Safety Data Sheet

According to Regulation (EC) No 1907/2006 and 1272/2008

LaserForm® Maraging Steel (A)

Revision Date: March 03th, 2018

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

1.1 Product identifier

Product name: LaserForm® Maraging steel
Product type: Solid. [Metallic powder.]

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

Identified uses
For use with 3D Systems DMP (Direct Metal Printing) equipment.
Uses advised against
Any other uses.

1.3 Details of the supplier of the data sheet

3D Systems, Inc. 333 Three D Systems Circle Rock Hill, South Carolina U.S.A. Phone: 803.326.3900 or Toll-free Phone: 800.793.3669 e-mail: moreinfo@3dsystems.com	3D Systems Europe Ltd. Mark House, Mark Road Hemel Hempstead Herts HP2 7 United Kingdom Phone: +44 144-2282600 e-mail: moreinfo@3dsystems.com	3D Systems / Australia 5 Lynch Street Hawthorn, VIC 3122 +1 03 9819-4422 e-mail: moreinfo@3dsystems.com	3D Systems Japan K.K. Ebisu Garden Place Tower 27F 4-20-3, Ebisu, Shibuya-ku, Tokyo 50-6027 Japan Telephone No. +81-3-5798-2500 e-mail: moreinfo@3dsystems.com

1.4 Emergency telephone number:

USA Chemical Emergency: 800.424.9300 – Chemtrec	Europe Chemical Emergency: +1 703.527.3887 - Chemtrec	Australia Chemical Emergency: +(61) 29037.2994 – Aus Chemtrec	Japan Chemical Emergency +(81)-345209637 – Chemtrec

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of substance or mixture

Product definition: Mixture

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

Hazard Class	Category	Statement
Eye Irrit.	2	H319
Resp. Sens.	1	H334
Skin Sens	1	H317
Carc.	2	H351
Repr.	2	H361f
STOT RE	1	H372
Aquatic Acute	1	H400
Aquatic Chronic	2	H411

Ingredients of unknown toxicity : Not applicable
Ingredients of unknown ecotoxicity : Not applicable

2.1.2 Additional Information

For full text of Hazard- and EU Hazard-statements: see SECTION 16.

2.2 Label Elements

Hazard pictograms:

Signal word: Danger

Hazard statements:

H317 : May cause an allergic skin reaction.
H319 : Causes serious eye irritation.
H334 : May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H351 : Suspected of causing cancer.
H372 : Causes damage to organs through prolonged or repeated exposure.
H361f : Suspected of damaging fertility.
H400 : Very toxic to aquatic life
H411 : Toxic to aquatic life with long lasting effects.

Precautionary statements:

P201 : Obtain special instructions before use.
P260 : Do not breathe dust.
P273 : Avoid release to the environment
P280 : Wear protective gloves, protective clothing and eye protection or face protection.
P314 : Get medical attention if you feel unwell
P342+P311 : If experiencing respiratory symptoms: Call a POISON CENTER or physician.
P405 : Store locked up

2.3 Other Hazards which do not result in classification

None known

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Substance/mixture: Mixture

Chemical name	Reach No	CAS-No	EC-No	%	Classification according to Reg. (EC) No. 1272/2008
Iron	01-2119462838-24	7439-89-6	231-096-4	48.5-79.5	Not classified
Nickel	01-2119438727-29	7440-02-0	231-111-4	10-30	Skin send. 1, H317 Car. 2, H351 STOT RE 1, H372 Aquatic Chronic 3, H412
Cobalt		7440-48-4		7-13	Acute Tox. 4, H332 Ey Irrit. 2, H319 Resp. Sens. 1, H334 Skin Sens. 1, H317 Carc. 1, H350i Repr. 2 H361f Aquatic Acute 1, H400 (M=10) Aquatic Chronic 1, H410 (M=1)
Molybdenum	01-2119472304-43	7439-98-7	231-107-2	3-7	Not classified
Titanium		7440-32-6	231-142-3	0.5-1.5	Flam. Sol. 2, H228

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

See section 16 for the full text of the H statements declared above.

There are no additional ingredients present which within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment, are PBTs or vPvBs or have been assigned a workplace exposure limit and hence require reporting in this section.

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

- **Following eye contact**: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
- **Following inhalation:** Remove victim to fresh air and keep at rest in a position comfortable for breathing. If suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In the event of any complaints or symptoms, avoid further exposure.
- **Following skin contact:** Wash with plenty of soap and water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.
- **Following ingestion:** Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
- **Protection of the first aider:** No action shall be taken involving any personal risk or without suitable training. If it suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water.

4.2 Most important symptoms and effects, both acute and delayed

Potential acute health effects

- **Eye contact:** Moderately irritating to eyes.
- **Inhalation**: Exposure to high concentrations may result in health complaints. Irritating to respiratory system. Exposure may result in depressed respiration, coughing, nausea and sore throat. Prolonged or repeated exposure to large amounts may cause damage to lungs (lung edema). May cause sensitization by inhalation (fever, pain). For oversensitive people even exposure to very small amounts causes allergic reactions.
- **Skin Contact:** Exposure to high concentrations may result in health complaints. Prolonged or repeated exposure may be irritating (redness, pain). May cause sensitization by skin contact (sweating, fever, pain). For oversensitive people even exposure to very small amounts causes allergic reactions.
- **Ingestion:** Prolonged or repeated exposure may be irritating to mouth, throat and esophagus (sore throat, nausea).

Over-exposure signs/symptoms

- **Eye contact:** Adverse symptoms may include the following: pain or irritation, watering and redness.
- **Inhalation:** Adverse symptoms may include the following: respiratory tract irritation, coughing, wheezing and breathing difficulties, asthma, reduced fetal weight, an increase in fetal deaths, skeletal malformations.
- **Skin contact:** Adverse symptoms may include the following: Irritation, redness, reduced fetal weight, increase in foetal deaths, skeletal malformations
- **Ingestion:** Adverse symptoms may include the following: reduced fetal weight**,** increase in fetal deaths**,** skeletal malformations

Long term exposure

- Potential immediate effects : Not available.
- Potential delayed effects : Not available.

4.3 Indications of any immediate medical attention and special treatment needed

- **Notes to physician:** Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- **Specific treatment:** No specific treatment.

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing media:

- **Suitable extinguishing media:** Use approved type D extinguisher or smother with dry sand, dry clay or dry ground limestone.
- **Unsuitable extinguishing media**: Do not use water nor high volume water jets. Do not use dry chemical, Carbon dioxide (CO_2) or Halon.

5.2 Special hazards arising from the substance or mixture

- **Hazards from the substance or mixture:** This material is toxic to aquatic life with long lasting effects. Water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.
- **Hazardous thermal decomposition products:** Decomposition products may include the following materials: metal oxide/oxides

5.3 Advise for firefighters:

- **Special protective actions for firefighters:** Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
- **Special protective equipment for firefighters:** Firefighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for firefighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

- **For non-emergency personnel:** No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing dust. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- **For emergency responders:** if specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in “For non-emergency personnel”.

6.2 Environmental precautions

Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, or soil). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

6.3 Methods and material for containment and cleaning up

Wear appropriate protective equipment and antistatic clothing.

- **For containment:** Use non-sparking antistatic tools and containers. Do not use compressed air and avoid dust generation.
- **For cleaning up small spillage:** Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Place spilled material in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.
- **For cleaning up large spillage:** Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Avoid creating dusty conditions and prevent wind dispersal. Dispose of via a licensed waste disposal contractor.

6.4 Reference to other sections

- See Section 1 for emergency contact information.
- See section 8 for information on appropriate personal protective equipment.
- See section 13 for additional waste treatment information

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling

Protective measures:

- **Personel protection**
  Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitisation problems or asthma, allergies or chronic or recurrent respiratory disease should not be employed in any process in which this product is used. Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe dust. Do not ingest. Avoid the creation of dust when handling and avoid all possible sources of ignition (spark or flame). Prevent dust accumulation. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use.
- **Measures to prevent fire**
  Avoid the formation of dust. Electrical equipment and lighting should be protected to appropriate standards to prevent dust coming into contact with hot surfaces, sparks or other ignition sources. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by earthing and bonding containers and equipment before transferring material.
- **Measures to protect the environment**
  Avoid release to the environment. Empty containers retain product residue and can be hazardous. Do not reuse container for other purposes than storing this material.

Advice on general occupational hygiene

Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Remove contaminated clothing and protective equipment before entering eating areas. Avoid contact with skin and eyes. Do not breathe dust. Wash hands and face thoroughly after working with material. Contaminated clothing should be removed and washed before re-use. See also Section 8 for additional information on hygiene measures. See Section 10 for incompatible materials before handling or use.

7.2 Conditions for safe storage including any incompatibilities

Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate container to avoid environmental contamination.

7.3 Specific end use(s)

- **Recommendations:** Not available.
- **Industrial sector specific Solutions** Not available.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Occupational exposure limits

Titanium	
Poland	
Polish	**Rozporzadzenie Ministra Pracy i Polityki Spolecznej (Dz.U. 2014 poz. 817) (Polska, 6/2014).**
	NDSCh: 30 mg/m³, (w przeliczeniu na Ti) 15 minuty.
	NDS: 10 mg/m³, (w przeliczeniu na Ti) 8 godzin.

Iron	
Czech Republic	
Czech	**MZCR PEL/NPK-P (Česká republika, 1/2013).**
	PEL: 10 mg/m³ 8 hodin. Skupenství: prach

Cobalt	
Belgium	
Dutch	**Lijst Grenswaarden / Valeurs Limites (België, 4/2014).**
	Grenswaarde: 0.02 mg/m³, (als Co) 8 uren. Vorm: stof en rook
French	**Lijst Grenswaarden / Valeurs Limites (Belgique, 4/2014).**
	Valeur limite: 0.02 mg/m³, (en Co) 8 heures. Forme: poussières et fumées.
German	**Lijst Grenswaarden / Valeurs Limites (Belgien, 4/2014).**
	Mittelwert: 0.02 mg/m³, (als Co) 8 Stunden. Form: Rauch und Stäube.
Czech Republic	
Czech	**MZCR PEL/NPK-P (Česká republika, 1/2013). Senzibilizátor kůže.**
	NPK-P: 0.1 mg/m³, (jako Co) 15 minuty.
	PEL: 0.05 mg/m³, (jako Co) 8 hodin.
Denmark	
Danish	**Arbejdstilsynet (Danmark, 10/2012). Carcinogen.**
	GV: 0.01 mg/m³ 8 timer. Form: pulver, støv, røg
	DK-Arbejdstylsinet (Danmark, 1997). Carcinogen.
	GV: 0.02 mg/m³

Molybdenum	
Austria	
German	**GKV_MAK (Österreich, 12/2011).**
	MAK - Kurzzeitwerte: 20 mg/m³, (als Mo berechnet), 2 mal pro Schicht, 60 Minuten. Form: einatembare Fraktion
	MAK - Tagesmittelwert: 10 mg/m³, (als Mo berechnet) 8 Stunden. Form: einatembare Fraktion
Czech Republic	
Czech	**MZCR PEL/NPK-P (Česká republika, 1/2013).**
	NPK-P: 25 mg/m³ 15 minuty.
	PEL: 5 mg/m³ 8 hodin.
Finland	
Finish	**Työterveyslaitos, Sosiaali- ja terveysministeriö (Suomi, 3/2014)**
	HTP-arvot 8 h: 0.5 mg/m³, (laskettuna Mo:nä) 8 tuntia.
Poland	
Polish	**Rozporzadzenie Ministra Pracy i Polityki Spolecznej (Dz.U. 2014 poz. 817) (Polska, 6/2014).**
	NDSCh: 10 mg/m³, (w przeliczeniu na Mo) 15 minuty.
	NDS: 4 mg/m³, (w przeliczeniu na Mo) 8 godzin.
Portugal	
Portugese	**Instituto Português da Qualidade (Portugal, 11/2014).**
	VLE-MP: 10 mg/m³ 8 horas. Formulário: fracção inalável
	VLE-MP: 3 mg/m³ 8 horas. Formulário: fracção respirável
Spain	
Spanish	**INSHT (España, 1/2014).**
	VLA-ED: 10 mg/m³ 8 horas. Forma: fracción inhalable
	VLA-ED: 3 mg/m³ 8 horas. Forma: fracción respirable
Sweden	
Swedish	**AFS 2011:18 (Sverige, 12/2011).**
	NGV: 5 mg/m³, (som Mo) 8 timmar. Form: respirabelt damm
	NGV: 10 mg/m³, (som Mo) 8 timmar. Form: total damm
Switzerland	
French	**SUVA (Suisse, 1/2014).**
	VME: 10 mg/m³, (exprimé en Mo) 8 heures. Forme: Poussières inhalables (poussières totales)
German	**SUVA (Schweiz, 1/2014).**
	MAK-Wert: 10 mg/m³, (als Mo berechnet) 8 Stunden. Form: Einatembarer Staub (Gesamtstaub)
Italian	**SUVA (Svizzera, 1/2014).**
	TWA: 10 mg/m³, (calculated as Mo) 8 ore. Forma: Frazione inalabile

Nickel	
Austria	
German	**GKV_TRK (Österreich, 12/2011). Hautsensibilisator. Beim Einatmen sensibilisierender Stoff.**
	MAK - Kurzzeitwerte: 2 mg/m³, (als Ni berechnet), 4 mal pro
	Schicht, 15 Minuten. Form: Staub, einatembare Fraktion
	TRK - Tagesmittelwert: 0.5 mg/m³, (als Ni berechnet) 8 Stunden. Form: Staub, einatembare Fraktion
Belgium	
Dutch	**Lijst Grenswaarden / Valeurs Limites (België, 4/2014).**
	Grenswaarde: 1 mg/m³ 8 uren
French	**Lijst Grenswaarden / Valeurs Limites (Belgique, 4/2014).**
	Valeur limite: 1 mg/m³ 8 heures.
German	**Lijst Grenswaarden / Valeurs Limites (Belgien, 4/2014).**
	Mittelwert: 1 mg/m³ 8 Stunden.
Croatia	
Croatian	**MinGoRP GVI/KGVI (Hrvatska, 6/2013).**
	GVI: 0.5 mg/m³ 8 sati.
Czech Republic	
Czech	**MZCR PEL/NPK-P (Česká republika, 1/2013). Senzibilizátor kůže.**
	NPK-P: 1 mg/m³ 15 minuty.
	PEL: 0.5 mg/m³ 8 hodin.
Denmark	
Danish	**Arbejdstilsynet (Danmark, 10/2012). Carcinogen.**
	Gennemsnitværdier: 0.05 mg/m³, (beregnet som Ni) 8 timer. Form: pulver og støv
Finland	
Finish	**Työterveyslaitos, Sosiaali- ja terveysministeriö (Suomi, 3/2014)**
	HTP-arvot 8 h: 0.01 mg/m³, (laskettuna Ni:nä) 8 tuntia. Olomuoto: alveolijae
France	
French	**Ministère du travail (France, 7/2012).**
	VME: 1 mg/m³, (en Ni) 8 heures.
Hungary	
Hungarian	**25/2000. (IX. 30.) EüM-SzCsM együttes rendelet (Magyarország, 12/2011). A bőrrel érintkezésbe kerülve érzékenységet okoz.**
	MK: 0.1 mg/m³, (Ni re számítva)
Norway	
Norwegian	**FOR-2011-12-06-1358 (Norge, 1/2013). Hudirriterende. Kreftfremkallende. Reproduktiv gift.**
	Gjennomsnittsverdier: 0.05 mg/m³, (beregnet som Ni) 8 timer.
Poland	
Polish	**Rozporzadzenie Ministra Pracy i Polityki Spolecznej (Dz.U. 2014 poz. 817) (Polska, 6/2014).**
	NDS: 0.25 mg/m³, (w przeliczeniu na Ni) 8 godzin.
Portugal	
Portugese	**Instituto Português da Qualidade (Portugal, 11/2014).**
	VLE-MP: 1.5 mg/m³ 8 horas. Formulário: fracção inalável
Spain	
Spanish	**INSHT (España, 1/2014). Sensibilizante por contacto con la piel.**
	VLA-ED: 1 mg/m³ 8 horas
Sweden	
Swedish	**AFS 2011:18 (Sverige, 12/2011). Orsakar hudallergi.**
	NGV: 0.5 mg/m³ 8 timmar. Form: total damm
Switzerland	
French	**SUVA (Suisse, 1/2014). Sensibilisant cutané.**
	VME: 0.5 mg/m³ 8 heures. Forme: Poussières inhalables (poussières totales)
German	**SUVA (Schweiz, 1/2014). Hautsensibilisator.**
	MAK-Wert: 0.5 mg/m³ 8 Stunden. Form: Einatembarer Staub (Gesamtstaub)
Italian	**SUVA (Svizzera, 1/2014). Sensibilizzatore cutaneo.**
	TWA: 0.5 mg/m³ 8 ore. Forma: Frazione inalabile
UK	
English	**EH40/2005 WELs (United Kingdom (UK), 12/2011). Absorbed through skin.**
	TWA: 0.5 mg/m³, (as Ni) 8 hours.

Information on Monitoring procedures

If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to monitoring standards, such as the following: European Standard EN 689 (Workplace atmospheres - Guidance for the assessment of exposure by inhalation to chemical agents for comparison with limit values and measurement strategy) European Standard EN 14042 (Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents) European Standard EN 482 (Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents) Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

- **Derived effect levels:** No DELs available
- **Predicted effect concentrations:** No PECs available

8.2 Exposure controls

8.2.1 Appropiate engineering controls

Technical measures to prevent exposure

Ensure adequate ventilation to maintain exposures below occupational limits. Whenever possible the use of local exhaust explosion proof ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Do not blow dust off clothing or skin with compressed air.

8.2.2 Personel Protection equipment

8.2.2.1 Hygiene measures

Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

8.2.2.2 Eye and face protection

Safety glasses or goggles are recommended when handling this material.

8.2.2.3 Skin protection

Hand Protection

Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. Rubber or other appropriate gloves should be worn to minimize contact. For hygienic reasons rubber gloves should not be worn for more than 2 hours.

Other skin protection

Use long sleeved antistatic garments and closed, antistatic safety shoes. Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

8.2.2.4 Respiratory protection

Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

8.2.2 Environmental exposure control

Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance

Physical state : Solid. [Metallic Powder.]

Colour : Grey.

Odour : Odourless.

Odour threshold : Not available

pH : Not available

Meltingpoint/freezing point : 1370 - 1455°C

Initial boiling point and boiling range : Not available

Flash point : [Product does not sustain combustion.]

Flammability (solid, gas) : Non-flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and shocks and mechanical impacts.

Explosive properties : Not applicable

20 Liter Screening Test [ASTM E 1226] : Not explosive.

Minimum Ignition Temperature of a Dust Cloud (MAIT) [ASTM E1491] : >1000°C

Percent Combustible Material (PCM) [OSHA NEP Test #3] : The sample oxidized. No values could be determined.

Flammability - Burning rate test [UN - Transport of dangerous goods Test - N.1] : No ignition

Upper/lower flammability or explosive limits : Not available.

Auto-ignition temperature: Not available.

Oxidising properties : Not expected based on chemical composition.

Decomposition temperature: Not available.

Viscosity : Not available.

Evaporation rate : Not available.

Vapour pressure : Not available.

Vapour density : Not available.

Relative density : Not available.

Solubility(ies) : Not available.

Solubility in water (g/l) : Not available.

Partition coefficient: n-octanol/water : Not available.

9.2 Other information

No additional information.

SECTION 10. STABILITY AND REACTIVITY

10.1 Chemical Stability

Stable under normal conditions and under recommended storage conditions.

10.2 Reactivity

No specific test data related to reactivity available for this product or its ingredients.

10.3 Possibility of hazardous reactions

Under normal conditions of storage and use, hazardous reactions will not occur.

10.4 Conditions to avoid

Store and use away from heat, sparks, open flame or any other ignition source.

10.5 Incompatible materials

Avoid contact with combustible materials, acids, oxidising agents, halogenated hydrocarbons.

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

Conclusion/Summary : Not available

Acute Toxicity estimates :

Route	ATE Value
Inhalation (dusts and mists)	15 mg/l

Irritation/Corrosion

Conclusion/Summary : May be irritating to eyes, skin and respiratory system

Sensitisation

Conclusion/Summary : Not available

Mutagenicity

Conclusion/Summary : Not available

Carcinogenicity

Conclusion/Summary : Contains material which can cause cancer. Risk of cancer depends on duration and level of exposure.

Reproductive toxicity

Conclusion/Summary : Not available

Teratogenicity

Conclusion/Summary : Not available

Specific target organ toxicity (single exposure)

Conclusion/Summary : Not available

Specific target organ toxicity (repeated exposure)

Product/ingredient name	Category	Route of exposure	Target Organs
Nickel	Category 1	Not determined	Not determined

Aspiration hazard

Conclusion/Summary : Not available

11.2 Information on the likely routes of exposure

Routes of entry anticipated: oral, dermal, inhalation

11.3 Symptoms related to the physical, chemical and toxicological characteristics

Adverse symptoms may include the following

Eye contact : pain or irritation
watering
redness

Inhalation : respiratory tract irritation
coughing
wheezing and breathing difficulties
asthma
reduced foetal weight
increase in foetal deaths
skeletal malformations

Skin contact : irritation
redness
reduced foetal weight
increase in foetal deaths
skeletal malformations

Ingestion : reduced foetal weight
increase in foetal deaths
skeletal malformations

11.4 Delayed and immediate after short- and long-term exposure

11.4.1 Short term exposure

Potential immediate effects : Not available

Potential delayed effects : Not available

11.4.2 Long term exposure

Potential immediate effects : Not available

Potential delayed effects : Not available

11.5 Potential acute and chronic health effects

11.5.1 Potential acute health effects

Eye contact : Moderately irritating to eyes.

Inhalation : Exposure to high concentrations may result in health complaints. Irritating to respiratory system. Exposure may result in depressed respiration, coughing, nausea and sore throat. Prolonged or repeated exposure to large amounts may cause damage to lungs (lung edema). May cause sensitization by inhalation (fever, pain).

For oversensitive people even exposure to very small amounts causes allergic reactions.

Skin contact : Exposure to high concentrations may result in health complaints. Prolonged or repeated exposure may be irritating (redness, pain). May cause sensitization by skin contact (sweating, fever, pain). In oversensitive people even exposure to very small amounts causes allergic reactions.

Ingestion : Prolonged or repeated exposure may be irritating to mouth, throat and esophagus (sore throat, nausea).

11.5.2 Potential chronic health effects

Conclusion/Summary : Not available

General : Causes damage to organs through prolonged or repeated exposure. Repeated or prolonged inhalation of dust may lead to chronic respiratory irritation. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : Contains material which can cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards

Teratogenicity : No known significant effects or critical hazards

Developmental effects : No known significant effects or critical hazards

Fertility effects : Suspected of damaging fertility

SECTION 12. Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure
cobalt	Acute LC50 4400 µg/l Acute LC50 3.4 mg/l Fresh water	Daphnia – Daphnia magna Fish – Pimephales promelas	48 hours 96 hours

12.2 Persistence and degradability

Conclusion/Summary : Not available

12.3 Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
Cobalt	-	15600	high

12.4 Mobility in soil

Soil/water partition coefficient (Koc) : Not available

Mobility : Not available

12.5 Results of PBT and vPvB assessment

PBT : Not applicable

vPvB : Not applicable

12.6 Other adverse effects

No known significant effects or critical hazards

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

13.1.1 Product

Methods of disposal

The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction.

Hazardous waste

The classification of the product may meet the criteria for a hazardous waste.

13.1.2 Packaging

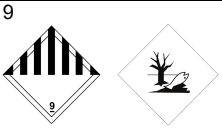
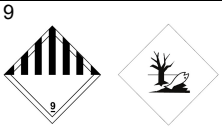
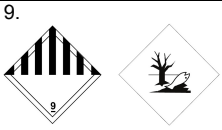
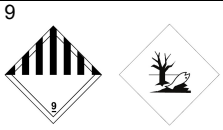
Methods of disposal

Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

13.2 Special precautions

This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

SECTION 14. Transport information

	ADR/RID	ADN	IMDG	IATA
14.1 UN number	UN3077	UN3077	UN3077	UN3077
14.2 UN proper shipping name	Environmentally hazardous substance, solid, n.o.s. (Cobalt)	Environmentally hazardous substance, solid, n.o.s. (Cobalt)	Environmentally hazardous substance, solid, n.o.s. (Cobalt). Marine pollutant (Cobalt)	Environmentally hazardous substance, solid, n.o.s. (Cobalt)
14.3 Transport hazard class(es)	9 	9 	9. 	9 
14.4 Packaging group	III	III	III	III
14.5 Environmental hazards	Yes.	Yes.	Yes.	Yes.
14.6 Special precautions for user	**Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in event of an accident or spllage.	**Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in event of an accident or spillage.	**Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in event of an accident or spillage.	**Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in event of an accident or spillage.
Additional information	This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8. **Tunnel code** (E) **Remarks** Subject to ADR Special Provision A375	This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8.	This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 4.1.1.1, 4.1.1.2 and 4.1.1.4 to 4.1.1.8. **Remarks** Subject to IMDG Code 37-14 Chapter 2.10.2.7	This product is not regulated as a dangerous good when transported in sizes of ≤5 L or ≤5 kg, provided the packagings meet the general provisions of 5.0.2.4.1, 5.0.2.6.1. 1 and 5.0.2.8. **Remarks** Subject to IATA Special Provision A 197

SECTION 15: Regulatory information

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

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV – List of substances subject to authorisation - Substances of very high concern

None of the components are listed

Annex XVII – Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles

Restricted to professional users

Additional information
Cobalt: Group 2B carcinogen (possible for humans) by IARC.
Inhalable cobalt metal: Carcinogen Category 3 (limited evidence of a carcinogenic effect) by TRGS 905 (Germany).

Other EU regulations

Europe inventory : All components listed are exempted.
Black List Chemicals : Not listed
Priority list Chemicals : Listed
Integrated pollution prevention and control list (IPPC) – Air : Listed
Integrated pollution prevention and control list (IPPC) – Water : Listed
Chemical Weapons Convention List Schedule I Chemicals : Not Listed
Chemical Weapons Convention List Schedule II Chemicals : Not Listed
Chemical Weapons Convention List Schedule III Chemicals : Not Listed

Product/ingredient name	Carcinogenic effects	Mutagenic effects	Developmental effects	Fertility effects
Cobalt	Carc. 1, H350	-	-	Repr. 2, H361f
Nickel	Carc. 1, H351	-	-	-

Ozone depleting Substances (1005/2009 EU) : Not listed
Prior Informed Consent : Not listed
Seveso Directive : This product is controlled under the Seveso Directive

Danger Criteria

Category
E1: Hazardous to the aquatic environment - Acute 1 or Chronic 1

15.2 Chemical Safety Assessment
This product contains substances for which Chemical Safety Assessments are still required.

SECTION 16. OTHER INFORMATION

Abbreviations and acronyms

ATE = Acute Toxicity Estimate
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No.1272/2008]
DNEL = Derived No Effect Level
EUH statement = CLP-specific Hazard statement
PNEC = Predicted No Effect Concentration
RRN = REACH Registration Number

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Classification	Justification
Eye Irrit. 2, H319	Calculation method
Resp. Sens. 1, H334	Calculation method
Skin Sens. 1, H317	Calculation method
Carc. 2, H351	Expert judgment
Repr. 2, H361f	Calculation method
STOT RE 1, H372	Calculation method
Aquatic Acute 1, H400	Calculation method
Aquatic Chronic 2, H411	Calculation method

Full text of abbreviated H statements

H317 : May cause an allergic skin reaction.
H319 : Causes serious eye irritation.
H332 : Harmful if inhaled.
H334 : May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H350i : May cause cancer if inhaled.
H351 : Suspected of causing cancer.
H361f : Suspected of damaging fertility.
H372 : Causes damage to organs through prolonged or repeated exposure.
H400 : Very toxic to aquatic life.
H410 : Very toxic to aquatic life with long lasting effects.

H411 : Toxic to aquatic life with long lasting effects.
H412 : Harmful to aquatic life with long lasting effects.

Full text of classifications [CLP/GHS]

Acute Tox. 4, H332	ACUTE TOXICITY: INHALATION - Category 4
Aquatic Acute 1, H400	ACUTE AQUATIC HAZARD - Category 1
Aquatic Chronic 1, H410	LONG-TERM AQUATIC HAZARD - Category 1
Aquatic Chronic 2, H411	LONG-TERM AQUATIC HAZARD - Category 2
Aquatic Chronic 3, H412	LONG-TERM AQUATIC HAZARD - Category 3
Carc. 1, H350i	CARCINOGENICITY: INHALATION - Category 1
Carc. 2, H351	CARCINOGENICITY - Category 2
Eye Irrit. 2, H319	SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2
Repr. 2, H361f	TOXIC TO REPRODUCTION [Fertility] - Category 2
Resp. Sens. 1, H334	RESPIRATORY SENSITIZATION - Category 1
Skin Sens. 1, H317	SKIN SENSITIZATION - Category 1
STOT RE 1, H372	SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1

SDS information

Creation date	: October 12th, 2017
Revision	: 00-B
Revision date	: March 03th, 2018
Revision changes	: Addition of H sentence (H400), explosion/flammability test results and Seveso directive.

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