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

1.1. Product identifier

Product Code
SAC015

Product Name
Vanadium-Nickel Alloys

Synonyms
All massive Vanadium Nickel Alloys (Product #987)

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

2.1. Classification of the substance or mixture

Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin sensitisation</td>
<td>Category 1</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>Category 2</td>
</tr>
<tr>
<td>Specific target organ toxicity — repeated exposure</td>
<td>Category 1</td>
</tr>
</tbody>
</table>

2.2. Label elements

Emergency Overview

Danger

Hazard statements
May cause an allergic skin reaction
Suspected of causing cancer
Causes damage to the respiratory tract through prolonged or repeated exposure if inhaled

Appearance
Various massive product forms

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

Precautionary Statements - Response
If skin irritation or rash occurs: Get medical advice/attention

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:
Hexavalent Chromium (Chromium VI) may cause lung, nasal, and/or sinus cancer.
Vanadium pentoxide (V2O5) affects eyes, skin, respiratory system.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
Synonyms: All massive Vanadium Nickel Alloys (Product #987).

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>EC No</th>
<th>CAS No</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanadium</td>
<td>231-171-1</td>
<td>7440-62-2</td>
<td>40-47</td>
</tr>
<tr>
<td>Nickel</td>
<td>231-111-4</td>
<td>7440-02-0</td>
<td>40-47</td>
</tr>
<tr>
<td>Chromium</td>
<td>231-157-5</td>
<td>7440-47-3</td>
<td>8-12</td>
</tr>
<tr>
<td>Aluminium</td>
<td>231-072-3</td>
<td>7429-90-5</td>
<td>1-4</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: 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: Not an expected route of exposure.

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

Symptoms: May cause allergic skin reaction.

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
Product not flammable in the form as distributed, flammable as finely divided particles or pieces resulting from processing of this product. Isolate large fires and allow to burn out. Smother small fires 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. 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

Hazardous combustion products
Hexavalent Chromium (Chromium VI) may cause lung, nasal, and/or sinus cancer. Vanadium pentoxide (V2O5) affects eyes, skin, respiratory system.

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.

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
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.

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

<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>Vanadium 7440-62-2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Skin</td>
</tr>
<tr>
<td>Nickel 7440-02-0</td>
<td>-</td>
<td>STEL: 1.5 mg/m³ TWA: 0.5 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>Skin</td>
</tr>
<tr>
<td>Chromium 7440-47-3</td>
<td>TWA: 2 mg/m³</td>
<td>STEL: 1.5 mg/m³ TWA: 0.5 mg/m³</td>
<td>TWA: 2 mg/m³</td>
<td>TWA: 2 mg/m³</td>
<td>TWA: 2 mg/m³</td>
</tr>
<tr>
<td>Aluminium 7429-90-5</td>
<td>-</td>
<td>STEL: 30 mg/m³ TWA: 12 mg/m³ TWA: 10 mg/m³ TWA: 4 mg/m³</td>
<td>TWA: 10 mg/m³ TWA: 5 mg/m³</td>
<td>TWA: 10 mg/m³ TWA: 5 mg/m³</td>
<td>TWA: 4 mg/m³ TWA: 1.5 mg/m³</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Italy</th>
<th>Portugal</th>
<th>Netherlands</th>
<th>Finland</th>
<th>Denmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanadium 7440-62-2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>TWA: 1 mg/m³ TWA: 0.1 mg/m³</td>
<td>TWA: 0.05 mg/m³</td>
</tr>
<tr>
<td>Nickel 7440-02-0</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 2 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Chromium 7440-47-3</td>
<td>-</td>
<td>TWA: 10 mg/m³ TWA: 5 mg/m³</td>
<td>TWA: 0.05 mg/m³</td>
<td>TWA: 1.5 mg/m³ TWA: 2 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Aluminium 7429-90-5</td>
<td>TWA: 1 mg/m³ Ceiling: 0.6 mg/m³</td>
<td>TWA: 1 mg/m³ Ceiling: 0.6 mg/m³</td>
<td>TWA: 0.25 mg/m³ Ceiling: 0.15 mg/m³</td>
<td>TWA: 0.6 mg/m³ Ceiling: 0.15 mg/m³</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 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. 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 contaminate concentrations. Respiratory protection must be provided in accordance with current local regulations.
Section 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Values</th>
<th>Remarks / Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Solid</td>
<td></td>
</tr>
<tr>
<td>Appearance</td>
<td>Various massive product forms</td>
<td></td>
</tr>
<tr>
<td>Colour</td>
<td>metallic grey or Silver</td>
<td></td>
</tr>
<tr>
<td>Odour</td>
<td>Odourless</td>
<td></td>
</tr>
<tr>
<td>Odour threshold</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Softening point</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Molecular weight</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>VOC Content (%)</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td>230-250 lb/ft³</td>
<td></td>
</tr>
<tr>
<td>Bulk density</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>1000 °C / 1832 °F</td>
<td></td>
</tr>
<tr>
<td>Flash point</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>-</td>
<td>Product not flammable in the form as distributed, flammable as finely divided particles or pieces resulting from processing of this product</td>
</tr>
</tbody>
</table>

Flammability Limit in Air

Upper flammability limit: -
Lower flammability limit: -
Vapour pressure: -
Vapour density: -
Specific Gravity: 6.5-7.5
Water solubility: Insoluble
Solubility(ies): -
Partition coefficient: -
Autoignition temperature: -
Decomposition temperature: -
Kinematic viscosity: -
Dynamic viscosity: -
Explosive properties: Not applicable
Oxidising properties: Not applicable

9.2. Other information

Softening point: -
Molecular weight: -
VOC Content (%): Not applicable
Density: 230-250 lb/ft³
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: 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,

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: Hexavalent Chromium (Chromium VI) may cause lung, nasal, and/or sinus cancer. Vanadium pentoxide (V2O5) affects eyes, skin, respiratory system.

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### 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**: May cause sensitisation by skin contact.
- **Ingestion**: Not an expected route of exposure for product in massive form.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vanadium</td>
<td>&gt; 2000 mg/kg bw</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nickel</td>
<td>&gt; 9000 mg/kg bw</td>
<td>-</td>
<td>&gt; 10.2 mg/L</td>
</tr>
<tr>
<td>Chromium</td>
<td>&gt; 3400 mg/kg bw</td>
<td>-</td>
<td>&gt; 5.41 mg/L</td>
</tr>
<tr>
<td>Aluminium</td>
<td>15,900 mg/kg bw</td>
<td>-</td>
<td>&gt; 1 mg/L</td>
</tr>
</tbody>
</table>

**Information on toxicological effects**

**Inhalation**

- **Symptoms**: May cause sensitisation by skin contact.

**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**: May cause sensitisation by skin contact.
- **Germ cell mutagenicity**: Product not classified.
- **Carcinogenicity**: May cause cancer by inhalation.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>IARC</th>
<th>NTP</th>
<th>OSHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td></td>
<td>Group 1</td>
<td>Known</td>
<td>X</td>
</tr>
<tr>
<td>7440-02-0</td>
<td></td>
<td>Group 2B</td>
<td>Reasonably Anticipated</td>
<td></td>
</tr>
<tr>
<td>Chromium</td>
<td></td>
<td>Group 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7440-47-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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 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 microorganisms</th>
<th>Crustacea</th>
</tr>
</thead>
<tbody>
<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>Nickel</td>
<td>NOEC/EC10 values range from 12.3 µg/l for Scenedesmus accuminatus to 425 µg/l for Pseudokirchneriella subcapitata.</td>
<td>The 96h LC50 values range from 0.4 mg Ni/l for Pimephales promelas to 320 mg Ni/l for Brachydanio rerio.</td>
<td>The 30 min EC50 of nickel for activated sludge was 33 mg Ni/l.</td>
<td>The 48h LC50 values range from 0.013 mg Ni/l for Ceriodaphnia dubia to 4970 mg Ni/l for Daphnia magna.</td>
</tr>
<tr>
<td>Chromium</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aluminium</td>
<td>The 96-h EC50 values for reduction of biomass of Pseudokirchneriella subcapitata in AAP-Medium at pH 6, 7, and 8 were estimated as 20.1, 5.4, and 150.6 µg/L, respectively, for dissolved Al.</td>
<td>The 96 h LC50 of aluminum to Oncorhynchus mykiss was 7.4 mg of Al/l at pH 6.5 and 14.6 mg of Al/l at pH 7.5</td>
<td>-</td>
<td>The 48-hr LC50 for Ceriodaphnia dubia exposed to Aluminium chloride increased from 0.72 to greater than 99.6 mg/L with water hardness increasing from 25 to 200 mg/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

This product as shipped is not classified for environmental endpoints. However, when subjected to sawing or grinding, particles may be generated that are classified for aquatic chronic toxicity

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
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>Vanadium</td>
<td>RG 66</td>
<td></td>
</tr>
<tr>
<td>7440-62-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nickel</td>
<td>RG 37ter</td>
<td></td>
</tr>
<tr>
<td>7440-02-0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromium</td>
<td>RG 10</td>
<td></td>
</tr>
<tr>
<td>7440-47-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminium</td>
<td>RG 32</td>
<td></td>
</tr>
<tr>
<td>7429-90-5</td>
<td>RG 16, RG 16bis</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
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>Complies</td>
</tr>
<tr>
<td>AICS</td>
<td>Complies</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

Issue Date 28-May-2015
Revision Date 04-Nov-2018
Revision Note Updated Section(s): 2, 4, 5, 7, 9, 15.

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