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
+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:

Flammable solids	Category 1	H228

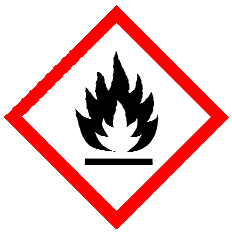
Regulation (EC) 67/548/EEC and 1999/45/EC:

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, Aluminium

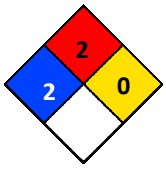
Hazard statements:

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:

Chemical name	CAS-No	EC-No	%	Classification	
				Regulation 67/548/EEG or 1999/45/EG	Regulation (EC) No. 1272/2008
Titanium	7440-32-6	231-142-3	88.5-91.5	R11, R17, F	Pyr. Sol.1, H250 Flam. Sol.1, H228
Aluminum	7429-90-5	231-072-3	5-7	T, F, R11, R15	Water react. 2, H261 Flam. Sol.1, H228
Vanadium	7440-62-2	231-171-1	3.5-4.5	Not Applicable	Not Applicable

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:

Exposure limits	OSHA/PEL	ACGIH/TLV
Titanium	No limit	10 mg/m^3 (as TiO_2)
Aluminium	No limit	5 mg/m^3 (Fumes)
Vanadium	0.5/ 0.1 mg/m^3 (dust/fume)	0.05 mg/m^3 (as V_2O_5)

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 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):	1 605 to 1 665
Boiling point/range (°C):	3287
Flash point (°C):	No Data
Ignition temperature (°C):	No Data
Vapour pressure (°C):	No Data
Density (g/cm3):	4.43
Bulk density (kg/m3):	No Data
Water solubility (20°C in g/l):	No Data
Viscosity:	NA
Auto-ignition temperature (°C):	480 (fine particles in cloud form)
Decomposition temperature:	No Data
Dust explosion hazard:	Fine dust clouds may form explosive mixtures with air
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: 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 aluminum. Aluminum 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

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

12.3. Bioccumulative 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 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	Dangerous substances (Combustible substances: Titanium powder, 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	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.
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
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

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)

DISCLAIMER OF LIABILITY: The following supersedes any related provision in your company's forms, letters, and agreements from, by or with 3D Systems Corporation. 3D Systems, Inc. makes no warranty whether expressed or implied, including warranties of merchantability or of fitness for a particular purpose for this product. No statements or recommendations contained in the product literature are to be construed as inducements to infringe any relevant patent now or hereafter in existence. Under

no circumstances shall 3D Systems, Inc. be liable for incidental, consequential, or other damages from alleged negligence, breach of warranty, strict liability or any other theory, arising out of the use or handling of this product. The sole liability of 3D Systems, Inc. for any claims arising out of the manufacture, use or sale of its products shall be for the buyer's purchase price.

The contents of this safety data sheet are subject to change without notice. 3D Systems, Inc. recommends that you periodically check www.3dsystems.com to make sure you are using the most current safety data sheet.