SAFETY DATA SHEET

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier
Product Name
Stainless Steel

Other means of identification
Product Code
FRP008

Synonyms
Stainless Steel: ATI 20™, ATI 20-20+Nb™, ATI 201™, ATI 219™, 21-8-9, AL40, XM-11,
ATI 301™, ATI 302™, ATI 303™, ATI 304™, ATI 305™, ATI 309™, ATI 310™, ATI 316™,
ATI 317™, ATI 321™, ATI 255™ DUPLEX, ATI 332™, ATI 334™, ATI 347™, ATI 348™,
AM 350®, AM 355™, ATI 403™, ATI Ohmalloy® 30, ATI Ohmalloy® 40, ATI Ohmalloy®,
ATI 409 HP™, ATI 409 Cb™, ATI 410™, ATI 412™, Type 415, ATI 416™, ATI 420™, ATI
430™, ATI 433™, Type 434, Type 436, ATI 439™, ATI 439 HP™, XM-8, Type 441, 18-0,
AL 18CrCb, ATI 441 HP™, ATI 444™, 18-2, ATI 468™, ATI 15-5™, ATI 17-4™, ATI
17-7™, ATI 15-7™, ATI JS700® ALLOY, ATI 800™ ALLOY, ATI 825™ ALLOY, Type 840,
ATI E-BRITE® 26-1, ASTM XM 27, ATI 2205™ DUPLEX, 318, ATI 2205™ DUPLEX, 322,
ATI 201LN™, Type 301L, ATI 304 DA™, Type 304H, ATI 304L™, 374L, Type 304LN, Type
304N, Type 309H, ATI 309S™, 398, Type 309Si, Type 310Cb, Type 310H, Type 310L, ATI
310S™, Type 310Si, ATI 316L™, 376, ATI 316LN™, ATI 316Ti™, ATI 317LN™, ATI
317LMM™, 317 LX, 317 LXM, 317 XN, Type 321H, Type 410 MOD, Type 410HC, ATI
410S™, Type 418 SPL™, Type 420HC, ALLEGHENY Type 425 Modified, ATI 436S™, ATI
440A™, ATI 440C™, ATI 800™ ALLOY, ATI 800 H™ ALLOY, ATI 904L™, ATI 610™,
ATI 611™, ATI 13-8Mo™, ATI 13-8 SuperTough®, AL 13-8 STAINLESS STEEL, ASTM
Type XM-13, ATI 2003® DUPLEX, AL 20-25+Nb alloy, AL 29-4C®, AL 322Mo® alloy, AL
334Mo® alloy, ATI 201HP™, AL33, XM-29, ATI 456S™, ATI 50™, 22-13-5, XM-19, AL60,
21800, AL-6X® ALLOY, AL-6X® ALLOY, AL-6X® Plus® ALLOY, A286 Altemp®, PC1017, SeaCure®
26-3-3, Zeron® 100, 22-4-9, 21-11N, HOLDER BLOCK STEEL, MAXEL 400 SUPER,
AL-6X, AL 404, Type 405, Type 446, AL 29-4C®, AL 29-4, AL 29-4-2, 14-4 FERRITIC, AL
453, AL 666, ALTEMP® ALLOY STEEL, 19-9-2L, Type 302B, ATI 409 Cb™, Type 409 Ni,
ATI 430Ti™, ALLEGHENY EDRO 441MOD1, ALLEGHENY CRUCIBLE 441MOD2, TOOL
STEEL D2T, CSM-21 STAINLESS STEEL, ULTRACHEM STAINLESS STEEL, RA85H
STEEL, 365, ZrCor™, RA 330™, ATI 304B7 P/M™ BOR7

Recommended use of the chemical and restrictions on use
Recommended Use
Stainless steel product manufacture.

Uses advised against

Details of the supplier of the safety data sheet
Manufacturer Address
ATI, 1000 Six PPG Place, Pittsburgh, PA
15222 USA

Emergency telephone number
Emergency Telephone
Chemtrec: 1-800-424-9300

2. HAZARDS IDENTIFICATION

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200). This product is
an article and, as such, does not present a hazard to human health by inhalation or ingestion.

<table>
<thead>
<tr>
<th>Skin sensitization</th>
<th>Category 1</th>
</tr>
</thead>
<tbody>
<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>
### 3. COMPOSITION/INFORMATION ON INGREDIENTS

**Synonyms**

Stainless Steel: ATI 20™, ATI 20-20+Nb™, ATI 201™, ATI 219™, 21-6-9, AL40, XM-11, ATI 301™, ATI 302™, ATI 303™, ATI 304™, ATI 305™, ATI 309™, ATI 310™, ATI 316™, ATI 317™, ATI 321™, ATI 255™ DUPLEX, ATI 332™, ATI 334™, ATI 347™, ATI 348™, AM 350®, AM 355™, ATI 403™, ATI Ohmaloy® 30, ATI Ohmaloy® 40, ATI Ohmaloy®, ATI 409 HP™, ATI 409 Cb™, ATI 410™, ATI 412™, Type 415, ATI 416™, ATI 420™, ATI 430™, ATI 433™, Type 434, Type 436, ATI 439™, ATI 439 HP™, XM-8, Type 441, 18-0, AL 18CrCb, ATI 441 HP™, ATI 444™, 18-2, ATI 468™, ATI 17-5™, ATI 17-4™, ATI 17-7™, ATI 15-7™, ATI JS700® ALLOY, ATI 800™ ALLOY, ATI 825™ ALLOY, Type 840, ATI E-BRITE® 26-1, ASTM XM-27, ATI 2205™ DUPLEX; 316, ATI 2205™ DUPLEX; 322, ATI 201LN™, Type 301L, ATI 304 DA™, Type 304H, ATI 304L™, 374L, Type 304LN, Type 304N, Type 309H, ATI 309S™, 398, Type 309Si, Type 310Cb, Type 310H, Type 310L, ATI 310S™, Type 310Si, ATI 316L™, 378, ATI 316LN™, ATI 316Ti™, ATI 317L™, ATI 317LN™, 317 LX, 317 LXN, 317 XN, Type 321H, Type 410 MOD, Type 410HC, ATI 410S™, ATI 418 SPL™, Type 420HC, ALLEGHENY Type 425 Modified, ATI 436S™, ATI 440A™, ATI 440C™, ATI 800 AT™ ALLOY, ATI 800 H™ ALLOY, ATI 504L™, ATI 610™,
FRP008 Stainless Steel

Revision Date 27-May-2016

ATI 611™, ATI 13-8Mo™, ATI 13-8 SuperTough®, AL 13-8 STAINLESS STEEL, ASTM Type XM-13, ATI 2003® DUPLEX, AL 20-25+Nb alloy, AL 29-4C®, AL 332Mo® alloy, AL 334Mo® alloy, ATI 201HP™, AL33, XM-29, ATI 4565™, ATI 50™, 22-13-5, XM-19, AL60, 21800, AL-6XN® ALLOY, AL-6XN Plus® ALLOY, A266 Altemp®, PC1017, Sea Cure®, 26-3-3, Zeron® 100, 22-4-9, 21-11N, HOLDER BLOCK STEEL, MAXEL 400 SUPER, AL-6X, AL 404, Type 405, Type 446, AL 29-4C®, AL 29-4, AL 29-4-2, 14-4 FERRITIC, AL 453, AL 466, ALTEMP® ALLOY STEEL, 19-9-8L, Type 302B, ATI 409 CB™, Type 409Ni, ATI 430Ti™, ALLEGHENY EDRO 441MOD1, ALLEGHENY CRUCIBLE 441MOD2, TOOL STEEL D2T, CSM-21 STAINLESS STEEL, ULTRACHEM STAINLESS STEEL, RA85H STEEL, 385, ZrCo™, RA 330™, ATI304B7 P/M™ BOR7.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>Weight-%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>&lt;90</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>0-46</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>10-30</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>0-10</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>7439-98-7</td>
<td>0-7.0</td>
</tr>
<tr>
<td>Silicon</td>
<td>7440-21-3</td>
<td>0-6.5</td>
</tr>
<tr>
<td>Aluminum</td>
<td>7429-90-5</td>
<td>0-4.0</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>0-4.0</td>
</tr>
<tr>
<td>Tungsten</td>
<td>7440-33-7</td>
<td>0-2.5</td>
</tr>
<tr>
<td>Titanium</td>
<td>7440-32-6</td>
<td>0-2.4</td>
</tr>
<tr>
<td>Boron</td>
<td>19287-88-8</td>
<td>0-2.25</td>
</tr>
<tr>
<td>Vanadium</td>
<td>7440-62-2</td>
<td>0-1.1</td>
</tr>
<tr>
<td>Tantalum</td>
<td>7440-25-7</td>
<td>0-1.0</td>
</tr>
<tr>
<td>Niobium (Columbiun)</td>
<td>7440-03-1</td>
<td>0-1.0</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

First aid measures

Eye contact
In the case of particles coming in contact with eyes during processing, treat as with any foreign object.

Skin Contact
In the case of skin irritation or allergic reactions see a physician.

Inhalation
If excessive amounts of vapors, smoke, fume, or particles are inhaled during processing, remove to fresh air and consult a qualified health professional.

Ingestion
Not an expected route of exposure.

Most important symptoms and effects, both acute and delayed

Symptoms
May cause allergic skin reaction.

Indication of any immediate medical attention and special treatment needed

Note to physicians
Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Not flammable in the form of this product as distributed, flammable as finely divided particles or pieces resulting from processing of this product. 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.

Specific hazards arising from the chemical
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 minimize combustible dust hazard.

**Hazardous combustion products**
Titanium dioxide an IARC Group 2B carcinogen. Hexavalent Chromium (Chromium VI) may cause lung, nasal, and/or sinus cancer. Vanadium pentoxide (V2O5) affects eyes, skin, respiratory system. Zinc, copper, magnesium, or cadmium fumes may cause metal fumes fever. Soluble molybdenum compounds such as molybdenum trioxide may cause lung irritation.

**Explosion data**
- **Sensitivity to Mechanical Impact**: None.
- **Sensitivity to Static Discharge**: None.

**Protective equipment and precautions for firefighters**
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH approved (or equivalent) respirator and full protective gear.

### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions, protective equipment and emergency procedures**

**Personal precautions**
Use personal protective equipment as required.

**For emergency responders**
Use personal protective equipment as required.

**Environmental precautions**

**Environmental precautions**
Not applicable to massive product.

**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.

### 7. HANDLING AND STORAGE

**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 minimize combustible dust hazard.

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

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Control parameters**

**Exposure Guidelines**
<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron 7439-89-6</td>
<td>TWA: 1.5 mg/m³ inhalable fraction</td>
<td>TWA: 1 mg/m³</td>
</tr>
<tr>
<td>Nickel 7440-02-0</td>
<td>TWA: 0.5 mg/m³</td>
<td>TWA: 1 mg/m³</td>
</tr>
<tr>
<td>Chromium 7440-47-3</td>
<td>TWA: 0.2 mg/m³ fume TWA: 0.1 mg/m³ Mn</td>
<td>(vacated) STEL: 3 mg/m³ fume Ceiling: 5 mg/m³ Mn</td>
</tr>
<tr>
<td>Manganese 7439-96-5</td>
<td>TWA: 0.02 mg/m³ respirable fraction</td>
<td>TWA: 0.1 mg/m³ Mn</td>
</tr>
<tr>
<td>Molybdenum 7439-96-7</td>
<td>TWA: 10 mg/m³ inhalable fraction</td>
<td>TWA: 15 mg/m³ total dust TWA: 5 mg/m³ respirable fraction</td>
</tr>
<tr>
<td>Silicon 7440-21-3</td>
<td>TWA: 3 mg/m³ respirable fraction</td>
<td>TWA: 5 mg/m³ Mn</td>
</tr>
<tr>
<td>Aluminum 7439-96-5</td>
<td>TWA: 1 mg/m³ respirable fraction</td>
<td>TWA: 15 mg/m³ total dust TWA: 5 mg/m³ respirable fraction</td>
</tr>
<tr>
<td>Copper 7440-50-8</td>
<td>TWA: 0.2 mg/m³ fume TWA: 1 mg/m³ Cu dust and mist</td>
<td>TWA: 0.1 mg/m³ fume TWA: 1 mg/m³ dust and mist</td>
</tr>
<tr>
<td>Tungsten 7440-33-7</td>
<td>STEL: 10 mg/m³ W TWA: 5 mg/m³ W</td>
<td>(vacated) STEL: 10 mg/m³ (vacated) STEL: 10 mg/m³ W</td>
</tr>
<tr>
<td>Titanium 7440-32-6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boron 19287-88-8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vanadium 7440-62-2</td>
<td>Ceiling: 0.5 mg/m³ VO2S respirable dust Ceiling: 0.1 mg/m³ VO2S fume</td>
<td></td>
</tr>
<tr>
<td>Tantalum 7440-25-7</td>
<td>TWA: 5 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Niobium (Columbium) 7440-03-1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Appropriate engineering controls

Engineering Controls

Avoid generation of uncontrolled particles.

Individual protection measures, such as 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 contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations

Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

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>Color</td>
<td>metallic, gray</td>
<td></td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless</td>
<td></td>
</tr>
<tr>
<td>Odor threshold</td>
<td>Not applicable</td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>1430-1540 °C / 2600-2800 °F</td>
<td></td>
</tr>
</tbody>
</table>
10. STABILITY AND REACTIVITY

Reactivity
Not applicable

Chemical stability
Stable under normal conditions.

Possibility of Hazardous Reactions
None under normal processing.

Hazardous polymerization
Hazardous polymerization does not occur.

Conditions to avoid
Dust formation and dust accumulation;

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.

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. Hexavalent Chromium (Chromium VI) may cause lung, nasal, and/or sinus cancer. Vanadium pentoxide (V2O5) affects eyes, skin, respiratory system. Soluble molybdenum compounds such as molybdenum trioxide may cause lung irritation.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
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 sensitization 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>Iron 7439-89-6</td>
<td>98,600 mg/kg bw</td>
<td>-</td>
<td>&gt; 0.25 mg/L</td>
</tr>
<tr>
<td>Nickel 7440-02-0</td>
<td>&gt; 9000 mg/kg bw</td>
<td>-</td>
<td>&gt; 10.2 mg/L</td>
</tr>
<tr>
<td>Chromium 7440-47-3</td>
<td>&gt; 3400 mg/kg bw</td>
<td>-</td>
<td>&gt; 5.41 mg/L</td>
</tr>
<tr>
<td>Manganese 7439-96-5</td>
<td>&gt; 2000 mg/kg bw</td>
<td>-</td>
<td>&gt; 5.14 mg/L</td>
</tr>
<tr>
<td>Molybdenum 7439-98-7</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 5.10 mg/L</td>
</tr>
<tr>
<td>Silicon 7440-21-3</td>
<td>&gt; 5000 mg/kg bw</td>
<td>&gt; 5000 mg/kg bw</td>
<td>&gt; 2.08 mg/L</td>
</tr>
<tr>
<td>Copper 7440-50-8</td>
<td>481 mg/kg bw</td>
<td>&gt; 2000 mg/kg bw</td>
<td>&gt; 5.11 mg/L</td>
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<td>Aluminum 7429-90-5</td>
<td>15,300 mg/kg bw</td>
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<td>&gt; 1 mg/L</td>
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<tr>
<td>Tungsten 7440-33-7</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>Titanium 7440-32-6</td>
<td>&gt; 5000 mg/kg bw</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Boron 19287-88-8</td>
<td>&gt; 2000 mg/kg bw</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vanadium 7440-62-2</td>
<td>&gt; 2000 mg/kg bw</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tantalum 7440-25-7</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 (Columbium) 7440-03-1</td>
<td>&gt; 10,000 mg/kg bw</td>
<td>&gt; 2000 mg/kg bw</td>
<td>-</td>
</tr>
</tbody>
</table>

Information on toxicological effects

Symptoms
May cause sensitization 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.

Sensitization
May cause sensitization 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 7440-02-0</td>
<td></td>
<td>Group 1</td>
<td>Known</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group 2B</td>
<td>Reasonably Anticipated</td>
<td></td>
</tr>
<tr>
<td>Chromium 7440-47-3</td>
<td></td>
<td>Group 3</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.
### Ecotoxicity

This product as shipped is not classified for aquatic toxicity. This product contains a chemical which is listed as a severe marine pollutant according to IMDG/IMO

<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>Iron 7439-89-6</td>
<td>-</td>
<td>The 96 h LC50 of 50% iron oxide biocid in water to Danio rerio was greater than 10,000 mg/L.</td>
<td>The 3 h EC50 of iron oxide for activated sludge was greater than 10,000 mg/L.</td>
<td>The 48 h EC50 of iron oxide to Daphnia magna was greater than 100 mg/L.</td>
</tr>
<tr>
<td>Nickel 7440-02-0</td>
<td>NOEC/EC10 values range from 12.3 μg/l for Scenedesmus accumulans to 655 μg/l for Pseudokirchneriella subcapitata.</td>
<td>The 96 h LC50s 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 48 h LC50s values range from 0.013 mg Ni/L for Ceriodaphnia dubia to 4970 mg Ni/L for Daphnia magna.</td>
</tr>
<tr>
<td>Chromium 7440-47-3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Manganese 7439-98-5</td>
<td>The 72 h EC50 of manganese to Desmodesmus subspicatus was 2.8 mg of Mn/L.</td>
<td>The 96 h LC50 of manganese to Oncorhynchus mykiss was greater than 3.8 mg of Mn/L.</td>
<td>The 3 h EC50 of manganese for activated sludge was greater than 1000 mg/L.</td>
<td>The 48 h EC50 of manganese to Daphnia magna was greater than 1.6 mg/L.</td>
</tr>
<tr>
<td>Molybdenum 7439-98-7</td>
<td>The 72 h EC50 of sodium molybdate dihydrate to Pseudokirchneriella subcapitata was 357.9 mg of Mo/L.</td>
<td>The 96 h LC50 of sodium molybdate dihydrate to Pimephales promelas was 944.2 mg/L.</td>
<td>The 3 h EC50 of molybdenum trioxide for activated sludge was 820 mg/L.</td>
<td>The 48 h LC50 of sodium molybdate dihydrate to Ceriodaphnia dubia was 1,015 mg/L. The 48 h LC50 of sodium molybdate dihydrate to Daphnia magna was greater than 1,727.8 mg/L.</td>
</tr>
<tr>
<td>Silicon 7440-21-3</td>
<td>The 72 h EC50 of sodium metasilicate pentahydrate to Pseudokirchneriella subcapitata was greater than 250 mg/L.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aluminum 7429-90-5</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 aluminum chloride increased from 0.72 mg/L to greater than 96.8 mg/L with water hardness increasing from 25 to 200 mg/L.</td>
</tr>
<tr>
<td>Copper 7440-50-8</td>
<td>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 6.27, hardness 100 mg/L CaCO3, DOC 15.8 mg/L).</td>
<td>The 96-hr LC50 for Pimephales promelas exposed to copper sulfate ranged from 255.2 to 38.4 μg/L with water hardness increasing from 45 to 255.7 mg/L.</td>
<td>The 24 h NOEC of copper chloride for activated sludge ranged from 0.32 to 0.64 mg of Cu/L.</td>
<td>The 48 h LC50 of copper chloride to 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 CaCO3, DOC 22.8 mg/L).</td>
</tr>
<tr>
<td>Tungsten 7440-33-7</td>
<td>The 72 h EC50 of sodium tungstate to Pseudokirchneriella subcapitata was 31.0 μg 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>Titanium 7440-32-6</td>
<td>The 72 h EC50 of titanium dioxide to Pseudokirchneriella subcapitata was 61 mg of TiO2/L.</td>
<td>The 98 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.</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>
</tbody>
</table>
Boron
19287-88-8
The 72-h EC50 value for reduction of biomass of
Pseudokirchneriella subcapitata exposed to Boric
acid at pH 7.5 to 8.3 was 40.2 mg/L

Vanadium
7440-62-2
The 72 h EC50 of vanadium pentoxide to Desmodesmus
subspicatus was 2,907 ug of V/L.

Tantalum
7440-25-7
- - - -

Niobium (Columbium)
7440-03-1
- - - -

Persistence and degradability

Bioaccumulation

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
acute or aquatic chronic toxicity.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes
Disposal should be in accordance with applicable regional, national and local laws and
regulations.

Contaminated packaging
None anticipated.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>RCRA - D Series Wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium</td>
<td>5.0 mg/L regulatory level</td>
</tr>
<tr>
<td>7440-47-3</td>
<td></td>
</tr>
</tbody>
</table>

This product contains one or more substances that are listed with the State of California as a hazardous waste.

14. TRANSPORT INFORMATION

DOT
Not regulated

15. REGULATORY INFORMATION

International Inventories
TSCA - Complies
DSL/NDISL - Complies
EINECS/ELINCS - Complies
ENCS - Complies
IECSS - Complies
KECL - Complies
PICCS - Complies
AICS - Complies

Legend:
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDISL - Canadian Domestic Substances List/Non-Domestic Substances List
FRP008 Stainless Steel

Revision Date: 27-May-2016

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 - Korea Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372: Chromium (Cr)

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>Weight %</th>
<th>SARA 313 - Threshold Values %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel - 7440-02-0</td>
<td>7440-02-0</td>
<td>0.46</td>
<td>0.1</td>
</tr>
<tr>
<td>Chromium - 7440-47-3</td>
<td>7440-47-3</td>
<td>10-30</td>
<td>1.0</td>
</tr>
<tr>
<td>Manganese - 7439-96-5</td>
<td>7439-96-5</td>
<td>0-10</td>
<td>1.0</td>
</tr>
<tr>
<td>Copper - 7440-50-8</td>
<td>7440-50-8</td>
<td>0-4.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazard Categories
- Acute health hazard: Yes
- Chronic Health Hazard: Yes
- Fire hazard: No
- Sudden release of pressure hazard: No
- Reactive Hazard: No

CWA (Clean Water Act)
This product contains the following substances which are regulated pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CWA - Reportable Quantities</th>
<th>CWA - Toxic Pollutants</th>
<th>CWA - Priority Pollutants</th>
<th>CWA - Hazardous Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel - 7440-02-0</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Chromium - 7440-47-3</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper - 7440-50-8</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Hazardous Substances RQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>100 lb</td>
</tr>
<tr>
<td>Chromium</td>
<td>5000 lb</td>
</tr>
<tr>
<td>Copper</td>
<td>5000 lb</td>
</tr>
</tbody>
</table>

US State Regulations

California Proposition 65
This product contains the following Proposition 65 chemicals

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>California Proposition 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>Carcinogen</td>
</tr>
</tbody>
</table>

U.S. State Right-to-Know Regulations

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>New Jersey</th>
<th>Massachusetts</th>
<th>Pennsylvania</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
### 16. OTHER INFORMATION

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health hazards</th>
<th>Flammability</th>
<th>Instability</th>
<th>Physical and Chemical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMIS</td>
<td>Health hazards</td>
<td>Flammability</td>
<td></td>
<td>Personal protection</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2*</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Chronic Hazard Star Legend**  
* = Chronic Health Hazard

**Issue Date**  
28-May-2015

**Revision Date**  
27-May-2016

**Revision Note**  
Updated Section(s): 1, 3, 7

**Note:**  
The information provided in this 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