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

1.1. Product identifier

Product Code
SAC003

Product Name
Tantalum and Tantalum Alloys

Synonyms
All solid (non-powder) Tantalum products (Product #612)

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 Address
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

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

2.2. Label elements

Emergency Overview

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Physical state</th>
<th>Odour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Various massive product forms</td>
<td>Solid</td>
<td>Odourless</td>
</tr>
</tbody>
</table>

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.
- Vanadium pentoxide (V2O5) affects eyes, skin, respiratory system.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

Page 1 / 9
3.1 Substances
Synonyms
All solid (non-powder) Tantalum products, (Product #612).

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>EC No</th>
<th>CAS No</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tantalum</td>
<td>231-135-5</td>
<td>7440-25-7</td>
<td>60-&gt;99</td>
</tr>
<tr>
<td>Niobium</td>
<td>231-113-5</td>
<td>7440-03-1</td>
<td>0-35</td>
</tr>
<tr>
<td>Titanium</td>
<td>231-142-3</td>
<td>7440-32-6</td>
<td>0-25</td>
</tr>
<tr>
<td>Vanadium</td>
<td>231-171-1</td>
<td>7440-62-2</td>
<td>0-10</td>
</tr>
<tr>
<td>Tungsten</td>
<td>231-143-9</td>
<td>7440-33-7</td>
<td>0-10</td>
</tr>
<tr>
<td>Hafnium</td>
<td>231-166-4</td>
<td>7440-58-6</td>
<td>0-5</td>
</tr>
</tbody>
</table>

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
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
Not an expected route of exposure.

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

Symptoms
None anticipated.

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

Note to doctors
Treat symptomatically.

Section 5: FIRE FIGHTING MEASURES

5.1. Extinguishing media

Suitable extinguishing media
None in massive form, flammable as finely divided particles. Smother with salt (NaCl) or class D dry powder fire extinguisher.

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 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 minimise combustible dust hazard.

5.3. Advice for firefighters

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

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.

6.2. Environmental precautions
Not applicable to massive product.

6.3. Methods and material for containment and cleaning up

Methods for containment
Not applicable to massive product.

Methods for cleaning up
Not applicable to massive product.

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 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 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 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. 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)
Not required.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>European Union</th>
<th>United Kingdom</th>
<th>France</th>
<th>Spain</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tantalum</td>
<td>-</td>
<td>STEL: 10 mg/m³</td>
<td>TWA: 5 mg/m³</td>
<td>TWA: 5 mg/m³</td>
<td>TWA: 4 mg/m³</td>
</tr>
<tr>
<td>7440-25-7</td>
<td>-</td>
<td>TWA: 5 mg/m³</td>
<td>-</td>
<td>-</td>
<td>TWA: 1.5 mg/m³</td>
</tr>
<tr>
<td>Niobium</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7440-03-1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Titanium</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7440-32-6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vanadium</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Skin</td>
</tr>
<tr>
<td>7440-62-2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
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 particulates.

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. Cut-resistant gloves and/or protective clothing may be appropriate when sharp surfaces are present.

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 contaminant 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

<table>
<thead>
<tr>
<th>Physical state</th>
<th>Solid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Various massive product forms</td>
</tr>
<tr>
<td>Colour</td>
<td>blue grey</td>
</tr>
<tr>
<td>Odour</td>
<td>Odourless</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>
9.2. Other information

- Softening point
- Molecular weight
- VOC Content (%)
- Density
- Bulk density 850-1050 lb/ft³

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: None.

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. Vanadium pentoxide (V2O5) affects eyes, skin, respiratory system.

### Section 11: TOXICOLOGICAL INFORMATION

#### 11.1. Information on toxicological effects

**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.

**Unknown Acute Toxicity**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tantalum</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 5.18 mg/L</td>
</tr>
<tr>
<td>Niobium</td>
<td>&gt; 10,000 mg/kg bw</td>
<td>&gt; 2000 mg/kg bw</td>
<td>-</td>
</tr>
<tr>
<td>Titanium</td>
<td>&gt; 5000 mg/kg bw</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vanadium</td>
<td>&gt; 2000 mg/kg bw</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tungsten</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 5.4 mg/L</td>
</tr>
<tr>
<td>Hafnium</td>
<td>&gt; 5000 mg/kg bw</td>
<td>-</td>
<td>&gt;4.3 mg/L</td>
</tr>
</tbody>
</table>

**Information on toxicological effects**

- **Symptoms**
  - None known.

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

- **Acute toxicity**
  - Product not classified.
- **Skin corrosion/irritation**
  - Product not classified.
- **Serious eye damage/eye irritation**
  - Product not classified.
- **Sensitisation**
  - 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

#### 12.1. Toxicity

This product as shipped is not classified for aquatic toxicity

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants</th>
<th>Fish</th>
<th>Toxicity to Micro-organisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tantalum</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Niobium</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Titanium</td>
<td>The 72 h EC50 of titanium dioxide to Pseudokirchnerella subcapitata was 61 mg of TiO2/L.</td>
<td>The 96 h LC50 of titanium dioxide to Cyprinodon variegatus was greater than 10,000 mg of TiO2/L.</td>
<td>The 3 h EC50 of titanium dioxide for activated sludge were greater than 1000 mg/L.</td>
<td>The 48 h EC50 of titanium dioxide to Daphnia Magna was greater than 1000 mg of TiO2/L.</td>
</tr>
<tr>
<td>Vanadium</td>
<td>The 72 h EC50 of vanadium pentoxide to Desmodesmus subspicatus was 2,907 ug of V/L.</td>
<td>The 96 h LC50 of vanadium pentoxide to Pimephales promelas was 1,850 ug of V/L.</td>
<td>The 3 h EC50 of sodium metavanadate for activated sludge was greater than 100 mg/L.</td>
<td>The 48 h EC50 of sodium vanadate to Daphnia magna was 2,661 ug of V/L.</td>
</tr>
<tr>
<td>Tungsten</td>
<td>The 72 h EC50 of sodium tungstate to Pseudokirchnerella subcapitata was 31.0 mg of W/L.</td>
<td>The 96 h LC50 of sodium tungstate to Danio rerio was greater than 106 mg of W/L.</td>
<td>The 30 min EC50 of sodium tungstate for activated sludge were greater than 1000 mg/L.</td>
<td>The 48 h EC50 of sodium tungstate to Daphnia magna was greater than 96 mg of W/L.</td>
</tr>
<tr>
<td>Hafnium</td>
<td>The 72 h EC50 of hafnium to Pseudokirchneriella subcapitata was great than 8 ug of Hf/L (100% saturated solution).</td>
<td>The 96 h LC50 of Hafnium dioxide in water to Danio rerio was greater than the solubility limit of 0.007 mg Hf/L.</td>
<td>-</td>
<td>The 48 h EC50 of Hafnium dioxide to Daphnia magna was greater than the solubility limit of 0.007 mg Hf/L.</td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability

12.3. Bioaccumulative potential

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**
None anticipated.

---

**Section 14: TRANSPORT INFORMATION**

**IMDG**

14.1 **UN/ID no**
Not regulated

14.2 **Proper shipping name**
Not regulated

14.3 **Hazard Class**
Not regulated

14.4 **Packing Group**
Not regulated

14.5 **Marine pollutant**
Not applicable

14.6 **Special Provisions**
None

14.7 **Transport in bulk according to Annex II of MARPOL 73/78 and the**
Not applicable
IBC Code

RID
14.1 UN/ID no Not regulated
14.2 Proper shipping name Not regulated
14.3 Hazard Class Not regulated
14.4 Packing Group Not regulated
14.5 Environmental hazard Not applicable
14.6 Special Provisions None

ADR
14.1 UN/ID no Not regulated
14.2 Proper shipping name Not regulated
14.3 Hazard Class Not regulated
14.4 Packing Group Not regulated
14.5 Environmental hazard Not applicable
14.6 Special Provisions None

ICAO (air)
14.1 UN/ID no Not regulated
14.2 Proper shipping name Not regulated
14.3 Hazard Class Not regulated
14.4 Packing Group Not applicable
14.5 Environmental hazard Not applicable
14.6 Special Provisions None

IATA
14.1 UN/ID no Not regulated
14.2 Proper shipping name Not regulated
14.3 Hazard Class Not regulated
14.4 Packing Group Not regulated
14.5 Environmental hazard Not applicable
14.6 Special Provisions None

Section 15: REGULATORY INFORMATION

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

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>French RG number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tantalum</td>
<td>7440-25-7</td>
<td>-</td>
</tr>
<tr>
<td>Niobium</td>
<td>7440-03-1</td>
<td>-</td>
</tr>
<tr>
<td>Titanium</td>
<td>7440-32-6</td>
<td>-</td>
</tr>
<tr>
<td>Vanadium</td>
<td>7440-62-2</td>
<td>RG 66</td>
</tr>
<tr>
<td>Tungsten</td>
<td>7440-33-7</td>
<td>-</td>
</tr>
<tr>
<td>Hafnium</td>
<td>7440-58-6</td>
<td>-</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSL/NDSL</td>
<td>Complies</td>
</tr>
<tr>
<td>EINECS/ELINCS</td>
<td>Complies</td>
</tr>
<tr>
<td>ENCS</td>
<td>Complies</td>
</tr>
<tr>
<td>IECSC</td>
<td>Complies</td>
</tr>
<tr>
<td>KECL</td>
<td>Complies</td>
</tr>
<tr>
<td>PICCS</td>
<td>Does not comply</td>
</tr>
<tr>
<td>AICS</td>
<td>Does not comply</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>Issue Date</th>
<th>28-May-2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revision Date</td>
<td>07-Nov-2016</td>
</tr>
<tr>
<td>Revision Note</td>
<td>Updated Section(s): 1, 3, 4.</td>
</tr>
</tbody>
</table>

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.

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

End of Safety Data Sheet