

Material Safety Data Sheet

Ti-6Al-4V Titanium Products

(Not Including Powders, Dust or Fines)

SECTION 1: PRODUCT & COMPANY INFORMATION

Product Name:	Products manufactured from Grade 5 Titanium (Ti-6Al-4V)	Manufacturer:	Allied Titanium, Inc.
Titanium Grades:	Grade 5, Grade 23 (Ti-6Al-4V ELI), Grade 5 STA	Manufacturer Address:	Western Headquarters 1400 East Washington St. Sequim, WA 98382
Formula:	Ti-6Al-4V	Manufacturer Phone:	(302) 725-8300
Titanium CAS No:	7440-32-6	Manufacturer email:	info@alliedtitanium.com
Aluminum CAS No:	7429-90-5	Manufacturer Website:	www.alliedtitanium.com
Vanadium CAS No:	7440-62-2		
Emergency Phone:		Chemtrec:	1-(703) 741-5970

SECTION 2: HAZARDS IDENTIFICATION

GHS Classification:	None	NFPA 704 Rating:	None
GHS-US Labeling:	No labeling applicable	HMIS Rating:	None
Signal Word:	None		
Hazards not otherwise classified (HNOC):	Not applicable		

Under normal use and handling, Grade 5 (Ti-6Al-4V) Titanium products in their solid form present few health hazards. Cutting, welding, melting, grinding, etc. of these products will produce dust, fumes or particulates containing the component elements of these products. Exposure to the dust, fume or particulate of these products may present significant health hazards. Exposure to dust or fume may cause irritation of the eyes, skin and respiratory tract. Fine particulates dispersed in air may present an explosion hazard.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name:	Ti-6Al-4V	Trade Name:	Grade 5
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Principal Components	C.A.S.#	EC #	% by Weight
Titanium, Ti	7440-32-6	231-142-3	87.725 - 91 %
Aluminum	7429-90-5	231-072-3	5.5 - 6.75 %
Vanadium	7440-62-2	231-171-1	3.5 - 4.5 %
Iron	7439-89-6	231-096-4	<= 0.40 %
Carbon	7440-44-0	231-153-3	<= 0.10 %
Other Elements			<= 0.40 %

SECTION 4: FIRST AID MEASURES

General: If injured or concerned: Get medical advice/attention. Never give anything by mouth to an unconscious person.	Inhalation: If excessive amounts of smoke, fume, or particulate are inhaled during processing, remove to fresh air and consult a qualified health professional.
Skin Contact: None under normal use conditions.	Eye Contact: In the case of particles coming in contact with eyes during processing, treat as with any foreign object.
Ingestion: Do not induce vomiting. Seek medical assistance.	Note to Physician: Treat systematically and supportively as required.

SECTION 5: FIRE-FIGHTING MEASURES

Products are not flammable in the form as manufactured. Titanium is flammable as finely divided particles or pieces resulting from processing of these products.

Suitable extinguishing media:

Small Fire:	Use Class D fire extinguisher; table salt; sand; dry ground dolomite; or dry powder extinguishing agents.
Large Fire:	Isolate fire and allow to burn out.

Unsuitable extinguishing media:

Do not spray water on burning metal as an explosion may occur.

The explosive characteristic is caused by hydrogen and steam generated by the reaction of the water with the burning material.

Do NOT use carbon dioxide. Do NOT use halogenated extinguisher.

Titanium fires produce intense heat. Very fine, high surface area material resulting from grinding, buffing, polishing, or similar processes of this product may ignite spontaneously at room temperature. WARNING: Fine particles resulting from grinding, buffing, polishing, or similar processes of this product may form combustible

dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimize combustible dust hazard.

Advice for firefighters:

Wear self-contained breathing apparatus and protective suit. Use personal protective equipment as required.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:

Personal Precautions:	Use personal protective equipment as required.
For emergency responders:	Use personal protective equipment as required.
Environmental precautions:	Not applicable to product.
Methods for containment:	Keep fines from becoming airborne. DO NOT USE COMPRESSED AIR. If titanium fines become airborne, ventilate properly to reduce air density.
Methods for cleaning up:	Use non-sparking tools. Do not push powder long distances across the floor. Keep in small piles away from each other. Place material into non-sparking or anti-static containers. Use only static-free vacuums for cleaning.
Other Information:	Spills of this material do not need to be reported to the National Response Center.
Reference to other sections:	See Section 12: ECOLOGICAL INFORMATION.

Section 7: HANDLING AND STORAGE

Precautions for safe handling:	WARNING: Fine particles resulting from grinding, buffing, polishing, or similar processes of this product may form combustible dust-air mixtures. Keep particles away from all ignition sources including heat, sparks, and flame. Prevent dust accumulations to minimize combustible dust hazard.
General Hygiene Considerations	Handle in accordance with good industrial hygiene and safety practice.
Storage Conditions:	Keep chips, turnings, dust, and other small particles away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity).
Incompatible materials:	Dissolves in hydrofluoric acid. When heated above 200°C, reacts exothermically with the following: Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.
Risk Management Methods (RMM)	Not required.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Control Parameters:

Chemical Name	United States	European Union	United Kingdom	France	Spain	Germany
Titanium 7440-32-6	N/A	N/A	N/A	N/A	N/A	N/A
Aluminum 7429-90-5	N/A	N/A	N/A	N/A	N/A	N/A
Vanadium 7440-62-2	N/A	N/A	N/A	N/A	N/A	N/A
	Derived No Effect Level (DNEL):			No DNELs are available for this product as a whole.		
	Predicted No Effect Concentration (PNEC):			No PNECs are available for this product as a whole.		

Exposure Guidelines:

Titanium:

OSHA PEL and ACGIH TLV have been set for titanium powder and dust only.

OSHA PEL is 15mg/m³ (Total Dust) and 5 mg/m³ (Respiratory Dust).

ACGIH TLV is 10 mg/m³ (Total Dust).

Not listed by IARC, NIOSH, NTP.

Aluminum:

OSHA PEL and ACGIH TLV have been set for respirable aluminum.

OSHA PEL is 5 mg/m³ (Respiratory Dust).

ACGIH TLV is 1 mg/m³ (Respiratory Dust).

Vanadium:

OSHA PEL and ACGIH TLV: No exposure limit established.

Engineering Controls:

Avoid generation of uncontrolled particles.

Personal protective equipment:

Eye/face protection: When airborne particles may be present, appropriate eye protection is recommended. For example, tight-fitting goggles, foam-lined safety glasses or other protective equipment that shield the eyes from particles.

Skin and body protection: Wear fire/flame resistant/retardant clothing.

Respiratory protection: When particulates/fumes/gases are generated and if exposure limits are exceeded or irritation is experienced, proper approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminate concentrations. Respiratory protection must be provided in accordance with current local regulations.

Environmental exposure controls: Section 6: ACCIDENTAL RELEASE MEASURES.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	Solid
Appearance:	Various product forms
Color:	Metallic grey or Silver
Odor:	Odorless
Odor threshold:	Not applicable
pH:	N/A
Melting point:	1537.8 - 1671.1 °C (2800.04 - 3039.98 °F)
Freezing point:	N/A
Boiling Point:	3287 °C
Evaporation rate:	N/A
Flammability (solid, gas):	Product not flammable in the form as distributed, flammable as finely divided particles or pieces resulting from processing of this product
Vapor pressure:	N/A
Vapor density:	N/A
Specific Gravity:	4.4 - 4.5 gr/cc ³
Water solubility:	Insoluble
Partition coefficient:	N/A
Auto ignition temperature:	N/A
Decomposition temperature:	N/A
Kinematic viscosity:	N/A
Dynamic viscosity:	N/A
Explosive properties:	N/A
Oxidizing properties:	N/A
VOC Content (%):	N/A
Density:	0.160 lb/in ³

Section 10: STABILITY AND REACTIVITY

Reactivity:	Not applicable
Chemical stability:	Stable under normal conditions.
Sensitivity to Mechanical Impact:	None
Sensitivity to Static Discharge:	None
Possibility of Hazardous Reactions:	Hazardous polymerization does not occur.
Conditions to avoid:	Dust formation and dust accumulation.

Incompatible materials:	Dissolves in hydrofluoric acid. When heated above 200°C, reacts exothermically with the following: Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.
Hazardous decomposition products:	When product is subjected to welding, burning, melting, sawing, brazing, grinding, buffing, polishing, or other similar heat-generating processes, the following potentially hazardous airborne particles may be generated: Titanium dioxide

Section 11: TOXICOLOGICAL INFORMATION

Product Information:

Inhalation:	Not an expected route of exposure for product in massive form.
Eye contact:	Not an expected route of exposure for product in massive form.
Skin Contact:	Product not classified.
Ingestion:	Not an expected route of exposure for product in massive form.

Information on toxicological effects:

Symptoms:	Product not classified.
Acute toxicity:	Product not classified.
Skin corrosion/irritation:	Product not classified.
Serious eye damage/eye irritation:	Product not classified.
Sensitization:	Product not classified.
Conditions to avoid:	Product not classified.
Germ cell mutagenicity:	Product not classified.
Carcinogenicity:	Product not classified.
Reproductive toxicity:	Product not classified.
STOT - single exposure:	Product not classified.
STOT - repeated exposure:	Product not classified.
Aspiration hazard:	Product not classified.

Section 12: ECOLOGICAL INFORMATION

Toxicity:

This product, as manufactured, is not classified for aquatic toxicity.

Persistence and degradability:

Not established.

Bio accumulative potential:

Not established.

Mobility in Soil:

Not available.

Results of PBT and vPvB assessment:

The PBT and vPvB criteria do not apply to inorganic substances.

Other Adverse Effects:

No information available.

Section 13: DISPOSAL CONSIDERATIONS:

Waste treatment methods:

Waste from residues/unused products:

Recycle product or dispose properly in accordance with applicable local, regional, national and international laws and regulations.

Contaminated packaging:

None anticipated.

SECTION 14: TRANSPORT INFORMATION

DOT Not regulated

IMDG
UN/ID no Not regulated
Proper shipping name Not regulated
Hazard Class Not regulated
Packing Group Not regulated
Marine pollutant Not applicable
Special Provisions None
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable

RID
UN/ID no Not regulated
Proper shipping name Not regulated
Hazard Class Not regulated
Packing Group Not regulated

Environmental hazard Not applicable
Special Provisions None

ADR

UN/ID no Not regulated
Proper shipping name Not regulated
Hazard Class Not regulated
Packing Group Not regulated
Environmental hazard Not applicable
Special Provisions None

ICAO (air)

UN/ID no Not regulated
Proper shipping name Not regulated
Hazard Class Not regulated
Packing Group Not applicable
Environmental hazard Not applicable
Special Provisions None

IATA

UN/ID no Not regulated
Proper shipping name Not regulated
Hazard Class Not regulated
Packing Group Not regulated
Description Not applicable
Environmental hazard Not regulated
Special Provisions None

SECTION 15: REGULATORY INFORMATION

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

TSCA Listed: All components are listed.

Regulation (EC) No 1272/2008 (CLP): N/A

Canada WHMIS Classification (CPR, SOR/88-66): N/A

HMIS Ratings: Health: 0 Flammability: 0 Physical: 0

NFPA Ratings: Health: 0 Flammability: 0 Reactivity: 0

European Union

Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

Authorizations and/or restrictions on use:

REACH

This product does not contain substances subject to authorization (Regulation (EC) No. 1907/2006 (REACH), Annex XIV). This product does not contain substances subject to restriction (Regulation (EC) No. 1907/2006 (REACH), Annex XVII).

State of California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)

As of the revision date of this Safety Data Sheet, Titanium is not on Proposition 65 list.

Clean Water Act (CWA)

To the best of our knowledge, this product does not contain hazardous substances, priority pollutants, or toxic pollutants as defined by the CWA.

International Inventories

DSL/NDSL	Complies
EINECS/ELINCS	Complies
ENCS	Complies
IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Complies

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

SECTION 16: OTHER INFORMATION

Prepared by: Allied Titanium, Inc.

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Revision Date: 9/22/2018

Revision Notes: None

This document has been prepared in accordance with the SDS requirements of the OSHA Hazard Communication Standard 29 CFR 1910.1200.

The information in this Material Safety Data Sheet relates only to the specific products designated and may not be valid for such products used in combination with any other materials or in any process, unless specified in the text.

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