

**1. Identification****Product identifier****Product Name** LaserForm® Ti Gr5 (A)**Other means of identification****Product Code(s)** 151801**UN number or ID number** 3089**Synonyms** None**Recommended use of the chemical and restrictions on use****Recommended use** For use with 3D Systems' Direct Metal Printing equipment. Restricted to professional users**Restrictions on use** Any non-intended use**Details of the supplier of the safety data sheet****Manufacturer Address**3D Systems, Inc.  
333 Three D Systems Circle  
Rock Hill, South Carolina 29730 U.S.A.**E-mail** moreinfo@3dsystems.com**Emergency telephone number****Company Phone Number** 800.793.3669 (Toll-free)**Emergency Telephone** Chemtec - 800.424.9300 (Toll Free)  
+1 703-527-3887**2. Hazard(s) identification****Classification**

Flammable solids

Category 1

**Hazards not otherwise classified (HNOC)**

Not applicable

**Label elements**



**Danger**

**Hazard statements**

Flammable solid

**Precautionary Statements - Prevention**

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking

Ground and bond container and receiving equipment

Use explosion-proof electrical/ ventilating/ lighting/ equipment

Wear protective gloves/eye protection/face protection

**Precautionary Statements - Response**

In case of fire: Use dry chemical, CO<sub>2</sub>, water spray or regular foam to extinguish

**Other information**

Dust can form an explosive mixture with air. Use with local exhaust ventilation.

### 3. Composition/information on ingredients

**Substance**

Not applicable.

**Mixture**

Chemical name	CAS No	Weight-%
Titanium	7440-32-6	75 - 90
Aluminium	7429-90-5	<10
Vanadium	7440-62-2	<10

\*The exact percentage (concentration) of composition has been withheld as a trade secret.

### 4. First-aid measures

**Description of first aid measures**

**General advice**

Get medical attention if symptoms occur. Show this safety data sheet to the doctor in attendance. Immediate medical attention is required.

**Inhalation**

IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If breathing has stopped, give artificial respiration. Get medical attention immediately. Remove to fresh air. Do not breathe dust. Do not use



**Personal precautions, protective equipment and emergency procedures**

<b>Personal precautions</b>	Evacuate personnel to safe areas. Use personal protective equipment as required. See section 8 for more information. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Keep people away from and upwind of spill/leak. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Pay attention to flashback. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Avoid generation of dust. Do not breathe dust. Avoid breathing (dust, vapor, mist, gas). In case of insufficient ventilation, wear suitable respiratory equipment.
<b>Other information</b>	Ventilate the area. Refer to protective measures listed in Sections 7 and 8.
<b>For emergency responders</b>	See Section 8 for information on appropriate personal protective equipment.

**Methods and material for containment and cleaning up**

<b>Methods for containment</b>	Prevent further leakage or spillage if safe to do so. Stop leak if you can do it without risk. Do not touch or walk through spilled material. A vapor suppressing foam may be used to reduce vapors. Keep out of drains, sewers, ditches and waterways.
<b>Methods for cleaning up</b>	Use appropriate personal protective equipment (PPE). Carefully shovel or sweep up spilled material and place in suitable container. Avoid generating dust. Do not dry sweep. Use only vacuum cleaners equipped with a wet separator system and a grounding cable. Move containers from spill area. Prevent dust cloud. Use of a dust mask is recommended during cleaning surfaces with dust. Use only vacuum cleaners equipped with a wet separator system and a grounding cable (ATEX, Hazardous locations certified/Suitable for use with Group E (IIIC) Conductive Dusts / Suitable for use in Class 2, Division II (Zone 22) locations or better). Dispose of via a licensed waste disposal contractor. Take precautionary measures against static discharges. Pick up and transfer to properly labeled containers.
<b>Reference to other sections</b>	See section 13 for more information.

**7. Handling and storage****Precautions for safe handling**

<b>Advice on safe handling</b>	Use personal protection equipment. Avoid breathing vapors or mists. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use grounding and bonding connection when transferring this material to prevent static discharge, fire or explosion. Use spark-proof tools and explosion-proof equipment. Keep in an area equipped with sprinklers. Use according to package label instructions. Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. In case of insufficient ventilation, wear suitable respiratory equipment. Handle product only in closed system or provide appropriate exhaust ventilation. Do not eat, drink or smoke when using this product. Take off contaminated clothing and wash before reuse. Dust can form an explosive mixture with air. This product is a poor conductor of electricity and can become electrostatically charged. If sufficient charge is accumulated, ignition of flammable mixtures can occur. To reduce potential for static discharge, use proper bonding and grounding procedures.
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**Conditions for safe storage, including any incompatibilities**

<b>Storage Conditions</b>	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Keep in properly labeled containers. Do not store near combustible materials.
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Keep in an area equipped with sprinklers. Store in accordance with the particular national regulations. Store in accordance with local regulations. Keep out of the reach of children. Store locked up. Keep container tightly closed in a dry and well-ventilated place. Dust can form an explosive mixture with air.

## 8. Exposure controls/personal protection

### Control parameters

#### Exposure Limits

The following ingredients are the only ingredients of the product above the cut-off level (or level that contributes to the hazard classification of the mixture) which have an exposure limit applicable in the region for which this safety data sheet is intended or other recommended limit. At this time, the other relevant constituents have no known exposure limits from the sources listed here.

Chemical name	ACGIH TLV	OSHA PEL	NIOSH
Aluminium 7429-90-5	TWA: 1 mg/m <sup>3</sup> respirable particulate matter	TWA: 15 mg/m <sup>3</sup> total dust TWA: 5 mg/m <sup>3</sup> respirable fraction (vacated) TWA: 15 mg/m <sup>3</sup> total dust (vacated) TWA: 5 mg/m <sup>3</sup> respirable fraction	TWA: 10 mg/m <sup>3</sup> total dust TWA: 5 mg/m <sup>3</sup> respirable dust
Vanadium 7440-62-2	-	(vacated) TWA: 0.05 mg/m <sup>3</sup> V2O5 respirable dust (vacated) TWA: 0.05 mg/m <sup>3</sup> V2O5 fume Ceiling: 0.5 mg/m <sup>3</sup> V2O5 respirable dust Ceiling: 0.1 mg/m <sup>3</sup> V2O5 fume	TWA: 1 mg/m <sup>3</sup> STEL: 3 mg/m <sup>3</sup> Ferrovanadium dust

### Appropriate engineering controls

#### Engineering controls

Recommend users establish appropriate engineering control measures, including but not limited to local exhaust ventilation, in rooms/areas where printers are installed and in post-processing areas, to minimize inhalation exposure.

### Individual protection measures, such as personal protective equipment

#### Eye/face protection

May cause eye irritation. Tight sealing safety goggles.

#### Hand protection

Wear suitable gloves. Impervious gloves.

#### Skin and body protection

Wear suitable protective clothing. Long sleeved clothing. Chemical resistant apron. Antistatic boots.

#### Respiratory protection

Ensure adequate ventilation. Wear skin and eye/face protection PPE during part processing.

#### Environmental exposure controls

Avoid release to the environment. Do not allow to enter into soil/subsoil.

#### General hygiene considerations

Do not eat, drink or smoke when using this product. Use of a dust mask is recommended during cleaning surfaces with dust. Recommend use of gloves and dust mask during sanding or grinding printed parts. Do not eat, drink or smoke when using this product.

Contaminated work clothing must not be allowed out of the workplace. Regular cleaning of equipment, work area and clothing is recommended. Wash hands before breaks and immediately after handling the product. Avoid contact with skin, eyes or clothing. Do not breathe dust. Wear suitable gloves and eye/face protection. Take off contaminated clothing and wash before reuse.

## 9. Physical and chemical properties

### Information on basic physical and chemical properties

Physical state	Solid
Appearance	Powder
Color	Gray
Odor	Odorless
Odor threshold	No information available

<u>Property</u>	<u>Values</u>	<u>Remarks • Method</u>
pH	No data available	-
Melting point / freezing point	1605-1665 °C / °F	-
Boiling point / boiling range	3287 °C / 5948.6 °F	-
Flash point	No data available	-
Evaporation rate	No data available	None known
Flammability (solid, gas)	No data available	-
Flammability Limit in Air		-
Upper flammability or explosive limits	No data available	
Lower flammability or explosive limits	50 mg/m (minimum explosive concentration of dust) [tested on similar material: Ti Gr5 (A), Ti Gr23 (A)]	
Vapor pressure	No data available	-
Relative vapor density	No data available	-
Relative density	4.43 g/cm <sup>3</sup> (Ti alloy)	-
Water solubility	Insoluble	-
Solubility(ies)	insoluble	-
Partition coefficient	No data available	-
Autoignition temperature	No data available	-
Decomposition temperature		-
Kinematic viscosity	No data available	-
Dynamic viscosity	No data available	-

### Other information

Explosive properties	No information available
Oxidizing properties	No information available
Softening point	No information available
Molecular weight	No information available
VOC content	No information available
Liquid Density	No information available
Bulk density	No information available

K <sub>st</sub> (bar.m/s)	Kst Value: 60 bar m/s - Class ST 1
Minimum Ignition Energy (mJ)	3-5 mJ - tested on similar material: Ti Gr5 (A)
Minimum Ignition Temperature (°C)	Minimum cloud ignition temperature (°C): 710 Minimum layer ignition temperature (°C): >400

## 10. Stability and reactivity

Reactivity	Stable under normal conditions.
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<b>Chemical stability</b>	Stable under recommended storage conditions.
<b>Possibility of hazardous reactions</b>	May form explosible dust-air mixture if dispersed.
<b>Conditions to avoid</b>	Humidity. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Heat, flames and sparks. Excessive heat.
<b>Incompatible materials</b>	Water. Acids and alkalis.
<b>Hazardous decomposition products</b>	None under normal use conditions. May emit toxic fumes under fire conditions.

## 11. Toxicological information

### Information on likely routes of exposure

#### Product Information

<b>Inhalation</b>	May cause respiratory irritation. May cause drowsiness or dizziness. Specific test data for the substance or mixture is not available. Toxic by inhalation. (based on components).
<b>Eye contact</b>	Specific test data for the substance or mixture is not available.
<b>Skin contact</b>	Specific test data for the substance or mixture is not available.
<b>Ingestion</b>	Specific test data for the substance or mixture is not available. Harmful if swallowed. (based on components).

### Symptoms related to the physical, chemical and toxicological characteristics

<b>Symptoms</b>	Coughing and/ or wheezing. Difficulty in breathing.
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### Acute toxicity

#### Numerical measures of toxicity

#### Component Information

Chemical name	Oral LD50	Dermal LD50	Inhalation LC50
Aluminium 7429-90-5	-	-	> 0.888 mg/L ( Rat ) 4 h
Vanadium 7440-62-2	> 2000 mg/kg ( Rat )	-	-

### Delayed and immediate effects as well as chronic effects from short and long-term exposure

<b>Skin corrosion/irritation</b>	No information available.
<b>Serious eye damage/eye irritation</b>	No information available.
<b>Respiratory or skin sensitization</b>	No information available.
<b>Germ cell mutagenicity</b>	No information available.

<b>Carcinogenicity</b>	No information available.
<b>Reproductive toxicity</b>	No information available.
<b>STOT - single exposure</b>	No information available.
<b>STOT - repeated exposure</b>	No information available.
<b>Target organ effects</b>	Respiratory system, Eyes, Skin.
<b>Aspiration hazard</b>	No information available.
<b>Other adverse effects</b>	No information available.
<b>Interactive effects</b>	No information available.

## 12. Ecological information

<b>Ecotoxicity</b>	The environmental impact of this product has not been fully investigated.
<b>Persistence and degradability</b>	No information available.
<b>Bioaccumulation</b>	There is no data for this product.
<b>Other adverse effects</b>	No information available.

## 13. Disposal considerations

### Waste treatment methods

<b>Waste from residues/unused products</b>	Reduce waste by attempting to utilize product completely. Dispose of contents and container in accordance with local, regional, national, and international regulations as applicable. Should not be released into the environment. Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.
<b>Contaminated packaging</b>	Empty containers pose a potential fire and explosion hazard. Do not cut, puncture or weld containers.
<b>California Hazardous Waste Status</b>	This product contains one or more substances that are listed with the State of California as a hazardous waste.

## 14. Transport information

<b>DOT</b>	Regulated
UN number or ID number	3089
Proper shipping name	METAL POWDER, FLAMMABLE, N.O.S
Transport hazard class(es)	4.1
Packing group	II
DOT Marine Pollutant	NP
<b>IATA</b>	Regulated
UN number or ID number	3089
UN proper shipping name	METAL POWDER, FLAMMABLE, N.O.S
Transport hazard class(es)	4.1
Packing group	II
Special Provisions	Passenger and Cargo Aircraft: 15 kg. Packaging instructions: 445. Cargo Aircraft Only: 50 kg. Packaging instructions: 448. Special Provisions : 3; A803
<b>IMDG</b>	Regulated
UN number or ID number	3089
UN proper shipping name	METAL POWDER, FLAMMABLE, N.O.S
Transport hazard class(es)	4.1
Packing group	II
Special Provisions	Emergency schedules F-G, S-G
Marine pollutant	NP
UN number or ID number	3089
UN proper shipping name	METAL POWDER, FLAMMABLE, N.O.S
Transport hazard class(es)	4.1
Packing group	II
Special Provisions	552
<b>ADR</b>	Regulated
UN number or ID number	3089
UN proper shipping name	METAL POWDER, FLAMMABLE, N.O.S
Transport hazard class(es)	4.1
Packing group	II
Tunnel restriction code	E
Special Provisions	552

## 15. Regulatory information

### International Inventories

**TSCA** All ingredients are listed (Active) or exempt.

### **U.S. - TSCA (Toxic Substances Control Act) - Section 5(a)(2) - Chemicals with Significant New Use Rules (SNURs)**

**TSCA Section 6 restricted substances** This formulation DO NOT contain substances listed under the EPA Regulation of Persistent, Bioaccumulative, and Toxic Chemicals Under TSCA Section 6(h).

**DSL/NDSL** All ingredients are listed or exempt.

<b>EINECS/ELINCS</b>	All ingredients are listed or exempt.
<b>ENCS</b>	All ingredients are listed or exempt.
<b>IECSC</b>	All ingredients are listed or exempt.
<b>KECL</b>	All ingredients are listed or exempt.
<b>PICCS</b>	All ingredients are listed or exempt.
<b>AICS</b>	All ingredients are listed or exempt.
<b>TCSI</b>	All ingredients are listed or exempt.
<b>NZIoC</b>	All ingredients are listed or exempt.

**Legend:**

- TSCA** - United States Toxic Substances Control Act Section 8(b) Inventory  
**DSL/NDSL** - Canadian Domestic Substances List/Non-Domestic Substances List  
**EINECS/ELINCS** - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances  
**ENCS** - Japan Existing and New Chemical Substances  
**IECSC** - China Inventory of Existing Chemical Substances  
**KECL** - Korean Existing and Evaluated Chemical Substances  
**PICCS** - Philippines Inventory of Chemicals and Chemical Substances  
**AICS** - Australian Inventory of Chemical Substances  
**NZIoC** - New Zealand Inventory of Chemical Substances

**US Federal Regulations**
**SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Chemical name	SARA 313 - Threshold Values %
Aluminium - 7429-90-5	1.0
Vanadium - 7440-62-2	1.0

**SARA 311/312 Hazard Categories**

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

**CWA (Clean Water Act)**

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

**CERCLA**

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

**US State Regulations**
**California Proposition 65**

This product does not contain any Proposition 65 chemicals.

**U.S. State Right-to-Know Regulations**

Chemical name	New Jersey	Massachusetts	Pennsylvania
Titanium	X	-	-

7440-32-6			
Aluminium 7429-90-5	X	X	X
Vanadium 7440-62-2	X	X	X

**U.S. EPA Label Information**
**EPA Pesticide Registration Number** Not applicable

**16. Other information**

<b>NFPA</b>	<b>Health hazards</b> 3	<b>Flammability</b> 3	<b>Instability</b> 0	<b>Special hazards</b> -
<b>HMIS</b>	<b>Health hazards</b> 3	<b>Flammability</b> 3	<b>Physical hazards</b> 0	<b>Personal protection</b> X

**Key or legend to abbreviations and acronyms used in the safety data sheet**
**Legend Section 8: Exposure controls/personal protection**

TWA	TWA (time-weighted average)	STEL	STEL (Short Term Exposure Limit)
Ceiling	Maximum limit value	*	Skin designation

**Key literature references and sources for data used to compile the SDS**

Agency for Toxic Substances and Disease Registry (ATSDR)  
 U.S. Environmental Protection Agency ChemView Database  
 European Food Safety Authority (EFSA)  
 EPA (Environmental Protection Agency)  
 Acute Exposure Guideline Level(s) (AEGL(s))  
 U.S. Environmental Protection Agency Federal Insecticide, Fungicide, and Rodenticide Act  
 U.S. Environmental Protection Agency High Production Volume Chemicals  
 Food Research Journal  
 Hazardous Substance Database  
 International Uniform Chemical Information Database (IUCLID)  
 National Institute of Technology and Evaluation (NITE)  
 Australia National Industrial Chemicals Notification and Assessment Scheme (NICNAS)  
 NIOSH (National Institute for Occupational Safety and Health)  
 National Library of Medicine's ChemID Plus (NLM CIP)  
 National Library of Medicine's PubMed database (NLM PUBMED)  
 National Toxicology Program (NTP)  
 New Zealand's Chemical Classification and Information Database (CCID)  
 Organization for Economic Co-operation and Development Environment, Health, and Safety Publications  
 Organization for Economic Co-operation and Development High Production Volume Chemicals Program  
 Organization for Economic Co-operation and Development Screening Information Data Set  
 World Health Organization

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**Disclaimer**

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**End of Safety Data Sheet**