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

GHS product identifier

Product Name Chromium-Manganese and Chromium-Nickel-Manganese Alloyed Stainless Steel grades

Other means of identification

Synonyms 201, 218, 307, LDX 2101®, and N80. This includes all listed grades with letter prefixes and suffixes as well as PRODEC® suffix.

Recommended use of the chemical and restrictions on use

Recommended Use Solid stainless steel products, various forms, and uses

Uses advised against No information available

Supplier's details

<table>
<thead>
<tr>
<th>Outokumpu Stainless Plate, LLC</th>
<th>Outokumpu Stainless Pipe, LLC</th>
<th>Outokumpu Mexinox S.A de C.V</th>
</tr>
</thead>
<tbody>
<tr>
<td>549 W. St. Rd. 38</td>
<td>241 West Clarke Street</td>
<td>Av. Industrias No.4100,</td>
</tr>
<tr>
<td>New Castle, IN 47362</td>
<td>Wildwood, FL 34785</td>
<td>Zona Industrial 1a. Sección,</td>
</tr>
<tr>
<td>Tel: 1-800-349-0023; 1-765-529-0120</td>
<td>Tel: 1-800-731-7473; 1-352-748-1313</td>
<td>78395, San Luis Potosi, México</td>
</tr>
<tr>
<td>Outokumpu Stainless Bar, LLC</td>
<td>Outokumpu Stainless USA, LLC</td>
<td>Tel: +52+444+826-5100</td>
</tr>
<tr>
<td>3043 Creshaw Parkway</td>
<td>One ThyssenKrupp Dr. P.O. Box 13000</td>
<td>Additional Information Contact:</td>
</tr>
<tr>
<td>Richburg, SC 29729</td>
<td>Calvert, AL 36513-13000</td>
<td>Tel: 1-800-349-0023</td>
</tr>
<tr>
<td>Tel: 1-858-4600; 1-803-789-5383</td>
<td>Tel: 1-251-829-3600</td>
<td>Web site: <a href="http://www.outokumpu.com">www.outokumpu.com</a></td>
</tr>
</tbody>
</table>

1.4. Emergency Telephone Number
Emergency Number 1-765-529-0120

2. HAZARDS IDENTIFICATION

Classification

This chemical is not considered hazardous according to the OSHA Hazard Communication Standard 2012 (29 CFR 1910.1200). Solid metallic products are generally classified as "articles" and do not constitute hazardous materials in solid form. However, downstream use of the article could result in some hazardous elements contained in these products to be emitted under certain processing conditions such as but not limited to: burning, melting, cutting, sawing, brazing, grinding, machining, milling, and welding.

GHS Label elements, including precautionary statements
No labeling applicable.

Hazard Not Otherwise Classified (HNOC)

Not applicable

Other information
No information available.
3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms 201, 218, 307, LDX 2101®, and N60. This includes all listed grades with letter prefixes and suffixes as well as PRODEC® suffix.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>Weight %</th>
<th>Trade secret</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>7439-89-6</td>
<td>Balance</td>
<td>*</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>16-22</td>
<td>*</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>1.3-9</td>
<td>*</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>4-9</td>
<td>*</td>
</tr>
<tr>
<td>Silicon</td>
<td>7440-21-3</td>
<td>0-4,5</td>
<td>*</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>7439-98-7</td>
<td>0-1</td>
<td>*</td>
</tr>
<tr>
<td>Copper</td>
<td>7440-50-8</td>
<td>0-0.8</td>
<td>*</td>
</tr>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>0-0.6</td>
<td>*</td>
</tr>
<tr>
<td>Titanium</td>
<td>7440-32-6</td>
<td>0-0.5</td>
<td>*</td>
</tr>
</tbody>
</table>

*The exact percentage (concentration) of composition has been withheld as a trade secret.

4. FIRST AID MEASURES

Description of necessary first-aid measures

General Advice In its solid form stainless steel does not present an inhalation, absorption, or ingestion hazard. Grinding, polishing, abrasive blasting, hot rolling, hot forging, thermal cutting, or welding may produce stainless steel dust or fumes containing complex or mixed oxides (spinels) of its components. Metal dust particles may cause eye, skin and/or respiratory system irritation. The below information is for these instances.

Eye Contact Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

Skin Contact Wash off immediately with soap and plenty of water. In the case of skin irritation or allergic reactions see a physician.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Consult a physician.

Ingestion Not an expected route of exposure. If swallowed: Get medical attention.

Most important symptoms/effects, acute and delayed

Most Important Symptoms/Effects During processing: Coughing and/or wheezing. Difficulty in breathing. Irritation. May cause allergic skin reaction.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to Physician May cause sensitization by inhalation and skin contact. Treat symptomatically.
5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media None

Specific Hazards Arising from the Chemical
Avoid dust formation. Dusts or fumes may form explosive mixtures in air. May cause sensitization by inhalation and skin contact.

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) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions
Avoid dust formation. Avoid inhalation of dust. Ensure adequate ventilation. In case of insufficient ventilation wear suitable respiratory equipment. Use personal protective equipment. Avoid contact with skin, eyes and clothing.

Environmental Precautions

Environmental Precautions
Not applicable to steel in solid state. Follow applicable federal, state and local regulations

Methods and materials for containment and cleaning up

Methods for Containment
Prevent further leakage or spillage if safe to do so. Cover dust spill with plastic sheet or tarp to minimize spreading.

Methods for Cleaning Up
Take up mechanically and collect in suitable container for disposal. Avoid dust formation. Clean contaminated surface thoroughly.

7. HANDLING AND STORAGE

Precautions for safe handling

Handling
Handle in accordance with good industrial hygiene and safety practice. Avoid dust formation. Avoid breathing dust. Avoid contact with skin, eyes and clothing. Wear personal protective equipment. Do not eat, drink or smoke when using this product.

Conditions for safe storage, including any Incompatibilities

Storage
Store in accordance with local regulations.

Incompatible Products
May react in contact with strong acids to release gaseous acid decomposition products, e.g. hydrogen, oxides of nitrogen. Use of strong oxidizers (high pH) on stainless steel may cause Cr(VI) compounds to form at ambient temperatures. Decomposition: Fumes generated during welding, brazing, or thermal cutting may contain chromium compounds, including hexavalent chromium Cr(VI); nickel; manganese; iron; molybdenum; and silicon compounds.
8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Exposure Guidelines
There are no occupational exposure limits for stainless steels. Occupational exposure limits apply to some components resulting from grinding, polishing, abrasive blasting, hot rolling, hot forging, thermal cutting, or welding which may produce stainless steel dust or fumes.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH TLV</th>
<th>OSHAPEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>TWA: 1.5 mg/m³</td>
<td>TWA: 1 mg/m³</td>
<td>IDLH: 10 mg/m³</td>
</tr>
<tr>
<td>7440-02-0</td>
<td></td>
<td>(vacated) TWA: 1 mg/m³</td>
<td>TWA: 0.015 mg/m³</td>
</tr>
<tr>
<td>Manganese</td>
<td>TWA: 0.2 mg/m³</td>
<td>(vacated) STEL: 3 mg/m³</td>
<td>IDLH: 500 mg/m³</td>
</tr>
<tr>
<td>7439-96-5</td>
<td></td>
<td>fume (vacated) Ceiling: 5 mg/m³</td>
<td>TWA: 1 mg/m³</td>
</tr>
<tr>
<td>Silicon</td>
<td>-</td>
<td>TWA: 15 mg/m³</td>
<td>STEL: 3 mg/m³</td>
</tr>
<tr>
<td>7440-21-3</td>
<td></td>
<td>total dust</td>
<td>fume</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>TWA: 10 mg/m³</td>
<td>TWA: 10 mg/m³</td>
<td>IDLH: 100 mg/m³</td>
</tr>
<tr>
<td>7439-98-7</td>
<td>TWA: 3 mg/m³</td>
<td>(vacated) TWA: 10 mg/m³</td>
<td>dust, fume and</td>
</tr>
<tr>
<td></td>
<td>TWA: 10 mg/m³</td>
<td></td>
<td>mist</td>
</tr>
<tr>
<td>Copper</td>
<td>TWA: 0.2 mg/m³</td>
<td>TWA: 0.1 mg/m³</td>
<td>IDLH: 20 mg/m³</td>
</tr>
<tr>
<td>7440-50-8</td>
<td>fume</td>
<td>dust and mist</td>
<td>dust and fume</td>
</tr>
<tr>
<td>Cobalt</td>
<td>TWA: 0.02 mg/m³</td>
<td>TWA: 0.05 mg/m³</td>
<td>dust and fume</td>
</tr>
<tr>
<td>7440-48-4</td>
<td></td>
<td>dust and fume</td>
<td></td>
</tr>
</tbody>
</table>

Appropriate engineering controls

Engineering Measures
Ensure adequate ventilation, especially in confined area (i.e. showers, eyewash stations, etc.).

Individual protection measures, such as personal protective equipment

Eye/Face Protection
When processing the metal alloy wear: Tightly fitting safety goggles.

Skin and Body Protection
When processing the metal alloy: Wear protective gloves/clothing.

Respiratory Protection
If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA 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.

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

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State
Solid

Appearance
Varying from dull very light grey, to shiny metallic light grey to bright mirror-finish

Odor
Odorless

Odor Threshold
No information available

Property | Values | Remarks/ Method |
---|---|---|
ph | No data available | None known |
Melting Point/Range | 1370-1520 °C / 2498-2768 °F | None known |
Boiling Point/Boiling Range | No data available | None known |
Flash Point | No data available | None known |
Evaporation rate | No data available | None known |
10. STABILITY AND REACTIVITY

Reactivity

No data available.

Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions

None under normal processing.

Conditions to avoid

Dust formation.

Incompatible materials

May react in contact with strong acids to release gaseous acid decomposition products, e.g. hydrogen, oxides of nitrogen. Use of strong oxidizers (high pH) on stainless steel may cause Cr(VI) compounds to form at ambient temperatures. Decomposition: Fumes generated during welding, brazing, or thermal cutting may contain: chromium compounds, including hexavalent chromium Cr(VI); nickel; manganese; iron; molybdenum; and silicon compounds.

Hazardous decomposition products

None known based on information supplied.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure
Product Information

In its solid form stainless steel does not present an inhalation, absorption, or ingestion hazard. Grinding, polishing, abrasive blasting, hot rolling, hot forging, thermal cutting, or welding may produce stainless steel dust or fumes containing complex or mixed oxides (spinels) of its components. Metal dust particles may cause eye, skin and/or respiratory system irritation. The below information is for these instances.

### Inhalation

May cause irritation of respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause allergy or asthma symptoms or breathing difficulties if inhaled.

### Eye Contact

Contact with eyes may cause irritation.

### Skin Contact

Contact with dust can cause mechanical irritation or drying of the skin. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons.

### Ingestion

May cause irritation.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>LD50 Oral</th>
<th>LD50 Dermal</th>
<th>LC50 Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>= 984 mg/kg (Rat)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Manganese</td>
<td>= 9 g/kg (Rat)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nickel</td>
<td>&gt; 9000 mg/kg (Rat)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Silicon</td>
<td>= 3180 mg/kg (Rat)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cobalt</td>
<td>= 6170 mg/kg (Rat)</td>
<td>-</td>
<td>&gt; 10 mg/L (Rat) 1 h</td>
</tr>
</tbody>
</table>

**Symptoms related to the physical, chemical and toxicological characteristics**

Symptoms

No information available.

**Delayed and immediate effects and also chronic effects from short and long term exposure**

**Sensitization**

During processing: May cause sensitization by inhalation and skin contact

**Mutagenic Effects**

No information available.

**Carcinogenicity**

The table below indicates whether each agency has listed any ingredient as a carcinogen.

<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>Group 3</td>
<td>Group 2B</td>
<td>Reasonably Anticipated</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Group 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cobalt</td>
<td>A3</td>
<td>Group 2A</td>
<td>Group 2B</td>
<td>X</td>
</tr>
</tbody>
</table>

**Reproductive Toxicity**

No information available.

**STOT - single exposure**

No information available.

**STOT - repeated exposure**

Causes damage to organs through prolonged or repeated exposure. Elevated temperature processing such as welding and plasma arc cutting may release hazardous fumes. Overexposure to metal fumes may cause pulmonary edema (fluid in the lungs) and methemoglobinemia. May also cause pulmonary fibrosis and lung cancer. Chronic exposure to manganese may cause impairment to the central nervous system including sluggishness, sleepiness, muscle weakness, loss of facial muscle control, edema, emotional disturbances, spastic gait, and falling.

**Chronic Toxicity**

Respiratory system. Skin.

**Target Organ Effects**

Aspiration Hazard

No information available.

**Numerical measures of toxicity - Product**

The following values are calculated based on chapter 3.1 of the GHS document:

- LD50 Oral: 809 mg/kg; Acute toxicity estimate 7500

**12. ECOLOGICAL INFORMATION**

**Ecotoxicity**

The environmental impact of this product has not been fully investigated.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Toxicity to Algae</th>
<th>Toxicity to Fish</th>
<th>Toxicity to Microorganisms</th>
<th>Daphnia Magna (Water Flea)</th>
</tr>
</thead>
</table>
13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods
Recover or recycle if possible. Dispose of in accordance with federal, state, and local regulations.

Contaminated Packaging
Dispose of in accordance with federal, state, and local regulations.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>RCRA</th>
<th>RCRA - Basis for Listing</th>
<th>RCRA - D Series Wastes</th>
<th>RCRA - U Series Wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium - 7440-47-3</td>
<td></td>
<td>Included in waste streams: F032, F034, F035, F037, F038, F039</td>
<td>5.0 mg/L regulatory level</td>
<td></td>
</tr>
<tr>
<td>Nickel - 7440-02-0</td>
<td>(hazardous constituent - no waste number)</td>
<td>Included in waste streams: F006, F039</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chemical Name           | California Hazardous Waste |
------------------------|----------------------------|
Chromium                | Toxic                     |
                        | Corrosive                 |
                        | Ignitable                 |
Nickel                  | Toxic powder              |
                        | Ignitable powder          |
Manganese               | Ignitable powder          |
Molybdenum             | Ignitable powder          |
Copper                  | Toxic                     |
Cobalt                  | Toxic powder              |
                        | Ignitable powder          |
Titanium                | Ignitable powder          |
14. TRANSPORTATION INFORMATION

DOT
Not regulated

15. REGULATORY INFORMATION

International Inventories
TSCA Complies
DSL Complies

Legend
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

U.S. Federal Regulations

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:

<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>Chromium</td>
<td>7440-47-3</td>
<td>15-22</td>
<td>1.0</td>
</tr>
<tr>
<td>Manganese</td>
<td>7439-96-5</td>
<td>4-9</td>
<td>1.0</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>1.3-9</td>
<td>0.1</td>
</tr>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>0-0.6</td>
<td>0.1</td>
</tr>
</tbody>
</table>

SARA 311/312 Hazard Categories
- Acute Health Hazard No
- Chronic Health Hazard No
- Fire Hazard No
- Sudden Release of Pressure Hazard No
- Reactive Hazard No

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</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</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>
<th>Extremely Hazardous Substances RQs</th>
<th>RQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium</td>
<td></td>
<td></td>
<td>RQ 5000 lb final RQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RQ 2270 kg final RQ</td>
</tr>
<tr>
<td>Nickel</td>
<td>100 lb</td>
<td></td>
<td>RQ 100 lb final RQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RQ 45.4 kg final RQ</td>
</tr>
<tr>
<td>Copper</td>
<td>5000 lb</td>
<td></td>
<td>RQ 5000 lb final RQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RQ 2270 kg final RQ</td>
</tr>
</tbody>
</table>

U.S. State Regulations
California Proposition 65
This product contains the following Proposition 65 chemicals:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS-No</th>
<th>California Prop. 65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>Carcinogen</td>
</tr>
<tr>
<td>Cobalt</td>
<td>7440-46-4</td>
<td>Carcinogen</td>
</tr>
</tbody>
</table>

U.S. State Right-to-Know Regulations

Chemical Name  New Jersey  Massachusetts  Pennsylvania  Illinois  Rhode Island
Chromium  X
Manganese  X  X  X  X  X
Nickel  X  X  X  X  X
Silicon  X  X  X  X
Molybdenum  X  X  X  X
Cobalt  X  X  X  X
Titanium  X

U.S. EPA Label Information
EPA Pesticide Registration Number  Not applicable

16. OTHER INFORMATION

<table>
<thead>
<tr>
<th>NFPA</th>
<th>Health Hazard</th>
<th>Flammability</th>
<th>Instability</th>
<th>Physical and Chemical Hazards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HMIS</th>
<th>Health Hazard</th>
<th>Flammability</th>
<th>Physical Hazard</th>
<th>Personal Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>X</td>
</tr>
</tbody>
</table>

Prepared By
Product Stewardship
23 British American Blvd.
Latham, NY 12110
1-800-572-6501

Issuing Date 09-Jun-2015
Revision Date 09-Jun-2015
Revision Note Initial Release.

General Disclaimer
The information provided on this SDS 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 guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as 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 material or in any process, unless specified in the text.

End of Safety Data Sheet