Occupational Exposure Limits</b>	
OEL TWA	2 mg/m <sup>3</sup>
<b>Netherlands - Occupational Exposure Limits</b>	
Local name	Chroom
TGG-8u (OEL TWA)	0.5 mg/m <sup>3</sup>
Regulatory reference	Arbeidsomstandighedenregeling 2021
<b>Poland - Occupational Exposure Limits</b>	
Local name	Chrom metaliczny
NDS (OEL TWA)	0.5 mg/m <sup>3</sup>
Regulatory reference	Dz. U. 2018 poz. 1286
<b>Portugal - Occupational Exposure Limits</b>	
Local name	Crómio metal e compostos de crómio (III), expressos em Cr
OEL TWA	2 mg/m <sup>3</sup> (Indicative limit value)
OEL chemical category	A4 - Not Classifiable as a Human Carcinogen
Remark	A4 (Agente não classificável como carcinogénico no Homem)
Regulatory reference	Norma Portuguesa NP 1796:2014

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chromium (7440-47-3)	
<b>Romania - Occupational Exposure Limits</b>	
OEL TWA	0.5 mg/m <sup>3</sup> (Metallurgy) 2 mg/m <sup>3</sup> (metal)
OEL chemical category	Carcinogen Metallurgy
<b>Romania - Biological limit values</b>	
BLV	10 µg/g creatinine
<b>Slovakia - Occupational Exposure Limits</b>	
Local name	Chróm anorg. zlúč. chrómu (II) a (III) – nerozpustné (ako Cr)
NPHV (OEL TWA) [1]	2 mg/m <sup>3</sup>
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
<b>Slovenia - Occupational Exposure Limits</b>	
Local name	krom – kovinski, anorganske kromove (II) spojine in anorganske kromove (III) spojine (netopne)
OEL TWA	2 mg/m <sup>3</sup>
OEL STEL	2 mg/m <sup>3</sup>
Remark	EU
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
<b>Spain - Occupational Exposure Limits</b>	
Local name	Cromo metal
VLA-ED (OEL TWA) [1]	2 mg/m <sup>3</sup>
Remark	VLI (Agente químico para el que la U.E. estableció en su día un valor límite indicativo).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2021. INSHT
<b>Sweden - Occupational Exposure Limits</b>	
Local name	Krom, och oorg. (II, III)-föreningar (som Cr)
NGV (OEL TWA)	0.5 mg/m <sup>3</sup> (total dust / totalt damm)
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
<b>United Kingdom - Occupational Exposure Limits</b>	
Local name	Chromium
WEL TWA (OEL TWA) [1]	0.5 mg/m <sup>3</sup>
WEL STEL (OEL STEL)	1.5 mg/m <sup>3</sup> (calculated)
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
<b>United Kingdom - Biological limit values</b>	
Local name	Chromium VI
BMGV	10 µmol/mol creatinine Parameter: chromium - Medium: urine - Sampling time: Post shift
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
<b>Norway - Occupational Exposure Limits</b>	
Grenseverdi (OEL TWA) [1]	0.5 mg/m <sup>3</sup>
Korttidsverdi (OEL STEL)	0.5 mg/m <sup>3</sup>
<b>Switzerland - Occupational Exposure Limits</b>	
Local name	Chrome (métal) / Chrom (Metall)

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<b>chromium (7440-47-3)</b>	
MAK (OEL TWA) [1]	0.5 mg/m <sup>3</sup> (VME, inhalable dust)
Critical toxicity	VRS, Peau / OAW, Haut
Notation	S / S
Remark	HSE, NIOSH
OEL chemical category	Sensitizer
Regulatory reference	www.suva.ch, 01.01.2021
<b>Switzerland - BAT</b>	
Local name	Chrome, composés hexavalents / Chrom(VI)-Verbindungen
BAT	11 µg/l (212 nmol/l; Paramètre biologique: Chrome; Substrat d'examen: Urine; Moment du prélèvement: Fin de l'exposition, de la période de travail.) / (212 nmol/l; Biologischer Parameter: Chrom; Untersuchungsmaterial: Urin; Probenahmezeitpunkt: Expositionsende, bzw. Schichtende.)
Remark	Influence de l'environnement. / Umwelteinflüsse.
Regulatory reference	Ordonnance 832.30 (OPA), article 50 al. 3, www.suva.ch/valeurs-limites / Verordnung 832.30 (VUV), Art. 50 Abs. 3, www.suva.ch/grenzwerte
<b>USA - ACGIH - Occupational Exposure Limits</b>	
Local name	Metallic chromium, as Cr(0)
ACGIH OEL TWA	0.5 mg/m <sup>3</sup> (Inhalable fraction)
Remark (ACGIH)	TLV® Basis: Resp tract irr
Regulatory reference	ACGIH 2021
<b>USA - ACGIH - Biological Exposure Indices</b>	
Local name	CHROMIUM
BEI	0.7 µg/l Parameter: Total chromium - Medium: urine - Sampling time: End of shift at end of workweek - Notations: Pop
Regulatory reference	ACGIH 2021
<b>manganese, powder (7439-96-5)</b>	
<b>EU - Indicative Occupational Exposure Limit (IOEL)</b>	
Local name	Manganese
IOEL TWA	0.2 mg/m <sup>3</sup> (Inhalable fraction) 0.05 mg/m <sup>3</sup> (Respirable fraction)
Remark	(Year of adoption 2011)
Regulatory reference	SCOEL Recommendations
<b>Austria - Occupational Exposure Limits</b>	
Local name	Mangan und seine anorganischen Verbindungen: Mangan
MAK (OEL TWA)	0.2 mg/m <sup>3</sup> (als Mn berechnet, E) 0.05 mg/m <sup>3</sup> (als Mn berechnet, A)
MAK (OEL STEL)	1.6 mg/m <sup>3</sup> (als Mn berechnet, E, 4x 15(Miw) min) 0.16 mg/m <sup>3</sup> (als Mn berechnet, A, 4x 15(Miw) min)
Regulatory reference	BGBl. II Nr. 156/2021
<b>Austria - Biological limit values</b>	
Local name	Mangan
BLV	20 µg/l Parameter: Mangan - Untersuchungsmaterial: Blut



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<b>manganese, powder (7439-96-5)</b>	
Remark	Eignung: Blut: nur bei Verdacht auf manganbedingte neurologische Symptomatik Eignung mit vorzeitiger Folgeuntersuchung: Bei Überschreiten des Grenzwertes für Mangan im Blut. Bei anhaltendem Husten oder Abfall des systolischen Blutdrucks. Bei Vorliegen einer wesentlichen Beeinträchtigung der Lungenfunktion. Diese liegt vor, wenn nach mehrmaliger Messung der beste gemessene Wert den für den/die Untersuchte/n maßgebenden Sollwert um 20% unterschreitet bzw. den MEF50-Sollwert um 50% unterschreitet. Eine vorzeitige Folgeuntersuchung ist jedoch nicht erforderlich, wenn im Vergleich zu Vorbefunden der altersabhängige physiologische Abfall der 1-Sekundenkapazität (FEV1) von 40 ml/Jahr nicht überschritten wird oder aus der Beurteilung des Kurvenverlaufes der Forcierten Vitalkapazität (FVC) eine eingeschränkte Mitarbeit des Untersuchten/der Untersuchten ersichtlich ist. Der Zeitabstand zwischen den Untersuchungen beträgt bei Eignung: ein Jahr; bei Eignung mit vorzeitiger Folgeuntersuchung: sechs Monate
Regulatory reference	Verordnung über die Gesundheitsüberwachung am Arbeitsplatz 2017 (VGÜ 2017)
<b>Belgium - Occupational Exposure Limits</b>	
Local name	Manganèse et ses composés (en Mn) # Mangaan, en -verbindingen (als Mn)
OEL TWA	0.2 mg/m <sup>3</sup>
Regulatory reference	Koninklijk besluit/Arrêté royal 19/11/2020
<b>Croatia - Occupational Exposure Limits</b>	
Local name	Mangan i anorganski spojevi mangana (kao Mn)
GVI (OEL TWA) [1]	0.2 mg/m <sup>3</sup> U (ukupna prašina) 0.05 mg/m <sup>3</sup> R (respirabilna prašina)
Remark	Direktiva: 2017/164/EU
Regulatory reference	Pravilnik o izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN 1/2021)
<b>Czech Republic - Occupational Exposure Limits</b>	
Local name	Mangan a jeho anorganické sloučeniny, jako Mn
PEL (OEL TWA)	0.2 mg/m <sup>3</sup> (V) 0.05 mg/m <sup>3</sup> (R)
NPK-P (OEL C)	0.4 mg/m <sup>3</sup> (V) 0.1 mg/m <sup>3</sup> (R)
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
<b>Denmark - Occupational Exposure Limits</b>	
Local name	Mangan, pulver, støv og uorganiske forbindelser
OEL TWA [1]	0.2 mg/m <sup>3</sup> inhalerbar, beregnet som Mn 0.05 mg/m <sup>3</sup> respirabel, beregnet som Mn
Regulatory reference	BEK nr 1426 af 28. juni 2021
<b>Estonia - Occupational Exposure Limits</b>	
Local name	Mangaan ja anorgaanilised ühendid (arvutatud mangaanile)
OEL TWA	0.2 mg/m <sup>3</sup> kogu tolm 0.05 mg/m <sup>3</sup> peentolm
Remark	1 (Peentolm koosneb alla 2,5-mikromeetrise läbimõõduga osakestest, mis võivad jõuda koos sissehingatava õhuga kopsu alveoolidesse (respireeritav fraktsioon))
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 17.10.2019, 2); Vabariigi Valitsuse 10. märtsi 2019. a määruse nr 84

# GE+ 17-4PH, Stainless Steel 17-4PH DMLM powder (CL 92PH)

## Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH)

<b>manganese, powder (7439-96-5)</b>	
<b>Finland - Occupational Exposure Limits</b>	
Local name	Mangaani, metalli
HTP (OEL TWA) [1]	0.02 mg/m <sup>3</sup> Mn, alveolijae
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
<b>France - Occupational Exposure Limits</b>	
VME (OEL TWA)	1 mg/m <sup>3</sup>
<b>Germany - Occupational Exposure Limits (TRGS 900)</b>	
Local name	Mangan und seine anorganischen Verbindungen
AGW (OEL TWA) [1]	0.02 mg/m <sup>3</sup> (A) 0.2 mg/m <sup>3</sup> (E)
Peak exposure limitation factor	8(II)
Remark	DFG - Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe der DFG (MAK-Kommission); Y - Ein Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes (BGW) nicht befürchtet zu werden; 10 - Der Arbeitsplatzgrenzwert bezieht sich auf den Elementgehalt des entsprechenden Metalls; 20 - Für Permanganate gilt Spitzenbegrenzung, Überschreitungsfaktor 1(II)
Regulatory reference	TRGS900
<b>Hungary - Occupational Exposure Limits</b>	
Local name	MANGÁN ÉS SZERVETLEN SÓI (Mn-ra számítva)
AK (OEL TWA)	0.2 mg/m <sup>3</sup> 0.05 mg/m <sup>3</sup> respirábilis frakció
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
<b>Ireland - Occupational Exposure Limits</b>	
Local name	Manganese, fume (as Mn)
OEL TWA [1]	0.2 mg/m <sup>3</sup> I (Inhalable Fraction) 0.02 mg/m <sup>3</sup> R (Respirable Fraction)
OEL STEL	3 mg/m <sup>3</sup>
Regulatory reference	Chemical Agents Code of Practice 2021
<b>Latvia - Occupational Exposure Limits</b>	
Local name	Mangāns metināšanas aerosolos (kondensācijas aerosols)
OEL TWA	0.1 mg/m <sup>3</sup>
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325 (Grozījumi Ministru kabineta 2011. gada 1. februārī noteikumiem Nr. 92)
<b>Netherlands - Occupational Exposure Limits</b>	
Local name	Mangaan en anorganische mangaan-verbindingen
TGG-8u (OEL TWA)	0.05 mg/m <sup>3</sup> (respirabel) 0.2 mg/m <sup>3</sup> (inhaleerbaar)
TGG-15min (OEL STEL)	0.05 mg/m <sup>3</sup> Respirabel (als mangaan)
Regulatory reference	Arbeidsomstandighedenregeling 2021
<b>Poland - Occupational Exposure Limits</b>	
Local name	Mangan i jego związki nieorganiczne

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according to Regulation (EC) No. 1907/2006 (REACH)

<b>manganese, powder (7439-96-5)</b>	
NDS (OEL TWA)	0.2 mg/m <sup>3</sup> w przeliczeniu na Mn: frakcja wdychalna 0.05 mg/m <sup>3</sup> w przeliczeniu na Mn: frakcja respirabilna
Regulatory reference	Dz. U. 2018 poz. 1286
<b>Portugal - Occupational Exposure Limits</b>	
Local name	Manganês e compostos inorgânicos, expressos em Mn
OEL TWA	0.1 mg/m <sup>3</sup> I (Fração inalável) 0.02 mg/m <sup>3</sup> R (Fração respirável)
Remark	A4 (Agente não classificável como carcinogénico no Homem)
Regulatory reference	Norma Portuguesa NP 1796:2014
<b>Slovakia - Occupational Exposure Limits</b>	
Local name	Mangán a jeho anorganické zlúčeniny (ako mangán)
NPHV (OEL TWA) [1]	0.2 mg/m <sup>3</sup> inhalovateľná frakcia 0.05 mg/m <sup>3</sup> respirabilná frakcia
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
<b>Slovenia - Occupational Exposure Limits</b>	
Local name	mangan in anorganske manganove spojine (računano kot Mg)
OEL TWA	0.2 mg/m <sup>3</sup> 0.05 mg/m <sup>3</sup>
OEL STEL	1.6 mg/m <sup>3</sup> 0.4 mg/m <sup>3</sup>
Remark	Y (Snovi, pri katerih ni nevarnosti za zarodek ob upoštevanju mejnih vrednosti in bat vrednosti), EU
Regulatory reference	Uradni list RS, št. 72/2021 z dne 11.5.2021
<b>Spain - Occupational Exposure Limits</b>	
Local name	Manganeso elemental
VLA-ED (OEL TWA) [1]	0.2 mg/m <sup>3</sup> Fracción inhalable 0.05 mg/m <sup>3</sup> Fracción respirable
Remark	VLI (Agente químico para el que la U.E. estableció en su día un valor límite indicativo), d (Véase UNE EN 481: Atmósferas en los puestos de trabajo. Definición de las fracciones por el tamaño de las partículas para la medición de aerosoles).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2021. INSHT
<b>Sweden - Occupational Exposure Limits</b>	
Local name	Mangan, och oorg. föreningar (som Mn)
NGV (OEL TWA)	0.2 mg/m <sup>3</sup> inhalerbar fraktion 0.05 mg/m <sup>3</sup> respirabel fraktion
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
<b>United Kingdom - Occupational Exposure Limits</b>	
WEL TWA (OEL TWA) [1]	0.2 mg/m <sup>3</sup> 0.05 mg/m <sup>3</sup>
<b>Norway - Occupational Exposure Limits</b>	
Local name	Mangan og uorganiske manganforb. (beregnet som Mn)
Grenseverdi (OEL TWA) [1]	0.2 mg/m <sup>3</sup> Inhalerbar fraksjon 0.05 mg/m <sup>3</sup> Respirabel fraksjon

# GE+ 17-4PH, Stainless Steel 17-4PH DMLM powder (CL 92PH)

## Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH)

<b>manganese, powder (7439-96-5)</b>	
Regulatory reference	FOR-2021-06-28-2248
<b>Switzerland - Occupational Exposure Limits</b>	
Local name	Manganèse et ses composés inorg. / Mangan und seine anorganischen Verbindungen
MAK (OEL TWA) [1]	0.5 mg/m <sup>3</sup> (i) / (e)
Critical toxicity	SNC / ZNS
Notation	SS <sub>C</sub> , B, P / SS <sub>C</sub> , B, P
Remark	NIOSH
Regulatory reference	www.suva.ch, 01.01.2021
<b>Switzerland - BAT</b>	
Local name	Manganèse et ses composés inorg. / Mangan und seine anorganischen Verbindungen
BAT	20 µg/l (364 nmol/l; Paramètre biologique: Manganèse; Substrat d'examen: Sang complet; Moment du prélèvement: Fin de l'exposition, de la période de travail. Exposition de longue durée: après plusieurs périodes de travail.) / (364 nmol/l; Biologischer Parameter: Mangan; Untersuchungsmaterial: Vollblut; Probennahmezeitpunkt: Expositionsende, bzw. Schichtende. Bei Langzeitexposition: nach mehreren vorangegangenen Schichten.)
Remark	Interprétation quantitative difficile. / Quantitative Interpretation schwierig.
Regulatory reference	Ordonnance 832.30 (OPA), article 50 al. 3, www.suva.ch/valeurs-limites / Verordnung 832.30 (VUV), Art. 50 Abs. 3, www.suva.ch/grenzwerte
<b>USA - ACGIH - Occupational Exposure Limits</b>	
Local name	Manganese, elemental and inorganic compounds, as Mn
ACGIH OEL TWA	0.02 mg/m <sup>3</sup> (Respirable fraction) 0.1 mg/m <sup>3</sup> (Inhalable fraction)
Remark (ACGIH)	TLV® Basis: CNS impair. Notations: A4 (Not classifiable as a Human Carcinogen)
Regulatory reference	ACGIH 2021
<b>silicon, powder, amorphous (7440-21-3)</b>	
<b>Belgium - Occupational Exposure Limits</b>	
Local name	Silicium # Silicium
OEL TWA	10 mg/m <sup>3</sup>
Regulatory reference	Koninklijk besluit/Arrêté royal 19/11/2020
<b>Croatia - Occupational Exposure Limits</b>	
Local name	Silicij
GVI (OEL TWA) [1]	10 mg/m <sup>3</sup> U (ukupna prašina) 4 mg/m <sup>3</sup> R (respirabilna prašina)
Regulatory reference	Pravilnik o izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN 1/2021)
<b>Denmark - Occupational Exposure Limits</b>	
Local name	Silicium
OEL TWA [1]	10 mg/m <sup>3</sup>
Regulatory reference	BEK nr 1426 af 28. juni 2021
<b>Estonia - Occupational Exposure Limits</b>	
Local name	Silikoon

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according to Regulation (EC) No. 1907/2006 (REACH)

silicon, powder, amorphous (7440-21-3)	
OEL TWA	10 mg/m <sup>3</sup> 5 mg/m <sup>3</sup> peentolm
Remark	1 (Peentolm koosneb alla 2,5-mikromeetrise läbimõõduga osakestest, mis võivad jõuda koos sissehingatava õhuga kopsu alveoolidesse (respireeritav fraktsioon))
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 17.10.2019, 2); Vabariigi Valitsuse 10. märtsi 2019. a määruse nr 84
France - Occupational Exposure Limits	
Local name	Silicium
VME (OEL TWA)	10 mg/m <sup>3</sup>
Remark	Valeurs recommandées/admises
Regulatory reference	Circulaire du Ministère du travail (réf.: INRS ED 984, 2016)
Greece - Occupational Exposure Limits	
Local name	Πυρίτιο
OEL TWA	10 mg/m <sup>3</sup> εισπν. 5 mg/m <sup>3</sup> αναπν.
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
Ireland - Occupational Exposure Limits	
Local name	Silicon Si
OEL TWA [1]	10 mg/m <sup>3</sup> total inhalable dust 4 mg/m <sup>3</sup> respirable dust
Regulatory reference	Chemical Agents Code of Practice 2021
Slovakia - Occupational Exposure Limits	
Local name	Silikón
NPHV (OEL TWA) [1]	10 mg/m <sup>3</sup> inhalovateľná frakcia 4 mg/m <sup>3</sup> respirabilná frakcia
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
United Kingdom - Occupational Exposure Limits	
Local name	Silicon
WEL TWA (OEL TWA) [1]	10 mg/m <sup>3</sup> 4 mg/m <sup>3</sup>
Remark	WEL TWA: 10 mg/m <sup>3</sup> (inhalable aerosol); 4 mg/m <sup>3</sup> (respirable aerosol)
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
Norway - Occupational Exposure Limits	
Local name	Silisium
Grenseverdi (OEL TWA) [1]	10 mg/m <sup>3</sup>
Regulatory reference	FOR-2021-06-28-2248
Switzerland - Occupational Exposure Limits	
Local name	Silicium / Silicium
MAK (OEL TWA) [1]	3 mg/m <sup>3</sup> (a) / (a)
Remark	NIOSH
Regulatory reference	www.suva.ch, 01.01.2021

# GE+ 17-4PH, Stainless Steel 17-4PH DMLM powder (CL 92PH)

## Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH)

<b>copper, powder (7440-50-8)</b>	
<b>EU - Indicative Occupational Exposure Limit (IOEL)</b>	
Local name	Copper
Remark	(Year of adoption 2014)
Regulatory reference	SCOEL Recommendations
<b>Austria - Occupational Exposure Limits</b>	
Local name	Kupfer und seine Verbindungen
MAK (OEL TWA)	1 mg/m <sup>3</sup> (als Cu berechnet, E) 0.1 mg/m <sup>3</sup> (als Rauch, als Cu berechnet, A)
MAK (OEL STEL)	4 mg/m <sup>3</sup> (als Cu berechnet, E, 4x 15(Miw) min) 0.4 mg/m <sup>3</sup> (als Rauch, als Cu berechnet, A, 4x 15(Miw) min)
Regulatory reference	BGBl. II Nr. 156/2021
<b>Belgium - Occupational Exposure Limits</b>	
Local name	Cuivre (en Cu) # Koper (als Cu)
OEL TWA	0.2 mg/m <sup>3</sup> 1 mg/m <sup>3</sup>
Regulatory reference	Koninklijk besluit/Arrêté royal 19/11/2020
<b>Bulgaria - Occupational Exposure Limits</b>	
Local name	Мед
OEL TWA	0.1 mg/m <sup>3</sup> (метални пари (като мед)) 1 mg/m <sup>3</sup> (оксиди и неорганични съединения (като мед))
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
<b>Croatia - Occupational Exposure Limits</b>	
Local name	Bakar
GVI (OEL TWA) [1]	0.2 mg/m <sup>3</sup> dim (kao Cu) 1 mg/m <sup>3</sup> prašina (kao Cu)
KGVI (OEL STEL)	2 mg/m <sup>3</sup> prašina (kao Cu)
Regulatory reference	Pravilnik o izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN 1/2021)
<b>Czech Republic - Occupational Exposure Limits</b>	
Local name	Měď
PEL (OEL TWA)	1 mg/m <sup>3</sup> (prach) (V) 0.1 mg/m <sup>3</sup> (dýmy) (R)
NPK-P (OEL C)	2 mg/m <sup>3</sup> (prach) (V) 0.2 mg/m <sup>3</sup> (dýmy) (R)
Regulatory reference	Nařízení vlády č. 361/2007 Sb. (Předpis 195/2021 Sb.)
<b>Denmark - Occupational Exposure Limits</b>	
Local name	Kobber
OEL TWA [1]	1 mg/m <sup>3</sup> pulver og støv 0.1 mg/m <sup>3</sup> røg, beregnet som Cu
Regulatory reference	BEK nr 1426 af 28. juni 2021

# GE+ 17-4PH, Stainless Steel 17-4PH DMLM powder (CL 92PH)

## Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH)

<b>copper, powder (7440-50-8)</b>	
<b>Estonia - Occupational Exposure Limits</b>	
Local name	Vask ja anorgaanilised ühendid (arvutatud vasele)
OEL TWA	1 mg/m <sup>3</sup> kogu tolm 0.2 mg/m <sup>3</sup> peentolm
Regulatory reference	Vabariigi Valitsuse 20. märtsi 2001. a määruse nr 105 (RT I, 17.10.2019, 2); Vabariigi Valitsuse 10. märtsi 2019. a määruse nr 84
<b>Finland - Occupational Exposure Limits</b>	
Local name	Kupari, metalli
HTP (OEL TWA) [1]	0.02 mg/m <sup>3</sup> Cu, alveolijae
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveystministeriö)
<b>France - Occupational Exposure Limits</b>	
Local name	Cuivre
VME (OEL TWA)	0.2 mg/m <sup>3</sup> 1 mg/m <sup>3</sup>
VLE (OEL C/STEL)	2 mg/m <sup>3</sup>
Remark	Valeurs recommandées/admises
Regulatory reference	Circulaire du Ministère du travail (réf.: INRS ED 984, 2016)
<b>Hungary - Occupational Exposure Limits</b>	
Local name	RÉZ és vegyületei (Cu-re számítva)
AK (OEL TWA)	0.1 mg/m <sup>3</sup> 0.01 mg/m <sup>3</sup> füst, respirábilis frakció
CK (OEL STEL)	0.2 mg/m <sup>3</sup>
Regulatory reference	5/2020. (II. 6.) ITM rendelet - A kémiai kóroki tényezők hatásának kitett munkavállalók egészségének és biztonságának védelméről
<b>Ireland - Occupational Exposure Limits</b>	
Local name	Copper (as Cu)
OEL TWA [1]	0.2 mg/m <sup>3</sup> Fume 1 mg/m <sup>3</sup> Dusts and mists
Regulatory reference	Chemical Agents Code of Practice 2021
<b>Latvia - Occupational Exposure Limits</b>	
Local name	Varš
OEL TWA	0.5 mg/m <sup>3</sup>
OEL STEL	1 mg/m <sup>3</sup>
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325
<b>Netherlands - Occupational Exposure Limits</b>	
Local name	Koper
TGG-8u (OEL TWA)	0.1 mg/m <sup>3</sup>
Regulatory reference	Arbeidsomstandighedenregeling 2021
<b>Poland - Occupational Exposure Limits</b>	
Local name	Miedź i jej związki nieorganiczne
NDS (OEL TWA)	0.2 mg/m <sup>3</sup> w przeliczeniu na Cu

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<b>copper, powder (7440-50-8)</b>	
Regulatory reference	Dz. U. 2018 poz. 1286
<b>Portugal - Occupational Exposure Limits</b>	
Local name	Cobre
OEL TWA	0.2 mg/m <sup>3</sup> Fumos, expressos em Cu 1 mg/m <sup>3</sup> Poeiras e névoas, expressos em Cu
Regulatory reference	Norma Portuguesa NP 1796:2014
<b>Romania - Occupational Exposure Limits</b>	
Local name	Cupru
OEL TWA	0.5 mg/m <sup>3</sup> (Pulberi)
OEL STEL	0.2 mg/m <sup>3</sup> (Fumuri) 1.5 mg/m <sup>3</sup> (Pulberi)
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
<b>Slovakia - Occupational Exposure Limits</b>	
Local name	Meď a jej anorganické zlúčeniny (ako Cu)
NPHV (OEL TWA) [1]	1 mg/m <sup>3</sup> inhalovateľná frakcia 0.2 mg/m <sup>3</sup> respirabilná frakcia a dymy
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
<b>Spain - Occupational Exposure Limits</b>	
Local name	Cobre
VLA-ED (OEL TWA) [1]	0.1 mg/m <sup>3</sup> Fracción respirable 0.01 mg/m <sup>3</sup> Condicionado según los términos establecidos en el acuerdo del Pleno de la CNSST de 23 de abril de 2021.
Remark	d (Véase UNE EN 481: Atmósferas en los puestos de trabajo. Definición de las fracciones por el tamaño de las partículas para la medición de aerosoles).
Regulatory reference	Límites de Exposición Profesional para Agentes Químicos en España 2021. INSHT
<b>Sweden - Occupational Exposure Limits</b>	
Local name	Koppar, och oorg. Föreningar (som Cu)
NGV (OEL TWA)	0.01 mg/m <sup>3</sup> respirabel fraktion
Regulatory reference	Hygieniska gränsvärden (AFS 2018:1)
<b>United Kingdom - Occupational Exposure Limits</b>	
Local name	Copper
WEL TWA (OEL TWA) [1]	0.2 mg/m <sup>3</sup> 1 mg/m <sup>3</sup>
WEL STEL (OEL STEL)	2 mg/m <sup>3</sup>
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
<b>Norway - Occupational Exposure Limits</b>	
Local name	Kobber
Grenseverdi (OEL TWA) [1]	0.1 mg/m <sup>3</sup> Røyk 1 mg/m <sup>3</sup> Støv
Regulatory reference	FOR-2021-06-28-2248
<b>Switzerland - Occupational Exposure Limits</b>	
Local name	Cuivre et ses composés inorganiques / Kupfer und seine anorganischen Verbindungen



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according to Regulation (EC) No. 1907/2006 (REACH)

<b>copper, powder (7440-50-8)</b>	
MAK (OEL TWA) [1]	0.1 mg/m <sup>3</sup> (i) / (e)
KZGW (OEL STEL)	0.2 mg/m <sup>3</sup> (i) / (e)
Critical toxicity	Poumons, Fimétal / Lunge, Metallrauch
Notation	SS <sub>c</sub> / SS <sub>c</sub>
Remark	NIOSH
Regulatory reference	www.suva.ch, 01.01.2021
<b>USA - ACGIH - Occupational Exposure Limits</b>	
Local name	Copper, as Cu
ACGIH OEL TWA	0.2 mg/m <sup>3</sup> 1 mg/m <sup>3</sup>
Remark (ACGIH)	TLV® Basis: Irr; GI; metal fume fever
Regulatory reference	ACGIH 2021
<b>Carbon (C) (7440-44-0)</b>	
<b>Austria - Occupational Exposure Limits</b>	
Local name	Graphit (Alveolarstaub mit < 1% Quarz)
MAK (OEL TWA)	5 mg/m <sup>3</sup> (A)
MAK (OEL STEL)	10 mg/m <sup>3</sup> (A, 2x 60(Miw) min)
Regulatory reference	BGBI. II Nr. 156/2021
<b>Poland - Occupational Exposure Limits</b>	
Local name	Grafit syntetyczny
NDS (OEL TWA)	6 mg/m <sup>3</sup> frakcja wdychalna
Regulatory reference	Dz. U. 2018 poz. 1286
<b>United Kingdom - Occupational Exposure Limits</b>	
Local name	Graphite
WEL TWA (OEL TWA) [1]	10 mg/m <sup>3</sup> inhalable dust 4 mg/m <sup>3</sup> respirable
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
<b>Sulfur (7704-34-9)</b>	
<b>Latvia - Occupational Exposure Limits</b>	
Local name	Sērs
OEL TWA	6 mg/m <sup>3</sup>
Regulatory reference	Ministru kabineta 2007. gada 15. maija noteikumiem Nr. 325
<b>Lithuania - Occupational Exposure Limits</b>	
Local name	Siera
IPRV (OEL TWA)	6 mg/m <sup>3</sup>
Regulatory reference	LIETUVOS HIGIENOS NORMA HN 23:2011 (Nr. V-695/A1-272, 2018-06-12)
<b>Romania - Occupational Exposure Limits</b>	
Local name	Sulf
OEL STEL	15 mg/m <sup>3</sup> (Pulberi)

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according to Regulation (EC) No. 1907/2006 (REACH)

<b>Sulfur (7704-34-9)</b>	
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
<b>tantalum, powder (7440-25-7)</b>	
<b>Austria - Occupational Exposure Limits</b>	
Local name	Tantal
MAK (OEL TWA)	5 mg/m <sup>3</sup> (E)
Regulatory reference	BGBl. II Nr. 156/2021
<b>Belgium - Occupational Exposure Limits</b>	
Local name	Tantale (métal) # Tantaal (metaal)
OEL TWA	5 mg/m <sup>3</sup>
Regulatory reference	Koninklijk besluit/Arrêté royal 19/11/2020
<b>Bulgaria - Occupational Exposure Limits</b>	
Local name	Тантал
OEL TWA	5 mg/m <sup>3</sup>
Regulatory reference	Наредба № 13 от 30.12.2003 г. за защита на работещите от рискове, свързани с експозиция на химични агенти при работа (изм. и доп. ДВ. бр. 47 от 2021 г., в сила от 04.06.2021 г.)
<b>Croatia - Occupational Exposure Limits</b>	
Local name	Tantal
GVI (OEL TWA) [1]	5 mg/m <sup>3</sup>
KGVI (OEL STEL)	10 mg/m <sup>3</sup>
Regulatory reference	Pravilnik o izmjenama i dopunama Pravilnika o graničnim vrijednostima izloženosti opasnim tvarima pri radu i o biološkim graničnim vrijednostima (NN 1/2021)
<b>Denmark - Occupational Exposure Limits</b>	
Local name	Tantal, pulver
OEL TWA [1]	5 mg/m <sup>3</sup> beregnet som Ta
Regulatory reference	BEK nr 1426 af 28. juni 2021
<b>Finland - Occupational Exposure Limits</b>	
Local name	Tantaali, metalli
HTP (OEL TWA) [1]	5 mg/m <sup>3</sup> Ta
Regulatory reference	HTP-ARVOT 2020 (Sosiaali- ja terveysministeriö)
<b>France - Occupational Exposure Limits</b>	
Local name	Tantale (métal)
VME (OEL TWA)	5 mg/m <sup>3</sup>
Remark	Valeurs recommandées/admises
Regulatory reference	Circulaire du Ministère du travail (réf.: INRS ED 984, 2016)
<b>Greece - Occupational Exposure Limits</b>	
Local name	Ταντάλιο
OEL TWA	5 mg/m <sup>3</sup>
OEL STEL	10 mg/m <sup>3</sup>

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<b>tantalum, powder (7440-25-7)</b>	
Regulatory reference	Π.Δ. 90/1999 - Προστασία της υγείας των εργαζομένων που εκτίθενται σε ορισμένους χημικούς παράγοντες κατά τη διάρκεια της εργασίας τους
<b>Ireland - Occupational Exposure Limits</b>	
Local name	Tantalum
OEL TWA [1]	5 mg/m <sup>3</sup>
OEL STEL	10 mg/m <sup>3</sup>
Regulatory reference	Chemical Agents Code of Practice 2021
<b>Poland - Occupational Exposure Limits</b>	
Local name	Tantal
NDS (OEL TWA)	5 mg/m <sup>3</sup>
Regulatory reference	Dz. U. 2018 poz. 1286
<b>Romania - Occupational Exposure Limits</b>	
Local name	Tantal
OEL TWA	5 mg/m <sup>3</sup>
OEL STEL	10 mg/m <sup>3</sup>
Regulatory reference	Hotărârea Guvernului nr. 1.218/2006 (Hotărârea nr. 53/2021)
<b>Slovakia - Occupational Exposure Limits</b>	
Local name	Tantal
NPHV (OEL TWA) [1]	4 mg/m <sup>3</sup> inhalovateľná frakcia 1.5 mg/m <sup>3</sup> respirabilná frakcia
Regulatory reference	Nariadenie vlády č. 355/2006 Z. z. (236/2020 Z. z.)
<b>United Kingdom - Occupational Exposure Limits</b>	
Local name	Tantalum
WEL TWA (OEL TWA) [1]	5 mg/m <sup>3</sup>
WEL STEL (OEL STEL)	10 mg/m <sup>3</sup>
Regulatory reference	EH40/2005 (Fourth edition, 2020). HSE
<b>Switzerland - Occupational Exposure Limits</b>	
Local name	Tantale / Tantal
MAK (OEL TWA) [1]	5 mg/m <sup>3</sup> (i) / (e)
Critical toxicity	Formel / Formal
Notation	SS <sub>c</sub> / SS <sub>c</sub>
Remark	NIOSH, OSHA
Regulatory reference	www.suva.ch, 01.01.2021
<b>niobium, solid (7440-03-1)</b>	
<b>Austria - Occupational Exposure Limits</b>	
Local name	Niob
MAK (OEL TWA)	5 mg/m <sup>3</sup> (E) 0.5 mg/m <sup>3</sup> (als Rauch, A)
MAK (OEL STEL)	10 mg/m <sup>3</sup> (E, 4x 15(Miw) min) 1 mg/m <sup>3</sup> (als Rauch, A, 4x 15(Miw) min)

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niobium, solid (7440-03-1)	
Regulatory reference	BGBl. II Nr. 156/2021
<b>Denmark - Occupational Exposure Limits</b>	
Local name	Niobium, pulver, støv og uopløselige forbindelser
OEL TWA [1]	5 mg/m <sup>3</sup> beregnet som Nb
Regulatory reference	BEK nr 1426 af 28. juni 2021

### 8.1.2. Recommended monitoring procedures

No additional information available

### 8.1.3. Air contaminants formed

No additional information available

### 8.1.4. DNEL and PNEC

No additional information available

### 8.1.5. Control banding

No additional information available

## 8.2. Exposure controls

### 8.2.1. Appropriate engineering controls

#### Appropriate engineering controls:

Ensure good ventilation of the work station.

### 8.2.2. Personal protection equipment

#### Personal protective equipment:

Gloves. Dust formation: dust mask.

#### Personal protective equipment symbol(s):



#### 8.2.2.1. Eye and face protection

##### Eye protection:

Safety glasses

#### 8.2.2.2. Skin protection

##### Skin and body protection:

Wear suitable protective clothing

##### Hand protection:

Protective gloves

#### 8.2.2.3. Respiratory protection

##### Respiratory protection:

[In case of inadequate ventilation] wear respiratory protection. Recommendation: Filter P3 or N95 or P100 based on exposure level. Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard. Respirator selection must be based on known or anticipated exposure levels, the hazards of the material, and the safe working limits of the selected respirator. Recommendation: Filter P3 or N95 or P100 based on exposure level.

#### 8.2.2.4. Thermal hazards

##### Thermal hazard protection:

Wear fire/flammable resistant/retardant clothing.

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### 8.2.3. Environmental exposure controls

#### Environmental exposure controls:

Avoid release to the environment. Install and operate general and/or local exhaust ventilation systems of sufficient power to maintain airborne concentration below the defined or recommended limit. Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard. Respirator selection must be based on known or anticipated exposure levels, the hazards of the material, and the safe working limits of the selected respirator.

#### Consumer exposure controls:

Comply with applicable regulations. Keep in a cool, well-ventilated place away from heat. Store in a well-ventilated place. Keep container tightly closed. Ensure adequate ventilation, especially in confined areas.

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical state	: Solid
Appearance	: Metal powder.
Colour	: Grey.
Odour	: Odourless.
Odour threshold	: No data available
pH	: No data available
Relative evaporation rate (butylacetate=1)	: No data available
Melting point	: ≈ 1415 °C
Freezing point	: Not applicable
Boiling point	: ≈ 2800 °C
Flash point	: Not applicable
Auto-ignition temperature	: Not applicable
Decomposition temperature	: No data available
Flammability (solid, gas)	: Non flammable.
Vapour pressure	: No data available
Relative vapour density at 20 °C	: No data available
Relative density	: No data available
Density	: ≈ 8.2 g/cm <sup>3</sup>
Solubility	: No data available
Partition coefficient n-octanol/water (Log Pow)	: No data available
Viscosity, kinematic	: Not applicable
Viscosity, dynamic	: No data available
Explosive properties	: Fine dust clouds may form explosive mixtures with air. Risk of explosion if heated under confinement.
Oxidising properties	: No data available
Explosive limits	: Not applicable
Dust deflagration index	: N/A (from 20 liters explosion sphere, 2Kj Test - No ignition made)

### 9.2. Other information

Minimum ignition energy	: Not determined
Other properties	: Data in this section is Typical & based on tests for powder ranging from 5/15 microns to 45/63 microns powder (typical laser additive manufacturing powder. Particle size determined by ASTM B822 and ASTM B214 or similar methods and particle size distribution/PSD values such as D10 and D90).

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

The product is non-reactive under normal conditions of use, storage and transport.

### 10.2. Chemical stability

Stable under normal conditions.

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### 10.3. Possibility of hazardous reactions

No dangerous reactions known under normal conditions of use.

### 10.4. Conditions to avoid

None under recommended storage and handling conditions (see section 7).

### 10.5. Incompatible materials

Acids. Combustible materials. Halogenated hydrocarbons. Oxidizing agent. Strong acids. Strong bases.

### 10.6. Hazardous decomposition products

Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## SECTION 11: Toxicological information

### 11.1 Information on toxicological effects

Acute toxicity (oral) : Not classified  
Acute toxicity (dermal) : Not classified  
Acute toxicity (inhalation) : Not classified

#### iron, powder (7439-89-6)

LD50 oral rat	98600 mg/kg bodyweight (Equivalent or similar to OECD 401, Rat, Male, Experimental value, Oral)
LC50 Inhalation - Rat	> 250 mg/m <sup>3</sup> air (6 h, Rat, Male, Experimental value, Inhalation (dust))

#### nickel, powder, particle diameter < 1 mm (7440-02-0)

LD50 oral rat	> 9000 mg/kg bodyweight (Equivalent or similar to OECD 401, Rat, Male / female, Experimental value, Oral, 15 day(s))
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#### chromium (7440-47-3)

LD50 oral rat	> 5000 mg/kg bodyweight (Equivalent or similar to OECD 420, Rat, Male / female, Read-across, Oral, 14 day(s))
LC50 Inhalation - Rat	> 5.41 mg/l (OECD 403: Acute Inhalation Toxicity, 4 h, Rat, Male / female, Read-across, Inhalation (aerosol), 14 day(s))
LC50 Inhalation - Rat (Dust/Mist)	> 5.41 mg/l Source: ECHA

#### manganese, powder (7439-96-5)

LD50 oral rat	> 2000 mg/kg bodyweight (OECD 420: Acute Oral toxicity – Acute Toxic Class Method, Rat, Female, Experimental value, Oral, 14 day(s))
LC50 Inhalation - Rat	> 5.14 mg/l (OECD 403: Acute Inhalation Toxicity, 4 h, Rat, Male / female, Experimental value, Inhalation (dust), 14 day(s))
LC50 Inhalation - Rat (Dust/Mist)	> 5.14 mg/l Source: ECHA

#### silicon, powder, amorphous (7440-21-3)

LD50 oral rat	> 5000 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 401 (Acute Oral Toxicity)
LD50 dermal rabbit	> 5000 mg/kg bodyweight Animal: rabbit

#### copper, powder (7440-50-8)

LD50 oral rat	> 2500 mg/kg bodyweight (OECD 423: Acute Oral Toxicity – Acute Toxic Class Method, Rat, Male, Experimental value, Oral, 14 day(s))
LD50 dermal rat	> 2000 mg/kg bodyweight (OECD 402: Acute Dermal Toxicity, 24 h, Rat, Male / female, Experimental value, Dermal, 14 day(s))

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<b>copper, powder (7440-50-8)</b>	
LC50 Inhalation - Rat	> 5.11 mg/l (OECD 436: Acute inhalation toxicity-acute toxic class method, 4 h, Rat, Male / female, Experimental value, Inhalation (dust), 14 day(s))
<b>Carbon (C) (7440-44-0)</b>	
LD50 oral rat	≥ 2000 mg/kg bodyweight Animal: rat, Animal sex: female, Guideline: OECD Guideline 423 (Acute Oral toxicity - Acute Toxic Class Method), Guideline: EU Method B.1 tris (Acute Oral Toxicity - Acute Toxic Class Method)
<b>Sulfur (7704-34-9)</b>	
LD50 oral rat	> 2200 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 401 (Acute Oral Toxicity)
LD50 dermal rat	> 2000 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 402 (Acute Dermal Toxicity)
LC50 Inhalation - Rat	> 5.4 mg/l air Animal: rat, Guideline: OECD Guideline 403 (Acute Inhalation Toxicity)
<b>tantalum, powder (7440-25-7)</b>	
LD50 oral rat	> 2000 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 423 (Acute Oral toxicity - Acute Toxic Class Method), Guideline: EU Method B.1 (Acute Toxicity (Oral))
LD50 dermal rat	> 2000 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 402 (Acute Dermal Toxicity), Guideline: EPA OPPTS 870.1200 (Acute Dermal Toxicity)
LD50 dermal rabbit	> 2000 mg/kg Source: ECHA
LC50 Inhalation - Rat	> 5.18 mg/l air Animal: rat, Guideline: OECD Guideline 403 (Acute Inhalation Toxicity), Guideline: EPA OPPTS 870.1300 (Acute inhalation toxicity), Guideline: other:J-MAFF test guidelines for acute inhalation studies
LC50 Inhalation - Rat (Dust/Mist)	> 5.18 mg/l Source: ECHA
<b>niobium, solid (7440-03-1)</b>	
LD50 oral rat	> 2000 mg/kg bodyweight (OECD 423: Acute Oral Toxicity – Acute Toxic Class Method, Rat, Female, Experimental value, Oral)
LD50 dermal rat	> 2000 mg/kg bodyweight (OECD 402: Acute Dermal Toxicity, 24 h, Rat, Male / female, Experimental value, Dermal)
LC50 Inhalation - Rat	> 5.45 mg/l (OECD 403: Acute Inhalation Toxicity, 4 h, Rat, Male / female, Experimental value, Inhalation (aerosol))
Skin corrosion/irritation	: Not classified
Serious eye damage/irritation	: Not classified
Respiratory or skin sensitisation	: May cause an allergic skin reaction.
Germ cell mutagenicity	: Not classified
Carcinogenicity	: Suspected of causing cancer.
<b>nickel, powder, particle diameter &lt; 1 mm (7440-02-0)</b>	
IARC group	2B - Possibly carcinogenic to humans
<b>chromium (7440-47-3)</b>	
IARC group	3 - Not classifiable
Reproductive toxicity	: Not classified
<b>silicon, powder, amorphous (7440-21-3)</b>	
NOAEL (animal/male, F0/P)	5000 mg/kg bodyweight Animal: rat, Animal sex: male, Guideline: other:OECD Guideline 478 (Genetic Toxicology: Rodent Dominant Lethal Test)

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<b>Carbon (C) (7440-44-0)</b>	
NOAEL (animal/male, F0/P)	≥ 859 mg/kg bodyweight Animal: rat, Animal sex: male, Guideline: OECD Guideline 422 (Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test)
STOT-single exposure	: Not classified
STOT-repeated exposure	: May cause damage to organs through prolonged or repeated exposure.
<b>nickel, powder, particle diameter &lt; 1 mm (7440-02-0)</b>	
LOAEC (inhalation, rat,dust/mist/fume, 90 days)	0.004 mg/l air Animal: rat, Guideline: OECD Guideline 412 (Subacute Inhalation Toxicity: 28-Day Study)
STOT-repeated exposure	Causes damage to organs (lungs) through prolonged or repeated exposure (if inhaled).
<b>chromium (7440-47-3)</b>	
LOAEC (inhalation, rat,dust/mist/fume, 90 days)	≥ 0.0044 mg/l air Animal: rat, Guideline: OECD Guideline 413 (Subchronic Inhalation Toxicity: 90-Day Study)
<b>silicon, powder, amorphous (7440-21-3)</b>	
NOAEL (oral, rat, 90 days)	> 5000 mg/kg bodyweight Animal: rat, Animal sex: male
<b>tantalum, powder (7440-25-7)</b>	
NOAEL (oral, rat, 90 days)	1000 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 422 (Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test)
<b>niobium, solid (7440-03-1)</b>	
NOAEL (oral, rat, 90 days)	> 1000 mg/kg bodyweight Animal: rat, Guideline: OECD Guideline 422 (Combined Repeated Dose Toxicity Study with the Reproduction / Developmental Toxicity Screening Test)
Aspiration hazard	: Not classified
<b>GE+ 17-4PH, Stainless Steel 17-4PH DMLM powder (CL 92PH)</b>	
Viscosity, kinematic	Not applicable

## SECTION 12: Ecological information

### 12.1. Toxicity

Ecology - general	: May cause long lasting harmful effects to aquatic life.
Hazardous to the aquatic environment, short-term (acute)	: Not classified
Hazardous to the aquatic environment, long-term (chronic)	: Not classified
Not rapidly degradable	

<b>iron, powder (7439-89-6)</b>	
LC50 - Fish [1]	8.65 mg/l Source: ECHA
LC50 - Other aquatic organisms [1]	106.3 mg/l Source: ECHA
EC50 - Crustacea [1]	> 100 mg/l Test organisms (species): Daphnia magna
EC50 - Crustacea [2]	> 10000 mg/l Test organisms (species): Daphnia magna
EC50 72h - Algae [1]	18 mg/l Source: ECHA
<b>nickel, powder, particle diameter &lt; 1 mm (7440-02-0)</b>	
LC50 - Fish [1]	15.3 mg/l (96 h, Oncorhynchus mykiss, Semi-static system, Fresh water, Experimental value, Lethal)



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<b>nickel, powder, particle diameter &lt; 1 mm (7440-02-0)</b>	
EC50 72h - Algae [1]	81.5 – 148 µg/l (OECD 201: Alga, Growth Inhibition Test, Pseudokirchneriella subcapitata, Static system, Fresh water, Experimental value, Growth rate)
<b>chromium (7440-47-3)</b>	
LC50 - Fish [1]	13.9 – 210 mg/l Source: GESTIS
EC50 - Crustacea [1]	17.7 – 18.9 mg/l Source: ECHA
EC50 72h - Algae [1]	0.1 – 17.8 mg/l Source: GESTIS
<b>manganese, powder (7439-96-5)</b>	
LC50 - Fish [1]	> 3.6 mg/l (OECD 203: Fish, Acute Toxicity Test, 96 h, Oncorhynchus mykiss, Semi-static system, Fresh water, Experimental value, GLP)
EC50 - Crustacea [1]	> 1.6 mg/l (OECD 202: Daphnia sp. Acute Immobilisation Test, 48 h, Daphnia magna, Static system, Fresh water, Experimental value, Locomotor effect)
EC50 72h - Algae [1]	4.5 mg/l Test organisms (species): Desmodesmus subspicatus (previous name: Scenedesmus subspicatus)
EC50 72h - Algae [2]	2.8 mg/l Test organisms (species): Desmodesmus subspicatus (previous name: Scenedesmus subspicatus)
ErC50 algae	4.5 mg/l (OECD 201: Alga, Growth Inhibition Test, 72 h, Desmodesmus subspicatus, Static system, Fresh water, Experimental value, GLP)
NOEC (chronic)	1.7 mg/l Test organisms (species): Ceriodaphnia dubia Duration: '8 d'
<b>silicon, powder, amorphous (7440-21-3)</b>	
EC50 72h - Algae [1]	≈ 250 mg/l Test organisms (species): Pseudokirchneriella subcapitata (previous names: Raphidocelis subcapitata, Selenastrum capricornutum)
<b>copper, powder (7440-50-8)</b>	
LC50 - Fish [1]	810 µg/l (APHA, 96 h, Cyprinus carpio, Fresh water, Experimental value)
EC50 - Crustacea [1]	792 µg/l (OECD 202: Daphnia sp. Acute Immobilisation Test, 48 h, Daphnia magna, Static system, Fresh water, Experimental value, Locomotor effect)
<b>Sulfur (7704-34-9)</b>	
LC50 - Fish [1]	> 5000 mg/l Test organisms (species): Oncorhynchus mykiss (previous name: Salmo gairdneri)
EC50 - Crustacea [1]	≥ 5000 mg/l Source: ECOTOX
NOEC chronic fish	9.3 mg/l Test organisms (species): Oncorhynchus mykiss (previous name: Salmo gairdneri) Duration: '28 d'
<b>tantalum, powder (7440-25-7)</b>	
LC50 - Fish [1]	> 100 mg/l Source: ECHA
<b>niobium, solid (7440-03-1)</b>	
LC50 - Fish [1]	2589.695 mg/l Source: Ecological Structure Activity Relationships
EC50 96h - Algae [1]	247.252 mg/l Source: Ecological Structure Activity Relationships
<b>12.2. Persistence and degradability</b>	
<b>iron, powder (7439-89-6)</b>	
Persistence and degradability	Biodegradability in soil: not applicable. Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable

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<b>iron, powder (7439-89-6)</b>	
ThOD	Not applicable
BOD (% of ThOD)	Not applicable
<b>nickel, powder, particle diameter &lt; 1 mm (7440-02-0)</b>	
Persistence and degradability	Biodegradability in soil: not applicable. Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable (inorganic)
ThOD	Not applicable (inorganic)
<b>chromium (7440-47-3)</b>	
Persistence and degradability	Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable (inorganic)
ThOD	Not applicable (inorganic)
<b>manganese, powder (7439-96-5)</b>	
Persistence and degradability	Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable (inorganic)
ThOD	Not applicable (inorganic)
<b>silicon, powder, amorphous (7440-21-3)</b>	
Persistence and degradability	Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable
BOD (% of ThOD)	Not applicable
<b>copper, powder (7440-50-8)</b>	
Persistence and degradability	Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable (inorganic)
ThOD	Not applicable (inorganic)
<b>Sulfur (7704-34-9)</b>	
Persistence and degradability	Biodegradability: not applicable.
BOD (% of ThOD)	Not applicable
<b>tantalum, powder (7440-25-7)</b>	
Persistence and degradability	Biodegradability in soil: not applicable. Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
BOD (% of ThOD)	Not applicable
<b>niobium, solid (7440-03-1)</b>	
Persistence and degradability	Biodegradability: not applicable.
Chemical oxygen demand (COD)	Not applicable
ThOD	Not applicable
BOD (% of ThOD)	Not applicable

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### 12.3. Bioaccumulative potential

#### iron, powder (7439-89-6)

Bioaccumulative potential	No bioaccumulation data available.
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#### nickel, powder, particle diameter < 1 mm (7440-02-0)

BCF - Fish [1]	47 – 106 (30 day(s), Pimephales promelas, Flow-through system, Fresh water, Experimental value)
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BCF - Other aquatic organisms [1]	1555 (Myrriophyllum sp., Fresh water, Experimental value, Nickel ion)
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Partition coefficient n-octanol/water (Log Pow)	-0.57 (Estimated value)
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Bioaccumulative potential	Low potential for bioaccumulation (BCF < 500).
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#### chromium (7440-47-3)

BCF - Fish [1]	0.0048 (Pisces, Literature study, Dry weight)
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Partition coefficient n-octanol/water (Log Pow)	0.23 Source: SRC
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Bioaccumulative potential	Not bioaccumulative.
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#### manganese, powder (7439-96-5)

BCF - Fish [1]	81 (Pisces)
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BCF - Other aquatic organisms [1]	300000 (Mollusca)
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BCF - Other aquatic organisms [2]	125000 (Crustacea)
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Bioaccumulative potential	Not bioaccumulative.
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#### copper, powder (7440-50-8)

Partition coefficient n-octanol/water (Log Pow)	-0.57 Source: EPISUITE
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Bioaccumulative potential	Not bioaccumulative.
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#### Carbon (C) (7440-44-0)

Partition coefficient n-octanol/water (Log Pow)	0.78 Source: Quantitative Structure Activity Relation
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#### Sulfur (7704-34-9)

Partition coefficient n-octanol/water (Log Pow)	0.23
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Bioaccumulative potential	Low potential for bioaccumulation (Log Kow < 4).
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#### tantalum, powder (7440-25-7)

Bioaccumulative potential	Not bioaccumulative.
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#### niobium, solid (7440-03-1)

Partition coefficient n-octanol/water (Log Pow)	0.23 Source: Ecological Structure Activity Relationships
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Bioaccumulative potential	No bioaccumulation data available.
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### 12.4. Mobility in soil

#### iron, powder (7439-89-6)

Surface tension	Not applicable (solid)
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Ecology - soil	Adsorbs into the soil.
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#### nickel, powder, particle diameter < 1 mm (7440-02-0)

Surface tension	No data available (test not performed)
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Ecology - soil	Adsorbs into the soil.
----------------	------------------------

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<b>chromium (7440-47-3)</b>	
Surface tension	No data available (test not performed)
Ecology - soil	No (test)data on mobility of the substance available.
<b>manganese, powder (7439-96-5)</b>	
Ecology - soil	Adsorbs into the soil.
<b>silicon, powder, amorphous (7440-21-3)</b>	
Surface tension	0.74 N/m (1410 °C)
<b>copper, powder (7440-50-8)</b>	
Surface tension	No data available (test not performed)
Ecology - soil	No (test)data on mobility of the substance available.
<b>Sulfur (7704-34-9)</b>	
Surface tension	No data available in the literature
Organic Carbon Normalized Adsorption Coefficient (Log Koc)	1.12 (log Koc, SRC PCKOCWIN v2.0, Estimated value)
Ecology - soil	Highly mobile in soil.
<b>tantalum, powder (7440-25-7)</b>	
Ecology - soil	Adsorbs into the soil.
<b>niobium, solid (7440-03-1)</b>	
Mobility in soil	0.199 Source: Quantitative Structure Activity Relation
Ecology - soil	No (test)data on mobility of the substance available.

### 12.5. Results of PBT and vPvB assessment

<b>Component</b>	
iron, powder (7439-89-6)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
chromium (7440-47-3)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
copper, powder (7440-50-8)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
nickel, powder, particle diameter < 1 mm (7440-02-0)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
manganese, powder (7439-96-5)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
tantalum, powder (7440-25-7)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII
Sulfur (7704-34-9)	This substance/mixture does not meet the PBT criteria of REACH regulation, annex XIII This substance/mixture does not meet the vPvB criteria of REACH regulation, annex XIII

### 12.6. Other adverse effects

No additional information available

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### SECTION 13: Disposal considerations

#### 13.1. Waste treatment methods

Regional legislation (waste)	: Disposal must be done according to official regulations.
Waste treatment methods	: Dispose of contents/container in accordance with licensed collector's sorting instructions.
Sewage disposal recommendations	: Disposal must be done according to official regulations. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.
Product/Packaging disposal recommendations	: Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Do not discharge into drains or the environment. Dispose of at authorized waste collection point. Disposal must be done according to official regulations.
Additional information	: Industrial waste. Clean up even minor leaks or spills if possible without unnecessary risk.
Ecology - waste materials	: Avoid release to the environment.

### SECTION 14: Transport information

In accordance with ADR / IMDG / IATA / ADN / RID

ADR	IMDG	IATA	ADN	RID
<b>14.1. UN number</b>				
Not regulated	Not regulated	Not regulated	Not regulated	Not regulated
<b>14.2. UN proper shipping name</b>				
Not regulated	Not regulated	Not regulated	Not regulated	Not regulated
<b>14.3. Transport hazard class(es)</b>				
Not regulated	Not regulated	Not regulated	Not regulated	Not regulated
<b>14.4. Packing group</b>				
Not regulated	Not regulated	Not regulated	Not regulated	Not regulated
<b>14.5. Environmental hazards</b>				
Not regulated	Not regulated	Not regulated	Not regulated	Not regulated
No supplementary information available				

#### 14.6. Special precautions for user

##### Overland transport

Not regulated

##### Transport by sea

Not regulated

##### Air transport

Not regulated

##### Inland waterway transport

Not regulated

##### Rail transport

Not regulated

#### 14.7. Transport in bulk according to Annex II of Marpol and the IBC Code

Not applicable

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### SECTION 15: Regulatory information

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

##### 15.1.1. EU-Regulations

EU restriction list (REACH Annex XVII)		
Reference code	Applicable on	Entry title or description
27.	nickel, powder, particle diameter < 1 mm	Nickel and its compounds

Contains no substance on the REACH candidate list

Contains no REACH Annex XIV substances

Contains no substance subject to Regulation (EU) No 649/2012 of the European Parliament and of the Council of 4 July 2012 concerning the export and import of hazardous chemicals.

Contains no substance subject to Regulation (EU) No 2019/1021 of the European Parliament and of the Council of 20 June 2019 on persistent organic pollutants

Contains no substance subject to Regulation (EU) 2019/1148 of the European Parliament and of the Council of 20 June 2019 on the marketing and use of explosives precursors.

##### 15.1.2. National regulations

France	
Occupational diseases	
Code	Description
RG 37	Professional skin disorders caused by oxides and nickel salts
RG 37 BIS	Respiratory disorders caused by oxides and nickel salts
RG 37 TER	Cancers caused by roasting operations of nickel mattes

##### Germany

Employment restrictions : Observe restrictions according Act on the Protection of Working Mothers (MuSchG)  
Observe restrictions according Act on the Protection of Young People in Employment (JArbSchG)

Water hazard class (WGK) : WGK 2, Significantly hazardous to water (Classification according to AwSV, Annex 1)

Hazardous Incident Ordinance (12. BImSchV) : Is not subject of the Hazardous Incident Ordinance (12. BImSchV)

##### Netherlands

ABM category : C(2) - low hazard for aquatic organisms occurs naturally in surface water

SZW-lijst van kankerverwekkende stoffen : None of the components are listed

SZW-lijst van mutagene stoffen : None of the components are listed

SZW-lijst van reprotoxische stoffen – Borstvoeding : None of the components are listed

SZW-lijst van reprotoxische stoffen – Vruchtbaarheid : manganese, powder is listed

SZW-lijst van reprotoxische stoffen – Ontwikkeling : manganese, powder is listed

##### Denmark

Danish National Regulations : Young people below the age of 18 years are not allowed to use the product  
Pregnant/breastfeeding women working with the product must not be in direct contact with the product

The requirements from the Danish Working Environment Authorities regarding work with carcinogens must be followed during use and disposal

##### Switzerland

Storage class (LK) : LK 6.1 - Toxic materials

#### 15.2. Chemical safety assessment

No chemical safety assessment has been carried out

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### SECTION 16: Other information

Indication of changes			
Section	Changed item	Change	Comments
	Supersedes version of 02/01/2021	Modified	
	Revision date: 4/8/2021	Modified	

Abbreviations and acronyms:	
ADN	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
ATE	Acute Toxicity Estimate
BLV	Biological limit value
CAS-No.	Chemical Abstract Service number
CLP	Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008
DMEL	Derived Minimal Effect level
DNEL	Derived-No Effect Level
EC50	Median effective concentration
EC-No.	European Community number
EN	European Standard
IATA	International Air Transport Association
IMDG	International Maritime Dangerous Goods
LC50	Median lethal concentration
LD50	Median lethal dose
LOAEL	Lowest Observed Adverse Effect Level
NOAEC	No-Observed Adverse Effect Concentration
NOAEL	No-Observed Adverse Effect Level
NOEC	No-Observed Effect Concentration
OEL	Occupational Exposure Limit
PBT	Persistent Bioaccumulative Toxic
PNEC	Predicted No-Effect Concentration
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 1907/2006
RID	Regulations concerning the International Carriage of Dangerous Goods by Rail
SDS	Safety Data Sheet
vPvB	Very Persistent and Very Bioaccumulative
WGK	Water Hazard Class
BCF	Bioconcentration factor
BOD	Biochemical oxygen demand (BOD)
COD	Chemical oxygen demand (COD)
IARC	International Agency for Research on Cancer
OECD	Organisation for Economic Co-operation and Development
STP	Sewage treatment plant

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### Abbreviations and acronyms:

ThOD	Theoretical oxygen demand (ThOD)
TLM	Median Tolerance Limit
VOC	Volatile Organic Compounds
N.O.S.	Not Otherwise Specified
ED	Endocrine disrupting properties

Data sources : ECHA (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 of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006.

Training advice : Normal use of this product shall imply use in accordance with the instructions on the packaging.

### Full text of H- and EUH-statements:

Acute Tox. 4 (Oral)	Acute toxicity (oral), Category 4
Aquatic Acute 1	Hazardous to the aquatic environment — Acute Hazard, Category 1
Aquatic Chronic 3	Hazardous to the aquatic environment — Chronic Hazard, Category 3
Carc. 2	Carcinogenicity, Category 2
Flam. Sol. 1	Flammable solids, Category 1
Flam. Sol. 2	Flammable solids, Category 2
H228	Flammable solid.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H412	Harmful to aquatic life with long lasting effects.
Skin Irrit. 2	Skin corrosion/irritation, Category 2
Skin Sens. 1	Skin sensitisation, Category 1
STOT RE 1	Specific target organ toxicity — Repeated exposure, Category 1

The classification complies with : ATP 12

Safety Data Sheet (SDS), EU

The above information describes exclusively the safety requirements of the product and is based on our present-day knowledge. The information is intended to give you advice about the safe handling of the product named in this safety data sheet, for storage, processing, transport and disposal. The information cannot be transferred to other products. In the case of mixing the product with other products or in the case of processing, the information on this safety data sheet is not necessarily valid for the new processed material.