

Trade name: Ti RM1
Product no: A-5983-0311
Current revision: 2



Safety data sheet

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Chemical name : Titanium alloy powder

Synonyms: Metal alloy powder, Ti64, Ti-6Al-4V. Applicable to powder smaller than 44 µm only.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Uses: Metal powder for additive layer manufacturer or HIP detailing.

Not to be used for: Any other purpose.

1.3 Details of the supplier of the safety data sheet

Address

Renishaw plc
New Mills, Wotton-under-Edge
Gloucestershire
GL12 8JR
United Kingdom

Telephone no. +44 (0) 1453 524524
Fax no. +44 (0)1453 524901
e-mail msds@renishaw.com

Emergency telephone number

999/911 or local emergency number.

Section 2: Hazards identification

2.1 Classification of the substance or mixture

Extremely flammable material.
May cause sensitisation by inhalation and skin contact.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.

2.2 Label elements

Labelling according to Regulation (EC) No 1272/2008 (CLP Regulation)

Hazard pictograms



GHS08



DANGER

Hazard statements

H222	Extremely flammable aerosol.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Precautionary statements

P210	Keep away from heat/sparks/open flames/hot surfaces – No smoking.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P370+P378	In case of fire: Use Class D extinguisher or smother with dry sand, dry clay or dry limestone for extinction.

2.3 Other hazards

Dust can irritate the eyes. High dust levels may irritate the respiratory system.

Section 3: Composition/information on ingredients

Ingredient	CAS number	EC number	Weight %
Titanium	7440-32-6	231-142-3	88.75 – 91.0
Aluminium	7429-90-5	231-072-3	5.5 – 6.75
Vanadium	7440-62-2	231-171-1	3.5 – 4.5

Section 4: First aid measures**4.1 Description of first aid measures****After inhalation**

Remove patient to fresh air, allow to rest and keep warm. If not breathing, give artificial respiration and seek medical attention.

After skin contact

Remove contaminated clothing, shoes and jewellery and wash before reuse. Wash skin with soap and water for several minutes. Get medical attention if symptoms persist.

After eye contact

Rinse with a gentle stream water for at least 15 minutes. Hold eye lids open. Remove any contact lenses. Get medical attention if symptoms persist.

After ingestion

DO NOT induce vomiting! Rinse mouth out and then drink plenty of water. Get medical attention if discomfort occurs.

Personal precautions

Ensure that those giving first aid treatment do not get contaminated by product spills, etc. Wear suitable protective clothing, gloves and eye protection. See also Section 8 for details.

4.2 Most important symptoms and effects, both acute and delayed

May cause allergic skin reaction. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

4.3 Indication of any immediate medical attention and special treatment needed

None other than above.

Section 5: Fire-fighting measures**5.1 Extinguishing media**

Suitable extinguishing media Use approved Class D extinguisher or smother with dry sand, dry clay or dry limestone.

Unsuitable extinguishing media Do not use water, dry chemical, CO₂, or halon.

5.2 Special hazards arising from the substance or mixture

Product is highly flammable. Fire in the surrounding materials can give rise to toxic fire gases. High concentration of airborne dust may form explosive mixture with air. Decomposition of this product may yield metallic oxides.

Not to be used: Do not use water jet, foam.

5.3 Advice for firefighters

Self-contained breathing apparatus and protective clothing. Prevent firefighting water entering watercourses or groundwater. Avoid creation of dusts.

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment, see Section 8. Avoid contact with eyes and skin and inhalation of dust. Use with adequate ventilation. Remove all sources of ignition.

6.2 Environmental precautions

Prevent from entering sewers or the immediate environment. In case of large spill, inform local police, local authority, water company, appropriate local environmental authority and/or fire brigade as appropriate.

6.3 Methods and material for containment and cleaning up

On soil: Contain any spilled material immediately by vacuuming or shovelling, taking care not to raise dust, into labelled containers for disposal (See Section 13). Do not use compressed air to clean spills. Use non-sparking tools to clean up. Do not push powder long distances across the floor. Keep in small piles away from each other. Place collect material into non-sparking or anti-static containers, containing large quantities of sand, or other appropriate heat dissipation materials. The use of plastic bags is not recommended, due to potential for static electricity build-up (inside plastic bags).

On water: None known.

6.4 Reference to other sections

See Section 8 for details of protective equipment.
See Section 13 for details of disposal.

Section 7: Handling and storage

7.1 Precautions for handling

Use personal protective equipment, see Section 8. Avoid creating dust where possible. Ensure good dust ventilation during handling. If necessary, use local exhaust ventilation. Use non-sparking tools when opening or closing containers. Wet mopping or HEPA vacuuming is recommended to clean up any dusts that may be generated during handling and processing. Wash hands and face thoroughly before eating, drinking or smoking. Keep powder away from open flames and other sources of ignition. Try to maintain humidity above 50% to prevent electrostatic build-up. Maintain a supply of "coarse" (rock-type) salt and/or "Class D" (for metal fires) fire extinguisher located near processing and storage areas.

7.2 Conditions for safe storage, including any incompatibilities

Store indoors. Keep in original containers. Keep dry. Good housekeeping and engineering practices should be employed to prevent the generation and accumulation of dusts. Comply with local fire prevention and building codes for the storage of these materials.

Section 8: Exposure controls/personal protection

8.1 Control parameters

Aluminium	(231-072-3)
OSHA:	15 mg/m ³ TWA (total particulate); 5 mg/m ³ TWA (respirable fraction)
NIOSH:	10 mg/m ³ TWA (total particulate); 5 mg/m ³ TWA (respirable fraction)
WEL:	10 mg/m ³ TWA (inhalable dust); 4 mg/m ³ TWA (respirable dust)

Monitoring procedures: None specified.

8.2 Exposure controls

Recommended engineering controls

Ensure good ventilation, where possible at local site of dust formation. Arrange for eye wash possibility.

Personal protection

Always check applicability with your supplier of protective equipment.

Respiratory protection

Personal exposure must be controlled to conform with local/national regulations (see above). If this is not possible, respiratory protection must be worn. Full face respirator conforming to EN143, Type P3 should be used.

Skin protection

Chemically and fire-resistant resistant protective overalls.

Eye protection

Wear safety glasses or goggles.

Hand protection

Always wear gloves when handling the product. Contact your supplier of protective equipment for more details. Note: Break-through times can vary depending on thickness, use and source. Change gloves regularly.

General hygiene

Do not eat, drink, or smoke while using this product. Immediately take off any contaminated clothing and laundry before re-use. Wash hands and / or face before breaks and at the end of the shift. After the session, wash the skin and apply skin cream.

Section 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	Powder.
Colour	Grey.
Odour	Odourless.
Odour threshold value	No information available.
pH-value	No information available.
Melting point (°C)	1605 - 1660
Boiling point	No information available.
Flash point	No information available.
Evaporation rate	No information available.
Flammability	No information available.
Upper flammability limit (UFL)	No information available.
Dust explosion class* (St class)	1
Lower explosibility limit* (LEL g/m ³)	50
Vapour pressure	No information available.
Vapour density	No information available.
Density (g/cm ³)	No information available.
Solubility (H ₂ O)	Insoluble.
Partition coefficient	No information available.
Auto-ignition temperature (°C)	480 (very fine particles in cloud form).
Decomposition temperature	No information available.
Viscosity	No information available.
Minimum ignition temperature* (MIT, °C)	710-860
Limiting oxygen concentration* (LOC, % by volume)	7
Explosive properties	No information available.
Oxidising properties	No information available.

* Data is indicative and will vary depending on chemistry and particle size distribution.

9.2 Other Information

These are typical values and do not constitute a specification. Fine dust clouds may form explosive mixtures with air.

Section 10: Stability and reactivity

10.1 Reactivity

Stable product under recommended storage and handling conditions.

10.2 Chemical stability

Stable product under recommended storage and handling conditions.

10.3 Possibility of hazardous reactions

Stable product under recommended storage and handling conditions.

10.4 Conditions to avoid

Static electricity, heat or ignition source, formation of dust.

10.5 Incompatible materials

Combustible materials, acid, oxidising agents, halogenated hydrocarbons.

10.6 Hazardous decomposition products

Flammable gas, nitrogen oxides.

Section 11: Toxicological information

11.1 Potential health effects

A: General product Information

No scientific evidence was found of a health hazard from the inhalation of titanium powder in concentration of air that does not exceed 10 mg/m³ total dust containing less than 1% quartz. The toxicity of titanium has been found to be relatively inert. Skin contact with titanium powders may cause physical abrasion. Eye contact has shown particulate irritation. This product is not considered carcinogenic, mutagenic, or teratogenic.

B: Substance Analysis - LD50/LC50

Not available.

11.2 Carcinogenicity

A: General product information

No carcinogenicity data available for this product. This product is not considered carcinogenic, mutagenic, or teratogenic.

11.3 Other toxicological information

No toxicological data available for this product. This product is not considered carcinogenic, mutagenic, or teratogenic.

Section 12: Ecological information

No data available on mixture. Data based on individual 1% components shown below. Based upon component, product may be toxic to aquatic life.

12.1 Toxicity

No information available for the product.

12.2 Persistence and degradability

May cause long-term adverse effects in the aquatic environment.

12.3 Bioaccumulative potential

Not expected to occur.

12.4 Mobility in soil

No information available for the product.

12.5 Results of PBT and vPvB assessment

May cause long-term adverse effects in the aquatic environment.

12.6 Other adverse effects

No information available for the product.

Section 13: Disposal considerations

13.1 Waste treatment methods

Product

Waste product is considered Hazardous Waste and should be disposed of via a licensed operator.

Packaging

Contaminated packing should be disposed of as Hazardous Waste according to local authority guidelines.

Section 14: Transport information

14.1 UN number

UN3089

14.2 UN proper shipping name

Metal powders, flammable, n.o.s. (Spherical Ti-6Al-4V Powder < 45 µm)

14.3 Transport hazard class(es)

4.1

14.4 Packing group

II

14.5 Environmental hazards

Not applicable.

14.6 Special precautions for user

None.

Section 15: Regulatory information

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

Chemical Agents Directive 98/24/EC

15.2 Chemical safety assessment

A chemical safety assessment has not been carried out for this mixture.

Section 16: Other information

Sources of data used to compile the data sheet:

In-house data files, CLP Annex VI Tables 3.1 & 3.2, TOXNET, IARC, International Labour Organization, NIOSH Pocket Guide to Chemical Hazards, European Chemicals Agency, Institute for Health and Consumer Protection.

Key/legend

EEC = European Economic Community; EINECS = European Inventory of Existing Commercial Chemical Substances; ELINCS = European List of Notified Chemical Substances; EU = European Union; HMIS = Hazardous Materials Identification System; IARC = International Agency for Research on Cancer; IMO = International Maritime Organization; IATA = International Air Transport Association; LC50 = Lethal Concentration 50%; LD50 = Lethal Dose 50%; MAK = Maximum Concentration Value in the Workplace; NDSL = Non-Domestic Substances List; NFPA = National Fire Protection Association; NIOSH = The National Institute for Occupational Safety and Health; NOHSC = National Occupational Health & Safety Commission; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; STEL = Short-term Exposure Limit; TDG = Transportation of Dangerous Goods; TLV = Threshold Limit Value; TSCA = Toxic Substances Control Act; TWA = Time Weighted Average.

The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. Although reasonable care has been taken in the preparation of this document to assess and summarise the hazard properties of the product, the user must satisfy himself that the information contained herein is pertinent to permit safe handling under his use conditions, since the supplier cannot foresee all conditions of use.