

Product: Spherical APA Ti-6Al-4V Powder (Coarse)**SECTION 1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY UNDERTAKING****1.1 Identification of the substance or preparation**

Trade / material name: Spherical APA Ti-6Al-4V powder (Coarse)

Chemical name: Titanium 6-Aluminum 4-Vanadium Alloy Powder
(size: 20-53 µm, 20-63 µm, 45-106 µm, > 45 µm, > 106 µm, as-produced)

Synonyms: Ti-6Al-4V Grade 5 Powder
Ti-6Al-4V Grade 23 Powder
Ti-6Al-4V ELI Powder (Extra Low Interstitials)

1.2 Use of the substance/preparation

Powder metallurgy parts manufacturing including additive manufacturing, metal injection molding, laser sintering, plasma spraying, cold spraying or others.

1.3 Company/undertaking identification

AP&C Advanced Powders and Coatings Inc.
3765 La Vérendrye, suite 110,
Boisbriand, Quebec, J7H 1R8
CANADA
Phone No.: +1 450.434.1004
Resp.: Frédéric Marion fmarion@advancedpowders.com

1.4 Emergency Telephone

24-Hour Transportation Emergency Phone: CANUTEC +1 613.996.6666

SECTION 2 HAZARDS IDENTIFICATION**2.1 Classification of the substance or mixture**

Classification according to Regulation (EC) No 1272/2008: Not classified

This substance is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

2.1.1. CLP**2.1.2. CHIP (Chemical Hazard Information for Packaging and Supply)**

Risk phrases: Not classified

Physical/Chemical Hazards: Dust clouds may form explosive mixtures with air. Handling and/or processing of this material may generate a dust which can cause mechanical irritation of the eyes, skin, nose and throat.

Safety phrases: S16 – Keep away from sources of ignition - No smoking.
S22 – Do not breathe dust.
S23 – Do not breathe fumes.
S36/37 – Wear suitable protective clothing and gloves.
S38 – In case of insufficient ventilation, wear suitable respiratory equipment.
S43 – In case of fire, use sand.
S51 – Use only in well-ventilated areas.

SAFETY DATA SHEET

Product: Spherical APA Ti-6Al-4V Powder (Coarse)

2.2 Label elements

Hazard pictograms: None

Signal word: None

Hazard statements: May form combustible dust concentrations in air.

Precautionary statements

Prevention: P210 – Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P241 – Use explosion-proof electrical equipment.
P280 – Wear protective gloves, protective clothing and eye protection.
P370 + 378 – In case of fire: Use table salt, dry sand or Class D Fire Extinguisher to contain fire.

Response: Get medical attention if you feel unwell. If exposed or concerned: get medical attention.

Storage: Not applicable

Disposal: Not applicable

Hazardous ingredients: None

Supplemental label elements: Finer powders (<45 µm) obtained from separation or processing might be classed as flammable solids.

Special packaging requirements:

Containers to be fitted with child-resistant fastenings: Not applicable

Tactile warning of danger: Not applicable

2.3 Other hazards

Other hazards which do not result in classification: Dust clouds may form explosive mixture with air. Handling and/or processing of this material may generate a dust which can cause mechanical irritation of the eyes, skin, nose and throat.

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SECTION 3 COMPOSITION/INFORMATION ON INGREDIENTS

Substance/Mixture: Mixture

Ingredient name	CAS number	EC numbers	Percent		Classification		Type
			Ti-6Al-4V	67/548/EEC	Regulation (EC) No. 1272/2008 [CLP]		
Titanium	7440-32-6	231-142-3	88.75-91.0	Fine powder*		F; R11	Flam. Sol. 1, H228
				Coarse powder*			
Aluminum	7429-90-5	231-072-3	5.5-6.75	F, R15-R17	Flam. Sol. 1, H228 Water-react. 2, H261		
Vanadium	7440-62-2	231-171-1	3.5-4.5		Not classified		

* Fine powder size distribution includes but is not limited to 0-20 µm, 0-45 µm, 10-45 µm, 15-45 µm and 20-45 µm.

* Coarse powder size distribution includes but is not limited to 20-53 µm, 20-63 µm, 45-106 µm, > 45 µm and 0-180 µm.

Type

[1] Substance classified with a health or environmental hazard

[2] Substance with a workplace exposure limit

SECTION 4 FIRST AID MEASURES

4.1 Description of first aid measures

- Eye contact: Immediately flush eyes gently and thoroughly, including under the eyelids, with clean running water for 20 minutes.
- Skin contact: Wash thoroughly with soap and water. Remove and properly dispose or launder contaminated clothing before wearing it again. Clean material from shoes and equipment. Seek medical attention.
- Inhalation: Remove victim to fresh air. Restore and/or support breathing as needed. Seek medical attention.
- Ingestion: Call poison control centre. Never give anything by mouth to someone who is unconscious or convulsing. A professional decision about whether or not to induce vomiting is required. Seek medical attention.

4.2 Most important symptoms and effects

- Eye contact: Moderate irritating to eyes.
- Skin contact: Prolonged or repeated exposure may be irritating.
- Inhalation: Prolonged or repeated exposure to large amounts may cause damage to lungs.
- Ingestion: Prolonged or repeated exposure may be irritating to mouth, throat and oesophagus.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician: Call poison treatment specialist immediately if large quantities have been ingested or inhaled.Specific treatments: None

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SECTION 5 FIRE-FIGHTING MEASURES

- 5.1 Suitable extinguishing media:** Use approved Class D extinguisher or smother with dry sand, dry clay, dry limestone or salt.
- 5.2 Not suitable as extinguishing media:** Do not use water, dry chemical, CO₂, or halon.
- 5.3 Special protective equipment for fire-fighters:** Wear appropriate protective equipment and self-contained breathing apparatus (SCBA).

SECTION 6 ACCIDENTAL RELEASE MEASURES

- 6.1 Personal precautions:** Immediately contact emergency personnel. Remove all sources of ignition. Keep unnecessary personnel away. Use suitable protective equipment. Do not touch or walk through spilt material.
- 6.2 Environmental precautions:** Keep spilt material away from drains and runoff, ground-water and soil.
- 6.3 Methods for containment and clean-up:** 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 collected 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).
- 6.4 Reference to other sections:** See section 1 for contact information. See section 8 for information on appropriate personal protective equipment. See section 13 for waste treatment information.

SECTION 7 HANDLING AND STORAGE

- 7.1 Handling:** This powder is not classified as a flammable solid, but finer powder obtained from separation or powder after processing might be. Keep powder away from open flames and other sources of ignition. No smoking in area. Prevent electrostatic build-up. Use non-sparking metal tools and equipment. When transferring powder between two containers, bonding and grounding the containers or equipment is highly recommended. Dust clouds should be minimized when handling the powder. Consider using an inert gas cover when powder dust clouds may be present. Electrical installation should meet code for handling hazardous material (combustible dust). Maintain a supply of "coarse" (rock-type) salt and/or "Class D" (for metal fires) fire extinguisher located near processing and storage areas. Keep work areas clean and free of waste and minimise dust accumulation on surfaces (walls, floor, equipment). Standard industrial vacuum systems should not be used for cleaning.
- 7.2 Storage:** Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Comply with local fire prevention and building codes for the storage of these materials. Storage area should be separated from handling area. Keep away from incompatible materials.
- 7.3 Specific end use(s) recommendations and industrial sector specific solutions:** Not available

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SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

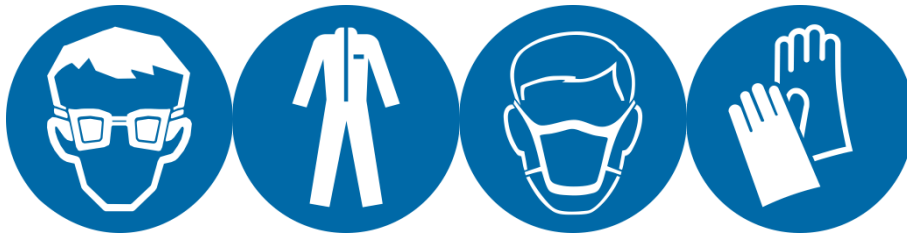
8.1 Control parameters

Exposure limit values:

<u>INGREDIENT NAME</u>	<u>OSHA PEL (mg/m³)</u>	<u>ACGIH TLV (mg/m³)</u>	<u>TRGS 900 AGM TWA (mg/m³)</u>	<u>INGREDIENT NAME</u>	<u>OSHA PEL (mg/m³)</u>	<u>ACGIH TLV (mg/m³)</u>	<u>TRGS 900 AGM TWA (mg/m³)</u>
Titanium	NE	NE	NE	Vanadium	NE	NE	NE
Aluminum	1	1	3				

OSHA: Occupational Safety and Health Administration
 PEL: Permissible Exposure Limit
 ACGIH: American Conference of Governmental Industrial Hygienists
 TLV: Threshold Limit Value
 TRGS 900: Technische Regel Gefahrstoffe 900- Germany
 AGW: Workplace exposure limit
 TWA: Time-weighted average
 NE: Not Established

8.2 Exposure controls



- 8.2.1. Occupational exposure controls: Install and operate general and/or local exhaust ventilation systems of sufficient power to maintain airborne concentration below the defined or recommended limit.
- 8.2.2. Respiratory protection: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard. Respirator selection must be based on known or anticipated exposure levels, the hazards of the material, and the safe working limits of the selected respirator.
- 8.2.3. Hand protection: Non-static gloves when skin abrasion is possible. For hygienic reasons, rubber gloves should not be worn more than 2 hours.
- 8.2.4. Eye protection: Safety glasses with side shields or goggles when potential exposure exists.
- 8.2.5. Skin protection: Wear fire-resistant clothing when handling materials.

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SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

General Information:

Appearance:	Solid metallic powder, grey
Odour:	None
Melting point:	1605-1660 °C
Explosive properties:	Dust clouds may form explosive mixtures with air.
Relative density:	4.43 (H ₂ O=1)
Water solubility:	Insoluble.
Oxidising properties:	Not expected.
Flammability:	Finer powders (<45 µm) obtained from separation or processing might be classed as flammable solids.

Typical data for 45-106 microns powder (D10 - 53 µm / D50 - 74 µm / D90 - 103 µm):

Minimum ignition energy (MIE):	> 1000 mJ – without inductance (< 25 µH)
Explosion severity (20 litre sphere):	
P _{max} :	2.8 bar @ 3000 g/m ³
(dP/dt) _{max} :	22 bar/s @ 3000 g/m ³
K _{st} :	6 bar m/s
St class:	1
Limiting oxygen concentration (LOC):	15-16% O ₂ (v/v)
Minimum explosive concentration (MEC):	800-850 g/m ³
Minimum (dust cloud) ignition temperature (MIT):	573 °C
Layer (5 mm) ignition temperature (LIT):	325 °C

**Previous data were obtained from a representative sample but individual lot result may vary. Particle size distribution will strongly influence powder reactivity.*

SECTION 10 STABILITY AND REACTIVITY

10.1 Reactivity:	No specific test data related to reactivity available for this product.
10.2 Chemical stability:	This product is stable under normal storage conditions.
10.3 Possibility of hazardous reactions:	Under normal conditions of storage and use, hazardous reactions will not occur.
10.4 Conditions to avoid:	Static electricity, heat or ignition source, formation of dust cloud.
10.5 Incompatible materials:	Combustible materials, acid, oxidizing agents, halogenated hydrocarbons.
10.6 Hazardous decomposition products:	None

SECTION 11 TOXICOLOGICAL 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.

Product: Spherical APA Ti-6Al-4V Powder (Coarse)**SECTION 12 ECOLOGICAL INFORMATION**

No known significant effects or critical hazards for this product. The individual elements might have some degree of ecotoxicity not reported here.

- | | |
|--|---|
| 12.1. Toxicity: | Not available |
| 12.2. Persistence and degradability: | Not available |
| 12.3. Bioaccumulative potential: | Not available |
| 12.4. Mobility in soil: | Not available |
| 12.5. Results of PBT and vPvB assessment: | Not applicable |
| 12.6. Other adverse effects: | No known significant effects or critical hazards. |

SECTION 13 DISPOSAL CONSIDERATIONS**13.1 Waste treatment methods**

The generation of waste should be avoided or minimised whenever possible. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Disposal of this product, and any by-product should at all times comply with the requirements of environmental protection and waste disposal legislation and any national, regional and local authority requirements. Contaminated packaging materials, cleaning tissues, disposable gloves, and other contaminated materials should be disposed off in the same manner as the product itself.

SECTION 14 TRANSPORT INFORMATION

- | | |
|---|----------------|
| 14.1 UN number: | Not classified |
| 14.2 UN proper shipping name: | None |
| 14.3 Transport hazard class(es): | Not applicable |
| 14.4 Packing group: | Not applicable |
| 14.5 Environmental hazards: | No |
| 14.6 Special precautions for user: | Not available |
| 14.7 Transport in bulk according to Annex II of MARPOL 73/78 and IBS Code: | Not available |

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SECTION 15 REGULATORY INFORMATION

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

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorisationSubstances of very high concern

None of the components are listed.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles: Not applicable

Additional information: None

Other EU regulations

Europe inventory: Not listed
 Black List Chemicals: Not listed
 Priority List Chemicals: Not listed
 Integrated pollution prevention and control list (IPPC) – Air: Not listed
 Integrated pollution prevention and control list (IPPC) – Water: Not listed

International regulations

Chemical Weapons Convention List Schedule I Chemicals: Not listed
 Chemical Weapons Convention List Schedule II Chemicals: Not listed
 Chemical Weapons Convention List Schedule III Chemicals: Not listed

German regulations

Storage code: 11
 Hazard class for water: WGH 2
 Waste catalogue classification: 12-01-04 – non-hazardous waste

15.2 Chemical Safety Assessment:

This product contains substances for which Chemical Safety Assessments are still required.

SECTION 16 OTHER INFORMATION

16.1 Abbreviations and acronyms

[DSD/DPD] classification: F – Highly flammable

[CLP/GHS] classification: Flam. Sol. 1 – Flammable solids category 1
 Water-react. 2 – Substance or mixture which in contact with water emits flammable gas category 2

Risk phrases: R11 – Highly flammable
 R15 – Contact with water liberates extremely flammable gases
 R17 – Spontaneously flammable in air

Safety phrases: S16 – Keep away from sources of ignition - No smoking.
 S22 – Do not breathe dust.
 S23 – Do not breathe fumes.
 S36/37 – Wear suitable protective clothing and gloves.
 S38 – In case of insufficient ventilation, wear suitable respiratory equipment.

SAFETY DATA SHEET

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S43 – In case of fire, use sand.
S51 – Use only in well-ventilated areas.

H statements:

H228 – Flammable solid
H261 – In contact with water releases flammable gas

Precautionary statements:

P210 – Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P241 – Use explosion-proof electrical equipment.
P280 – Wear protective gloves, protective clothing and eye protection.
P370 + 378 – In case of fire: Use table salt, dry sand or Class D Fire Extinguisher to contain fire.

16.2 References and sources of primary data

Not available

16.3 Procedure used to derived the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Classification	Justification
None	Not applicable

16.4 Training information

None

16.5 Information on the revision

Date of Issue: April 15th, 2016

Version: 6

Date of previous issue: March 23rd, 2016

Notice:

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