SAFETY DATA SHEET

Issue Date 11-Aug-2016 **Revision Date** 30-Sep-2020 **Version** 2

Section 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product Code PM019
Product Name Titanium Brazing Alloy A

UN/ID no 3089
Synonyms Titanium brazing alloy, including but not limited to: Ti Braze Alloy, Ti-20-20-20
Contains Cobalt, Nickel

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

Recommended Use Alloy product manufacture

Uses advised against

1.3. Details of the supplier of the safety data sheet

Manufacturer
ATI, 1000 Six PPG Place, Pittsburgh, PA 15222 USA

1.4. Emergency telephone number

Emergency Telephone Chemtrec: +1-703-741-5970

Section 2: HAZARDS IDENTIFICATION

This material is classified per Regulation (EC) No 1272/2008.

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

Acute toxicity - Oral	Category 4
Skin sensitisation	Category 1
Carcinogenicity	Category 2
Specific target organ toxicity — repeated exposure	Category 1
Chronic aquatic toxicity	Category 3
Flammable solids	Category 1

2.2. Label elements

Emergency Overview

Danger

Hazard statements
Harmful if swallowed
Suspected of causing cancer
Causes damage to the respiratory tract through prolonged or repeated exposure if inhaled
May cause an allergic skin reaction
Harmful to aquatic life with long lasting effects
Flammable solid

Appearance Powder **Physical state** Solid **Odour** Odourless

Precautionary Statements - Prevention
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required
Wear protective gloves/protective clothing/eye protection
Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Ground/bond container and receiving equipment
If dust clouds can occur, use explosion-proof electrical/ ventilating/lighting/equipment
Wash hands thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid breathing dust/fume
Avoid release to the environment

Precautionary Statements - Response
Wash contaminated clothing before reuse
If skin irritation or rash occurs: Get medical advice/attention
IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
IF ON SKIN: Wash with plenty of soap and water
In case of fire: Use salt (NaCl) for extinction

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

2.3 Hazards not otherwise classified (HNOC)
Not applicable
Other Information
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 and/or fumes may be generated: Titanium dioxide, an IARC Group 2B carcinogen. Zinc, copper, magnesium, or cadmium fumes may cause metal fume fever.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms Titanium brazing alloy, including but not limited to: Ti Braze Alloy, Ti-20-20-20.

Chemical Name	EC No	CAS No	Weight-%
Titanium	231-142-3	7440-32-6	60 - 90
Nickel	231-111-4	7440-02-0	0 - 25
Zirconium	231-176-9	7440-67-7	0 - 20
Copper	231-159-6	7440-50-8	0 - 20

Section 4: FIRST AID MEASURES

4.1. Description of first aid measures

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	Wash off immediately with soap and plenty of water. In the case of skin allergic reactions see a doctor.
Eye contact	In the case of particles coming in contact with eyes during processing, treat as with any foreign object.
Ingestion	IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms	May cause allergic skin reaction. May cause acute gastrointestinal effects if swallowed.

4.3. Indication of any immediate medical attention and special treatment needed

Note to doctors	Treat symptomatically.

Section 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media
Isolate large fires and allow to burn out. Smother small fires with salt (NaCl).

Unsuitable extinguishing media
Do not spray water on burning metal as an explosion may occur. This explosive characteristic is caused by the hydrogen and steam generated by the reaction of water with the burning material

5.2. Special hazards arising from the substance or mixture

Intense heat. Very fine, high surface area material resulting from processing this product may ignite spontaneously at room temperature WARNING: Fine particles 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 minimise combustible dust hazard

Hazardous combustion products	Titanium dioxide, an IARC Group 2B carcinogen. Zinc, copper, magnesium, or cadmium fumes may cause metal fume fever.

5.3. Advice for firefighters

Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions
Use personal protective equipment as required.

For emergency responders
Use personal protective equipment as required. Follow Emergency Response Guidebook, Guide No. 170.

6.2. Environmental precautions

Collect spillage to prevent release to the environment.

6.3. Methods and material for containment and cleaning up

Methods for containment	Prevent further leakage or spillage if safe to do so.
Methods for cleaning up	Sweep or shovel material into dry containers using non-sparking tools. Avoid creating uncontrolled dust.

6.4. Reference to other sections

See Section 12: ECOLOGICAL INFORMATION.

Section 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Advice on safe handling
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 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 minimise combustible dust hazard.

General Hygiene Considerations
Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Conditions
Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). For long-term storage, keep sealed in argon-filled steel drums.

Incompatible materials
Dissolves in hydrofluoric acid. Ignites in the presence of fluorine. When heated above 200°C, reacts exothermically with the following: Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.

7.3. Specific end use(s)

Risk Management Methods (RMM)
The information required is contained in this Safety Data Sheet.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Chemical Name	European Union	United Kingdom	France	Spain	Germany
Titanium 7440-32-6	-	-	-	-	-
Nickel 7440-02-0	-	STEL: 1.5 mg/m³ TWA: 0.5 mg/m³	TWA: 1 mg/m³	TWA: 1 mg/m³	Skin
Zirconium 7440-67-7	-	TWA: 5 mg/m³	-	STEL: 10 mg/m³ TWA: 5 mg/m³	TWA: 1 mg/m³ Ceiling / Peak: 1 mg/m³
Copper 7440-50-8	-	STEL: 0.6 mg/m³ STEL: 2 mg/m³ TWA: 0.2 mg/m³ TWA: 1 mg/m³	TWA: 0.2 mg/m³ TWA: 1 mg/m³ STEL: 2 mg/m³	TWA: 0.2 mg/m³ TWA: 1 mg/m³	TWA: 0.1 mg/m³ Ceiling / Peak: 0.2 mg/m³
Chemical Name	**Italy**	**Portugal**	**Netherlands**	**Finland**	**Denmark**
Titanium 7440-32-6	-	-	-	-	-
Nickel 7440-02-0	-	TWA: 1.5 mg/m³	-	TWA: 1 mg/m³ TWA: 0.1 mg/m³	TWA: 0.05 mg/m³
Zirconium 7440-67-7	-	STEL: 10 mg/m³ TWA: 5 mg/m³	-	TWA: 1 mg/m³	TWA: 5 mg/m³
Copper 7440-50-8	-	TWA: 0.2 mg/m³ TWA: 1 mg/m³	TWA: 0.1 mg/m³	TWA: 1 mg/m³ TWA: 0.1 mg/m³	TWA: 1.0 mg/m³ TWA: 0.1 mg/m³
Chemical Name	**Austria**	**Switzerland**	**Poland**	**Norway**	**Ireland**
Titanium 7440-32-6	-	-	STEL: 30 mg/m³ TWA: 10 mg/m³	-	-
Nickel 7440-02-0	-	TWA: 0.5 mg/m³	TWA: 0.25 mg/m³	TWA: 0.05 mg/m³ STEL: 0.15 mg/m³	TWA: 0.5 mg/m³
Zirconium	TWA: 5 mg/m³	TWA: 5 mg/m³	STEL: 10 mg/m³	TWA: 5 mg/m³	TWA: 5 mg/m³

7440-67-7			TWA: 5 mg/m³	STEL: 10 mg/m³	STEL: 10 mg/m³
Copper 7440-50-8	STEL 4 mg/m³ STEL 0.4 mg/m³ TWA: 1 mg/m³ TWA: 0.1 mg/m³	STEL: 0.2 mg/m³ TWA: 0.1 mg/m³	TWA: 0.2 mg/m³	TWA: 0.1 mg/m³ TWA: 1 mg/m³ STEL: 0.3 mg/m³ STEL: 3 mg/m³	TWA: 0.2 mg/m³ TWA: 1 mg/m³ STEL: 2 mg/m³

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.

8.2. Exposure controls

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 Fire/flame resistant/retardant clothing may be appropriate during hot work with the product. Wear protective gloves.

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

9.1. Information on basic physical and chemical properties

Physical state	Solid		
Appearance	Powder	**Odour**	Odourless
Colour	metallic, grey or Silver	**Odour threshold**	Not applicable

Property	**Values**	**Remarks • Method**
pH	-	Not applicable
Melting point / freezing point	870 °C / 1600 °F	
Boiling point / boiling range	-	
Flash point	-	
Evaporation rate	-	Not applicable
Flammability (solid, gas)	-	Flammable
Flammability Limit in Air		
Upper flammability limit:		-
Lower flammability limit		-
Vapour pressure	-	Not applicable
Vapour density	-	Not applicable
Specific Gravity	6.1	
Water solubility	Insoluble	
Solubility(ies)		
Partition coefficient	-	Not applicable
Autoignition temperature	-	Not applicable
Decomposition temperature	-	Not applicable
Kinematic viscosity	-	Not applicable
Dynamic viscosity	-	Not applicable
Explosive properties	Not applicable	
Oxidising properties	Not applicable	

9.2. Other information

Softening point	-
Molecular weight	-

VOC Content (%)	Not applicable
Density	-
Bulk density	-

Section 10: STABILITY AND REACTIVITY

10.1. Reactivity

Not applicable .

10.2. Chemical stability

Stable under normal conditions.

Explosion data

Sensitivity to Mechanical Impact	None.
Sensitivity to Static Discharge	May be ignited by heat, sparks or flames.

10.3. Possibility of hazardous reactions

Hazardous polymerisation
Hazardous polymerisation does not occur.

Possibility of Hazardous Reactions
None under normal processing.

10.4. Conditions to avoid

Dust formation and dust accumulation.

10.5. Incompatible materials

Dissolves in hydrofluoric acid. Ignites in the presence of fluorine. When heated above 200°C, reacts exothermically with the following: Chlorine, bromine, halocarbons, carbon tetrachloride, carbon tetrafluoride, and freon.

10.6. 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 and/or fumes may be generated:: Titanium dioxide, an IARC Group 2B carcinogen.

Section 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Product Information

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Inhalation	Suspected of causing cancer if inhaled. Causes damage to the respiratory tract through prolonged or repeated exposure if inhaled.
Eye contact	Product not classified.
Skin Contact	May cause sensitisation by skin contact.
Ingestion	Harmful if swallowed.

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Titanium	> 5000 mg/kg bw	-	-
Nickel	> 9000 mg/kg bw	-	> 10.2 mg/L
Zirconium	> 5000 mg/kg bw	-	>4.3 mg/L
Copper	481 mg/kg bw	>2000 mg/kg bw	>5.11 mg/L

Information on toxicological effects

Symptoms May cause sensitisation by skin contact. May cause acute gastrointestinal effects if

swallowed.

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

Acute toxicity Harmful if swallowed.

Skin corrosion/irritation Product not classified.

Serious eye damage/eye irritation Product not classified.

Sensitisation May cause sensitisation by skin contact.

Germ cell mutagenicity Product not classified.

Carcinogenicity May cause cancer by inhalation.

Chemical Name	ACGIH	IARC	NTP	OSHA
Nickel 7440-02-0		Group 1 Group 2B	Known Reasonably Anticipated	X

Reproductive toxicity Product not classified.

STOT - single exposure Product not classified.

STOT - repeated exposure Causes disorder and damage to the: Respiratory System.

Aspiration hazard Product not classified.

Section 12: ECOLOGICAL INFORMATION

12.1. Toxicity

This product contains a chemical which is listed as a severe marine pollutant according to IMDG/IMO

This product as shipped is classified for aquatic chronic toxicity

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Titanium	The 72 h EC50 of titanium dioxide to Pseudokirchnerella subcapitata was 61 mg of TiO2/L.	The 96 h LC50 of titanium dioxide to Cyprinodon variegatus was greater than 10,000 mg of TiO2/L. The 96 h LC50 of titanium dioxide to Pimephales promelas was greater than 1,000 mg of TiO2/L .	The 3 h EC50 of titanium dioxide for activated sludge were greater than 1000 mg/L.	The 48 h EC50 of titanium dioxide to Daphnia Magna was greater than 1000 mg of TiO2/L.
Nickel	NOEC/EC10 values range from 12.3 µg/l for Scenedesmus accuminatus to 425 µg/l for Pseudokirchneriella subcapitata.	The 96h LC50s values range from 0.4 mg Ni/L for Pimephales promelas to 320 mg Ni/L for Brachydanio rerio.	The 30 min EC50 of nickel for activated sludge was 33 mg Ni/L.	The 48h LC50s values range from 0.013 mg Ni/L for Ceriodaphnia dubia to 4970 mg Ni/L for Daphnia magna.
Zirconium	The 14 d NOEC of zirconium dichloride oxide to Chlorella vulgaris was greater than 102.5 mg of Zr/L.	The 96 h LL50 of zirconium to Danio rerio was greater than 74.03 mg/L.	-	The 48 h EC50 of zirconium dioxide to Daphnia magna was greater than 74.03 mg of Zr/L.
Copper	The 72 h EC50 values of copper chloride to Pseudokirchneriella subcapitata ranged between 30 µg/L (pH 7.02, hardness 250 mg/L CaCO3, DOC 1.95 mg/L) and 824 µg/L (pH 6.22,	The 96-hr LC50 for Pimephales promelas exposed to Copper sulfate ranged from 256.2 to 38.4 ug/L with water hardness increasing from 45 to 255.7 mg/L.	The 24 h NOEC of copper chloride for activated sludge ranged from 0.32 to 0.64 mg of Cu/L.	The 48 h LC50 values for Daphnia magna exposed to copper in natural water ranged between 33.8 µg/L (pH 6.1, hardness 12.4 mg/L CaCO3, DOC 2.34 mg/L) and 792 µg/L (pH 7.35, hardness 139.7 mg/L

	hardness 100 mg/L CaCO3, DOC 15.8 mg/L).			CaCO3, DOC 22.8 mg/L).

12.2. Persistence and degradability

No information available.

12.3. Bioaccumulative potential

No information available.

12.4. Mobility in soil

12.5. Results of PBT and vPvB assessment

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

12.6. Other adverse effects

Section 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Waste from residues/unused products Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging Disposal should be in accordance with applicable regional, national and local laws and regulations.

Section 14: TRANSPORT INFORMATION

IMDG

14.1 UN/ID no 3089
14.2 Proper shipping name Metal powders, flammable, n.o.s. (Titanium)
14.3 Hazard Class 4.1
Subsidiary hazard class Hazard Class 9, if transported in bulk or by vessel
14.4 Packing Group II
14.5 Marine pollutant This product contains a chemical which is listed as a severe marine pollutant according to IMDG/IMO
Environmental hazard Yes
14.6 Special Provisions IB8, IP2, IP4, T3, TP33 If Class 9, also 8, 146, 335, A112, B54, B120, IB8, IP3, N20, N91, T1
14.7 Transport in bulk according to Annex II of MARPOL and the IBC Code -

RID

14.1 UN/ID no 3089
14.2 Proper shipping name Metal powders, flammable, n.o.s. (Titanium)
14.3 Hazard Class 4.1
Subsidiary hazard class Hazard Class 9, if transported in bulk or by vessel
14.4 Packing Group II
14.5 Environmental hazard Yes
14.6 Special Provisions IB8, IP2, IP4, T3, TP33 If Class 9, also 8, 146, 335, A112, B54, B120, IB8, IP3, N20, N91, T1

ADR

14.1 UN/ID no 3089
14.2 Proper shipping name Metal powders, flammable, n.o.s. (Titanium)

14.3 Hazard Class	4.1
Subsidiary hazard class	Hazard Class 9, if transported in bulk or by vessel
14.4 Packing Group	II
14.5 Environmental hazard	Yes
14.6 Special Provisions	IB8, IP2, IP4, T3, TP33 If Class 9, also 8, 146, 335, A112, B54, B120, IB8, IP3, N20, N91, T1

ICAO (air)

14.1 UN/ID no	3089
14.2 Proper shipping name	Metal powders, flammable, n.o.s. (Titanium)
14.3 Hazard Class	4.1
Subsidiary hazard class	Hazard Class 9, if transported in bulk or by vessel
14.4 Packing Group	II
14.5 Environmental hazard	Yes
14.6 Special Provisions	IB8, IP2, IP4, T3, TP33. If Class 9, also 8, 146, 335, A112, B54, B120, IP3, N20, N91, T1

IATA

14.1 UN/ID no	3089
14.2 Proper shipping name	Metal powders, flammable, n.o.s. (Titanium)
14.3 Hazard Class	4.1
Subsidiary hazard class	Hazard Class 9, if transported in bulk or by vessel
14.4 Packing Group	II
Description	-
14.5 Environmental hazard	Yes
14.6 Special Provisions	IB8, IP2, IP4, T3, TP33. If 170 Class 9, also 8, 146, 335, A112, B54, B120, IP3, N20, N91, T1 **ERG Code**

Section 15: REGULATORY INFORMATION

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

Chemical Name	French RG number	Title
Titanium 7440-32-6	-	-
Nickel 7440-02-0	RG 37ter	-
Zirconium 7440-67-7	-	-
Copper 7440-50-8	-	-

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

Authorisations and/or restrictions on use:
This product does not contain substances subject to authorisation (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).

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

15.2. Chemical safety assessment

No chemical safety assessment has been performed for this product.

Section 16: OTHER INFORMATION

Issue Date	11-Aug-2016
Revision Date	30-Sep-2020
Revision Note	SDS sections updated: 1, 2, 5, 6, 7, 9, 14.

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Note:
The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

Additional information available from: Safety data sheets and labels available at ATImetals.com