

SDS written in accordance with HCS (29 CFR 1910.1200(g)) 2012

SECTION 1: IDENTIFICATION
1.1 Product Identifier
Product Name Ti64

Other Identification Titanium Alloy Powder, Titanium Aluminium Vanadium Alloy, Titanium-6Al-4V, Ti64

Chemical Name Titanium Aluminium Vanadium

Product Code 35821, 36396, 36464, 38028, 38188, 39864, 40301, 40324, 40325, 41728, 42176, 42384, 42845, 60008, 60031

CAS No. Mixture.

EC No. Mixture.

REACH Registration No. No applicable information was found. None assigned.

1.2 Recommended Use of the Chemical and Any Restrictions on Use
Identified Use(s) For sintering applications including but not limited to SLS, LPBF, DMLS, and cold spray applications

Restrictions on Use(s) No applicable information was found. None known.

1.3 Details of the supplier of this safety data sheet
Manufacturer Name Amaero Advanced Materials & Manufacturing, Inc.

Manufacturer Address 130 Innovation Drive
McDonald, TN 37353, USA

Manufacturer Telephone No. (423) 255 0461

Manufacturer E-mail amaeroinc.com

1.4 Emergency Phone Number
Emergency Phone No. Chemtrec: 1-800-424-9300 or (423) 255 0461

SECTION 2: HAZARD(S) IDENTIFICATION
2.1 Hazard Classification of the Chemical
Regulation (EC) No. Flam. Sol. 1: Flammable solid.
1272/2008 (CLP)

Signal Word(s) Danger

Hazard Statement(s) H228: Flammable solid.

Precautionary Statement(s) P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P240: Ground/bond container and receiving equipment.
P241: Use explosion-proof electrical/ventilating/lighting/equipment.
P280: Wear protective gloves/protective clothing/eye protection/face protection. P370+P378: In case of fire: Use table salt, dry sand, or Class D Fire Extinguisher to extinguish.

2.2 Hazard Label Information
Product Name Ti64-63+20

Hazard Pictogram/Symbol


GHS02

2.3 Description of any hazards not otherwise classified

Other Hazards Danger of dust explosion. Can form explosive mixture with air.
Dust may have irritant effect on skin, eyes and air passages.

2.4 Additional Information

No applicable information was found.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS
3.1 Chemical Name and Concentration Ranges of Health Hazards according to Paragraph (d) of 1910.1200

HAZARDOUS INGREDIENT(S)	CAS No.	EC No. / REACH Registration No.	%W/W	Hazard State	Hazard Pictogram(s)
Titanium	7440-32-6	231-142-3 / 01-2119484878-14-0000	88-100	Flam. Sol. 1; H228	GHS02
Aluminium	7429-90-5	231-072-3 / 01-2119529243-45-0000	0-7	Flam. Sol. 1; H228	GHS02
Vanadium	7440-62-2	231-171-1 / 01-2119537418-34-0000	0-5	Not classified	

SECTION 4: FIRST-AID MEASURES
4.1 Necessary First-aid Instructions by Relevant Routes of Exposure

Inhalation Flam. Sol. 1: Flammable solid.

Skin Contact Danger

Eye Contact H228: Flammable solid.

Ingestion H228: Flammable solid.

4.2 Most Important Symptoms or Effects, both acute and/or delayed

Symptoms No applicable information was found.

4.2 Immediate Medical Care and Special Treatment Needed (Where Necessary)

Care Required Treat as symptoms arise.

SECTION 5: FIREFIGHTING MEASURES
5.1 Extinguishing media

Suitable Extinguishing media In case of fire: Use table salt, dry sand, or Class D Fire Extinguisher to extinguish. Fire may also be isolated and allowed to burn itself out.

Unsuitable Extinguishing media Do not use water, halogenated agents or ABC dry chemical agents.

5.2 Special hazards arising from the substance or mixture

Special Hazards Titanium alloy is flammable powder, when suspended in air can readily be ignited, will propagate flame, and may generate considerable pressure and/or deflagrate. May form explosive dust/air mixtures. Decomposes in a fire giving off toxic fumes: Metal oxides, hydrogen gas.

5.3 Immediate Medical Care and Special Treatment Needed (Where Necessary)

Fire fighters should wear complete protective clothing including self-contained breathing apparatus. If the fire is in container, smother with inert gas (Argon/Helium).

SECTION 6: ACCIDENTAL RELEASE MEASURES
6.1 Personal precautions, protective equipment and emergency procedures

Ensure adequate ventilation. Eliminate sources of ignition. Avoid dust generation. Avoid inhalation of dusts. Wear protective gloves/protective clothing/eye protection/face protection.

6.2 Environmental precautions

Do not allow to enter drains, sewers or watercourses

6.3 Methods and material for containment and cleaning up

Stop leak if safe to do so. Sweep or shovel-up spillage and remove to a safe place. Use vacuum equipment for collecting spilt materials, where practicable. Avoid the use of compressed air to clean spills or leaks of fine material.

6.4 Reference to other sections

See Sections 8 and 13 for more information.

SECTION 7: HANDLING AND STORAGE
7.1 Precautions for safe handling

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/equipment. Avoid build-up of dust. Avoid inhalation of dusts. Avoid contact with skin and eyes. Wear protective gloves/protective clothing/eye protection/face protection.

7.2 Conditions for safe storage, including any incompatibilities

Keep containers in a clean, cool and dry area away from heat sources. Store in a well-ventilated place.

Storage temperature Ambient.

Storage life Stable under normal conditions.

Incompatible materials Strong oxidising agents, Acids, Alkaline.

7.3 Specific end use(s)

For sintering applications including but not limited to SLS, LPBF, DMLS, and cold spray applications

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION
8.1 Exposure Limits

Occupational Exposure Limits

Substance	CAS No.	LTEL (8hr TWA ppm)	LTEL (8hr TWA mg/m3)	STEL (ppm)	L (mg/	Notes
Aluminium (Inhalable Dust)	7429-90-5		10			

Aluminium (Respirable Dust)	7429-90-5		4		
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Source: Workplace Exposure Limit (UK HSE EH40)

8.2 Appropriate Engineering Controls

Engineering Controls Avoid generation of dust clouds. Process under argo. Provide ventilation where required, including local extraction

8.3 Recommendations for Personal Protective Measures to Prevent Illness or Injury from Exposure to Chemicals

Eye/face protection Eyeprotection such as foam sealed goggles should be worn when there is risk of foreign substances being airborne.

Skin and body protection When appropriate wear flame resistant clothing, especially when heat will be generated.

Respiratory protection Positive-pressure air respirators should be used when there is risk of inhalation. Follow local regulations for respiratory requirements.

General Hygiene Always process with good industrial hygiene and safety practice in mind.

Considerations Follow local regulations.

Thermal Hazards No thermal hazards known.

8.3 Environmental Exposure Controls

Do not allow to enter drains, sewers, or watercourses.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES
9.1 Information on basic physical and chemical properties

Appearance Solid, Color: metallic grey

Odour Odourless

Odor threshold Not available

pH Not available

Melting point/ freezing point 1660 °C (3260 °F)

Initial boiling point and boiling range: 3287 °C (5949 °F)

Flash point Not available

Evaporation rate Not applicable

Flammability (solid, gas): Flammable solid.

Upper/lower flammability or explosive limits: Not available

Vapor pressure: Not available

Vapor density: Not available

Density: Not available

Relative Density: 4.5 g/cm³

Solubility(ies): Solubility (Water): Insoluble

Solubility (Other): Not available

Partition coefficient: n-octanol/water: Not available

Auto-ignition temperature: Not available

Decomposition temperature: Not available

Viscosity: Not applicable

9.2 Other Information (-53+20 µm range)

Minimum ignition energy (MIE): 74 mJ (-63+20 µm powder)

Dust deflagration index (Kst): 42 bar·m/s

Dust explosives classes: ST 1

Maximum explosion pressure (Pmax): 5.81 barg

Maximum rate of pressure rise ((dP/dt)max): 155

Minimum Explosible Concentration (MEC): 60 < MEC < 80g/m³

Limiting Oxidant Concentration (LOC) 7.5 % O₂

Minimum Ignition Temperature of a Dust Cloud (MAIT) 750 °C

Minimum Ignition Temperature of a Dust Layer (MIT): > 450 °C

SECTION 10: STABILITY AND REACTIVITY
10.1 Reactivity

Stable under normal conditions.

10.2 Chemical Stability

Stable under normal conditions.

10.3 Possibility of hazardous reactions

Danger of dust explosion. Can form explosive mixture with air.

10.4 Conditions to avoid

Keep away from heat and direct sunlight. Avoid contact with moisture.

10.5 Incompatible materials

Strong oxidising agents, Acids, Alkaline.

10.6 Hazardous decomposition products

No hazardous decomposition products known.

SECTION 11: TOXICOLOGICAL INFORMATION
11.1 Information on toxicological effects

Acute toxicity - Ingestion Low acute toxicity.

Acute toxicity - Skin Contact Low acute toxicity.

Acute toxicity - Inhalation Low acute toxicity.

Skin corrosion/irritation Dust may cause irritation.

Serious eye damage/irritation Dust may cause irritation.

Skin sensitization data It is not a skin sensitiser.

Respiratory sensitisation data None anticipated.

Germ cell mutagenicity There is no evidence of mutagenic potential.

Carcinogenicity No evidence of carcinogenicity.

Reproductive toxicity None anticipated.

Lactation Not classified.

STOT - single exposure None anticipated.

STOT - repeated exposure None anticipated.

Aspiration hazard Not classified.

11.2 Other Information

No applicable information was found.

SECTION 12: ECOLOGICAL INFORMATION
12.1 Toxicity

Toxicity - Aquatic invertebrates Low toxicity to invertebrates

Toxicity - Fish Low toxicity to fish

Toxicity - Algae Low toxicity to algae

Toxicity - Sediment Compartment Not classified.

Toxicity - Terrestrial Compartment Not classified.

12.2 Persistence and Degradation

No data.

12.3 Bioaccumulative potential

No data.

12.4 Mobility in soil

Insoluble in water. The product is predicted to have low mobility in soil.

12.5 Results of PBT and vPvB assessment

Not classified as PBT or vPvB.

12.6 Other adverse effects

None

SECTION 13: DISPOSAL CONSIDERATIONS
13.1 Waste treatment methods

Dispose of this material and its container as hazardous waste. Disposal should be in accordance with local, state or national legislation.

13.2 Additional information

EU Waste Code 17 04 07 mixed metals

SECTION 14: TRANSPORT INFORMATION
14.1 UN number

UN No. 3089

14.2 UN Proper Shipping Name

Proper shipping name METAL POWDER, FLAMMABLE, N.O.S

14.3 Transport hazard class(es)

ADR/RID Class 4.1

IMDG Class 4.1

IMDG EMS Not available

ICAO/IATA 4.1

Expected Quantities E2

Passenger and Cargo Aircraft Limited Quantities Y441
 Packing Instructions

Passenger and Cargo Aircraft Limited Quantities 5 kg
 Max Net Qty

Passenger and Cargo Aircraft Packing 445
 Instructions

Passenger and Cargo Aircraft Max Net Qty. 15 kg

Cargo Aircraft Packing Instructions 448

Cargo Aircraft Max Net Qty 50 kg

Special Provisions A3

Emergency Response Guidebook (ERG) Code 3L

ADR Classification Code F3

ADR HIN 40

ADR Transport Category 2

Tunnel Restriction Code E

Emergency Action Code 4Y

APP Advice on Additional Personal Protection (APP) Not applicable

14.4 Packing Group

Packing Group II

4.1

Labels



Special Provisions 552

Limited Quantity 1 kg

Expected Quantities E2

Mixed Packing Instructions for Packages P002 IBC08

Special Packing Provisions for Packages B4

Mixed Packing Instructions for Packages MP11

14.5 Environmental Hazards

Environmental hazards Not known.

14.6 Special precautions for user

Special precautions for user Not known.

14.7 Transport in bulk according to Annex II of Marpol and the IBC Code

Packing Instructions for Portable Tanks T3

Special Provisions for Portable Tanks TP33

Tank Code for Tanks SGAN

Special Provisions for Tanks Not applicable

Vehicle for Tank Carriage AT**Special Provisions for Carriage – Packages** V11**Special Provisions for Carriage – Bulk** Not applicable**Special Provisions for Carriage – Loading,
Unloading and Handling** Not applicable**SECTION 15: REGULATORY INFORMATION****15.1 Safety, health and environmental regulations/ legislation specific for the substance or mixture**

None known

SECTION 16: OTHER INFORMATION**LEGEND****LTEL** Long Term Exposure Limit**STEL** Short Term Exposure Limit**PBT** Persistent, Bioaccumulative and Toxic**vPvB** very Persistent, and very Bioaccumulative**STOT** Specific Target Organ Toxicity**Flam. Sol. 1** Flammable solid Category 1**Water-react. 1** Substance or mixture which in contact with water emits flammable gas Category 1**Hazard Statements** H228: Flammable solid

H261: In contact with water releases flammable gases

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