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

1.1 Product identifier
Product name: LaserForm® AlSi7Mg0,6 Type A
Product type: Solid (Metal alloy 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
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
GHS product definition: Mixture

2.1.1 Classification
Regulation (EC) No. 1272/2008 [CLP/GHS]
No hazardous product as specified in EU-Directive 1272/2008
To our knowledge, this product does not present any particular risk, provided it is handled in accordance with good occupational hygiene and safety practice.

US Hazard Communication Standard 2012 (GHS)
Classified with an OSHA defined hazard: Combustible dust - May form combustible dust concentrations in air.

2.1.2 Additional Information

2.2 Label Elements
Hazard pictograms

signal word:
GHS-US: Warning

Hazard statements:
EUH210: Safety data sheet available on request
GHS-US: May form combustible dust concentrations in air.
GHS-US: The substance possibly demonstrates unusual reactivity with water under fire exposure conditions.

Precautionary statements:
P202: Do not handle until all safety precautions have been read and understood.
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P223: Do not allow contact with water.
P260: Do not breathe dust.
P280: Wear protective gloves, clothing and eye protection.
The substance possibly demonstrates unusual reactivity with water under fire exposure conditions. Risk of dust explosion.

2.3 Other Hazards which do not result in classification

Results of PBT and vPvB assessment
- PBT: Not applicable.
- vPvB: Not applicable.

Danger of dust explosion: Dust clouds can be ignited and could pose an explosion risk in a confined space.
Reactivity: Can react with oxidizing agents and in alkaline solutions, causing hydrogen release. Hydrogen gas can ignite spontaneously due to exothermal nature of reaction. Can react violently with halogenated hydrocarbons.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Chemical characterization:

Substance/mixture: Mixture

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No</th>
<th>EC-No</th>
<th>%</th>
<th>Classification according to Reg. (EC) No. 1272/2008 and GHS-US</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>7429-90-5</td>
<td>231-072-3</td>
<td>&gt;80</td>
<td>Flam. Sol.1, H228</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Water react. 2, H261</td>
</tr>
<tr>
<td>Silicon</td>
<td>7440-21-3</td>
<td>231-130-8</td>
<td>1-12</td>
<td>Flam. Sol.2, H228</td>
</tr>
</tbody>
</table>

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**: Rinse gently but thoroughly, including under the eyelids, with water for at least 10 to 20 minutes. If symptoms persist consult doctor/ophthalmologist.
- **Following inhalation**: Move the affected person away from the contaminated area and into the fresh air. Give artificial respiration if necessary. If you feel unwell, seek medical advice.
- **Following skin contact**: Generally the product does not irritate the skin. Wash off thoroughly with soap and water. If case of redness or irritation, call a doctor. Remove all contaminated clothing and footwear. Dispose or properly launder contaminated clothing before wearing again.
- **Following ingestion**: Wash out mouth thoroughly with water. Drink 1 to 2 glasses of water. DO NOT INDUCE VOMITING. Seek medical attention if irritation persists.
- **Protection of the first aider**: Put on appropriate protective equipment (see section 8).

4.2 Most important symptoms and effects, both acute and delayed

Potential acute health effects
- **Eye contact**: Mechanical irritation. Dust may cause slight irritation to the ocular mucous membranes due to the presence of a foreign body.
Safety Data Sheet

According to Hazard Communication Standard 29 CFR 1910 (USA)

LaserForm® AlSi7Mg0.6 Type A
Revision Date: November 24th, 2017

4.3 Indications of any immediate medical attention and special treatment needed

- **Notes to physician:** Treat symptomatically.
- **Specific treatment:**

SECTION 5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media:
- **Suitable extinguishing media:** Use extinguishing type D powder, type D foam, dry salt, alumina or sand if available. Adapt extinguishing measures to surroundings.
- **Unsuitable extinguishing media:** Do not use water (explosion hazard), including high volume water jets, Carbon dioxide, Halon, foam and ABC powder.

5.2 Special hazards arising from the substance or mixture
- **Hazards from the substance or mixture:** The product itself is flammable. Increased fire hazard during dust formation. When dispersed in air the powder is susceptible to dust explosions. Contact with water releases flammable hydrogen gas.
- **Hazardous thermal decomposition products:** May release inert alumina dust.

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. Contain the extinguishing fluids by bunding. Do not breathe fumes. Avoid raising powdered material due to explosion hazard.
- **Special protective equipment for firefighters:** Do not attempt to take action without suitable protective equipment. Self-contained breathing apparatus. Wear complete protective clothing.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

- **General measures:** Avoid formation of dust due to explosion hazard. Keep away from ignition sources. Keep unnecessary personnel away and contact emergency personnel. Wear appropriate protective equipment and clothing.
- **For non-emergency personnel:** Access forbidden to unauthorised personnel. Only qualified personnel equipped with suitable protective equipment may intervene. Avoid contact with skin and eyes. Do not breathe dust.
- **For emergency responders:** 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

Do not allow product to spread into the environment. Do not discharge into drains or rivers.

6.3 Methods and material for containment and cleaning up

For containment: Use non-sparking antistatic tools and containers
For cleaning up small spillage: Use an explosion proof vacuum cleaner with equipment fitted with immersion filtration. Do not use water or aqueous cleansing agents for cleaning. Contact with water liberates flammable gases.
For cleaning up large spillage: Mechanically recover the product. Avoid dust production. Gather the product and place it in a spare container that has been suitably labeled. Dispose of materials or solid residues at an authorized site. Do not use water for cleaning. Any residues should be treated as small spillages.

Other information: Do not use compressed air. Prevent the formation of dust clouds.
6.4 Reference to other sections
- See Section 1 for emergency contact information.
- See Section 7 for information on safe handling.
- See section 8 for information on appropriate personal protective equipment.

SECTION 7. HANDLING AND STORAGE
7.1 Precautions for safe handling
Protective measures:
- **Personal protection:** Work using a suitable extraction/ventilation system. Avoid contact with skin and eyes. Wear suitable antistatic garments and respiration protection.
- **Measures to prevent fire:** Any unavoidable deposit of dust must be regularly removed. Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces. Prevent the formation of dust clouds. Dust can combine with air to form an explosive mixture. Keep ignition sources away. Do not smoke. Protect against electrostatic charges. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. Use explosion-proof apparatus / fittings and spark-proof tools. Contact with water releases flammable gases.
- **Measures to protect the environment:** Use appropriate containment to avoid environmental hazard.

Advice on general occupational hygiene:
Do not drink, eat or smoke in the workplace. 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 reuse.

7.2 Conditions for safe storage
Local regulations should be followed regarding the storage of this material.
- **Technical measures and storage conditions:** Keep in a well-ventilated room. Keep container dry. Keep the container tightly closed. Keep away from sources of ignition. Avoid the proximity of flammable products (including wood, cardboard ...). Store away from incompatible materials such as water, acids, strong oxidizing agents, Bases, Alkaline earth metals, Alcohols and Metallic oxides.
- **Packaging materials:** Keep in the container supplied, or suitable metal, antistatic plastic or polythene container.
- **Requirements for storage rooms and vessels:** Containers should be stored in a fire proof cabinet or room in a clean, cool and dry environment.

7.3 Specific end use(s)
- **Recommendations:** Not available.
- **Industrial sector specific Solutions:** Not available.
### SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

#### 8.1 Exposure limit values:

<table>
<thead>
<tr>
<th>Country</th>
<th>Language</th>
<th>Exposure limit values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Australia</strong></td>
<td>English</td>
<td>Safe Work Australia (Australia, 1/2014). TWA: 10 mg/m³ 8 hours. Form: Dust. TWA: 5 mg/m³, (as Al) 8 hours. Form: Welding fume</td>
</tr>
<tr>
<td><strong>Austria</strong></td>
<td>German</td>
<td>MAK - Tagesmittelwert: 10 mg/m³ 8 Stunden. Form: einatembare Fraktion. MAK - Kurzzeitwerte: 20 mg/m³, 2 mal pro Schicht, 60 Minuten. Form: einatembare Fraktion. MAK - Kurzzeitwerte: 10 mg/m³, 2 mal pro Schicht, 60 Minuten. Form: alveolengängiger Anteil. MAK - Tagesmittelwert: 5 mg/m³ 8 Stunden. Form: alveolengängiger Anteil</td>
</tr>
<tr>
<td><strong>Belgium</strong></td>
<td>Dutch</td>
<td>Lijst Grenswaarden / Valeurs Limites (België, 4/2014). Grenswaarde: 1 mg/m³ 8 uren. Form: inadembare fraktie. MAK - Tagesmittelwert: 5 mg/m³ 8 Stunden. Form: alveolengängige Fraktion</td>
</tr>
<tr>
<td><strong>Brasil</strong></td>
<td>Portuguese</td>
<td>ACIGIH TLV (Estados Unidos, 4/2014). TWA: 1 mg/m³ 8 horas. Formulário: Fração respirável</td>
</tr>
<tr>
<td><strong>Czech Republic</strong></td>
<td>Czech</td>
<td>MZCR PEL/NPK-P (Česká republika, 1/2013). PEL: 10 mg/m³ 8 hodin. Skupenství: prach</td>
</tr>
<tr>
<td><strong>Denmark</strong></td>
<td>Danish</td>
<td>Arbejdstilsynet (Danmark, 10/2012). Gennemsnitværdier: 5 mg/m³, (beregnet som Al) 8 timer. Form: røg. Gennemsnitværdier: 2 mg/m³ 8 timer. Form: respirabel. Gennemsnitværdier: 5 mg/m³ 8 timer. Form: total. DK-Arbejdstilsynet (Danmark, 1997). GV: 10 mg/m³ Form:</td>
</tr>
<tr>
<td><strong>Finland</strong></td>
<td>Finish</td>
<td>Työterveyslaitos, Sosiaali- ja terveysministeriö (Suomi, 3/2014). HTP-anot 8 h: 1.5 mg/m³, (laskettuna Al:nä) 8 tuntia. Olomuoto: aerosoli</td>
</tr>
<tr>
<td><strong>France</strong></td>
<td>French</td>
<td>Ministère du travail (France, 7/2012). VME: 10 mg/m³ 8 heures. VME: 5 mg/m³ 8 heures. Forme: fumées. VME: 5 mg/m³ 8 heures. Forme: poudre.</td>
</tr>
<tr>
<td><strong>Germany</strong></td>
<td>German</td>
<td>TRGS900 AGW (Deutschland, 12/2014). Schichtmittelwert: 1.25 mg/m³ 8 Stunden. Form: alveolengängige Fraktion. Kurzzeitwert: 20 mg/m³ 15 Minuten. Form: einatembare Fraktion. Schichtmittelwert: 10 mg/m³ 8 Stunden. Form: einatembare Fraktion</td>
</tr>
<tr>
<td><strong>Hungary</strong></td>
<td>Hungarian</td>
<td>25/2000. (IX. 30.) EüM-SzCsM együttes rendelet (Magyarország, 12/2011). AK: 6 mg/m³ 8 óra. Forma: respirábilis frakció</td>
</tr>
<tr>
<td><strong>Mexico</strong></td>
<td>Spanish</td>
<td>NOM-010-STPS (México, 9/2000). LMPE-PPT: 5 mg/m³ 8 horas. LMPE-PPT: 5 mg/m³ 8 horas. Estado: polvo</td>
</tr>
</tbody>
</table>

**Note:** The information is based on the Hazard Communication Standard 29 CFR 1910 (USA) and provides exposure limit values from various countries for LaserForm® AlSi7Mg0.6 Type A.
<table>
<thead>
<tr>
<th>Country</th>
<th>Language</th>
<th>Source</th>
<th>Concentration</th>
<th>Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norway</td>
<td>Norwegian</td>
<td>FOR-2011-12-06-1358 (Norge, 1/2013).</td>
<td>5 mg/m³</td>
<td>8 timer. Form: pyroteknikk</td>
</tr>
<tr>
<td>Poland</td>
<td>Polish</td>
<td>Rozporzadzenie Ministra Pracy i Polityki Społecznej (Dz.U. 2014 poz. 817) (Polska, 6/2014).</td>
<td>2.5 mg/m³ 8 godzin.</td>
<td>Frakcja wychalna</td>
</tr>
<tr>
<td>Poland</td>
<td>Polish</td>
<td>Dz.U. 2014 poz. 817 (Polska, 6/2014).</td>
<td>1.2 mg/m³ 8 godzin.</td>
<td>Frakcja respirabilna</td>
</tr>
<tr>
<td>Portugal</td>
<td>Portuguese</td>
<td>Instituto Português da Qualidade (Portugal, 11/2014).</td>
<td>5 mg/m³</td>
<td>8 horas. Form: frakcja inalabila</td>
</tr>
<tr>
<td>Spain</td>
<td>Spanish</td>
<td>INSHT (España, 1/2014).</td>
<td>10 mg/m³</td>
<td>8 horas. Form: Poussière inhalables</td>
</tr>
<tr>
<td>Sweden</td>
<td>Swedish</td>
<td>AFS 2011:18 (Sverige, 12/2011).</td>
<td>2 mg/m³, (som Al) 8 timmar.</td>
<td>Form: respirabil anlegg</td>
</tr>
<tr>
<td>Switzerland</td>
<td>German</td>
<td>SUVA (Schweiz, 1/2014).</td>
<td>10 mg/m³</td>
<td>8 Stunden. Form: Einatembarer Staub (Gesamtstaub)</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Italian</td>
<td>SUVA (Svizzera, 1/2014).</td>
<td>10 mg/m³</td>
<td>8 ore. Form: Frazione inalabile</td>
</tr>
<tr>
<td>Turkey</td>
<td>Turkish</td>
<td>NIOSH REL (Amerika Birlezig Devletleri, 10/2013).</td>
<td>5 mg/m³</td>
<td>10 saatlier. Form: Solunabilir kism</td>
</tr>
<tr>
<td>UK</td>
<td>English</td>
<td>EH40/2005 WELs (United Kingdom (UK), 12/2011).</td>
<td>10 mg/m³</td>
<td>8 hours. Form: inhalaible dust</td>
</tr>
<tr>
<td>USA</td>
<td>English</td>
<td>ACGIH TLV (United States, 4/2014).</td>
<td>1 mg/m³</td>
<td>8 hours. Form: Respirable fraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OSHA PEL (United States, 2/2013).</td>
<td>5 mg/m³, (as Al) 8 hours.</td>
<td>Form: Respirable fraction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>15 mg/m³, (as Al) 8 hours.</td>
<td>Form: Total dust</td>
</tr>
<tr>
<td>Australia</td>
<td>English</td>
<td>Safe Work Australia (Australia, 1/2014).</td>
<td>10 mg/m³</td>
<td>8 hours. Form: inhalaible dust</td>
</tr>
<tr>
<td>Belgium</td>
<td>Dutch</td>
<td>Lijst Grenswaarden / Valeurs Limites (België, 4/2014).</td>
<td>10 mg/m³</td>
<td>8 uren. Form: Solunabilir kism</td>
</tr>
<tr>
<td></td>
<td>French</td>
<td>Lijst Grenswaarden / Valeurs Limites (Belgique, 4/2014).</td>
<td>10 mg/m³</td>
<td>8 heures. Form: inhalaible dust</td>
</tr>
<tr>
<td></td>
<td>German</td>
<td>Lijst Grenswaarden / Valeurs Limites (Belgien, 4/2014).</td>
<td>10 mg/m³</td>
<td>8 Stunden. Form: Solunabilir kism</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 mg/m³</td>
<td>8 uren. Form: Solunabilir kism</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 mg/m³</td>
<td>8 heures. Form: inhalaible dust</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 mg/m³</td>
<td>8 Stunden. Form: Solunabilir kism</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 mg/m³</td>
<td>8 uren. Form: Solunabilir kism</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 mg/m³</td>
<td>8 heures. Form: inhalaible dust</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10 mg/m³</td>
<td>8 Stunden. Form: Solunabilir kism</td>
</tr>
</tbody>
</table>
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.

8.2 Exposure controls
8.2.1 Appropriate 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 Personal Protection equipment

8.2.2.1 Hygiene measures
Do not use tobacco or food in work area. 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
If ventilation cannot effectively keep dust concentrations below established limits, appropriate certified respiratory protection must be provided. Use a dust mask or filter apparatus of minimal level FFP1.

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. Do not allow product to enter drains. Do not flush into surface water. Do not let product contaminate subsoil.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance:
- Physical state: Powder
- Colour: Silver/Gray
- Odour: Odourless
- pH (20 °C): Not Applicable
- Melting point/range (°C): 550 – 660 (1058 - 1220°F)
- Boiling point/range (°C): 2467 (4472°F) (for pure Aluminium)
- Flash point (°C): No Data
- Ignition temperature (°C): >500 (>932°F)
- Vapour pressure (°C): No Data
- Density (g/cm³): 2.5 - 2.7 (20.863 - 22.53 lbs/gal)
- Bulk density (g/cm³): 0.7 – 1.5 (5.84 - 12.52 lbs/gal)
- Water solubility (20°C in g/l): Insoluble
- Viscosity: Not Applicable
- Auto-ignition temperature (°C): Product is not self-igniting
- Minimum Ignition Energy (mJ): 10 – 100 mJ (for pure fine Aluminium powder)
- Decomposition temperature: No Data
- Dust explosion hazard: Fine dust clouds may form explosive mixtures with air
- Lower explosion limit (g/m³): 30 – 170 () (for pure fine Aluminium powder)
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. Aluminium and aluminium alloys may oxidize slowly when exposed to air.

10.2 Reactivity: Stable under normal conditions and under recommended storage conditions.

10.3 Possibility of hazardous reactions: Contact with water releases flammable gasses (hydrogen). Will react exothermally if mixed with strong oxidising substance and ignited. Susceptible to dust explosions.

10.4 Conditions to avoid: Prevent formation of dust clouds and accumulation of fines. Static electricity, heat or ignition source.

10.5 Incompatible materials: water, alcohols, amines, alkalis, oxidizing agents, strong acids and strong bases, halogenated hydrocarbons and other combustible materials.

10.6 Hazardous decomposition products: vapour, flammable gas (Hydrogen).

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects
Acute toxicity
Conclusion/Summary : Not Available

Aluminium (7429-96-5):

<table>
<thead>
<tr>
<th>Route of Exposure</th>
<th>Measure</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Inhalative</td>
<td>LD50</td>
<td>&gt;2000 mg/kg (rat)</td>
</tr>
<tr>
<td>Oral Inhalative</td>
<td>LC50/4 h</td>
<td>&gt;0.888 mg/l (rat)</td>
</tr>
</tbody>
</table>

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 : Not available

US organization:
IARC (International Agency for Research on Cancer) : None of the ingredients is listed.
NTP (National Toxicology Program) : None of the ingredients is listed.
OSHA-Ca (Occupational Safety & Health Administration) : None of the ingredients is listed.

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):
Conclusion/Summary : Not available

Aluminium (7429-96-5):

<table>
<thead>
<tr>
<th>Route of Exposure</th>
<th>Measure</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Inhalative</td>
<td>NOAEC</td>
<td>10 mg/m³ (rat)</td>
</tr>
</tbody>
</table>
Aspiration hazard

11.2 Information on the likely routes of exposure
Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

11.3 Symptoms related to the physical, chemical and toxicological characteristics
Adverse symptoms may include the following:
Eye contact: Dust may cause slight irritation to the ocular mucous membranes due to mechanical action.
Inhalation: Coughing. Dust from this product may cause irritation to the respiratory tract.

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: No known significant effects or critical hazards
Inhalation: No known significant effects or critical hazards
Skin contact: No known significant effects or critical hazards
Ingestion: No known significant effects or critical hazards

11.5.2 Potential chronic health effects
Conclusion/Summary: No known significant effects or critical hazards
General: No known significant effects or critical hazards
Carcinogenicity: No known significant effects or critical hazards
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: No known significant effects or critical hazards

SECTION 12. Ecological information
Presents no particular risk to the environment, provided the disposal requirements (see section 13) and national or local regulations are complied with.

12.1 Toxicity
Long-term Ecotoxicity: No data available

12.2 Persistence and degradability
Abiotic Degradation: No data available
Physical-and photo-chemical elimination: No data available
Biodegradation: Not readily biodegradable.

12.3 Biocumulative potential
Bioconcentration factor (BCF): No data available

12.4 Mobility in soil
Soil/water partition coefficient (Koc): Not available
Mobility: Not available

General note: Do not allow product to reach ground water, water course or sewage system.

12.5 Results of PBT and vPvB assessment
PBT: Not applicable
vPvB: Not applicable

12.6 Other adverse effects
Effect on global warming: No known significant effects or critical hazards
GWPmix comment: No known significant effects or critical hazards

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
13.1.1 Product

Methods of disposal
Do not contaminate sewers, drains, soil or surface waters with this material. Reduce waste by attempting to utilize product completely. Dispose of this container and its contents in accordance with all local, state, and federal regulations. Must not be disposed together with household garbage.

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

13.1.2 Packaging

Methods of disposal
Consult local and national guidelines for the disposal of discarded packaging.

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 split material and runoff and contact with soil, waterways, drains and sewers.

SECTION 14. TRANSPORT INFORMATION

UN Number
This product was tested according to UN-Regulations of transportation of dangerous goods (Orange Book) and ADR-Regulations and was classified as harmless.

UN proper shipping name
Not applicable

Transport hazard class(es)
Not applicable

Packing group
Not applicable

Label
Not applicable

Environmental hazards
Not applicable

Special precautions for user
Prevent moisture and contact with water, heat sources and sources of ignition

Transport in bulk according to Annex II of MARPOL73/78 and the IPBC code
Not applicable

SECTION 15. REGULATORY INFORMATION

EU regulations

EINEC/ELINCS/NLP: All materials are listed
REACH Annex XVII: None listed
Other guidelines: Falls under the ATEX guidelines

US Federal Regulations

Aluminium alloy atomized granules
SARA Section 311/312 Hazard Classes: Physical hazard - Combustible dust
Aluminum (7429-90-5)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Subject to reporting requirements of United States SARA Section 313
Silicon (7440-21-3)
Listed on the United States TSCA (Toxic Substances Control Act) inventory
Not subject to reporting requirements of the United States SARA Section 313

NFPA rating
Health: 0 Minimal Hazard - No significant risk to health
Flammability: 1 Slight Hazard - Materials that must be preheated before ignition will occur. Includes liquids, solids and semi solids having a flash point above 200F. (Class IIIB)
Reactivity: 1 Slight Hazard - Materials that are normally stable but can become unstable (self-react) at high temperatures and pressures. Materials may react non-violently with water or undergo hazardous polymerization in the absence of inhibitors.

US State Regulations

Aluminium alloy atomized granules
U.S. - California - Proposition 65 - Other information:
This product does not contain any substances known to the state of California to cause cancer, developmental and/or reproductive harm

Australian regulations

SUSDP, Industrial Chemicals Act 1989:
Australian Inventory of Chemical Substances, AICS: Listed

Canada

SDS • LaserForm® AlSi7Mg0.6 Type A • 15-0165-S12-00-A • ENGLISH • GHS
Aluminum (7429-90-5) Listed on the Canadian DSL (Domestic Substances List)
Silicon (7440-21-3) Listed on the Canadian DSL (Domestic Substances List)

SECTION 16. OTHER INFORMATION

Abbreviations and acronyms
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No.1272/2008]
EUH statement = CLP-specific Hazard statement
ICAO = International Civil Aviation Organisation
ADR: = Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
GHS = Globally Harmonised System of Classification and Labelling of Chemicals
CAS = Chemical Abstracts Service (division of the American Chemical Society)
LC50 = Lethal concentration, 50 percent
LD50 = Lethal dose, 50 percent
PBT = Persistent, Bioaccumulative and Toxic
vPvB = very Persistent and very Bioaccumulative
STOT RE = Specific target organ toxicity (repeated exposure)

Full text of abbreviated H statements
H228 : Flammable solid
H261 : In contact with water releases flammable gas

Relevant Precautionary statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):
P202: Do not handle until all safety precautions have been read and understood.
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P223: Do not allow contact with water.
P260: Do not breathe dust.
P280: Wear protective gloves, clothing and eye protection.

SDS information
Creation date : November 24th, 2017
Revision : 00-A
Revision date : /
Revision changes : /

Notice to reader
To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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800.793.3669 (Toll-free in the US GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
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LaserForm® AlSi10Mg Type A
Revision Date: February 7th, 2017

1. IDENTIFICATION OF THE PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the mixture: Aluminium alloy; Aluminium-silicon alloy; AlSi10Mg

1.2 Type: AlSi10Mg alloy

1.3 Use of the preparation: For use with ProX® DMP 320 printers

1.4 Uses advised against: No data

1.5 Company/undertaking identification:

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U.S.A.
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Chemical Emergency:
800.424.9300 – Chemtrec

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e-mail: moreinfo@3dsystems.com
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Chemtrec

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Tokyo 50-6027 Japan
Telephone No. +81-3-5798-
2500
e-mail: moreinfo@3dsystems.com
Chemical Emergency
+(81)-3-345209637 – Chemtrec

2. HAZARDS IDENTIFICATION

2.1 Classification

GHS Classification (29 CFR 1910.1200): Substances which, in contact with water, emit flammable gases Category 3 H261

Regulation (EC) No. 1272/2008, HazCom 29 CFD 1910:

Substances which, in contact with water, emit flammable gases Category 3 H261

Regulation (EC) 67/548/EEC and 1999/45/EC:
F, R11, R15

2.2 Label Elements

Regulation (EC) No. 1272/2008:
Hazard pictograms and signal word:

GHS02
Signal word: Warning
GHS08
Signal word: Warning

Hazard determining components of labelling: Aluminium, Silicium, Magnesium
Hazard statements:
H228: Flammable solid.
H261: In contact with water releases flammable gas
H334: May cause asthma symptoms or breathing difficulties if inhaled
H373: May cause damage to organs through prolonged or repeated exposure

Precautionary statements:
P202: Do not handle until all safety precautions have been read and understood.
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P223: Do not allow contact with water.
P231+232: Handle under inert gas. Protect from moisture.
P240: Ground/bond container and receiving equipment.
P241: Use explosion-proof electrical and ventilating equipment.
P260: Do not breathe dust.
P280: Wear protective gloves, clothing and eye protection.
P284: [In case of inadequate ventilation] wear respiratory protection.
P304+340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P314: Get medical advice/attention if you feel unwell.
P370+378: In case of fire: Use dry sand or Class D fire extinguisher to extinguish.
P402+404: Store in a dry place. Store in a closed container.
P421: Store contents under inert gas.

Other dangers:
Danger of dust explosion: Dust clouds can be ignited and could pose an explosion risk in a confined space.
Reactivity: Can react with oxidizing agents and in alkaline solutions, causing hydrogen release. Hydrogen gas can ignite spontaneously due to exothermal nature of reaction – Explosion risk.
Reactivity: Can react violently with halogenated hydrocarbons.

NFPA rating

- **NFPA Ratings**
  - 0 = Minimal
  - 1 = Slight
  - 2 = Moderate
  - 3 = Serious
  - 4 = Severe

- **Hazardous Materials Identification System (HMIS):**
  (Degree of hazard: 0 = low, 4 = extreme)
  - **Health**: 1
  - **Flammability**: 2
  - **Physical Hazards**: 1

- **Personal Protection**: Skin, eye protection
3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Chemical characterization:

Description: Metallic alloy powder

3.2 Dangerous components:

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No</th>
<th>EC-No</th>
<th>%</th>
<th>Classification</th>
<th>Regulation (EC) No. 1272/2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>7429-90-5</td>
<td>231-072-3</td>
<td>88-91</td>
<td>F R11, R15</td>
<td>Flam. Sol.1, H228 Water react. 2, H261</td>
</tr>
<tr>
<td>Silicium</td>
<td>7440-21-3</td>
<td>231-130-8</td>
<td>9-11</td>
<td>R11</td>
<td>Flam. Sol.2, H228</td>
</tr>
<tr>
<td>Magnesium</td>
<td>7439-95-4</td>
<td>231-104-6</td>
<td>0.2-0.5</td>
<td>F R15, R17</td>
<td>Pyr. Sol.1, H250 Self. Heat. 2, H252 Water react. 1, H261</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

4.1 General Information: Ensure that eyewash stations and safety showers are close to the workstation location.

4.2 Description of First Aid Measures

Skin contact: Wash off thoroughly with soap and water. Remove and dispose of or properly launder contaminated clothing before wearing again.

Eye contact: Irrigate gently but thoroughly, including under the eyelids, with water for at least 10 to 20 minutes. Obtain medical attention if irritation persists.

Inhalation: Move affected person to fresh air, rest and keep warm. Support breathing is necessary. In severe cases, if exposure has been great, or if respiratory irritation occurs, obtain medical attention.

Ingestion: Wash out mouth thoroughly with water. Drink 1 to 2 glasses of water. DO NOT INDUCE VOMITING. Seek medical attention if irritation persists.

4.3 Most important symptoms and effects, both acute and delayed

Skin Contact: Mechanical irritation.

Eye Contact: Mechanical irritation.

Inhalation: Mechanical irritation of airways. May cause asthma symptoms or breathing difficulties if inhaled.

Ingestion: Mechanical irritation.

4.4 Indications of any immediate medical attention and special treatment needed

Eye Contact: Treat symptomatically

Inhalation: Treat symptomatically

4.5 Self-protection of the first aider: Put on appropriate protective equipment (see section 8). Move exposed person to fresh air.
5. FIRE-FIGHTING MEASURES

5.1 Suitable extinguishing media: The product itself is flammable. When dispersed in air the powder is susceptible to dust explosions. Adapt extinguishing measures to surroundings. Use extinguishing type D powder, type D foam, dry salt or sand if available. Carbon dioxide is not effective.

5.2 Extinguishing media which must not be used for safety reasons: Do not use water (explosion hazard), including high volume water jets, Carbon dioxide or Halon.

5.3 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases: increased fire hazard during dust formation. Contact with water releases flammable hydrogen gas.

5.4 Special protective equipment for fire-fighters: Wear breathing protection in the presence of dust and suitable antistatic garments.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions: Keep unnecessary personnel away and contact emergency personnel. Wear appropriate protective equipment and clothing. Remove all sources of ignition. Avoid dust formation.

6.2 Environmental precautions: Take precautions to ensure product does not contaminate ground or enter the sewer or drainage system.

6.3 Methods for cleaning up:
   Wear appropriate protective equipment and antistatic clothing.
   
   For containment: Use non-sparking antistatic tools and containers
   For cleaning up small spillage: Use an explosion proof vacuum with equipment fitted with immersion filtration.
   For cleaning up large spillage: Solids should be carefully transferred to suitable salvage containers. Any residues should be treated as small spillages.
   Other information: Do not use compressed air. Prevent the formation of dust clouds.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
   Protective measures: Work using a suitable extraction/ventilation system. Use non-sparking explosion proof tools. Wear suitable antistatic garments and respiration protection.
   Measures to prevent fire: Prevent the formation of dust clouds. Avoid all sources of ignition.
   Measures to protect the environment: Use appropriate containment to avoid environmental hazard.
   Advice on general occupational hygiene: 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.
7.2 Conditions for safe storage
Technical measures and storage conditions: Store under inert gas in a sealed antistatic container in dry and cool conditions and keep the container closed when not in use.

Packaging materials: Keep in the container supplied, or suitable metal, antistatic plastic or polythene container.

Requirements for storage rooms and vessels: Containers should be stored in a fire proof cabinet or room in a clean, cool and dry environment.

Keep away from water or moisture.

Storage class: Class 4.3 (Releases flammable gas when wet)

Further information on storage conditions: Local regulations should be followed regarding the storage of this material.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure limit values:

<table>
<thead>
<tr>
<th>Exposure limits</th>
<th>OSHA/PEL</th>
<th>ACGIH/TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium</td>
<td>No limit</td>
<td>5 mg/m³ (Fumes)</td>
</tr>
<tr>
<td>Silicium</td>
<td>15/ 5 mg/m³ (total/respiratory)</td>
<td>0.3 mg/m³ (as SiO₂)</td>
</tr>
<tr>
<td>Magnesium</td>
<td>No limit</td>
<td>No limit</td>
</tr>
</tbody>
</table>

8.2 Exposure 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. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Instructional measures to prevent exposure:

Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Wash hands after handling and before eating, smoking and using the lavatory and at the end of the day.

Personal protection equipment:

Respiratory protection: If ventilation cannot effectively keep dust concentrations below established limits, appropriate certified respiratory protection must be provided. Use a dust mask or filter apparatus of minimal level FFP1.

Hand protection: Use impervious nitrile gloves.

Eye protection: Wear safety glasses or chemical goggles.

Body protection: Use long sleeved antistatic garments and closed, antistatic safety shoes.
9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance:
Physical state: Powder
Colour: Silver/Gray
Odour: Odourless

9.2 Important health, safety and environmental information
pH (20 °C): NA
Melting point/range (°C): 570 - 660
Boiling point/range (°C): No Data
Flash point (°C): No Data
Ignition temperature (°C): >500°C
Vapour pressure (°C): No Data
Density (g/cm³): 2.5 - 2.7
Bulk density (kg/m³): 0.7 – 1.5
Water solubility (20°C in g/l): Insoluble
Viscosity: NA
Auto-ignition temperature (°C): Product is not self-igniting
Decomposition temperature: No Data
Dust explosion hazard: Fine dust clouds may form explosive mixtures with air
Lower explosion limit (g/m³): 30
Upper explosion limit: No Data
Oxidising properties: No Data
Particle size: 100% <1mm

10. STABILITY AND REACTIVITY

10.1 Chemical Stability: Stable under normal conditions and under recommended storage conditions. Aluminium and aluminium alloys may oxidize slowly when exposed to air.

10.2 Reactivity: Stable under normal conditions and under recommended storage conditions.

10.3 Possibility of hazardous reactions: Contact with water releases flammable gasses (hydrogen). Will react exothermally if mixed with strong oxidising substance and ignited. Susceptible to dust explosions.

10.4 Conditions to avoid: Prevent formation of dust clouds and accumulation of fines. Static electricity, heat or ignition source.

10.5 Incompatible materials: water, alcohols, amines, alkalis, oxidizing agents, strong acids and strong bases, halogenated hydrocarbons and other combustible materials.

10.6 Hazardous decomposition products: vapour, flammable gas (Hydrogen).
11. TOXICOLOGICAL INFORMATION

11.1 Likely Routes of Exposure:

Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

11.2 Symptoms of Exposure:

Fines/dusts may irritate airways and eyes.

11.3 Acute and chronic effects:

**Aluminium:** No scientific data is available on the toxicity of aluminium. Aluminium is considered to be relatively inert. This product is also not considered to be mutagenic, teratogenic or carcinogenic.

**Silicium:** No scientific data is available on the toxicity of silicium. This product is also not considered to be mutagenic, teratogenic or carcinogenic. Oral LD50 Rat: 3160 mg/kg

**Magnesium:** No scientific data is available on the toxicity of magnesium. There is no know limit for allowable daily magnesium intake. This product is also not considered to be mutagenic, teratogenic or carcinogenic.

**Acute Toxicity:** No data available

12. Ecological information

12.1 Toxicity

**Long-term Ecotoxicity**

No data available

12.2 Persistence and degradability

**Abiotic Degradation**

No data available

**Physical-and photo-chemical elimination**

No data available

**Biodegradation**

Not readily biodegradable.

12.3 Biocumulative potential

**Bioconcentration factor (BCF)**

No data available

12.4 Mobility in soil

**Known or predicted distribution to environmental compartments**

No data available

**Adsorption/Desorption**

No data available

12.5 Additional information

Do not allow product to enter drains. Do not flush into surface water. Do not let product contaminate subsoil.
13. DISPOSAL CONSIDERATIONS

13.1 Appropriate disposal / Product: Do not contaminate sewers, drains, soil or surface waters with this material. Reduce waste by attempting to utilize product completely. Dispose of this container and its contents in accordance with all local, state, and federal regulations.

13.2 Packaging disposal: Consult local and national guidelines for the disposal of discarded packaging.

13.3 Additional information: Prior to disposal 3D Systems recommends consulting your local waste disposal authority or an approved waste disposal firm to ensure regulatory compliance.

14. TRANSPORT INFORMATION

UN Number: Not applicable
UN proper shipping name: Not applicable
Transport hazard class(es): Not applicable
Packing group: Not applicable
Label: Not applicable
Environmental hazards: Not applicable
Special precautions for user: Prevent moisture and contact with water, heat sources and sources of ignition
Transport in bulk according to Annex II of MARPOL73/78 and the IPBC code: Not applicable

15. REGULATORY INFORMATION

15.1 EU regulations
EINEC/ELINCS/NLP: All materials are listed
REACH Annex XVII: None listed
Other guidelines: Falls under the ATEX guidelines

15.2 National EU regulations
Not applicable

15.3 US FEDERAL
TSCA: All materials are listed on the TSCA Inventory or are not subject to TSCA requirements
SARA 302 EHS List (40 CFR 355 Appendix A): None listed
SARA 313 (40 CFR 372.65): None listed
CERCLA (40 CFR 302.4): None listed

15.4 Australian regulations
SUSDP, Industrial Chemicals Act 1989: Australian Inventory of Chemical Substances, AICS: Listed
15.5 Japanese regulations

Industrial Health and Safety Law Dangerous substances (Combustible substances: Aluminium powder)
Hazardous material not applicable
Organic solvent poison prevention rule not applicable
Ordinance on prevention of hazard due to specified chemical substances not applicable
Lead Poisoning Prevention Rule not applicable
Poison and Deleterious Substance Control law not applicable
Management law (PRTR Law) not applicable
Fire Services Act flammable solid
Explosives Law explosive dust
High pressure gas safety law not applicable
Export Trade Control Order not applicable
Ship Safety Act: Combustible material, pyrophoric substance
Aviation Law: Transport ban, combustible material, pyrophoric substance (194-1)
Waste Disposal and Public Cleaning Law
operative to ensure regulatory compliance
Before disposal, consult an approved waste disposal

16. OTHER INFORMATION

16.1 Relevant Hazard Statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):

Flam. Sol.1, H228- Flammable solid, category 1, H228: Flammable solid
Flam. Sol.2, H228- Flammable solid, category 2, H228: Flammable solid
Pyr. Sol.1, H250 – Pyrophoric solid, category 1, H250: Catches fire spontaneously if exposed to air
Self. Heat. 2, H252 – Self-heating solid, category 2, H252: Self-heating in large quantities; may catch fire
Water react. 2, H261- Emission of flammable gases in contact with water, category 2, H261: In contact with water releases flammable gas
Water react. 3, H261- Emission of flammable gases in contact with water, category 3, H261: In contact with water releases flammable gas
H334: May cause asthma symptoms or breathing difficulties if inhaled
H373: May cause damage to organs through prolonged or repeated exposure

Relevant Precautionary statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):

P202: Do not handle until all safety precautions have been read and understood.
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P223: Do not breathe dust.
P224: Store contents under inert gas.
P240: Ground/bond container and receiving equipment.
P241: Use explosion-proof electrical and ventilating equipment.
P260: Do not breathe dust.
P280: Wear protective gloves and eye protection.
P284: [In case of inadequate ventilation] wear respiratory protection.
P304+340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P314: Get medical advice/attention if you feel unwell.
P330+311: IF INVENTHREATENED BY FIRE OR HEAT: Use Class D extinguisher.
P337+378: IF ON SKIN (after removal from fire or heat): Keep cool and clean.
P361+373: In case of mixture: Use chemical foam or dry powder.
P370+378: In case of fire: Use dry sand or Class D fire extinguisher to extinguish.
P402+404: Store in a dry place. Store in a closed container.
P407: Store contents under inert gas.

Before disposal, consult an approved waste disposal.
Relevant other dangers referred to in sections 2 and 3:

Danger of dust explosion: Dust clouds can be ignited and could pose an explosion risk in a confined space.

Reactivity: Can react with oxidizing agents and in alkaline solutions, causing hydrogen release. Hydrogen gas can ignite spontaneously due to exothermal nature of reaction – Explosion risk.

Reactivity: Can react violently with halogenated hydrocarbons.

Relevant R-Phrases (number and full text) referred to in sections 2 and 3:

F, R11, R15, R17

F : Highly Flammable
R11 : Highly flammable
R15 : Contact with water liberates extremely flammable gases
R17: Spontaneously flammable in air.

16.2 Further information:
SDS Creation Date:......March 14th, 2016
SDS Revision #: ............00-C
SDS Revision Date:......February 7th, 2017
Reason for Revision: ..... Updated part number / updated header / updated danger class in accordance to latest safety testing results

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803.326.3900  (Outside the U.S. GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
+44 144-2282600  (Europe GMT+01:00; Mon – Fri, 08:00 a.m. - 17:00 p.m. MEZ)

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Safety Data Sheet
according to Regulation (EC) No 1907/2006 and 1272/2008,
Hazard Communication Standard 29 CFR 1910 (USA),
WHS Regulations Australia,
JIS Z 7253 (2012) Japan

LaserForm® CoCr F75 Type A
Revision Date: July 27th, 2016

1. IDENTIFICATION OF THE PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the mixture: Cobalt Alloy

1.2 Type: ASTM F75 CoCr alloy
Contains the following substances with hazardous properties: Cobalt

1.3 Use of the preparation: For use with ProX® DMP 320 printers

1.4 Uses advised against: No information

1.5 Company/undertaking identification:

| 3D Systems, Inc. | 3D Systems Europe Ltd. | 3D Systems / Australia |
| 333 Three D Systems Circle | Mark House, Mark Road | 5 Lynch Street |
| Rock Hill, South Carolina U.S.A. | Hemel Hempstead | Hawthorn, VIC 3122 |
| Phone: 803.326.3900 or | Phone: +44 144-2282600 | e-mail: moreinfo@3dsystems.com |
| Toll-free Phone: 800.793.3669 | e-mail: moreinfo@3dsystems.com | Chemical Emergency: +61 29037.2994 – Aus Chemtrec |
| e-mail: moreinfo@3dsystems.com | Chemical Emergency: 703.527.3887 - Chemtrec |

2. HAZARDS IDENTIFICATION

2.1 Classification

GHS Classification (29 CFR 1910.1200):

| Regulation (EC) No. 1272/2008, HazCom 29 CFD 1910: |
| Skin Sensitization | Category 1 | H317 |
| Eye irritant | Category 2 | H319 |
| Respiratory sensitization | Category 1 | H334 |
| Carcinogenic | Category 1 | H350 |
| Reproductive toxicant | Category 2 | H361fd |
| Specific target organ toxicity-repeated exposure | Category 1 | H372 |
| Aquatic environment - acute hazard | Category 1 | H400 |
| Aquatic environment - long term hazard | Category 1 | H410 |

Regulation (EC) 67/548/EEC and 1999/45/EC:
Xn; R20; R42/43; R51; R53

2.2 Label Elements

Hazard pictograms and signal word (Regulation (EC) No. 1272/2008):

GHS08  GHS09

Signal word: Danger
Safety Data Sheet
according to Regulation (EC) No 1907/2006 and 1272/2008,
Hazard Communication Standard 29 CFR 1910 (USA),
WHS Regulations Australia,
JIS Z 7253 (2012) Japan

LaserForm® CoCr F75 Type A
Revision Date: July 27th, 2016

Hazard determining components of labelling: Nickel, Cobalt

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
H350: May cause cancer
H361fd: Suspected of damaging fertility. Suspected of damaging the unborn child
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

Precautionary statements:
P201: Obtain special instructions before use.
P202: Do not handle until all safety precautions have been read and understood.
P260: Do not breathing dust.
P264: Wash hands thoroughly after handling
P270: Do not eat, drink or smoke when using this product.
P271: Use only in a well-ventilated area.
P272: Contaminated work clothing should not be allowed out of the workplace.
P273: Avoid release to the environment.
P280: Wear protective gloves, protective clothing and eye protection.
P284: Wear respiratory protection.
P302+352: IF ON SKIN: Wash with plenty of soap and water.
P304+340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312: Call a POISON CENTER or doctor/physician if you feel unwell.
P314: Get medical attention if you feel unwell.
P333+313: If skin irritation occurs: Get medical advice/attention.
P337+313: If eye irritation persists: Get medical attention.
P363: Wash contaminated clothing before reuse.
P391: Collect spillage.

NFPA rating

Hazardous Materials Identification System (HMIS):
(Degree of hazard: 0 = low, 4 = extreme):
Health 2
Flammability 2
Physical Hazards 0
Personal Protection: Skin, eye protection

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Chemical characterization:

Description: Metallic alloy powder
3.2 Dangerous components:

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No</th>
<th>EC-No</th>
<th>%</th>
<th>Classification</th>
</tr>
</thead>
</table>
| Cobalt          | 7440-48-4 | 231-158-0 | 59-64 | R42/43 R53  
|                 |         |         |      | Resp. Sens 1, H334  
|                 |         |         |      | Skin Sens. 1, H317  
|                 |         |         |      | Eye Irrit. 2, H319  
|                 |         |         |      | Carc. 1, H350  
|                 |         |         |      | Repr. 2, H361  
|                 |         |         |      | Aqu. Acute 1, H400  
|                 |         |         |      | Aqu. Chron. 1, H410  |
| Chromium        | 7440-47-3 | 231-157-5 | 27-30 | Not Applicable  |
| Molybdenum      | 7439-98-7 | 231-107-2 | 5-7  | Not Applicable  |
| Manganese       | 7439-96-5 | 231-105-1 | <1   | R11 R15 F  
|                 |         |         |      | Water react. 1, H260  |
| Iron            | 7439-89-6 | 231-096-4 | <0.75 | R11  
|                 |         |         |      | Flam. Sol. 1, H228  |
| Silicium        | 7439-95-4 | 231-104-6 | <1   | R11  
|                 |         |         |      | Flam. Sol. 1, H228  |

4. FIRST AID MEASURES

4.1 General Information: Ensure that eyewash stations and safety showers are close to the workstation location.

4.2 Description of First Aid Measures
Skin contact: Wash off thoroughly with soap and water. If rash develops, seek medical attention.
Eye contact: Irrigate thoroughly with water, including under the eyelids, for at least 10-20 minutes. Obtain medical attention if irritation persists.
Inhalation: Move affected person to fresh air, rest and keep warm. In severe cases, if exposure has been great, or if respiratory irritation occurs, obtain medical attention.
Ingestion: Wash out mouth thoroughly with water. Obtain medical attention if further symptoms develop.

4.2 Most important symptoms and effects, both acute and delayed
Skin Contact: Rash may develop.
Eye Contact: Mechanical irritation.
Inhalation: Possible asthma like symptoms.
Ingestion: No information

Chronic: Can cause an allergic skin reaction with repeated or prolonged exposure consisting of redness, swelling and/or rash (urticaria).

4.3 Indications of any immediate medical attention and special treatment needed
Skin Contact: Treat symptomatically
Eye Contact: Treat symptomatically
Inhalation: Treat symptomatically

4.4 Self-protection of the first aider: Put on appropriate protective equipment (see section 8). Move exposed person to fresh air.
5. FIRE-FIGHTING MEASURES

5.1. Suitable extinguishing media: The product itself is not flammable. Adapt extinguishing measures to surroundings. Use extinguishing type D powder or sand if available.

5.2. Extinguishing media which must not be used for safety reasons: High volume water jet.

5.3. Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases: Increased fire hazard during dust formation.

5.4. Special protective equipment for fire-fighters: Breathing protection in the presence of dust.

6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions: Keep unnecessary personnel away. Wear appropriate protective equipment and clothing.

6.2. Environmental precautions: Take precautions to ensure product does not contaminate ground or enter the sewer or drainage system.

6.3. Methods for cleaning up:
   For containment: not applicable
   For cleaning up small spillage: vacuum with equipment fitted with HEPA or immersion filtration.
   For cleaning up large spillage: solids should be carefully transferred to salvage containers. Any residues should be treated as small spillages.
   Other information: no information.

7. HANDLING AND STORAGE

7.1. Precautions for safe handling
   Protective measures: Work using a suitable extraction/ventilation system.
   Measures to prevent fire: Not applicable.
   Measures to protect the environment: Use appropriate containment to avoid environmental hazard.
   Advice on general occupational hygiene: Avoid contact with skin and eyes. Do not breathe dust. Wash hand and face thoroughly after working with material. Contaminated clothing should be removed and washed before re-use.

7.2. Conditions for safe storage
   Technical measures and storage conditions: Store in sealed container in dry conditions and keep the container closed when not in use.
   Packaging materials: Keep in the container supplied, or suitable metal, plastic or polythene container.
   Requirements for storage rooms and vessels: Containers should be stored under cover in a clean and dry environment.
   Storage class: Not applicable.
   Further information on storage conditions: Local regulations should be followed regarding the storage of this material.
8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure limit values:

<table>
<thead>
<tr>
<th>Exposure limits</th>
<th>OSHA/PEL</th>
<th>ACGIH/TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>0.1 mg/m³</td>
<td>0.02 mg/m³</td>
</tr>
<tr>
<td>Chromium</td>
<td>1 mg/m³</td>
<td>0.5 mg/m³</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>15 mg/m³ *</td>
<td>10 mg/m³ **</td>
</tr>
<tr>
<td>Manganese</td>
<td>5 mg/m³</td>
<td>0.2 mg/m³</td>
</tr>
<tr>
<td>Silicium</td>
<td>15/ 5 mg/m³ (total/respiratory)</td>
<td>0.3 mg/m³ (as SiO₂)</td>
</tr>
<tr>
<td>Iron</td>
<td>No exposure limit established</td>
<td></td>
</tr>
</tbody>
</table>

* insoluble compounds, total dust  
** insoluble compounds, inhalable

8.2 Exposure 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. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Instructual measures to prevent exposure:  
Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Wash hands after handling and before eating, smoking and using the lavatory and at the end of the day.

Personal protection equipment:
Respiratory protection: If ventilation cannot effectively keep dust concentrations below established limits, appropriate certified respiratory protection must be provided. Use a dust mask or filter apparatus of minimal level FFP3 or N99.
Hand protection: Use impervious nitrile gloves.
Eye protection: Wear safety glasses or chemical goggles.
Body protection: Use long sleeved antistatic garments and closed, antistatic safety shoes.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance:
Physical state: Powder  
Colour: Dark gray  
Odour: Odourless
9.2 Important health, safety and environmental information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (20 °C)</td>
<td>NA</td>
</tr>
<tr>
<td>Melting point/range (°C)</td>
<td>1315 - 1540</td>
</tr>
<tr>
<td>Boiling point/range (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Flash point (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Ignition temperature (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Vapour pressure (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Density (g/cm³)</td>
<td>8.4</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>No Data</td>
</tr>
<tr>
<td>Water solubility (20°C in g/l)</td>
<td>No Data</td>
</tr>
<tr>
<td>Viscosity</td>
<td>NA</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>No Data</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No Data</td>
</tr>
<tr>
<td>Dust explosion hazard</td>
<td>No Data</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No Data</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>No Data</td>
</tr>
<tr>
<td>Particle size</td>
<td>100% &lt;1mm</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

10.1 Chemical Stability: Stable under normal conditions and under recommended storage conditions

10.2 Reactivity: No data.

10.3 Possibility of hazardous reactions: No Data

10.4 Conditions to avoid: Prevent formation of dust clouds and accumulation of fines.

10.5 Incompatible materials: oxidizing agents. strong acids and strong bases.

10.6 Hazardous decomposition products: No data.

11. TOXICOLOGICAL INFORMATION

11.1 Likely Routes of Exposure:
Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

11.2 Symptoms of Exposure:
Fines/dusts may irritate skin and eyes.

11.2 Acute and chronic effects:

- **Cobalt:** Acute exposure to cobalt metal dusts or fumes is characterized by irritation to the eyes, and to a lesser extent, irritation to the skin. Chronic exposure to cobalt metal dust or fumes may cause respiratory and dermatologic signs and symptoms. Chronic exposure to cobalt by inhalation in humans results in effects on the respiratory system, such as respiratory irritation, wheezing, asthma, decreased lung function, pneumonia, and fibrosis.

- **Chromium:** Although much is known about the health effects of chromium compounds, the health effects of chromium metal, Cr(0), is not well studied. Due to insolubility most elements in their metallic state are not considered to be serious health hazards.

- **Molybdenum:** No data

- **Manganese:** Chronic inhalation exposure of humans to high levels of manganese may result in a syndrome called manganism which typically begins with feelings of weakness and lethargy and progresses to other symptoms such as gait disturbances, clumsiness, tremors, speech disturbances, a mask-like facial expression and psychological disturbances. Manganese is an essential micronutrient in humans.

 SDS • CoCrF75 Type A • 151816-S12-00-A • ENGLISH • GHS 6
Silicium: No scientific data is available on the toxicity of silicium. This product is also not considered to be mutagenic, teratogenic or carcinogenic. Oral LD50 Rat: 3160 mg/kg

Iron: Irritating to the respiratory tract, iron compounds may cause pulmonary fibrosis if dusts are inhaled. Inhalation of large amounts may cause iron pneumoconiosis. Chronic inhalation of finely divided powder may cause chronic iron poisoning and pathological deposition of iron in the body tissue. Ingestion may cause vomiting, diarrhea, pink urine, black stool, and liver damage. Iron compounds may also cause damage to the kidneys.

Acute Toxicity: No data

Carcinogenicity:
- Cobalt: NTP: R - reasonably anticipated to be a human carcinogen; IARC: 2B - possibly carcinogenic to humans

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12. Ecological information

12.1. Toxicity
- Long-term Ecotoxicity: May cause long-term adverse effects in the aquatic environment

12.2. Persistence and degradability
- Abiotic Degradation: No data available
- Physical-and photo-chemical elimination: No data available
- Biodegradation: Not readily biodegradable.

12.3. Bioaccumulative potential
- Bioconcentration factor (BCF): No data available

12.4. Mobility in soil
- Known or predicted distribution to environmental compartments: No data
- Adsorption/Desorption: No data available

12.7 Additional information
- Do not allow product to enter drains. Do not flush into surface water. Do not let product contaminate subsoil.

13. DISPOSAL CONSIDERATIONS

13.1 Appropriate disposal / Product: Do not contaminate sewers, drains, soil or surface waters with this material. Reduce waste by attempting to utilize product completely. Dispose of this container and its contents in accordance with all local, state, and federal regulations.

13.2 Packaging disposal: Consult local and national guidelines for the disposal of discarded packaging.

13.3 Additional information: Prior to disposal 3D Systems recommends consulting your local waste disposal authority or an approved waste disposal firm to ensure regulatory compliance.
14. TRANSPORT INFORMATION

UN Number
UN 3077

UN proper shipping name
Environmentally hazardous substance, solid, n.o.s. (cobalt)

Transport hazard class(es)
9

Packing group
III

Label(s)

Environmental hazards
May cause long-term adverse effects in the aquatic environment

Special precautions for user
Always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

15. REGULATORY INFORMATION

15.1 EU regulations
EINEC/ELINCS/NLP: All materials are listed
REACH Annex XVII: None listed

15.2. US FEDERAL
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): All components are listed or exempted
SARA 302/304: No products were found.
SARA 311/312: Hazards identification: Immediate (acute) health hazard, Delayed (chronic) health hazard
Clean Water Act (CWA) 307: chromium; Nickel

15.3 Canada
WHMIS: Class D-2A: Material causing other toxic effects (Very toxic). Class D-2B: Material causing other toxic effects (Toxic).

NPRI: The following components are listed: Cobalt (and its compounds); Chromium (and its compounds)

15.4 Australian regulations
SUSDP, Industrial Chemicals Act 1989:
Australian Inventory of Chemical Substances, AICS: Listed
Safety Data Sheet
according to Regulation (EC) No 1907/2006 and 1272/2008,
WHS Regulations Australia,
JIS Z 7253 (2012) Japan

LaserForm® CoCr F75 Type A
Revision Date: July 27th, 2016

15.5 Japanese regulations

Chemical Substance: Pneumoconiosis Act
Dust Disability Prevention Rules

Components: ISHL: Cobalt and its compounds, Deliver of Documents, etc. Articles 57-2.18-2
(CoCrF75), Table 9-172, ≥0.1%
Cobalt and its inorganic compounds, Labeling, etc. Articles 57.18, Table 9-04, ≥0.1%
Cobalt and its inorganic compounds, Specific Chemical Substances Disability Prevention Rules, 13-2
PRTR: Cobalt and its compounds, Designated Class I Substance, I-132 (previously 1-100), ≥1%
Ship Safety Act: Combustible material, Pyrophoric substance
Combustible material, Flammable substance
Aviation Law: Transport ban; combustible material, pyrophoric substance (194-1)
Clean Air Act: Cobalt and its compound, Hazardous Air Pollutants/ No. 60 of Environmental Council 9th report
Labor Standards Act: Cobalt and its compounds, Rule No. 75-2

Chromium:
Water Pollution Control Law: Designated Substance
PRTR: Chromium and Chromium(III) compounds, Designated Class I Substance, I-87, ≥1%
ISHL: Chromium and Chromium(III) compounds, Articles 57-2 and 18-2, Table 9-142, ≥0.1%
Air Pollution Control Law: Hazardous Air Pollutants/ Priority Initiative No. 49
Waste Disposal and Public Cleaning Law: Article 29

Manganese:
Water Pollution Control Law: Designated Substance
PRTR: Manganese and its compounds, Designated Class I Substance, I-412, ≥1%
ISHL: Manganese and its compounds, Articles 57-2 and 18-2, Table 9-550, ≥1%

Aqu. Acute 1, H400- Aquatic environment – acute hazard, Category 1, H400: Very toxic to aquatic life.
Aqu.Chron. 1, H410- Aquatic environment - long-term hazard, category 1, H410: Very toxic to aquatic life with long lasting effects
Flam. Sol.1, H228- Flammable solids, category 1, H228: Flammable solid
Water react. 1, H260- Water reactivity, category 1, H260: In contact with water releases flammable gases which may ignite spontaneously

OTHER INFORMATION

16.1 Relevant Hazard Statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):
Skin sens. 1, H317- Skin sensitization, category 1, H317: May cause an allergic skin reaction
Eye irrit. 2, H319- Eye irritant, category 2, H319: Causes serious eye irritation
Resp. sens. 1 H334- Respiratory sensitization, H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
Carc.1, H350- Carcinogenicity, category 1, H350: May cause cancer
Repr. 2, H361fd- Reproductive toxicant, category 2, H361fd: Suspected of damaging fertility. Suspected of damaging the unborn child.
STOT RE 1, H372- Specific target organ toxicity-repeated exposure, category 1, H372: Causes damage to organs through prolonged or repeated exposure
Aqu. Acute 1, H400- Aquatic environment – acute hazard, Category 1, H400: Very toxic to aquatic life.
Aqu.Chron. 1, H410- Aquatic environment - long-term hazard, category 1, H410: Very toxic to aquatic life with long lasting effects
Flam. Sol.1, H228- Flammable solids, category 1, H228: Flammable solid
Water react. 1, H260- Water reactivity, category 1, H260: In contact with water releases flammable gases which may ignite spontaneously
Relevant Precautionary statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):
P201: Obtain special instructions before use.
P202: Do not handle until all safety precautions have been read and understood.
P260: Do not breathing dust.
P264: Wash hands thoroughly after handling
P270: Do not eat, drink or smoke when using this product.
P271: Use only in a well-ventilated area.
P272: Contaminated work clothing should not be allowed out of the workplace.
P273: Avoid release to the environment.
P280: Wear protective gloves, protective clothing and eye protection.
P284: Wear respiratory protection.
P302+352: IF ON SKIN: Wash with plenty of soap and water.
P304+340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+351+338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P312: Call a POISON CENTER or doctor/physician if you feel unwell.
P314: Get medical attention if you feel unwell
P333+313: If skin irritation occurs: Get medical advice/attention.
P337+313: If eye irritation persists: Get medical attention
P363: Wash contaminated clothing before reuse
P391: Collect spillage

Relevant R-Phrases (number and full text) referred to in sections 2 and 3:
Xn: Harmfull
R42/43: May cause sensitization by inhalation and skin contact
R53: May cause long-term adverse effects in the aquatic environment
R11: Highly flammable
R15: Contact with water liberates extremely flammable gases
F: Flammable

16.2 Further information:
SDS Creation Date: ....... July 27th 2016
SDS Revision #: ............ 00-A
SDS Revision Date: ....... -
Reason for Revision: ..... -
www.3dsystems.com
800.793.3669  (Toll-free in the US GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
803.326.3900  (Outside the U.S. GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
+44 144-2282600  (Europe GMT+01:00; Mon – Fri, 08:00 a.m. - 17:00 p.m. MEZ)

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1. IDENTIFICATION OF THE PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the mixture: Nickel Alloy

1.2 Type: Nickel based superalloy
Contains the following substances with hazardous properties: Nickel

1.3 Use of the preparation: For use with ProX® DMP 320 printers

1.4 Uses advised against:
Use of nickel in articles intended for direct and prolonged contact with the skin where the release of nickel exceeds the limit set out in Directives 94/27/EC and 2004/6/EC and REACH regulation 1907/2009 (Annex XVII).
Use of nickel in nickel-containing food contact materials for which migration into foodstuff would exceed more than 0.1 mg/kg of nickel in accordance with the Council of Europe Guidelines on metals and alloys used as food contact materials.
Use of nickel in immersion-type kettles which would release more than 0.05 mg/l of nickel into the water in accordance with the Council of Europe Guidelines on metals and alloys used as food contact materials.
Use of nickel in commercially available “do-it-yourself” home electroplating kits.

1.5 Company/undertaking identification:
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
Chemical Emergency: 800.424.9300 – Chemtrec

3D Systems Europe Ltd.
Mark House, Mark Road
Hemel Hempstead
Herts HP2 7 United Kingdom
Phone: +44 144-2282600
e-mail: moreinfo@3dsystems.com
Chemical Emergency: 703.527.3887 - Chemtrec

3D Systems / Australia
5 Lynch Street
Hawthorn, VIC 3122
Phone: +61 03 9819-4422
e-mail: moreinfo@3dsystems.com
Chemical Emergency: +(61) 29037.2994 – Aus Chemtrec

2. HAZARDS IDENTIFICATION

2.1 Classification
GHS Classification

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Category</th>
<th>Corresponding Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin sensitization</td>
<td>Category 1</td>
<td>H317</td>
</tr>
<tr>
<td>Acute toxicity</td>
<td>Category 4</td>
<td>H332</td>
</tr>
<tr>
<td>Respiratory sensitization</td>
<td>Category 1</td>
<td>H334</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Category 1</td>
<td>H350</td>
</tr>
<tr>
<td>Specific target organ toxicity</td>
<td>Category 1</td>
<td>H372</td>
</tr>
<tr>
<td>Specific target organ toxicity</td>
<td>Category 1</td>
<td>H372</td>
</tr>
<tr>
<td>Aquatic environment - long term hazard</td>
<td>Category 3</td>
<td>H412</td>
</tr>
</tbody>
</table>

Regulation (EC) 67/548/EEC and 1999/45/EC:
T; R48/23 Xn; R40 Xi; R43 R52/53

2.2 Label Elements
Hazard pictograms and signal word (Regulation (EC) No. 1272/2008):

![GHS07]
![GHS08]

Signal word: Danger
Hazard determining components of labelling: Nickel, Cobalt

Hazard statements:
H317: May cause an allergic skin reaction
H332: Harmful if inhaled
H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
H350: May cause cancer
H372: Causes damage to organs through prolonged or repeated exposure
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P261: Avoid breathing dust.
P270: Do not eat, drink or smoke when using this product.
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P272: Contaminated work clothing should not be allowed out of the workplace.
P273: Avoid release to the environment.
P280: Wear protective gloves, protective clothing and eye protection.
P284: Wear respiratory protection.
P302+352: IF ON SKIN: Wash with plenty of soap and water.
P304+340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P312: Call a POISON CENTER or doctor/physician if you feel unwell.
P333 + P313: If skin irritation occurs: Get medical advice/attention.
P363: Wash contaminated clothing before reuse.

NFPA rating

Hazardous Materials Identification System (HMIS):
(Degree of hazard: 0 = low, 4 = extreme);
Health 2
Flammability 2
Physical Hazards 0
Personal Protection:
Skin, eye protection

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Chemical characterization:

Description: Metallic alloy powder
### 3.2 Dangerous components:

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No</th>
<th>EC-No</th>
<th>%</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>231-111-4</td>
<td>≥55</td>
<td>R40 R43 R48/23 R52/53 T Acute Tox. 4, H332 Carc.2, H351 Skin Sens. 1, H317 STOT RE 1, H372 Aqu.Chron. 3, H412</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>231-157-5</td>
<td>20-23</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>7439-98-7</td>
<td>231-107-2</td>
<td>8-10</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>231-096-4</td>
<td>≤5</td>
<td>R11 Flam. Sol. 1, H228</td>
</tr>
<tr>
<td>Niobium</td>
<td>7440-03-1</td>
<td>231-113-5</td>
<td>3-4.5</td>
<td>R17 F Resp. Sens 1, H334 Skin Sens. 1, H317 Eye Irrit. 2, H319 Carc. 1, H350 Repr. 2, H361 Aqu. Acute 1, H400 Aqu. Chron. 1, H410</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>231-105-1</td>
<td>≤0.5</td>
<td>R11 R15 F Water react. 1, H260</td>
</tr>
</tbody>
</table>

### 4. FIRST AID MEASURES

#### 4.1 General Information
Ensure that eyewash stations and safety showers are close to the workstation location.

#### 4.2 Description of First Aid Measures
- **Skin contact:** Wash off thoroughly with soap and water. If rash develops, seek medical attention.
- **Eye contact:** Irrigate thoroughly with water, including under the eyelids, for at least 10-20 minutes. Obtain medical attention if irritation persists.
- **Inhalation:** Move affected person to fresh air, rest and keep warm. In severe cases, if exposure has been great, or if respiratory irritation occurs, obtain medical attention.
- **Ingestion:** Wash out mouth thoroughly with water. Obtain medical attention if further symptoms develop.

#### 4.2 Most important symptoms and effects, both acute and delayed
- **Skin Contact:** Rash may develop.
- **Eye Contact:** Mechanical irritation.
- **Inhalation:** Possible asthma like symptoms.
- **Ingestion:** No information

#### 4.3 Indications of any immediate medical attention and special treatment needed
- **Skin Contact:** Treat symptomatically
- **Eye Contact:** Treat symptomatically
- **Inhalation:** Treat symptomatically

#### 4.4 Self-protection of the first aider
Put on appropriate protective equipment (see section 8). Move exposed person to fresh air.
5. FIRE-FIGHTING MEASURES

5.1. Suitable extinguishing media: The product itself is not flammable. Adapt extinguishing measures to surroundings. Use extinguishing type D powder or sand if available.

5.2 Extinguishing media which must not be used for safety reasons: High volume water jet.

5.3 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases: increased fire hazard during dust formation.

5.4 Special protective equipment for fire-fighters: breathing protection in the presence of dust.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions: Keep unnecessary personnel away. Wear appropriate protective equipment and clothing.

6.2 Environmental precautions: Take precautions to ensure product does not contaminate ground or enter the sewer or drainage system.

6.3 Methods for cleaning up:

Wear appropriate protective equipment and clothing.

For containment: not applicable
For cleaning up small spillage: vacuum with equipment fitted with HEPA or immersion filtration.
For cleaning up large spillage: solids should be carefully transferred to salvage containers. Any residues should be treated as small spillages.
Other information: no information.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Protective measures: Work using a suitable extraction/ventilation system.
Measures to prevent fire: Not applicable.
Measures to protect the environment: Use appropriate containment to avoid environmental hazard.
Advice on general occupational hygiene: Avoid contact with skin and eyes. Do not breathe dust. Wash hand and face thoroughly after working with material. Contaminated clothing should be removed and washed before re-use.

7.2 Conditions for safe storage

Technical measures and storage conditions: Store in sealed container in dry conditions and keep the container closed when not in use.
Packaging materials: Keep in the container supplied, or suitable metal, plastic or polythene container.
Requirements for storage rooms and vessels: Containers should be stored under cover in a clean and dry environment
Storage class: Not applicable.
Further information on storage conditions: Local regulations should be followed regarding the storage of this material.
8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure limit values:

<table>
<thead>
<tr>
<th>Exposure limits</th>
<th>OSHA/PEL</th>
<th>ACGIH/TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>1 mg/m³</td>
<td>1.5 mg/m³</td>
</tr>
<tr>
<td>Chromium</td>
<td>1 mg/m³</td>
<td>0.5 mg/m³</td>
</tr>
<tr>
<td>Iron</td>
<td>No exposure limit established</td>
<td></td>
</tr>
<tr>
<td>Molybdenum</td>
<td>15 mg/m³ *</td>
<td>10 mg/m³ **</td>
</tr>
<tr>
<td>Niobium</td>
<td>No exposure limit established</td>
<td></td>
</tr>
<tr>
<td>Cobalt</td>
<td>0.1 mg/m³</td>
<td>0.02 mg/m³</td>
</tr>
<tr>
<td>Manganese</td>
<td>5 mg/m³</td>
<td>0.2 mg/m³</td>
</tr>
</tbody>
</table>

* insoluble compounds, total dust

** insoluble compounds, inhalable

8.2 Exposure 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. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

**Instructual measures to prevent exposure:**
Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Wash hands after handling and before eating, smoking and using the lavatory and at the end of the day.

**Personal protection equipment:**

**Respiratory protection:** If ventilation cannot effectively keep dust concentrations below established limits, appropriate certified respiratory protection must be provided. Use a dust mask or filter apparatus of minimal level FFP3 or N99.

**Hand protection:** Use impervious nitrile gloves.

**Eye protection:** Wear safety glasses or chemical goggles.

**Body protection:** Use long sleeved antistatic garments and closed, antistatic safety shoes.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance:

**Physical state:** Powder

**Colour:** Gray

**Odour:** Odourless
9.2 Important health, safety and environmental information

- **pH (20 °C):** NA
- **Melting point/range (°C):** 1290 - 1350
- **Boiling point/range (°C):** No Data
- **Flash point (°C):** No Data
- **Ignition temperature (°C):** No Data
- **Vapour pressure (°C):** No Data
- **Density (g/cm³):** 8.44
- **Bulk density (kg/m³):** No Data
- **Water solubility (20°C in g/l):** No Data
- **Viscosity:** NA
- **Auto-ignition temperature:** No Data
- **Decomposition temperature:** No Data
- **Dust explosion hazard:** No Data
- **Explosive properties:** No Data
- **Oxidising properties:** No Data
- **Particle size:** 100% <1mm

10. STABILITY AND REACTIVITY

10.1 Chemical Stability: Stable under normal conditions and under recommended storage conditions

10.2 Reactivity: No data.

10.3 Possibility of hazardous reactions: No Data

10.4 Conditions to avoid: Prevent formation of dust clouds and accumulation of fines.

10.5 Incompatible materials: oxidizing agents, strong acids and strong bases.

10.6 Hazardous decomposition products: No data.

11. TOXICOLOGICAL INFORMATION

11.1 Likely Routes of Exposure:
Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

11.2 Symptoms of Exposure:
Fines/dusts may irritate skin and eyes.

11.2 Acute and chronic effects:

**Nickel:** The most common harmful health effect of metallic nickel in humans is an allergic skin reaction in those who are sensitive to nickel. Although nickel compounds are known human carcinogens, the evidence suggests that the relatively insoluble metallic nickel is less likely to present a carcinogenic hazard than are the nickel compounds that tend to release proportionately more nickel ion.

**Chromium:** Although much is known about the health effects of chromium compounds, the health effects of chromium metal, Cr(0), is not well studied. Due to insolubility most elements in their metallic state are not considered to be serious health hazards.

**Iron:** Irritating to the respiratory tract, iron compounds may cause pulmonary fibrosis if dusts are inhaled. Inhalation of large amounts may cause iron pneumoconiosis. Chronic inhalation of finely divided powder may cause chronic iron poisoning and pathological deposition of iron in the body tissue. Ingestion may cause vomiting, diarrhea, pink urine, black stool, and liver damage. Iron compounds may also cause damage to the kidneys.
Molybdenum: No data

Tungsten: No data

Niobium: No data

Cobalt: Acute exposure to cobalt metal dusts or fumes is characterized by irritation to the eyes, and to a lesser extent, irritation to the skin. Chronic exposure to cobalt metal dust or fumes may cause respiratory and dermatologic signs and symptoms. Chronic exposure to cobalt by inhalation in humans results in effects on the respiratory system, such as respiratory irritation, wheezing, asthma, decreased lung function, pneumonia, and fibrosis.

Manganese: Chronic inhalation exposure of humans to high levels of manganese may result in a syndrome called manganism which typically begins with feelings of weakness and lethargy and progresses to other symptoms such as gait disturbances, clumsiness, tremors, speech disturbances, a mask-like facial expression and psychological disturbances. Manganese is an essential micronutrient in humans.

Acute Toxicity: No data

Carcinogenicity:
- Nickel: NTP: R - reasonably anticipated to be a human carcinogen; IARC: 2B - possibly carcinogenic to humans
- Cobalt: NTP: R - reasonably anticipated to be a human carcinogen; IARC: 2B - possibly carcinogenic to humans

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12. Ecological information

12.1. Toxicity

Long-term Ecotoxicity: May cause long-term adverse effects in the aquatic environment

12.2. Persistence and degradability
- Abiotic Degradation: No data available
- Physical-and photo-chemical elimination: No data available
- Biodegradation: Not readily biodegradable.

12.3. Biocumulative potential
- Bioconcentration factor (BCF): No data available

12.4. Mobility in soil
- Known or predicted distribution to environmental compartments: No data
- Adsorption/Desorption: No data available

12.7 Additional information
- Do not allow product to enter drains. Do not flush into surface water. Do not let product contaminate subsoil.
13. DISPOSAL CONSIDERATIONS

13.1 Appropriate disposal / Product: Do not contaminate sewers, drains, soil or surface waters with this material. Reduce waste by attempting to utilize product completely. Dispose of this container and its contents in accordance with all local, state, and federal regulations.

13.2 Packaging disposal: Consult local and national guidelines for the disposal of discarded packaging.

13.3 Additional information: Prior to disposal 3D Systems recommends consulting your local waste disposal authority or an approved waste disposal firm to ensure regulatory compliance.

14. TRANSPORT INFORMATION

UN Number: None
UN proper shipping name: Not classified hazardous for transport
Transport hazard class(es): Not applicable
Packing group: Not applicable
Label(s): Not applicable
Environmental hazards: None
Special precautions for user: Always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

15. REGULATORY INFORMATION

15.1 EU regulations
EINEC/ELINCS/NLP: All materials are listed
REACH Annex XVII: None listed

15.2. US FEDERAL
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): All components are listed or exempted
SARA 302/304: No products were found.
SARA 311/312: Hazards identification: Immediate (acute) health hazard, Delayed (chronic) health hazard
Clean Water Act (CWA) 307: chromium; Nickel

15.3 Canada
WHMIS: Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).
NPRI: The following components are listed: Cobalt (and its compounds); Chromium (and its compounds)

15.4 Australian regulations
SUSDP, Industrial Chemicals Act 1989:
Australian Inventory of Chemical Substances, AICS: Listed
15.5 Japanese regulations

Chemical Substance: Pneumoconiosis Act

Components:

Cobalt:
- ISHL: Cobalt and its compounds, Deliver of Documents, etc. Articles 57-2.18-2 (MSDS), Table 9-172, ≥0.1%
- Cobalt and its inorganic compounds, Labeling, etc. Articles 57.18.Table 9-04, ≥0.1%
- Cobalt and its inorganic compounds, Specific Chemical Substances Disability Prevention Rules, 13-2
- PRTR: Cobalt and its compounds, Designated Class I Substance, I-132 (previously 1-100), ≥1%
- Ship Safety Act: Combustible material, Pyrophoric substance
  - Combustible material, Flammable substance
- Aviation Law: Transport ban; combustible material, pyrophoric substance (194-1)
- Clean Air Act: Cobalt and its compound, Hazardous Air Pollutants/No. 60 of Environmental Council 9th report
- Labor Standards Act: Cobalt and its compounds, Rule No. 75-2

Chromium:
- Water Pollution Control Law: Designated Substance
- PRTR: Chromium and Chromium(III) compounds, Designated Class I Substance, I-87, ≥1%
- ISHL: Chromium and Chromium(III) compounds, Articles 57-2 and 18-2, Table 9-142, ≥0.1%
- Air Pollution Control Law: Hazardous Air Pollutants/Priority Initiative No. 49
- Waste Disposal and Public Cleaning Law: Article 29

Nickel:
- Water Pollution Control Law: Designated Substance
- PRTR: Nickel, Designated Class I Substance, I-308
- ISHL: Nickel and its compounds, Articles 57-2 and 18-2, Table 9-418, ≥0.1%
- Specific Chemical Substances Disability Prevention Rules: Nickel compounds, 2-23
- Clean Air Act: Hazardous Air Pollutants, No. 148
- Labor Standards Act: carcinogenic substance (cancer of the upper respiratory tract or lung from working in the smelting or refining of nickel)

Manganese:
- PRTR: Manganese and its compounds, Designated Class I Substance, I-412, ≥1%
- ISHL: Manganese and its compounds, Articles 57-2 and 18-2, Table 9-550, ≥1%
- Water Pollution Control Law: Designated Substance
- Specific Chemical Substances Disability Prevention Rules: Designated Substance, 2-33
- Clean Air Act: Hazardous Air Pollutants, No. 225

Molybdenum:
- Water Pollution Control Law: Designated Substance
- Clean Air Act: Hazardous Air Pollutants, No. 243

OTHER INFORMATION

16.1 Relevant Hazard and Precautionary Statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):

Skin sens. 1, H317- Skin sensitization, category 1, H317: May cause an allergic skin reaction
Carc.1, H350- Carcinogenicity, category 1, H350: May cause cancer
Carc.2, H351- Carcinogenicity, category 2, H350: Suspected of causing cancer
STOT RE 1, H372- Specific target organ toxicity-repeated exposure, category 1, H372: Causes damage to organs through prolonged or repeated exposure
Aqu.Chron. 3, H412- Aquatic environment - long-term hazard, category 3, H412: Harmful to aquatic life with long lasting effects
Acute Tox. 4, H332- Acute Toxicity, category 4, H332: Harmful if inhaled.
Flam. Sol. 1, H228- Flammable solids, category, H228: Flammable solid
Pyr. Sol. 1, H250- Pyrophoric solids (liquids), category 1, H250: Catches fire spontaneously if exposed to air
Resp. Sens 1, H334- Sensitisation, respiratory, category 1, H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
Repr. 2, H361 – Reproduction, category 2, H361: Suspected of damaging fertility or the unborn child.
Water react. 1, H260- Emission of flammable gases in contact with water, category 1, H260: In contact with water releases flammable gases which may ignite spontaneously
Eye Irrit. 2, H319- Eye irritation, category 2, H319: Causes serious eye irritation.
Aq. Acute 1, H400 – Aquatic environment – acute hazard, category 1, H400: Very toxic to aquatic life
Aq. Chron. 1, H410- Aquatic environment - long-term hazard, category 1, H410: Very toxic to aquatic life with long-lasting effects

Relevant Precautionary statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):
P201: Obtain special instructions before use.
P202: Do not handle until all safety precautions have been read and understood.
P261: Avoid breathing dust.
P270: Do not eat, drink or smoke when using this product.
P271: Use only in a well-ventilated area.
P272: Contaminated work clothing should not be allowed out of the workplace.
P273: Avoid release to the environment.
P280: Wear protective gloves, protective clothing and eye protection.
P284: Wear respiratory protection.
P302+352: IF ON SKIN: Wash with plenty of soap and water.
P304+340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P312: Call a POISON CENTER or doctor/physician if you feel unwell.
P333 + P313: If skin irritation occurs: Get medical advice/attention.
P363: Wash contaminated clothing before reuse.

Relevant R-Phrases (number and full text) referred to in sections 2 and 3 (according to (EC) 67/548/EEC and 1999/45/EC):
T: Toxic
Xn: Harmful
Xi : Irritant
R40 : Limited evidence of a carcinogenic effect
R48/23: Danger of serious damage to health by prolonged exposure, Toxic by inhalation
R43 : May cause sensitisation by skin contact
R52/53 : Harmful to aquatic organisms, May cause long-term adverse effects in the aquatic environment
R11: Highly flammable
R17: Spontaneously flammable in air
R42/43: May cause sensitization by inhalation and skin contact
R15: Contact with water liberates extremely flammable gases

Relevant S-Phrases (number and full text) referred to in sections 2 and 3 (according to (EC) 67/548/EEC and 1999/45/EC):
S2 - Keep out of the reach of children
S36/37/39 - Wear suitable protective clothing, gloves and eye/face protection
S45 - In case of accident or if you feel unwell seek medical advice/attention immediately (show the label where possible)

16.2 Further information:
SDS Creation Date:............July 27th, 2016
SDS Revision #: .............00-A
SDS Revision Date:............
Reason for Revision:....../

www.3dsystems.com
800.793.3669 (Toll-free in the US GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
803.326.3900 (Outside the U.S. GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
+44 144-2282600 (Europe GMT+01:00; Mon – Fri, 08:00 a.m. - 17:00 p.m. MEZ)
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1. IDENTIFICATION OF THE PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the mixture: Nickel Alloy

1.2 Type: Nickel based superalloy
Contains the following substances with hazardous properties:
Nickel

1.3 Use of the preparation: For use with ProX® DMP 320 printers

1.4 Uses advised against:
Use of nickel in articles intended for direct and prolonged contact with the skin where the release of nickel exceeds the limit set out in Directives 94/27/EC and 2004/6/EC and REACH regulation 1907/2009 (Annex XVII).
Use of nickel in nickel-containing food contact materials for which migration into foodstuff would exceed more than 0.1 mg/kg of nickel in accordance with the Council of Europe Guidelines on metals and alloys used as food contact materials.
Use of nickel in immersion-type kettles which would release more than 0.05 mg/l of nickel into the water in accordance with the Council of Europe Guidelines on metals and alloys used as food contact materials.
Use of nickel in commercially available “do-it-yourself” home electroplating kits.

1.5 Company/undertaking identification:
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
Chemical Emergency: 800.424.9300 – Chemtrec

3D Systems Europe Ltd.
Mark House, Mark Road
Hemel Hempstead
Herts HP2 7
United Kingdom
Phone: +44 144-2282600
e-mail: moreinfo@3dsystems.com
Chemical Emergency: 703.527.3887 - Chemtrec

3D Systems / Australia
5 Lynch Street
Hawthorn, VIC 3122

3D Systems / Australia
5 Lynch Street
Hawthorn, VIC 3122

1.5 Company/undertaking identification:
3D Systems Europe Ltd.
Mark House, Mark Road
Hemel Hempstead
Herts HP2 7
United Kingdom
Phone: +44 144-2282600
e-mail: moreinfo@3dsystems.com
Chemical Emergency: 703.527.3887 - Chemtrec

2. HAZARDS IDENTIFICATION

2.1 Classification
GHS Classification
Regulation (EC) No. 1272/2008, HazCom 29 CFD 1910:

<table>
<thead>
<tr>
<th>Carcinogenicity</th>
<th>Category 2</th>
<th>H351</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Sensitization</td>
<td>Category 1</td>
<td>H317</td>
</tr>
<tr>
<td>Aquatic environment - long term hazard</td>
<td>Category 3</td>
<td>H412</td>
</tr>
<tr>
<td>Specific target organ toxicity-repeated exposure</td>
<td>Category 1</td>
<td>H372</td>
</tr>
</tbody>
</table>

Regulation (EC) 67/548/EEC and 1999/45/EC:
T; R48/23 Xn; R40 Xi; R43 R52/53

2.2 Label Elements
Hazard pictograms and signal word (Regulation (EC) No. 1272/2008):

GHS07 GHS08
Signal word: Danger
Safety Data Sheet
according to Regulation (EC) No 1907/2006 and 1272/2008,
Hazard Communication Standard 29 CFR 1910 (USA),
WHS Regulations Australia,
JIS Z 7253 (2012) Japan

LaserForm® Ni718 Type A
Revision Date: November 22nd, 2016

Hazard determining components of labelling:

Hazard statements:

H317: May cause an allergic skin reaction
H351: Suspected of causing cancer
H372: Causes damage to organs through prolonged or repeated exposure
H412: Harmful to aquatic life with long lasting effects

Precautionary statements:

P201: Obtain special instructions before use
P202: Do not handle until all safety precautions have been read and understood.
P260: Do not breathe dust.
P270: Do not eat, drink or smoke when using this product.
P271: Use only in a well-ventilated area.
P272: Contaminated work clothing should not be allowed out of the workplace.
P273: Avoid release to the environment.
P280: Wear protective gloves/protective clothing/eye protection/face protection.
P284: Wear protective gloves/protective clothing/eye protection/face protection.
P302 + P352: IF ON SKIN: Wash with plenty of soap and water.
P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P314: Get medical advice/attention if you feel unwell.
P333 + P313: If skin irritation occurs: Get medical advice/attention.
P362 + P364: Take off contaminated clothing and wash before reuse.

NFPA rating

<table>
<thead>
<tr>
<th>NFPA Ratings</th>
<th>Health</th>
<th>Flammability</th>
<th>Physical Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = Minimal</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>1 = Slight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 = Moderate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 = Serious</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 = Severe</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hazardous Materials Identification System (HMIS):

(Degree of hazard: 0 = low, 4 = extreme):

Personal Protection:
Skin, eye protection

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Chemical characterization:

Description: Metallic alloy powder
3.2 Dangerous components:

<table>
<thead>
<tr>
<th>Chemical name</th>
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<th>%</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>67/548/EEG or</td>
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<td>Nickel</td>
<td>7440-02-0</td>
<td>231-111-4</td>
<td>50-55</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>R43</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>R48/23</td>
</tr>
<tr>
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<td></td>
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<td>R52/53</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T</td>
</tr>
<tr>
<td>Nickel</td>
<td></td>
<td></td>
<td></td>
<td>Carc.2, H351</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Skin Sens. 1, H317</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td>STOT RE 1, H372</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Aqu.Chron. 3, H412</td>
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<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>231-157-5</td>
<td>17-21</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>231-096-4</td>
<td>13-24</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>7439-98-7</td>
<td>231-107-2</td>
<td>2.5-3.5</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Niobium</td>
<td>7440-03-1</td>
<td>231-113-5</td>
<td>4.5-5.5</td>
<td>R17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pyr. Sol. 1, H250</td>
</tr>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>231-158-0</td>
<td>≤1</td>
<td>R42/43</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R53</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>231-105-1</td>
<td>≤0.35</td>
<td>R11</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>R15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Water react. 1, H260</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

4.1 General Information: Ensure that eyewash stations and safety showers are close to the workstation location.

4.2 Description of First Aid Measures
Skin contact: Wash off thoroughly with soap and water. If rash develops, seek medical attention.
Eye contact: Irrigate thoroughly with water, including under the eyelids, for at least 10-20 minutes. Obtain medical attention if irritation persists.
Inhalation: Move affected person to fresh air, rest and keep warm. In severe cases, if exposure has been great, or if respiratory irritation occurs, obtain medical attention.
Ingestion: Wash out mouth thoroughly with water. Obtain medical attention if further symptoms develop.

4.2 Most important symptoms and effects, both acute and delayed
Skin Contact: Rash may develop.
Eye Contact: Mechanical irritation.
Inhalation: Possible asthma like symptoms.
Ingestion: No information

4.3 Indications of any immediate medical attention and special treatment needed
Skin Contact: Treat symptomatically
Eye Contact: Treat symptomatically
Inhalation: Treat symptomatically

4.6 Self-protection of the first aider: Put on appropriate protective equipment (see section 8). Move exposed person to fresh air.

5. FIRE-FIGHTING MEASURES

5.1. Suitable extinguishing media: The product itself is not flammable. Adapt extinguishing measures to surroundings. Use extinguishing type D powder or sand if available.
5.2 Extinguishing media which must not be used for safety reasons: High volume water jet.

5.3 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases: increased fire hazard during dust formation.

5.4 Special protective equipment for fire-fighters: breathing protection in the presence of dust.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions: Keep unnecessary personnel away. Wear appropriate protective equipment and clothing.

6.2 Environmental precautions: Take precautions to ensure product does not contaminate ground or enter the sewer or drainage system.

6.3 Methods for cleaning up:

Wear appropriate protective equipment and clothing.

<table>
<thead>
<tr>
<th>For containment:</th>
<th>not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>For cleaning up small spillage:</td>
<td>vacuum with equipment fitted with HEPA or immersion filtration.</td>
</tr>
<tr>
<td>For cleaning up large spillage:</td>
<td>solids should be carefully transferred to salvage containers. Any residues should be treated as small spillages.</td>
</tr>
<tr>
<td>Other information:</td>
<td>no information.</td>
</tr>
</tbody>
</table>

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Protective measures: Work using a suitable extraction/ventilation system.

Measures to prevent fire: Not applicable.

Measures to protect the environment: Use appropriate containment to avoid environmental hazard.

Advice on general occupational hygiene: Avoid contact with skin and eyes. Do not breathe dust. Wash hand and face thoroughly after working with material. Contaminated clothing should be removed and washed before re-use.

7.2 Conditions for safe storage

Technical measures and storage conditions: Store in sealed container in dry conditions and keep the container closed when not in use.

Packaging materials: Keep in the container supplied, or suitable metal, plastic or polythene container.

Requirements for storage rooms and vessels: Containers should be stored under cover in a clean and dry environment

Storage class: Not applicable.

Further information on storage conditions: Local regulations should be followed regarding the storage of this material.
8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure limit values:

<table>
<thead>
<tr>
<th>Exposure limits</th>
<th>OSHA/PEL</th>
<th>ACGIH/TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>1 mg/m³</td>
<td>1.5 mg/m³</td>
</tr>
<tr>
<td>Chromium</td>
<td>1 mg/m³</td>
<td>0.5 mg/m³</td>
</tr>
<tr>
<td>Iron</td>
<td></td>
<td>No exposure limit established</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>15 mg/m³ *</td>
<td>10 mg/m³ **</td>
</tr>
<tr>
<td>Niobium</td>
<td></td>
<td>No exposure limit established</td>
</tr>
<tr>
<td>Cobalt</td>
<td>0.1 mg/m³</td>
<td>0.02 mg/m³</td>
</tr>
<tr>
<td>Manganese</td>
<td>5 mg/m³</td>
<td>0.2 mg/m³</td>
</tr>
</tbody>
</table>

* insoluble compounds, total dust  
** insoluble compounds, inhalable

8.2 Exposure 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. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Instructual measures to prevent exposure:

Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Wash hands after handling and before eating, smoking and using the lavatory and at the end of the day.

Personal protection equipment:

Respiratory protection: If ventilation cannot effectively keep dust concentrations below established limits, appropriate certified respiratory protection must be provided. Use a dust mask or filter apparatus of minimal level FFP3.

Hand protection: Use impervious nitrile gloves.

Eye protection: Wear safety glasses or chemical goggles.

Body protection: Use long sleeved antistatic garments and closed, antistatic safety shoes.
9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance:
Physical state: Powder
Colour: Gray
Odour: Odourless

9.2 Important health, safety and environmental information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (20 °C)</td>
<td>NA</td>
</tr>
<tr>
<td>Melting point/range (°C)</td>
<td>1354 - 1413</td>
</tr>
<tr>
<td>Boiling point/range (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Flash point (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Ignition temperature (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Vapour pressure (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Density (g/cm³):</td>
<td>8.19</td>
</tr>
<tr>
<td>Bulk density (kg/m³):</td>
<td>No Data</td>
</tr>
<tr>
<td>Water solubility (20°C in g/l):</td>
<td>No Data</td>
</tr>
<tr>
<td>Viscosity:</td>
<td>NA</td>
</tr>
<tr>
<td>Auto-ignition temperature:</td>
<td>No Data</td>
</tr>
<tr>
<td>Decomposition temperature:</td>
<td>No Data</td>
</tr>
<tr>
<td>Dust explosion hazard:</td>
<td>No Data</td>
</tr>
<tr>
<td>Explosive properties:</td>
<td>No Data</td>
</tr>
<tr>
<td>Oxidising properties:</td>
<td>No Data</td>
</tr>
<tr>
<td>Particle size</td>
<td>100% &lt;1mm</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

10.1 Chemical Stability: Stable under normal conditions and under recommended storage conditions

10.2 Reactivity: No data.

10.3 Possibility of hazardous reactions: No Data

10.4 Conditions to avoid: Prevent formation of dust clouds and accumulation of fines.

10.5 Incompatible materials: oxidizing agents, strong acids and strong bases.

10.6 Hazardous decomposition products: No data.

11. TOXICOLOGICAL INFORMATION

11.1 Likely Routes of Exposure:
Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

11.2 Symptoms of Exposure:
Fines/dusts may irritate skin and eyes.
11.2 Acute and chronic effects:

**Nickel:** The most common harmful health effect of metallic nickel in humans is an allergic skin reaction in those who are sensitive to nickel. Although nickel compounds are known human carcinogens, the evidence suggests that the relatively insoluble metallic nickel is less likely to present a carcinogenic hazard than are the nickel compounds that tend to release proportionately more nickel ion.

**Chromium:** Although much is known about the health effects of chromium compounds, the health effects of chromium metal, Cr(0), is not well studied. Due to insolubility most elements in their metallic state are not considered to be serious health hazards.

**Iron:** Irritating to the respiratory tract, iron compounds may cause pulmonary fibrosis if dusts are inhaled. Inhalation of large amounts may cause iron pneumoconiosis. Chronic inhalation of finely divided powder may cause chronic iron poisoning and pathological deposition of iron in the body tissue. Ingestion may cause vomiting, diarrhea, pink urine, black stool, and liver damage. Iron compounds may also cause damage to the kidneys.

**Molybdenum:** No data

**Tungsten:** No data

**Niobium:** No data

**Cobalt:** Acute exposure to cobalt metal dusts or fumes is characterized by irritation to the eyes, and to a lesser extent, irritation to the skin. Chronic exposure to cobalt metal dust or fumes may cause respiratory and dermatologic signs and symptoms. Chronic exposure to cobalt by inhalation in humans results in effects on the respiratory system, such as respiratory irritation, wheezing, asthma, decreased lung function, pneumonia, and fibrosis.

**Manganese:** Chronic inhalation exposure of humans to high levels of manganese may result in a syndrome called manganism which typically begins with feelings of weakness and lethargy and progresses to other symptoms such as gait disturbances, clumsiness, tremors, speech disturbances, a mask-like facial expression and psychological disturbances. Manganese is an essential micronutrient in humans.

**Acute Toxicity:** No data

**Carcinogenicity:**

- **Nickel:** NTP: R - reasonably anticipated to be a human carcinogen; IARC: 2B - possibly carcinogenic to humans
- **Cobalt:** NTP: R - reasonably anticipated to be a human carcinogen; IARC: 2B - possibly carcinogenic to humans

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.
12. Ecological information
12.1. Toxicity

Long-term Ecotoxicity May cause long-term adverse effects in the aquatic environment

12.2. Persistence and degradability

Abiotic Degradation No data available
Physical-and photo-chemical elimination No data available
Biodegradation Not readily biodegradable.

12.3. Biocumulative potential

Bioconcentration factor (BCF) No data available

12.4. Mobility in soil

Known or predicted distribution to environmental compartments No data
Adsorption/Desorption No data available

12.7 Additional information

Do not allow product to enter drains. Do not flush into surface water. Do not let product contaminate subsoil.

13. DISPOSAL CONSIDERATIONS

13.1 Appropriate disposal / Product: Do not contaminate sewers, drains, soil or surface waters with this material. Reduce waste by attempting to utilize product completely. Dispose of this container and its contents in accordance with all local, state, and federal regulations.

13.2 Packaging disposal: Consult local and national guidelines for the disposal of discarded packaging.

13.3 Additional information: Prior to disposal 3D Systems recommends consulting your local waste disposal authority or an approved waste disposal firm to ensure regulatory compliance.

14. TRANSPORT INFORMATION

UN Number None
UN proper shipping name Not classified hazardous for transport
Transport hazard class(es) Not applicable
Packing group Not applicable
Label(s) Not applicable
Environmental hazards None
Special precautions for user Always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.
15. REGULATORY INFORMATION

15.1 EU regulations
EINEC/ELINCS/NLP: All materials are listed
REACH Annex XVII: None listed

15.2. US FEDERAL
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): All components are listed or exempted
SARA 302/304: No products were found.
SARA 311/312: Hazards identification: Immediate (acute) health hazard, Delayed (chronic) health hazard
Clean Water Act (CWA) 307: chromium; Nickel

15.3 Canada
WHMIS: Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).
NPRI: The following components are listed: Cobalt (and its compounds); Chromium (and its compounds)

15.4 Australian regulations
SUSDP, Industrial Chemicals Act 1989:
Australian Inventory of Chemical Substances, AICS: Listed

15.5 Japanese regulations
Chemical Substance: Pneumoconiosis Act
Dust Disability Prevention Rules

Components:
Cobalt: ISHL: Cobalt and its compounds, Deliver of Documents, etc. Articles 57-2,18-2
(CMSDS), Table 9-172, ≥0.1%
Cobalt and its inorganic compounds, Labeling, etc. Articles 57.18, Table 9-04, ≥0.1%
Cobalt and its inorganic compounds, Specific Chemical Substances Disability Prevention Rules, 13-2
PRTR: Cobalt and its compounds, Designated Class I Substance, I-132 (previously 1-100), ≥1%
Ship Safety Act: Combustible material, Pyrophoric substance
Combustible material, Flammable substance
Aviation Law: Transport ban; combustible material, pyrophoric substance (194-1)
Clean Air Act: Cobalt and its compound, Hazardous Air Pollutants/ No. 60 of Environmental Council 9th report
Labor Standards Act: Cobalt and its compounds, Rule No. 75-2

Chromium:
Water Pollution Control Law: Designated Substances
PRTR: Chromium and Chromium(III) compounds, Designated Class I Substance, I-87, ≥1%
ISHL: Chromium and Chromium(III) compounds, Articles 57-2 and 18-2, Table 9-142, ≥0.1%
Air Pollution Control Law: Hazardous Air Pollutants/Priority Initiative No. 49
Waste Disposal and Public Cleaning Law: Article 29

Nickel:
Water Pollution Control Law: Designated Substances
PRTR: Nickel, Designated Class I Substance, I-308
ISHL: Nickel and its compounds, Articles 57-2 and 18-2, Table 9-418, ≥0.1%
Specific Chemical Substances Disability Prevention Rules: Nickel compounds, 2-23
Clean Air Act: Hazardous Air Pollutants, No. 148
Labor Standards Act: carcinogenic substance (cancer of the upper respiratory tract or lung from working in the smelting or refining of nickel)
Manganese: PRTR: Manganese and its compounds, Designated Class I Substance, I-412, ≥1% ISHL: Manganese and its compounds, Articles 57-2 and 18-2, Table 9-550, ≥1% Water Pollution Control Law: Designated Substance Specific Chemical Substances Disability Prevention Rules: Designated Substance, 2-33 Clean Air Act: Hazardous Air Pollutants, No. 225

Molybdenum: Water Pollution Control Law: Designated Substance Clean Air Act: Hazardous Air Pollutants, No. 243

16.1 Relevant Hazard and Precautionary Statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):
Skin sens. 1, H317- Skin sensitization, category 1, H317: May cause an allergic skin reaction Carc.2, H351- Carcinogenicity, category 2, H351: Suspected of causing cancer STOT RE 1, H372- Specific target organ toxicity-repeated exposure, category 1, H372: Causes damage to organs through prolonged or repeated exposure Aqu.Chron. 3, H412- Aquatic environment - long-term hazard, category 3, H412: Harmful to aquatic life with long lasting effects Flam. Sol. 1, H228- Flammable solids, category, H228: Flammable solid Pyr. Sol. 1, H250- Pyrophoric solids (liquids), category 1, H250: Catches fire spontaneously if exposed to air Resp. Sens 1, H334- Sensitisation, respiratory, category 1, H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled Water react. 1, H260- Emission of flammable gases in contact with water, category 1, H260: In contact with water releases flammable gases which may ignite spontaneously Aqu. Chron. 4, H413- Aquatic environment - long-term hazard, category 4, H413: May cause long lasting harmful effects in the aquatic life

Relevant Precautionary statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):
P201: Obtain special instructions before use P202: Do not handle until all safety precautions have been read and understood. P260: Do not breathe dust. P270: Do not eat, drink or smoke when using this product. P271: Use only in a well-ventilated area. P272: Contaminated work clothing should not be allowed out of the workplace. P273: Avoid release to the environment P280: Wear protective gloves/protective clothing/eye protection/face protection. P284: Wear respiratory protection.

Relevant R-Phrases (number and full text) referred to in sections 2 and 3 (according to (EC) 67/548/EEC and 1999/45/EC):
T: Toxic Xn: Harmfull Xi : Irritant R40 : Limited evidence of a carcinogenic effect R48/23 : Danger of serious damage to health by prolonged exposure, Toxic by inhalation R43 : May cause sensitisation by skin contact R52/53 : Harmful to aquatic organisms, May cause long-term adverse effects in the aquatic environment R11: Highly flammable R17: Spontaneously flammable in air R42/43: May cause sensitization by inhalation and skin contact R15: Contact with water liberates extremely flammable gases
Safety Data Sheet
according to Regulation (EC) No 1907/2006 and 1272/2008,
Hazard Communication Standard 29 CFR 1910 (USA),
WHS Regulations Australia,
JIS Z 7253 (2012) Japan

LaserForm® Ni718 Type A
Revision Date: November 22nd, 2016

16.2 Further information:
SDS Creation Date:........... November 5th, 2015
SDS Revision #: ............00-C
SDS Revision Date:........... November 22nd, 2016
Reason for Revision: ...... Added additional P-phrases in accordance to GHS rev 6; Updated 3DSystems logo

www.3dsystems.com
800.793.3669  (Toll-free in the US GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
803.326.3900  (Outside the U.S. GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
+44 144-2282600  (Europe GMT+01:00; Mon – Fri, 08:00 a.m. - 17:00 p.m. MEZ)

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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
Australia
Phone: +61 39819-4422
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
Phone: +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)-3-5798-2500

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of substance or mixture
OSHA/HCS status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

2.1.1 Classification

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Category</th>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>EYE IRRITATION</td>
<td>2A</td>
<td>H319</td>
</tr>
<tr>
<td>RESPIRATORY SENSITIZATION</td>
<td>1</td>
<td>H334</td>
</tr>
<tr>
<td>SKIN SENSITIZATION</td>
<td>1</td>
<td>H317</td>
</tr>
<tr>
<td>CARCINOGENICITY</td>
<td>2</td>
<td>H351</td>
</tr>
<tr>
<td>TOXIC TO REPRODUCTION (Fertility)</td>
<td>2</td>
<td>H361f</td>
</tr>
<tr>
<td>SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE)</td>
<td>1</td>
<td>H372</td>
</tr>
<tr>
<td>AQUATIC HAZARD (ACUTE)</td>
<td>1</td>
<td>H401</td>
</tr>
<tr>
<td>AQUATIC HAZARD (LONG-TERM)</td>
<td>2</td>
<td>H411</td>
</tr>
</tbody>
</table>

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.
P202 : Do not handle until all safety precautions have been read and understood.
P260 : Do not breathe dust.
P264 : Wash hands thoroughly after handling.
P270 : Do not eat, drink or smoke when using this product.
P272 : Contaminated work clothing should not be allowed out of the workplace.
P273 : Avoid release to the environment.
P280 : Wear protective gloves, protective clothing and eye protection or face protection.
P284 : Wear respiratory protection.
P302+P352 : IF ON SKIN: Wash with plenty of soap and water.
P304+P340 : IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338 : IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313 : IF exposed or concerned: Get medical advice/attention.
P314 : Get medical attention if you feel unwell.
P333+P313 : If skin irritation or rash occurs: Get medical advice/attention.
P337+P313 : If eye irritation persists: Get medical advice/attention.
P342+P311 : If experiencing respiratory symptoms: Call a POISON CENTER or physician.
P362+P364 : Take off contaminated clothing. And wash it before reuse.
P391 : Collect spillage.
P405 : Store locked up.
P501 : Dispose of contents and container in accordance with all local, regional, national and international regulations.

2.3 Other Hazards which do not result in classification:
None known.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Substance/mixture:</th>
<th>Mixture</th>
</tr>
</thead>
</table>

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

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 and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.
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:** Causes serious eye irritation.

- **Inhalation:** Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

- **Skin Contact:** May cause an allergic skin reaction.

- **Ingestion:** No known significant effects or critical hazards.

**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 (CO₂) or Halon.

5.2 Special hazards arising from the substance or mixture
- **Hazards from the substance or mixture:** This material is very toxic to aquatic life. This material is toxic to aquatic life with long lasting effects. Fire 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.
- **Special protective equipment for firefighters:** Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

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 spilled material. 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 spill 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:** 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 release to the environment. 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. 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. Empty containers retain product residue and can be hazardous. Do not reuse container.

- **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.

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. See Section 10 for incompatible materials before handling or use.

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**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Exposure limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>nickel</td>
<td>ACGIH TLV (United States, 4/2014). Notes: Refers to Appendix A -- Carcinogens. Inhalable fraction. See Appendix C, paragraph A. Inhalable Particulate Mass TLVs (IPM–TLVs) for those materials that are hazardous when deposited anywhere in the respiratory tract. 1998 Adaption. TWA: 1.5 mg/m³ 8 hours. Form: Inhalable fraction OSHA PEL (United States, 2/2013). Notes: as Ni TWA: 1 mg/m³, (as Ni) 8 hours. NIOSH REL (United States, 10/2013). TWA: 0.015 mg/m³, (as Ni) 10 hours.</td>
</tr>
<tr>
<td>Cobalt</td>
<td>ACGIH TLV (United States, 3/2016). TWA: 0.02 mg/m³, (as Co) 8 hours. TWA: 0.005 mg/m³ 8 hours. Form: Thoracic fraction NIOSH REL (United States, 10/2013). TWA: 0.05 mg/m³, (as Co) 10 hours. Form: Dust and fumes OSHA PEL (United States, 6/2016). TWA: 0.1 mg/m³, (as Co) 8 hours.</td>
</tr>
</tbody>
</table>
8.2 Exposure controls
8.2.1 Appropriate 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 Personal 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.

Body 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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid. [Metallic Powder.]</td>
</tr>
<tr>
<td>Colour</td>
<td>Grey.</td>
</tr>
<tr>
<td>Odour</td>
<td>Odourless.</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>Not available</td>
</tr>
<tr>
<td>pH</td>
<td>Not available</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>1370 - 1455°C</td>
</tr>
</tbody>
</table>
**Safety Data Sheet**  
**LaserForm® Maraging Steel (A)**  
Revision Date: March 03\textsuperscript{rd}, 2018

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**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 E 1491]: >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.

**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

**Irritation/Corrosion**
- Conclusion/Summary: Not available

**Sensitisation**
- Conclusion/Summary: Not available

**Mutagenicity**
- Conclusion/Summary: Not available

**Carcinogenicity**

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>OSHA</th>
<th>IARC</th>
<th>NTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>nickel</td>
<td>-</td>
<td>2B</td>
<td>Reasonably anticipated to be a human carcinogen.</td>
</tr>
<tr>
<td>cobalt</td>
<td>-</td>
<td>2B</td>
<td>-</td>
</tr>
</tbody>
</table>

**Reproductive toxicity**
- Conclusion/Summary: Not available

---

SDS • LaserForm® Maraging Steel (A) • 15-0166-S12-00-B • ENGLISH (US) • GHS
Teratogenicity

Conclusion/Summary : Not available

Specific target organ toxicity (single exposure)

Conclusion/Summary : Not available

Specific target organ toxicity (repeated exposure)

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Category</th>
<th>Route of exposure</th>
<th>Target Organs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>Category 1</td>
<td>Not determined</td>
<td>Not determined</td>
</tr>
</tbody>
</table>

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 : Causes serious eye irritation.

Inhalation : Exposure to airborne concentrations above statutory or recommended exposure limits may cause irritation of the nose, throat and lungs. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Skin contact : May cause an allergic skin reaction

Ingestion : No known significant effects or critical hazards.

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: No known significant effects or critical hazards

SECTION 12. Ecological information

12.1 Toxicity

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>cobalt</td>
<td>Acute LC50 4400 µg/l</td>
<td>Daphnia – Daphnia magna</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Acute LC50 3.4 mg/l Fresh water</td>
<td>Fish – Pimephales promelas</td>
<td>96 hours</td>
</tr>
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</table>

12.2 Persistence and degradability

Conclusion/Summary: Not available

12.3 Bioaccumulative potential

<table>
<thead>
<tr>
<th>Product/ingredient name</th>
<th>LogP_{ow}</th>
<th>BCF</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>-</td>
<td>15600</td>
<td>high</td>
</tr>
</tbody>
</table>

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 spill material and runoff and contact with soil, waterways, drains and sewers.
SECTION 14. Transport information

<table>
<thead>
<tr>
<th>DOT Classification</th>
<th>TDG Classification</th>
<th>Mexico Classification</th>
<th>ADR/RID</th>
<th>IMDG</th>
<th>IATA</th>
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<tbody>
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<td>UN proper shipping name</td>
<td>Environmentally hazardous substance, solid, n.o.s. (cobalt, Nickel)</td>
<td>Environmentally hazardous substance, solid, n.o.s. (cobalt)</td>
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<td>III</td>
<td>III</td>
<td>III</td>
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<tr>
<td>Environmental hazards</td>
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<td>Yes.</td>
<td>Yes.</td>
<td>Yes.</td>
<td>Yes.</td>
</tr>
</tbody>
</table>

Additional information

**DOT Classification**
Reportable quantity: 10 lbs / 4.54 kg. The classification of the product is due solely to the presence of one or more US DOT-listed ‘Hazardous substances’ that are subject to reportable quantity requirements and only applies to shipments of packages greater than, or equal to, the product reportable quantity. Package sizes less than the product reportable quantity are not regulated as hazardous materials.

**Remarks**
Subject to 49 CFR Chapter 171.4 (c) (2)

**TDG Classification**
Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.43-2.45 (Class 9), 2.7 (Marine pollutant mark). Non-bulk packages of this product are not regulated as dangerous goods when transported by road or rail.

**Remarks**
Subject to TDG Special Provision 99 (2)

**Mexico Classification**
The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg.

**ADR/RID**
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 ADR Special Provision A375

**IMDG**
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

**IATA**
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

**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 the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code
Not available.
SECTION 15: Regulatory information

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

U.S. Federal regulations
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
Clean Water Act (CWA) 307: Nickel

Clean Air Act
Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed
Section 602 Class I Substances : Not listed
Section 602 Class II Substances : Not listed

DEA
List I Chemicals (Precursor Chemicals) : Not listed
List II Chemicals (Essential Chemicals) : Not listed

SARA
302/304
Composition/information on ingredients : No products were found
304 RQ : Not applicable.

311/312
Classification : Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients:

<table>
<thead>
<tr>
<th>Name</th>
<th>%</th>
<th>Fire hazard</th>
<th>Sudden release of pressure</th>
<th>Reactive</th>
<th>Immediate (acute) health hazard</th>
<th>Delayed (chronic) health hazard</th>
</tr>
</thead>
</table>

313

<table>
<thead>
<tr>
<th>Form – Reporting requirements</th>
<th>Product name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier notification</td>
<td>Nickel</td>
<td>7440-02-0</td>
<td>≥10 - ≤25</td>
</tr>
<tr>
<td></td>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>≥10 - ≤25</td>
</tr>
</tbody>
</table>

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

STATE REGULATIONS
Massachusetts: The following components are listed: NICKEL; COBALT; MOLYBDENUM
New York : The following components are listed: Nickel
New Jersey : The following components are listed: NICKEL; COBALT; MOLYBDENUM; TITANIUM
Pennsylvania : The following components are listed: NICKEL; COBALT FUME; MOLYBDENUM
California Prop. 65
WARNING: This product contains a chemical known to the State of California to cause cancer.

<table>
<thead>
<tr>
<th>Ingredient name</th>
<th>Cancer</th>
<th>Reproductive</th>
<th>No significant risk level</th>
<th>Maximum acceptable dosage level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>Yes.</td>
<td>No.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cobalt metal powder</td>
<td>Yes.</td>
<td>No.</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

INTERNATIONAL REGULATIONS
UN ECE Aarhus Protocol on POPs and Heavy Metals : Not listed.

INVENTORY LIST
United States : All components are listed or exempted.
15.2 Chemical Safety Assessment
This product contains substances for which Chemical Safety Assessments are still required.

SECTION 16. OTHER INFORMATION

National Fire Protection Association (U.S.A.)

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Abbreviations and acronyms
ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
UN = United Nations

Procedure used to derive the classification

<table>
<thead>
<tr>
<th>Classification</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye Irritation - Category 2A - H319</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Respiratory Sensitization - Category 1 - H334</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Skin Sensitization - Category 1 - H317</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Carcinogenicity - Category 2 - H351</td>
<td>Expert judgment</td>
</tr>
<tr>
<td>Toxic to reproduction (fertility) - Category 2 - H361f</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Specific Target Organ Toxicity (Repeated Exposure) - Category 1 - H372</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Aquatic Hazard (acute) - Category 1 - H400</td>
<td>Calculation method</td>
</tr>
<tr>
<td>Aquatic Hazard (long-term) - Category 2 - H411</td>
<td>Calculation method</td>
</tr>
</tbody>
</table>

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.

SDS information
Creation date : October 12th, 2017
Revision     : 00-B
Revision date : March 03th, 2018
Revision changes : Addition of H sentence (H400) and explosion/flammability test results.
Notice to reader
To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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800.793.3669 (Toll-free in the US GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
803.326.3900 (Outside the U.S. GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
+44 144-2282800 (Europe GMT+01:00; Mon – Fri, 08:00 a.m. - 17:00 p.m. MEZ)

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1. IDENTIFICATION OF THE PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the mixture: Stainless steel 316L

1.2 Type: Stainless steel, X 2 CrNiMo 17 12 2
Contains the following substances with hazardous properties: Nickel

1.3 Use of the preparation: For use with ProX® DMP 320 Direct Metal Printers

1.4 Uses advised against:
Use of nickel in articles intended for direct and prolonged contact with the skin where the release of nickel exceeds the limit set out in Directives 94/27/EC and 2004/6/EC and REACH regulation 1907/2009 (Annex XVII).
Use of nickel in nickel-containing food contact materials for which migration into foodstuff would exceed more than 0.1 mg/kg of nickel in accordance with the Council of Europe Guidelines on metals and alloys used as food contact materials
Use of nickel in immersion-type kettles which would release more than 0.05 mg/l of nickel into the water in accordance with the Council of Europe Guidelines on metals and alloys used as food contact materials.
Use of nickel in commercially available “do-it-yourself” home electroplating kits.

1.5 Company/undertaking identification:
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
Chemical Emergency: 800.424.9300 – Chemtrec

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Hemel Hempstead
Herts HP2 7
United Kingdom
Phone: +44 144-2282600
e-mail: moreinfo@3dsystems.com
Chemical Emergency: 703.527.3887 - Chemtrec

3D Systems / Australia
5 Lynch Street
Hawthorn, VIC 3122

3D Systems / Australia
5 Lynch Street
Hawthorn, VIC 3122

2. HAZARDS IDENTIFICATION

2.1 Classification
GHS Classification Regulation (EC) No. 1272/2008, HazCom 29 CFD 1910:

<table>
<thead>
<tr>
<th>Carcinogenicity</th>
<th>Category 2</th>
<th>H351</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Sensitization</td>
<td>Category 1</td>
<td>H317</td>
</tr>
<tr>
<td>Aquatic environment - long term hazard</td>
<td>Category 3</td>
<td>H412</td>
</tr>
<tr>
<td>Specific target organ toxicity-repeated exposure</td>
<td>Category 1</td>
<td>H372</td>
</tr>
</tbody>
</table>

Regulation (EC) 67/548/EEC and 1999/45/EC:
T; R48/23 Xn; R40 Xi; R43 R52/53

2.2 Label Elements:
Hazard pictograms and signal word (Regulation (EC) No. 1272/2008):

GHS07 GHS08
Signal word: Danger
3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Chemical characterization:

Description: Metallic alloy powder

3.2 Dangerous components:

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No</th>
<th>EC-No</th>
<th>%</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>231-111-4</td>
<td>12.5-13</td>
<td>Regulation 67/548/EEG or 1999/45/EG R40 R43 R48/23 R52/53</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>231-157-5</td>
<td>17.5-18</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-99-6</td>
<td>231-096-4</td>
<td>63-65</td>
<td>Flam. Sol. 1, H228 R11</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>7439-98-7</td>
<td>231-107-2</td>
<td>2.25-2.5</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

4.1 General Information: Ensure that eyewash stations and safety showers are close to the workstation location.
4.2 Description of First Aid Measures
Skin contact: Wash off thoroughly with soap and water. If rash develops, seek medical attention.
Eye contact: Irrigate thoroughly with water, including under the eyelids, for at least 10-20 minutes. Obtain medical attention if irritation persists.
Inhalation: Move affected person to fresh air, rest and keep warm. In severe cases, if exposure has been great, or if respiratory irritation occurs, obtain medical attention.
Ingestion: Wash out mouth thoroughly with water. Obtain medical attention if further symptoms develop.

4.2 Most important symptoms and effects, both acute and delayed
Skin Contact: Rash may develop.
Eye Contact: Mechanical irritation.
Inhalation: Possible asthma like symptoms.
Ingestion: No information

4.3 Indications of any immediate medical attention and special treatment needed
Skin Contact: Treat symptomatically
Eye Contact: Treat symptomatically
Inhalation: Treat symptomatically

4.6 Self-protection of the first aider: Put on appropriate protective equipment (see section 8). Move exposed person to fresh air.

5. FIRE-FIGHTING MEASURES

5.1. Suitable extinguishing media: The product itself is not flammable. Adapt extinguishing measures to surroundings. Use extinguishing type D powder or sand if available.

5.2 Extinguishing media which must not be used for safety reasons: High volume water jet.

5.3 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases: increased fire hazard during dust formation.

5.4 Special protective equipment for fire-fighters: breathing protection in the presence of dust.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions: Keep unnecessary personnel away. Wear appropriate protective equipment and clothing.

6.2 Environmental precautions: Take precautions to ensure product does not contaminate ground or enter the sewer or drainage system.

6.3 Methods for cleaning up:
Wear appropriate protective equipment and clothing.

For containment: not applicable
For cleaning up small spillage: vacuum with equipment fitted with HEPA or immersion filtration.
For cleaning up large spillage: solids should be carefully transferred to salvage containers. Any residues should be treated as small spillages.
Other information: no information.
7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Protective measures: Work using a suitable extraction/ventilation system.

Measures to prevent fire: Not applicable.

Measures to protect the environment: Use appropriate containment to avoid environmental hazard.

Advice on general occupational hygiene: Avoid contact with skin and eyes. Do not breathe dust. Wash hand and face thoroughly after working with material. Contaminated clothing should be removed and washed before re-use.

7.2 Conditions for safe storage

Technical measures and storage conditions: Store in sealed container in dry conditions and keep the container closed when not in use.

Packaging materials: Keep in the container supplied, or suitable metal, plastic or polythene container.

Requirements for storage rooms and vessels: Containers should be stored under cover in a clean and dry environment

Storage class: Not applicable.

Further information on storage conditions: Local regulations should be followed regarding the storage of this material.

---

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure limit values:

<table>
<thead>
<tr>
<th>Substance</th>
<th>OSHA/PEL</th>
<th>ACGIH/TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>1 mg/m³</td>
<td>1.5 mg/m³</td>
</tr>
<tr>
<td>Chromium</td>
<td>1 mg/m³</td>
<td>0.5 mg/m³</td>
</tr>
<tr>
<td>Iron</td>
<td>No limit</td>
<td></td>
</tr>
<tr>
<td>Molybdenum</td>
<td>15 mg/m³</td>
<td>10 mg/m³ **</td>
</tr>
</tbody>
</table>

8.2 Exposure 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. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Instructual measures to prevent exposure:

Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Wash hands after handling and before eating, smoking and using the lavatory and at the end of the day.
Personal protection equipment:
- **Respiratory protection:** If ventilation cannot effectively keep dust concentrations below established limits, appropriate certified respiratory protection must be provided. Use a dust mask or filter apparatus of minimal level FFP3.
- **Hand protection:** Use impervious nitrile gloves.
- **Eye protection:** Wear safety glasses or chemical goggles.
- **Body protection:** Use long sleeved antistatic garments and closed, antistatic safety shoes.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance:
- **Physical state:** Powder
- **Colour:** Gray
- **Odour:** Odourless

9.2 Important health, safety and environmental information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (20 °C):</td>
<td>NA</td>
</tr>
<tr>
<td>Melting point/range (°C):</td>
<td>1370 - 1455</td>
</tr>
<tr>
<td>Boiling point/range (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Flash point (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Ignition temperature (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Vapour pressure (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Density (g/cm³):</td>
<td>8</td>
</tr>
<tr>
<td>Bulk density (kg/m³):</td>
<td>No Data</td>
</tr>
<tr>
<td>Water solubility (20°C in g/l):</td>
<td>No Data</td>
</tr>
<tr>
<td>Viscosity:</td>
<td>NA</td>
</tr>
<tr>
<td>Auto-ignition temperature:</td>
<td>No Data</td>
</tr>
<tr>
<td>Decomposition temperature:</td>
<td>No Data</td>
</tr>
<tr>
<td>Dust explosion hazard:</td>
<td>No Data</td>
</tr>
<tr>
<td>Explosive properties:</td>
<td>No Data</td>
</tr>
<tr>
<td>Oxidising properties:</td>
<td>No Data</td>
</tr>
<tr>
<td>Particle size</td>
<td>100% &lt;1mm</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

10.1 Chemical Stability: Stable under normal conditions and under recommended storage conditions

10.2 Reactivity: No data.

10.3 Possibility of hazardous reactions: No Data

10.4 Conditions to avoid: Prevent formation of dust clouds and accumulation of fines.

10.5 Incompatible materials: oxidizing agents. strong acids and strong bases.

10.6 Hazardous decomposition products: No data.
11. TOXICOLOGICAL INFORMATION

11.1 Likely Routes of Exposure:

Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

11.2 Symptoms of Exposure:

Fines/dusts may irritate skin and eyes.

11.2 Acute and chronic effects:

**Nickel:** The most common harmful health effect of metallic nickel in humans is an allergic skin reaction in those who are sensitive to nickel. Although nickel compounds are known human carcinogens, the evidence suggests that the relatively insoluble metallic nickel is less likely to present a carcinogenic hazard than are the nickel compounds that tend to release proportionately more nickel ion.

**Chromium:** Although much is known about the health effects of chromium compounds, the health effects of chromium metal, Cr(0), is not well studied. Due to insolubility most elements in their metallic state are not considered to be serious health hazards.

**Iron:** Irritating to the respiratory tract, iron compounds may cause pulmonary fibrosis if dusts are inhaled. Inhalation of large amounts may cause iron pneumoconiosis. Chronic inhalation of finely divided powder may cause chronic iron poisoning and pathological deposition of iron in the body tissue. Ingestion may cause vomiting, diarrhea, pink urine, black stool, and liver damage. Iron compounds may also cause damage to the kidneys.

**Molybdenum:** No data

**Acute Toxicity:** No data

**Carcinogenicity:** Nickel: NTP: R - reasonably anticipated to be a human carcinogen; IARC: 2B - possibly carcinogenic to humans

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12. Ecological information

12.1. Toxicity

**Long-term Ecotoxicity**

May cause long-term adverse effects in the aquatic environment

12.2. Persistence and degradability

**Abiotic Degradation**

No data available

**Physical-and photo-chemical elimination**

No data available

**Biodegradation**

Not readily biodegradable.

12.3. Bioaccumulative potential

**Bioconcentration factor (BCF)**

No data available
12.4. Mobility in soil

Known or predicted distribution to environmental compartments: No data

Adsorption/Desorption: No data available

12.7 Additional information

Do not allow product to enter drains. Do not flush into surface water. Do not let product contaminate subsoil.

13. DISPOSAL CONSIDERATIONS

13.1 Appropriate disposal / Product: Do not contaminate sewers, drains, soil or surface waters with this material. Reduce waste by attempting to utilize product completely. Dispose of this container and its contents in accordance with all local, state, and federal regulations.

13.2 Packaging disposal: Consult local and national guidelines for the disposal of discarded packaging.

13.3 Additional information: Prior to disposal 3D Systems recommends consulting your local waste disposal authority or an approved waste disposal firm to ensure regulatory compliance.

14. TRANSPORT INFORMATION

UN Number: None

UN proper shipping name: Not classified hazardous for transport

Transport hazard class(es): Not applicable

Packing group: Not applicable

Environmental hazards: May cause long-term adverse effects in the aquatic environment

Special precautions for user: None

Transport in bulk according to Annex II of MARPOL73/78 and the IPBC code: Not applicable

15. REGULATORY INFORMATION

15.1 EU regulations
EINEC/ELINCS/NLP: All materials are listed
REACH Annex XVII: None listed

15.2 National EU regulations
Wassergefährdungsklasse (water hazard class, Germany): WGK 2: Hazard to waters

15.3. US FEDERAL
TSCA: All materials are listed on the TSCA Inventory or are not subject to TSCA requirements
SARA 302 EHS List (40 CFR 355 Appendix A): None listed
SARA 313 (40 CFR 372.65):
CERCLA (40 CFR 302.4): None listed

15.4 Australian regulations
SUSDP, Industrial Chemicals Act 1989:
Australian Inventory of Chemical Substances, AICS: Listed
15.5 Japanese regulations

**Chemical Substance:** Pneumoconiosis Act
- Dust Disability Prevention Rules

**Iron:** Water Pollution Control Law: Designated Substance

**Chromium:**
- Water Pollution Control Law: Designated Substance
- PRTR: Chromium and Chromium(III) compounds, Designated Class I Substance, I-87, ≥1%
- ISHL: Chromium and Chromium(III) compounds, Articles 57-2 and 18-2, Table 9-142, ≥0.1%
- Air Pollution Control Law: Hazardous Air Pollutants/Priority Initiative No. 49
- Waste Disposal and Public Cleaning Law: Article 29

**Nickel:**
- Water Pollution Control Law: Designated Substance
- PRTR: Nickel, Designated Class I Substance, I-308
- ISHL: Nickel and its compounds, Articles 57-2 and 18-2, Table 9-418, ≥0.1%
- Specific Chemical Substances Disability Prevention Rules: Nickel compounds, 2-23
- Clean Air Act: Hazardous Air Pollutants, No. 148
- Labor Standards Act: carcinogenic substance (cancer of the upper respiratory tract or lung from working in the smelting or refining of nickel)
- Ship Safety Act: pyrophoric substances (metal catalyst containing nickel)
- Aviation Law: pyrophoric substances (metal catalyst containing nickel)
- Port Regulations Law: pyrophoric substances (metal catalyst containing nickel)
- Waste Disposal and Public Cleaning Law: Article 30

**Molybdenum:** Water Pollution Control Law: Designated Substance
- Clean Air Act: Hazardous Air Pollutants, No. 243

**OTHER INFORMATION**

16.1 Relevant Hazard Statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):

- **Skin sens. 1, H 317-** Skin sensitization, category 1, H317: May cause an allergic skin reaction
- **Carc.2, H351-** Carcinogenicity, category 2, H351: Suspected of causing cancer
- **STOT RE 1, H372-** Specific target organ toxicity-repeated exposure, category 1, H372: Causes damage to organs through prolonged or repeated exposure
- **Aqu.Chron. 3, H412-** Aquatic environment - long-term hazard, category 3, H412: Harmful to aquatic life with long lasting effects
- **Flam. Sol.1, H228-** Flammable solids, category 1, H228: Flammable solid
Relevant Precautionary statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):

- P201: Obtain special instructions before use.
- P202: Do not handle until all safety precautions have been read and understood.
- P260: Do not breathe dust.
- P270: Do not eat, drink or smoke when using this product.
- P271: Use only in a well-ventilated area.
- P272: Contaminated work clothing should not be allowed out of the workplace.
- P273: Avoid release to the environment.
- P280: Wear protective gloves/protective clothing/eye protection/face protection.
- P284: Wear respiratory protection.
- P302 + P352: IF ON SKIN: Wash with plenty of soap and water.
- P304 + P340: IF INHALED: Remove person to fresh air and keep comfortable for breathing.
- P314: Get medical advice/attention if you feel unwell.
- P333 + P313: If skin irritation occurs: Get medical advice/attention.
- P362 + P364: Take off contaminated clothing and wash it before reuse.

Relevant R-Phrases (number and full text) referred to in sections 2 and 3:

- T: Toxic
- Xn: Harmfull
- Xi : Irritant
- R11: Highly flammable
- R40 : Limited evidence of a carcinogenic effect
- R48/23 : Danger of serious damage to health by prolonged exposure, Toxic by inhalation
- R43 : May cause sensitisation by skin contact
- R52/53 : Harmful to aquatic organisms, May cause long-term adverse effects in the aquatic environment

16.2 Further information:

SDS Creation Date:......November 5th, 2015
SDS Revision #: ..........00-B
SDS Revision Date:......November 23rd, 2016
Reason for Revision:......added additional P-phrases in accordance to GHS guidelines rev 6; Updated 3DSystems

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+44 144-2282600  (Europe GMT+01:00; Mon – Fri, 08:00 a.m. - 17:00 p.m. MEZ)

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1. IDENTIFICATION OF THE PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the mixture: Stainless steel 17-4PH

1.2 Type: Stainless steel, UNS S17400, DIN 1.4542
Contains the following substances with hazardous properties: Nickel

1.3 Use of the preparation: For use with ProX® DMP 320 Direct Metal Printers

1.4 Uses advised against:
Use of nickel in articles intended for direct and prolonged contact with the skin where the release of nickel exceeds the limit set out in Directives 94/27/EC and 2004/6/EC and REACH regulation 1907/2009 (Annex XVII).
Use of nickel in nickel-containing food contact materials for which migration into foodstuff would exceed more than 0.1 mg/kg of nickel in accordance with the Council of Europe Guidelines on metals and alloys used as food contact materials.
Use of nickel in immersion-type kettles which would release more than 0.05 mg/l of nickel into the water in accordance with the Council of Europe Guidelines on metals and alloys used as food contact materials.
Use of nickel in commercially available “do-it-yourself” home electroplating kits.

1.5 Company/undertaking identification:
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
Chemical Emergency: 800.424.9300 – Chemtrec

3D Systems Europe Ltd.
Mark House, Mark Road
Hemel Hempstead
Herts HP2 7 United Kingdom
Phone: +44 144-2282600
e-mail: moreinfo@3dsystems.com
Chemical Emergency: 703.527.3887 - Chemtrec

3D Systems / Australia
5 Lynch Street
Hawthorn, VIC 3122
Phone: +61 03 9819-4422
e-mail: moreinfo@3dsystems.com
Chemical Emergency: +(61) 29037.2994 – Aus Chemtrec

2. HAZARDS IDENTIFICATION

2.1 Classification
GHS Classification Regulation (EC) No. 1272/2008, HazCom 29 CFD 1910:

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin Sensitization</td>
<td>H317</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>H351</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific target organ toxicity-repeated exposure</td>
<td>H372</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aquatic environment - long term hazard</td>
<td>H412</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Regulation (EC) 67/548/EEC and 1999/45/EC:
T; Xn; Xi; R20; R40; R43; R48/23; R52/53

2.2 Label Elements:
Hazard pictograms and signal word (Regulation (EC) No. 1272/2008):

GHS07       GHS08
Signal word: Danger
Safety Data Sheet
according to Regulation (EC) No 1907/2006 and 1272/2008,
Hazard Communication Standard 29 CFR 1910 (USA),
WHS Regulations Australia,
JIS Z 7253 (2012) Japan

LaserForm® Stainless 17-4PH Type A
Revision Date: July 27th, 2016

Hazard determining components of labelling:

Hazard statements:
H317: May cause an allergic skin reaction
H351: Suspected of causing cancer
H372: Causes damage to organs through prolonged or repeated exposure
H412: Harmful to aquatic life with long lasting effects

Precautionary statements:
P201: Obtain special instructions before use
P202: Do not handle until all safety precautions have been read and understood.
P260: Do not breathe dust.
P270: Do not eat, drink or smoke when using this product.
P273: Avoid release to the environment
P380: Wear protective gloves/protective clothing/eye protection/face protection.
P302 + P352: IF ON SKIN: Wash with plenty of soap and water.
P333 + P313: If skin irritation occurs: Get medical advice/attention.
P363: Wash contaminated clothing before reuse.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Chemical characterization:
Description: Metallic alloy powder

3.2 Dangerous components:

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No</th>
<th>EC-No</th>
<th>%</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>231-111-4</td>
<td>4-5</td>
<td>T R40 R43 R48/23 R52/53</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>231-157-5</td>
<td>16-17</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>231-096-4</td>
<td>72-77</td>
<td>R11</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>7439-98-7</td>
<td>231-107-2</td>
<td>&lt;0.3</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
4. FIRST AID MEASURES

4.1 General Information: Ensure that eyewash stations and safety showers are close to the workstation location.

4.2 Description of First Aid Measures
Skin contact: Wash off thoroughly with soap and water. If rash develops, seek medical attention.
Eye contact: Irrigate thoroughly with water, including under the eyelids, for at least 10-20 minutes. Obtain medical attention if irritation persists.
Inhalation: Move affected person to fresh air, rest and keep warm. In severe cases, if exposure has been great, or if respiratory irritation occurs, obtain medical attention.
Ingestion: Wash out mouth thoroughly with water. Obtain medical attention if further symptoms develop.

4.2 Most important symptoms and effects, both acute and delayed
Skin Contact: Rash may develop.
Eye Contact: Mechanical irritation.
Inhalation: Possible asthma like symptoms.
Ingestion: No information

4.3 Indications of any immediate medical attention and special treatment needed
Skin Contact: Treat symptomatically
Eye Contact: Treat symptomatically
Inhalation: Treat symptomatically

4.6 Self-protection of the first aider: Put on appropriate protective equipment (see section 8). Move exposed person to fresh air.

5. FIRE-FIGHTING MEASURES

5.1. Suitable extinguishing media: The product itself is not flammable. Adapt extinguishing measures to surroundings. Use extinguishing type D powder or sand if available.

5.2 Extinguishing media which must not be used for safety reasons: High volume water jet.

5.3 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases: increased fire hazard during dust formation.

5.4 Special protective equipment for fire-fighters: breathing protection in the presence of dust.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions: Keep unnecessary personnel away. Wear appropriate protective equipment and clothing.

6.2 Environmental precautions: Take precautions to ensure product does not contaminate ground or enter the sewer or drainage system.

6.3 Methods for cleaning up:
Wear appropriate protective equipment and clothing.

<table>
<thead>
<tr>
<th>For containment:</th>
<th>For cleaning up small spillage:</th>
<th>For cleaning up large spillage:</th>
<th>Other information:</th>
</tr>
</thead>
<tbody>
<tr>
<td>not applicable</td>
<td>vacuum with equipment fitted with HEPA or immersion filtration.</td>
<td>solids should be carefully transferred to salvage containers. Any residues should be treated as small spillages.</td>
<td>no information.</td>
</tr>
</tbody>
</table>
7. HANDLING AND STORAGE

7.1 Precautions for safe handling

| Protective measures: | Work using a suitable extraction/ventilation system. |
| Measures to prevent fire: | Not applicable. |
| Measures to protect the environment: | Use appropriate containment to avoid environmental hazard. |
| Advice on general occupational hygiene: | Avoid contact with skin and eyes. Do not breathe dust. Wash hand and face thoroughly after working with material. Contaminated clothing should be removed and washed before re-use. |

7.2 Conditions for safe storage

Technical measures and storage conditions: Store in sealed container in dry conditions and keep the container closed when not in use.

Packaging materials: Keep in the container supplied, or suitable metal, plastic or polythene container.

Requirements for storage rooms and vessels: Containers should be stored under cover in a clean and dry environment

Storage class: Not applicable.

Further information on storage conditions: Local regulations should be followed regarding the storage of this material.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure limit values:

<table>
<thead>
<tr>
<th>Exposure limits</th>
<th>OSHA/PEL</th>
<th>ACGIH/TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>1 mg/m³</td>
<td>1.5 mg/m³</td>
</tr>
<tr>
<td>Chromium</td>
<td>1 mg/m³</td>
<td>0.5 mg/m³</td>
</tr>
<tr>
<td>Iron</td>
<td>No exposure limit established</td>
<td></td>
</tr>
<tr>
<td>Molybdenum</td>
<td>15 mg/m³ *</td>
<td>10 mg/m³ **</td>
</tr>
<tr>
<td>Copper</td>
<td>1 mg/m³</td>
<td>1 mg/m³</td>
</tr>
</tbody>
</table>

8.2 Exposure 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. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Instructual measures to prevent exposure:

Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Wash hands after handling and before eating, smoking and using the lavatory and at the end of the day.

Personal protection equipment:

Respiratory protection: If ventilation cannot effectively keep dust concentrations below established limits, appropriate certified respiratory protection must be provided. Use a dust mask or filter apparatus of minimal level FFP3 or N99.

Hand protection: Use impervious nitrile gloves.

Eye protection: Wear safety glasses or chemical goggles.

Body protection: Use long sleeved antistatic garments and closed, antistatic safety shoes.
9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance:
Physical state: Powder
Colour: Gray
Odour: Odourless

9.2 Important health, safety and environmental information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (20 °C):</td>
<td>NA</td>
</tr>
<tr>
<td>Melting point/range (°C):</td>
<td>1400-1440</td>
</tr>
<tr>
<td>Boiling point/range (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Flash point (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Ignition temperature (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Vapour pressure (°C):</td>
<td>No Data</td>
</tr>
<tr>
<td>Density (g/cm³):</td>
<td>7.8</td>
</tr>
<tr>
<td>Bulk density (kg/m³):</td>
<td>No Data</td>
</tr>
<tr>
<td>Water solubility (20°C in g/l):</td>
<td>No Data</td>
</tr>
<tr>
<td>Viscosity:</td>
<td>NA</td>
</tr>
<tr>
<td>Auto-ignition temperature:</td>
<td>No Data</td>
</tr>
<tr>
<td>Decomposition temperature:</td>
<td>No Data</td>
</tr>
<tr>
<td>Dust explosion hazard:</td>
<td>No Data</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No Data</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>No Data</td>
</tr>
<tr>
<td>Particle size:</td>
<td>100% &lt;1mm</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

10.1 Chemical Stability: Stable under normal conditions and under recommended storage conditions

10.2 Reactivity: No data.

10.3 Possibility of hazardous reactions: No Data

10.4 Conditions to avoid: Prevent formation of dust clouds and accumulation of fines.

10.5 Incompatible materials: oxidizing agents. strong acids and strong bases.

10.6 Hazardous decomposition products: No data.

11. TOXICOLOGICAL INFORMATION

11.1 Likely Routes of Exposure:
Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

11.2 Symptoms of Exposure:
Fines/dusts may irritate skin and eyes.

11.2 Acute and chronic effects:
Nickel: The most common harmful health effect of metallic nickel in humans is an allergic skin reaction in those who are sensitive to nickel. Although nickel compounds are known human carcinogens, the evidence suggests that the relatively insoluble metallic nickel is less likely to present a carcinogenic hazard than are the nickel compounds that tend to release proportionately more nickel ion.

Chromium: Although much is known about the health effects of chromium compounds, the health effects of chromium metal, Cr(0), is not well studied. Due to insolubility most elements in their metallic state are not considered to be serious health hazards.
Iron: Irritating to the respiratory tract, iron compounds may cause pulmonary fibrosis if dusts are inhaled. Inhalation of large amounts may cause iron pneumoconiosis. Chronic inhalation of finely divided powder may cause chronic iron poisoning and pathological deposition of iron in the body tissue. Ingestion may cause vomiting, diarrhea, pink urine, black stool, and liver damage. Iron compounds may also cause damage to the kidneys.

Molybdenum: No data

Copper: No data

Acute Toxicity: No data

Carcinogenicity: Nickel: NTP: R - reasonably anticipated to be a human carcinogen; IARC: 2B - possibly carcinogenic to humans

To the best of our knowledge the chemical, physical and toxicological characteristics of the substance are not fully known.

12. Ecological information

12.1. Toxicity

Long-term Ecotoxicity: May cause long-term adverse effects in the aquatic environment

12.2. Persistence and degradability

Abiotic Degradation: No data available
Physical-and photo-chemical elimination: No data available
Biodegradation: Not readily biodegradable.

12.3. Biocumulative potential

Bioconcentration factor (BCF): No data available

12.4. Mobility in soil

Known or predicted distribution to environmental compartments: No data

Adsorption/Desorption: No data available

12.7 Additional information

Do not allow product to enter drains. Do not flush into surface water. Do not let product contaminate subsoil.

13. DISPOSAL CONSIDERATIONS

13.1 Appropriate disposal / Product: Do not contaminate sewers, drains, soil or surface waters with this material. Reduce waste by attempting to utilize product completely. Dispose of this container and its contents in accordance with all local, state, and federal regulations.

13.2 Packaging disposal: Consult local and national guidelines for the disposal of discarded packaging.

13.3 Additional information: Prior to disposal 3D Systems recommends consulting your local waste disposal authority or an approved waste disposal firm to ensure regulatory compliance.
14. TRANSPORT INFORMATION

UN Number: None
UN proper shipping name: Not classified hazardous for transport
Transport hazard class(es): Not applicable
Packing group: Not applicable
Environmental hazards: May cause long-term adverse effects in the aquatic environment
Special precautions for user: None
Transport in bulk according to Annex II of MARPOL73/78 and the IPBC code: Not applicable

15. REGULATORY INFORMATION

15.1 EU regulations
EINEC/ELINCS/NLP: All materials are listed
REACH Annex XVII: None listed

15.2 National EU regulations
Wassergefährdungsklasse (water hazard class, Germany): WGK 2: Hazard to waters

15.3. US FEDERAL
TSCA: All materials are listed on the TSCA Inventory or are not subject to TSCA requirements
SARA 302 EHS List (40 CFR 355 Appendix A): None listed
SARA 313 (40 CFR 372.65): None listed
CERCLA (40 CFR 302.4): None listed

15.4 Australian regulations
SUSDP, Industrial Chemicals Act 1989:
Australian Inventory of Chemical Substances, AICS: Listed

15.5 Japanese regulations
Chemical Substance: Pneumoconiosis Act
Dust Disability Prevention Rules
Iron: Water Pollution Control Law: Designated Substance
Chromium: Water Pollution Control Law: Designated Substance
PRTR: Chromium and Chromium(III) compounds, Designated Class I Substance, I-87, ≥1%
ISHL: Chromium and Chromium(III) compounds, Articles 57-2 and 18-2, Table 9-142, ≥0.1%
Air Pollution Control Law: Hazardous Air Pollutants/Priority Initiative No. 49
Waste Disposal and Public Cleaning Law: Article 29
Nickel: Water Pollution Control Law: Designated Substance
PRTR: Nickel, Designated Class I Substance, I-308
ISHL: Nickel and its compounds, Articles 57-2 and 18-2, Table 9-418, ≥0.1%
Specific Chemical Substances Disability Prevention Rules: Nickel compounds, 2-23
Clean Air Act: Hazardous Air Pollutants, No. 148
Labor Standards Act: carcinogenic substance (cancer of the upper respiratory tract or lung
from working in the smelting or refining of nickel)
Ship Safety Act: pyrophoric substances (metal catalyst containing nickel)
Aviation Law: pyrophoric substances (metal catalyst containing nickel)
Port Regulations Law: pyrophoric substances (metal catalyst containing nickel)
Waste Disposal and Public Cleaning Law: Article 30
Molybdenum: Water Pollution Control Law: Designated Substance
Clean Air Act: Hazardous Air Pollutants, No. 243
Copper: Water Pollution Control Law: Designated Substance
OTHER INFORMATION

16.1 Relevant Hazard Statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):

- Skin sens. 1, H 317 - Skin sensitization, category 1, H317: May cause an allergic skin reaction
- Carc.2, H351- Carcinogenicity, category 2, H351: Suspected of causing cancer
- STOT RE 1, H372 - Specific target organ toxicity-repe ated exposure, category 1, H372: Causes damage to organs through prolonged or repeated exposure
- Aqu.Chron. 3, H412 - Aquatic environment - long-term hazard, category 3, H412: Harmful to aquatic life with long lasting effects
- Flam. Sol.1, H228 - Flammable solids, category 1, H228: Flammable solid
- Aqu.Acute 1, H400 – Aquatic Environment – Acute hazard, category 1, H400: Very toxic to aquatic life

Relevant Precautionary statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):

- P201: Obtain special instructions before use
- P202: Do not handle until all safety precautions have been read and understood.
- P260: Do not breathe dust.
- P270: Do not eat, drink or smoke when using this product.
- P273: Avoid release to the environment
- P280: Wear protective gloves/protective clothing/eye protection/face protection.
- P302 + P352: IF ON SKIN: Wash with plenty of soap and water.
- P333 + P313: If skin irritation occurs: Get medical advice/attention.
- P363: Wash contaminated clothing before reuse.

Relevant R-Phrases (number and full text) referred to in sections 2 and 3:

- T: Toxic
- Xn: Harmfull
- Xi: Irritant
- R11: Highly flammable
- R20: Harmful by inhalation
- R40: Limited evidence of a carcinogenic effect
- R43: May cause sensitisation by skin contact
- R48/23: Danger of serious damage to health by prolonged exposure, Toxic by inhalation
- R51: Toxic to aquatic organisms
- R52/53: Harmful to aquatic organisms, May cause long-term adverse effects in the aquatic environment

16.2 Further information:

- SDS Creation Date: .......... July 27th, 2016
- SDS Revision #: ............ 00-A
- SDS Revision Date: .......... /
- Reason for Revision: ...... /

www.3dsystems.com
800.793.3669 (Toll-free in the US GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
803.326.3900 (Outside the U.S. GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
+44 144-2282600 (Europe GMT+01:00; Mon – Fri, 08:00 a.m. - 17:00 p.m. MEZ)

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1. IDENTIFICATION OF THE PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the mixture: Titanium grade 1
                            Titanium grade 2

1.2 Type: Commercially pure Titanium

1.3 Use of the preparation: For use with ProX® 320 printers

1.4 Uses advised against: No data

1.5 Company/undertaking identification:

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  
Chemical Emergency:  
800.424.9300 – Chemtrec

3D Systems Europe Ltd.  
Mark House, Mark Road  
Hemel Hempstead  
Herts HP2 7  
United Kingdom  
Phone: +44 144-2282600  
e-mail: moreinfo@3dsystems.com  
Chemical Emergency:  
703.527.3887 - Chemtrec

3D Systems / Australia  
5 Lynch Street  
Hawthorn, VIC 3122  
Phone: +1 03 9819-4422  
e-mail: moreinfo@3dsystems.com  
Chemical Emergency:  
+(61) 29037.2994 – Aus Chemtrec

2. HAZARDS IDENTIFICATION

2.1 Classification

GHS Classification (29 CFR 1910.1200) :
Regulation (EC) No. 1272/2008, HazCom 29 CFD 1910:

<table>
<thead>
<tr>
<th>Flammable solids</th>
<th>Category 1</th>
<th>H228</th>
</tr>
</thead>
</table>

Regulation (EC) 67/548/EEC and 1999/45/EC:  
F, R11

2.2 Label Elements

Regulation (EC) No. 1272/2008:
Hazard pictograms and signal word:

GHS02  
Signal word: Danger

Hazard determining components of labelling: Titanium

Hazard statements:
H228: Flammable solid
Precautionary statements:

P202: Do not handle until all safety precautions have been read and understood.
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P231: Use explosion-proof electrical and ventilating equipment.
P241: Use explosion-proof electrical and ventilating equipment.
P280: Use explosion-proof electrical and ventilating equipment.
P370+378: In case of fire: Use dry sand or Class D fire extinguisher to extinguish.
P402+404: Store in a dry place. Store in a closed container.
P422: Store contents under inert gas.

NFPA rating

<table>
<thead>
<tr>
<th>NFPA Ratings</th>
<th>Hazardous Materials Identification System (HMIS):</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 = Minimal</td>
<td>(Degree of hazard: 0 = low, 4 = extreme):</td>
</tr>
<tr>
<td>1 = Slight</td>
<td>Health 2</td>
</tr>
<tr>
<td>2 = Moderate</td>
<td>Flammability 2</td>
</tr>
<tr>
<td>3 = Serious</td>
<td>Physical Hazards 0</td>
</tr>
<tr>
<td>4 = Severe</td>
<td>Personal Protection:</td>
</tr>
<tr>
<td></td>
<td>Skin, eye protection</td>
</tr>
</tbody>
</table>

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Chemical characterization:

Description: Metallic alloy powder

3.2 Dangerous components:

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No</th>
<th>EC-No</th>
<th>%</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium</td>
<td>7440-32-6</td>
<td>231-142-3</td>
<td>88.5-91.5</td>
<td>F, R11, R17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

4.1 General Information: Ensure that eyewash stations and safety showers are close to the workstation location.

4.2 Description of First Aid Measures:

**Skin contact:** Wash off thoroughly with soap and water. Remove and dispose of or properly launder contaminated clothing before wearing again.

**Eye contact:** Irrigate gently but thoroughly, including under the eyelids, with water for at least 10 to 20 minutes. Obtain medical attention if irritation persists.

**Inhalation:** Move affected person to fresh air, rest and keep warm. Support breathing is necessary. In severe cases, if exposure has been great, or if respiratory irritation occurs, obtain medical attention.

**Ingestion:** Wash out mouth thoroughly with water.
4.2 Most important symptoms and effects, both acute and delayed:

   **Skin Contact:** No information.
   **Eye Contact:** Mechanical irritation.
   **Inhalation:** Mechanical irritation of airways
   **Ingestion:** No information

4.3 Indications of any immediate medical attention and special treatment needed:

   **Eye Contact:** Treat symptomatically
   **Inhalation:** Treat symptomatically

4.6 Self-protection of the first aider: Put on appropriate protective equipment (see section 8). Move exposed person to fresh air.

5. FIRE-FIGHTING MEASURES

5.1 Suitable extinguishing media: The product itself is flammable and can spontaneously ignite when mixed with air. Adapt extinguishing measures to surroundings. Use extinguishing type D powder, dry salt or sand if available. Carbon dioxide is not effective.

5.2 Extinguishing media which must not be used for safety reasons: Do not use water (explosion hazard), including high volume water jets, Carbon dioxide (Titanium burns in carbon dioxide above 550°C) or Halon.

5.3 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases: increased fire hazard during dust formation.

5.4 Special protective equipment for fire-fighters: Wear breathing protection in the presence of dust and suitable antistatic garments.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions: Keep unnecessary personnel away and contact emergency personnel. Wear appropriate protective equipment and clothing. Remove all sources of ignition.

6.2 Environmental precautions: Take precautions to ensure product does not contaminate ground or enter the sewer or drainage system.

6.3 Methods for cleaning up: Wear appropriate protective equipment and antistatic clothing.

   **For containment:** Use non-sparking antistatic tools and containers
   **For cleaning up small spillage:** use an explosion proof vacuum with equipment fitted with immersion filtration.
   **For cleaning up large spillage:** solids should be carefully transferred to suitable salvage containers. Any residues should be treated as small spillages.
   **Other information:** Do not use compressed air. Prevent the formation of dust clouds.
7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Protective measures: Work using a suitable extraction/ventilation system. Use non-sparking explosion proof tools. Wear suitable antistatic garments and respiration protection.

Measures to prevent fire: Prevent the formation of dust clouds. Avoid all sources of ignition.

Measures to protect the environment: Use appropriate containment to avoid environmental hazard.

Advice on general occupational hygiene: Avoid contact with skin and eyes. Do not breathe dust. Wash hand and face thoroughly after working with material. Contaminated clothing should be removed and washed before re-use.

7.2 Conditions for safe storage

Technical measures and storage conditions: Store under inert gas in a sealed antistatic container in dry and cool conditions and keep the container closed when not in use.

Packaging materials: Keep in the container supplied, or suitable metal, antistatic plastic or polythene container.

Requirements for storage rooms and vessels: Containers should be stored in a fire proof cabinet or room in a clean, cool and dry environment.

Storage class: Class 4.1 (Flammable solid)

Further information on storage conditions: Local regulations should be followed regarding the storage of this material.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure limit values:

<table>
<thead>
<tr>
<th>Exposure limits</th>
<th>OSHA/PEL</th>
<th>ACGIH/TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium</td>
<td>No limit</td>
<td>10 mg/m³ (as TiO₂)</td>
</tr>
</tbody>
</table>

8.2 Exposure 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. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Instructional measures to prevent exposure:

Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Wash hands after handling and before eating, smoking and using the lavatory and at the end of the day.
9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance:

Physical state: Powder
Colour: Silver/Gray
Odour: Odourless

9.2 Important health, safety and environmental information

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (20°C)</td>
<td>NA</td>
</tr>
<tr>
<td>Melting point/range (°C)</td>
<td>1,675</td>
</tr>
<tr>
<td>Boiling point/range (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Flash point (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Ignition temperature (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Vapour pressure (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Density (g/cm³)</td>
<td>4.5</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>No Data</td>
</tr>
<tr>
<td>Water solubility (20°C in g/l)</td>
<td>No Data</td>
</tr>
<tr>
<td>Viscosity</td>
<td>NA</td>
</tr>
<tr>
<td>Auto-ignition temperature (°C)</td>
<td>480 (fine particles in cloud form)</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No Data</td>
</tr>
<tr>
<td>Dust explosion hazard</td>
<td>Fine dust clouds may form explosive mixtures with air</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No Data</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>No Data</td>
</tr>
<tr>
<td>Particle size</td>
<td>100% &lt;1mm</td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

10.1 Chemical Stability: Stable under normal conditions and under recommended storage conditions

10.2 Reactivity: Titanium and titanium alloys may oxidize slowly when exposed to air.

10.3 Possibility of hazardous reactions: Titanium reacts with halogens, Fluorine, Bromide, Iodine and chlorine at elevated temperatures (> 150°C). Titanium reacts violently with cupric or lead oxide when heated. Titanium powder combined with trichloroethylene or trichlorotrifluoroethane will flash or spark on heavy impact.

10.4 Conditions to avoid: Prevent formation of dust clouds and accumulation of fines. Static electricity, heat or ignition source.

10.5 Incompatible materials: oxidizing agents, strong acids and strong bases, halogenated hydrocarbons and other combustible materials.

10.6 Hazardous decomposition products: None.

11. TOXICOLOGICAL INFORMATION

11.1 Likely Routes of Exposure:

Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

11.2 Symptoms of Exposure:

Fines/dusts may irritate airways and eyes.

11.2 Acute and chronic effects:

Titanium: No scientific data is available on the toxicity of titanium. Titanium is considered to be inert. This product is also not considered to be mutagenic, teratogenic or carcinogenic.

Acute Toxicity: No data available

12. Ecological information

12.1. Toxicity

<table>
<thead>
<tr>
<th>Long-term Ecotoxicity</th>
<th>No data available</th>
</tr>
</thead>
</table>

12.2. Persistence and degradability

<table>
<thead>
<tr>
<th>Abiotic Degradation</th>
<th>No data available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical-and photo-chemical elimination</td>
<td>No data available</td>
</tr>
<tr>
<td>Biodegradation</td>
<td>Not readily biodegradable.</td>
</tr>
</tbody>
</table>

12.3. Biocumulative potential

| Bioconcentration factor (BCF) | No data available |

12.4. Mobility in soil

| Known or predicted distribution to environmental compartments | No data |
| Adsorption/Desorption | No data available |
12.7 Additional information

Do not allow product to enter drains. Do not flush into surface water. Do not let product contaminate subsoil.

13. DISPOSAL CONSIDERATIONS

13.1 Appropriate disposal / Product: Do not contaminate sewers, drains, soil or surface waters with this material. Reduce waste by attempting to utilize product completely. Dispose of this container and its contents in accordance with all local, state, and federal regulations.

13.2 Packaging disposal: Consult local and national guidelines for the disposal of discarded packaging.

13.3 Additional information: Prior to disposal 3D Systems recommends consulting your local waste disposal authority or an approved waste disposal firm to ensure regulatory compliance.

14. TRANSPORT INFORMATION

UN Number  UN3089
UN proper shipping name  Metal powders, Flammable, n.o.s. (Spherical Ti powder <45µm)
Transport hazard class(es)  Class 4.1 (Flammable solid)
Packing group  II
Label

Environmental hazards  Not applicable
Special precautions for user  Prevent heat sources and sources of ignition
Transport in bulk according to Annex II of MARPOL73/78 and the IPBC code  Not applicable

15. REGULATORY INFORMATION

15.1 EU regulations:
EINEC/ELINCS/NLP: All materials are listed
REACH Annex XVII: None listed

15.2. US FEDERAL:
TSCA: All materials are listed on the TSCA Inventory or are not subject to TSCA requirements
SARA 302 EHS List (40 CFR 355 Appendix A): None listed
SARA 313 (40 CFR 372.65): None listed
CERCLA (40 CFR 302.4): None listed
15.3. Australian regulations:

SUSDP, Industrial Chemicals Act 1989:
Australian Inventory of Chemical Substances, AICS: Listed

15.4 Canadian regulations

WHMIS Classification: Class B-4 – Flammable Solids
WHMIS Symbol:

15.5. Japanese regulations:

Industrial Health and Safety Law not applicable
Hazardous material not applicable
Organic solvent poison prevention rule not applicable
Ordinance on prevention of hazard due to specified chemical substances not applicable
Lead Poisoning Prevention Rule not applicable
Poison and Deleterious Substance Control law not applicable
Management law (PRTR Law) not applicable
Fire Services Act flammable solid
Explosives Law explosive dust
High pressure gas safety law not applicable
Export Trade Control Order not applicable
Ship Safety Act: Combustible material, pyrophoric substance
Aviation Law: Transport ban, combustible material, pyrophoric substance (194-1)
Waste Disposal and Public Cleaning Law Before disposal, consult an approved waste disposal operative to ensure regulatory compliance

16. OTHER INFORMATION

16.1 Relevant Hazard Statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):
Flam. Sol.1, H228- Flammable solids, category 1, H228: Flammable solid
Pyr. Sol. 1, H250- Pyrophoric solids, category 1, H250: Catches fire spontaneously if exposed to air
Relevant Precautionary statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):
P202: Do not handle until all safety precautions have been read and understood.
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P231: Handle under inert gas.
P241: Use explosion-proof electrical and ventilating equipment.
P280: Wear protective gloves, clothing and eye protection.
P370+378: In case of fire: Use dry sand or Class D fire extinguisher to extinguish.
P402+404: Store in a dry place. Store in a closed container.
P422: Store contents under inert gas.

Relevant R-Phrases (number and full text) referred to in sections 2 and 3:
F : Highly Flammable
R11 : Highly flammable
R17: Spontaneously flammable in air

16.2 Further information:
SDS Creation Date: .......... November 5th, 2015
SDS Revision #: ............. 01-A
SDS Revision Date:........... February 25th, 2016
Reason for Revision:..... Correction R-, H- and P- phrases
www.3dsystems.com
800.793.3669  (Toll-free in the US GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
803.326.3900  (Outside the U.S. GMT-07:00; N. America, Mon – Fri, 6:00 a.m. to 6 p.m.)
+44 144-2282600  (Europe GMT+01:00; Mon – Fri, 08:00 a.m. - 17:00 p.m. MEZ)

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Safety Data Sheet
according to Regulation (EC) No 1907/2006 and 1272/2008,
Hazard Communication Standard 29 CFR 1910 (USA),
WHS Regulations Australia,
JIS Z 7253 (2012) Japan

LaserForm™ Ti Gr. 23 Type A / LaserForm™ Ti Gr. 5 Type A
Revision Date: February 25th, 2016

1. IDENTIFICATION OF THE PREPARATION AND OF THE COMPANY/UNDERTAKING

1.1 Identification of the mixture: Titanium grade 5, Ti6Al4V
Titanium grade 23, Ti6Al4V ELI

1.2 Type: Ti6Al4V alloy

1.3 Use of the preparation: For use with ProX® 320 printers

1.4 Uses advised against: No data

1.5 Company/undertaking identification:
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
Chemical Emergency: 800.424.9300 – Chemtrec

3D Systems Europe Ltd.
Mark House, Mark Road
Hemel Hempstead
Herts HP2 7
United Kingdom
Phone: +44 144-2282600
e-mail: moreinfo@3dsystems.com
Chemical Emergency: 703.527.3887 - Chemtrec

3D Systems / Australia
5 Lynch Street
Hawthorn, VIC 3122

3D Systems / Australia
5 Lynch Street
Hawthorn, VIC 3122

2. HAZARDS IDENTIFICATION

2.1 Classification

GHS Classification (29 CFR 1910.1200):
Regulation (EC) No. 1272/2008, HazCom 29 CFD 1910:

<table>
<thead>
<tr>
<th>Flammable solids</th>
<th>Category 1</th>
<th>H228</th>
</tr>
</thead>
</table>

Regulation (EC) 67/548/EEC and 1999/45/EC:
F, R11

2.2 Label Elements

Regulation (EC) No. 1272/2008:

Hazard pictograms and signal word:

![GHS02 Signal word: Danger](image)

Hazard determining components of labelling: Titanium, Aluminium

Hazard statements:

H228: Flammable solid.
Precautionary statements:

P202: Do not handle until all safety precautions have been read and understood.
P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P231: Handle under inert gas.
P241: Use explosion-proof electrical and ventilating equipment.
P280: Wear protective gloves, clothing and eye protection.
P370+378: In case of fire: Use dry sand or Class D fire extinguisher to extinguish.
P402+404: Store in a dry place. Store in a closed container.
P422: Store contents under inert gas.

NFPA rating

NFPA Ratings
0 = Minimal
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

Hazardous Materials Identification System (HMIS):
(Degree of hazard: 0 = low, 4 = extreme);
Health 2
Flammability 2
Physical Hazards 0

Personal Protection:
Skin, eye protection

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Chemical characterization:

Description: Metallic alloy powder

3.2 Dangerous components:

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No</th>
<th>EC-No</th>
<th>%</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium</td>
<td>7440-32-6</td>
<td>231-142-3</td>
<td>88.5-91.5</td>
<td>R11, R17, F Pyr. Sol.1, H250 Flam. Sol.1, H228</td>
</tr>
<tr>
<td>Aluminum</td>
<td>7429-90-5</td>
<td>231-072-3</td>
<td>5-7</td>
<td>T, F, R11, R15 Water react. 2, H261 Flam. Sol.1, H228</td>
</tr>
<tr>
<td>Vanadium</td>
<td>7440-62-2</td>
<td>231-171-1</td>
<td>3.5-4.5</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

4.1 General Information: Ensure that eyewash stations and safety showers are close to the workstation location.
4.2 Description of First Aid Measures:

Skin contact: Wash off thoroughly with soap and water. Remove and dispose of or properly launder contaminated clothing before wearing again.

Eye contact: Irrigate gently but thoroughly, including under the eyelids, with water for at least 10 to 20 minutes. Obtain medical attention if irritation persists.

Inhalation: Move affected person to fresh air, rest and keep warm. Support breathing is necessary. In severe cases, if exposure has been great or if respiratory irritation occurs, obtain medical attention.

Ingestion: Wash out mouth thoroughly with water.

4.2 Most important symptoms and effects, both acute and delayed:

Skin Contact: No information.

Eye Contact: Mechanical irritation.

Inhalation: Mechanical irritation of airways

Ingestion: No information

4.3 Indications of any immediate medical attention and special treatment needed:

Eye Contact: Treat symptomatically

Inhalation: Treat symptomatically

4.6 Self-protection of the first aider: Put on appropriate protective equipment (see section 8). Move exposed person to fresh air.

5. FIRE-FIGHTING MEASURES

5.1 Suitable extinguishing media: The product itself is flammable and can spontaneously ignite when mixed with air. Adapt extinguishing measures to surroundings. Use extinguishing type D powder, dry salt or sand if available. Carbon dioxide is not effective.

5.2 Extinguishing media which must not be used for safety reasons: Do not use water (explosion hazard), including high volume water jets, Carbon dioxide (Titanium burns in carbon dioxide above 550°C) or Halon.

5.3 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases: Increased fire hazard during dust formation.

5.4 Special protective equipment for fire-fighters: Wear breathing protection in the presence of dust and suitable antistatic garments.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions: Keep unnecessary personnel away and contact emergency personnel. Wear appropriate protective equipment and clothing. Remove all sources of ignition.

6.2 Environmental precautions: Take precautions to ensure product does not contaminate ground or enter the sewer or drainage system.

6.3 Methods for cleaning up: Wear appropriate protective equipment and antistatic clothing.

For containment: Use non-sparking antistatic tools and containers

For cleaning up small spillage: use an explosion proof vacuum with equipment fitted with immersion filtration.

For cleaning up large spillage: solids should be carefully transferred to suitable salvage containers. Any residues should be treated as small spillages.

Other information: Do not use compressed air. Prevent the formation of dust clouds.
7. HANDLING AND STORAGE

7.1 Precautions for safe handling:

<table>
<thead>
<tr>
<th>Protective measures:</th>
<th>Work using a suitable extraction/ventilation system. Use non-sparking explosion proof tools. Wear suitable antistatic garments and respiration protection.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measures to prevent fire:</td>
<td>Prevent the formation of dust clouds. Avoid all sources of ignition.</td>
</tr>
<tr>
<td>Measures to protect the environment:</td>
<td>Use appropriate containment to avoid environmental hazard.</td>
</tr>
<tr>
<td>Advice on general occupational hygiene:</td>
<td>Avoid contact with skin and eyes. Do not breathe dust. Wash hand and face thoroughly after working with material. Contaminated clothing should be removed and washed before re-use.</td>
</tr>
</tbody>
</table>

7.2 Conditions for safe storage:

| Technical measures and storage conditions: | Store under inert gas in a sealed antistatic container in dry and cool conditions and keep the container closed when not in use. |
| Packaging materials: | Keep in the container supplied, or suitable metal, antistatic plastic or polythene container. |
| Requirements for storage rooms and vessels: | Containers should be stored in a fire proof cabinet or room in a clean, cool and dry environment. |
| Storage class: | Class 4.1 (Flammable solid) |
| Further information on storage conditions: | Local regulations should be followed regarding the storage of this material. |

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Exposure limit values:

<table>
<thead>
<tr>
<th>Exposure limits</th>
<th>OSHA/PEL</th>
<th>ACGIH/TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Titanium</td>
<td>No limit</td>
<td>10 mg/m³ (as TiO₂)</td>
</tr>
<tr>
<td>Aluminium</td>
<td>No limit</td>
<td>5 mg/m³ (Fumes)</td>
</tr>
<tr>
<td>Vanadium</td>
<td>0.5/ 0.1 mg/m³ (dust/fume)</td>
<td>0.05 mg/m³ (as V₂O₅)</td>
</tr>
</tbody>
</table>

8.2 Exposure 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. Use good housekeeping and sanitation practices. Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air.

Instrucntal measures to prevent exposure:

Do not use tobacco or food in work area. Wash thoroughly before eating or smoking. Do not blow dust off clothing or skin with compressed air. Wash hands after handling and before eating, smoking and using the lavatory and at the end of the day.
Personal protection equipment:

- **Respiratory protection**: If ventilation cannot effectively keep dust concentrations below established limits, appropriate certified respiratory protection must be provided. Use a dust mask or filter apparatus of minimal level FFP1.
- **Hand protection**: Use impervious nitrile gloves.
- **Eye protection**: Wear safety glasses or chemical goggles.
- **Body protection**: Use long sleeved antistatic garments and closed, antistatic safety shoes.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Appearance:

- **Physical state**: Powder
- **Colour**: Silver/Gray
- **Odour**: Odourless

9.2 Important health, safety and environmental information:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH (20 °C)</td>
<td>NA</td>
</tr>
<tr>
<td>Melting point/range (°C)</td>
<td>1 605 to 1 665</td>
</tr>
<tr>
<td>Boiling point/range (°C)</td>
<td>3287</td>
</tr>
<tr>
<td>Flash point (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Ignition temperature (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Vapour pressure (°C)</td>
<td>No Data</td>
</tr>
<tr>
<td>Density (g/cm³)</td>
<td>4.43</td>
</tr>
<tr>
<td>Bulk density (kg/m³)</td>
<td>No Data</td>
</tr>
<tr>
<td>Water solubility (20°C in g/l)</td>
<td>No Data</td>
</tr>
<tr>
<td>Viscosity</td>
<td>NA</td>
</tr>
<tr>
<td>Auto-ignition temperature (°C)</td>
<td>480 (fine particles in cloud form)</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>No Data</td>
</tr>
<tr>
<td>Dust explosion hazard</td>
<td>Fine dust clouds may form explosive mixtures with air</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>No Data</td>
</tr>
<tr>
<td>Oxidising properties</td>
<td>No Data</td>
</tr>
<tr>
<td>Particle size</td>
<td>100% &lt;1mm</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

10.1 Chemical Stability: Stable under normal conditions and under recommended storage conditions

10.2 Reactivity: Titanium and titanium alloys may oxidize slowly when exposed to air.
10.3 **Possibility of hazardous reactions:** Titanium reacts with halogens, Fluorine, Bromide, Iodine and chlorine at elevated temperatures (> 150°C). Titanium reacts violently with cupric or lead oxide when heated. Titanium powder combined with trichloroethylene or trichlorotrifluoroethane will flash or spark on heavy impact.

10.4 **Conditions to avoid:** Prevent formation of dust clouds and accumulation of fines. Static electricity, heat or ignition source.

10.5 **Incompatible materials:** oxidizing agents, strong acids and strong bases, halogenated hydrocarbons and other combustible materials.

10.6 **Hazardous decomposition products:** None.

11. **TOXICOLOGICAL INFORMATION**

11.1 **Likely Routes of Exposure:**

Inhalation, skin, eyes. Product as shipped does not present an inhalation hazard; however subsequent operations may create dusts or fumes which could be inhaled.

11.2 **Symptoms of Exposure:**

Fines/dusts may irritate airways and eyes.

11.2 **Acute and chronic effects:**

**Titanium:** No scientific data is available on the toxicity of titanium. Titanium is considered to be inert. This product is also not considered to be mutagenic, teratogenic or carcinogenic.

**Aluminium:** No scientific data is available on the toxicity of aluminium. Aluminium is considered to be relatively inert. This product is also not considered to be mutagenic, teratogenic or carcinogenic.

**Vanadium:** No scientific data is available on the toxicity of vanadium. Vanadium is considered to be relatively inert. This product is also not considered to be mutagenic, teratogenic or carcinogenic. Vanadium is suspected to be tumorigenic according to RTECS: possibility of casing tumors at the area of exposure.

**Acute Toxicity:** No data available

12. **Ecological information**

12.1. **Toxicity**

**Long-term Ecotoxicity**

No data available

12.2. **Persistence and degradability**

<table>
<thead>
<tr>
<th>Type of Degradation</th>
<th>Persistence and Degradability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abiotic Degradation</td>
<td>No data available</td>
</tr>
<tr>
<td>Physical and photo-chemical elimination</td>
<td>No data available</td>
</tr>
<tr>
<td>Biodegradation</td>
<td>Not readily biodegradable.</td>
</tr>
</tbody>
</table>

12.3. **Biocumulative potential**

<table>
<thead>
<tr>
<th>Biocumulative Potential</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioconcentration factor (BCF)</td>
<td>No data available</td>
</tr>
</tbody>
</table>
12.4. Mobility in soil

Known or predicted distribution to environmental compartments: No data
Adsorption/Desorption: No data available

12.7 Additional information

Do not allow product to enter drains. Do not flush into surface water. Do not let product contaminate subsoil.

13. DISPOSAL CONSIDERATIONS

13.1 Appropriate disposal / Product: Do not contaminate sewers, drains, soil or surface waters with this material. Reduce waste by attempting to utilize product completely. Dispose of this container and its contents in accordance with all local, state, and federal regulations.

13.2 Packaging disposal: Consult local and national guidelines for the disposal of discarded packaging.

13.3 Additional information: Prior to disposal 3D Systems recommends consulting your local waste disposal authority or an approved waste disposal firm to ensure regulatory compliance.

14. TRANSPORT INFORMATION

UN Number: UN3089
UN proper shipping name: Metal powders, Flammable, n.o.s. (Spherical Ti6Al4V powder <45µm)
Transport hazard class(es): Class 4.1 (Flammable solid)
Packing group: II
Label:

Environmental hazards: Not applicable
Special precautions for user: Prevent heat sources and sources of ignition
Transport in bulk according to Annex II of MARPOL73/78 and the IPBC code: Not applicable

15. REGULATORY INFORMATION

15.1 EU regulations
EINEC/ELINCS/NLP: All materials are listed
REACH Annex XVII: None listed

15.2 National EU regulations
Not applicable
15.3. US FEDERAL

TSCA: All materials are listed on the TSCA Inventory or are not subject to TSCA requirements
SARA 302 EHS List (40 CFR 355 Appendix A): None listed
SARA 313 (40 CFR 372.65): None listed
CERCLA (40 CFR 302.4): None listed

15.4 Australian regulations

SUSDP, Industrial Chemicals Act 1989:
Australian Inventory of Chemical Substances, AICS: Listed

15.5 Canadian regulations

WHMIS Classification: Class B-4 – Flammable Solids
WHMIS Symbol:

15.6 Japanese regulations

Industrial Health and Safety Law
Hazardous material: Dangerous substances (Combustible substances: Titanium powder, Aluminium powder)
Organic solvent poison prevention rule: not applicable
Ordinance on prevention of hazard due to specified chemical substances: not applicable
Lead Poisoning Prevention Rule: not applicable
Poison and Deleterious Substance Control law: not applicable
Management law (PRTR Law): not applicable
Fire Services Act: flammable solid
Explosives Law: explosive dust
High pressure gas safety law: not applicable
Export Trade Control Order: not applicable
Ship Safety Act: Combustible material, pyrophoric substance
Aviation Law: Transport ban, combustible material, pyrophoric substance (194-1)
Waste Disposal and Public Cleaning Law: Before disposal, consult an approved waste disposal operative to ensure regulatory compliance
16. OTHER INFORMATION

16.1 Relevant Hazard Statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):
- Flam. Sol.1, H228- Flammable solids, category 1, H228: Flammable solid
- Pyr. Sol. 1, H250- Pyrophoric solids, category 1, H250: Catches fire spontaneously if exposed to air
- Water react. 2, H261- Emission of flammable gases in contact with water, category 2, H261: In contact with water releases flammable gas

Relevant Precautionary statements (number and full text) referred to in sections 2 and 3 (according to (EC) No. 1272/2008):
- P202: Do not handle until all safety precautions have been read and understood.
- P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P231: Handle under inert gas.
- P241: Use explosion-proof electrical and ventilating equipment.
- P280: Wear protective gloves, clothing and eye protection.
- P370+378: In case of fire: Use dry sand or Class D fire extinguisher to extinguish.
- P402+404: Store in a dry place. Store in a closed container.

Relevant R-Phrases (number and full text) referred to in sections 2 and 3:
- F: Highly Flammable
- R11: Highly flammable
- R15: Contact with water liberates extremely flammable gases
- R17: Spontaneously flammable in air

16.2 Further information:
SDS Creation Date: November 5th, 2015
SDS Revision #: 01-A
SDS Revision Date: February 25th, 2016
Reason for Revision: Correct R-, H- and P-Phrases

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