MATERIAL SAFETY DATA SHEET

TRADE NAME (Common Name or Synonym)
Stainless Steels

CHEMICAL NAME
AISI/SAE Grades 300 Series, 400 Series, Special Alloys

I. INGREDIENTS

<table>
<thead>
<tr>
<th>Material or Component</th>
<th>CAS Number</th>
<th>% Weight</th>
<th>EXPOSURE LIMITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Metal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>7439-89-6</td>
<td>38.0-86.5</td>
<td>10 Oxide Fume</td>
</tr>
<tr>
<td>Alloying Elements</td>
<td></td>
<td></td>
<td>5 Oxide Fume</td>
</tr>
<tr>
<td>Aluminum (Al)</td>
<td>7429-90-5</td>
<td>&lt;.01-05</td>
<td>15 Dust</td>
</tr>
<tr>
<td>Carbon (C)</td>
<td>7440-44-0</td>
<td>&lt;.03-2.0</td>
<td>Not Established</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>7440-47-3</td>
<td>&lt;.10-27</td>
<td>1.0 Chrome Metal</td>
</tr>
<tr>
<td>Cobalt (Co)</td>
<td>7440-48-4</td>
<td>&lt;.01-.75</td>
<td>0.1 Cobalt Metal</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>7440-50-8</td>
<td>&lt;.18-4.5</td>
<td>0.1 Fume/1.0 Dust</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>7439-96-5</td>
<td>&lt;.2-10</td>
<td>5o Dust/5o Fume</td>
</tr>
<tr>
<td>Molybdenum (Mo)</td>
<td>7439-98-7</td>
<td>&lt;.04-5</td>
<td>5o Dust/1 Fume</td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>7440-02-0</td>
<td>&lt;.12-34</td>
<td>1 Nickel Metal</td>
</tr>
<tr>
<td>Phosphorous (P)</td>
<td>7723-47-0</td>
<td>&lt;.01-06</td>
<td>1 Nickel Metal</td>
</tr>
<tr>
<td>Selenium (Se)</td>
<td>7782-49-2</td>
<td>&lt;.01-03</td>
<td>1 Nickel Metal</td>
</tr>
<tr>
<td>Silicon (Si)</td>
<td>7440-21-3</td>
<td>&lt;.15-2.0</td>
<td>1 Nickel Metal</td>
</tr>
<tr>
<td>Sulfur (S)</td>
<td>7704-34-9</td>
<td>&lt;.01-06</td>
<td>1 Nickel Metal</td>
</tr>
<tr>
<td>Titanium (Ti)</td>
<td>7440-32-6</td>
<td>&lt;.01-70</td>
<td>1 Nickel Metal</td>
</tr>
<tr>
<td>Columbium</td>
<td>7440-03-1</td>
<td>&lt;.01-1.10</td>
<td>1 Nickel Metal</td>
</tr>
<tr>
<td>Tantalum (Cb+ Ta)</td>
<td>7440-25-7</td>
<td>&lt;.01-1.10</td>
<td>1 Nickel Metal</td>
</tr>
</tbody>
</table>

Note: The above listing is a summary of elements used in alloying stainless steels. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minimal amounts. No permissible exposure limits (PEL) or threshold limit values (TLV) exist for stainless steel. Values shown are applicable to component elements.

II. PHYSICAL DATA

MATERIAL IS (At Normal Conditions)
☐ LIQUID  ☐ SOLID  ☐ GAS  ☐ OTHER

APPEARANCE AND ODOR
Silvery-Grey, Odorless

% VOLATILE BY VOLUME
N/A

VAPOR DENSITY
N/A

ACIDITY/ALKALINITY
pH = N/A

Melting Point Approx. 2400-2800°F
Boiling Point N/A °F
Specific Gravity (H2O)=1 Approx. 8
Solubility in water (% by weight) N/A
VAPOR PRESSURE
(mm Hg at 20° C) N/A

III. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION
Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particles. If exposure limits are reached or exceeded use NIOSH approved equipment.

HANDS, ARMS AND BODY
Protective gloves should be worn as required for welding, burning or handling operations.

EYES AND FACE
Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.

OTHER CLOTHING AND EQUIPMENT
As required depending on operations and safety codes.

IV. EMERGENCY MEDICAL PROCEDURES

INHALATION:
Remove to fresh air; if condition continues, consult a physician.

EYE CONTACT:
Flush thoroughly with running water to remove particles; obtain medical attention.

SKIN CONTACT:
Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.

INGESTION:
If significant amounts of material are ingested, consult a physician.
V. HEALTH/SAFETY INFORMATION

Stainless steel products in their solid state present no inhalation, ingestion, or contact health hazard. Operations such as burning, welding, sewing, brazing, grinding, and machining, which result in elevating the temperature of the product to, or above its melting point, or result in the generation of airborne particulates may present hazards. The major exposure hazard is inhalation. Effects of overexposure to fume and dust are as follows:

ACUTE: Excessive Inhalation of metallic fumes and dust may result in irritation of eyes, nose and throat. High concentrations of fumes and dust of iron-oxide, manganese, copper, zinc and lead may result in metal fume fever. Typical symptoms last 12 to 48 hours and consist of a metallic taste in the mouth, dryness and irritation of the throat, chills and fever.

CHRONIC: Chronic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed opposite the element:

- Aluminum: Irritation of the eyes, nose and throat.
- Chromium: Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchogenic carcinoma.
- Cobalt: Respiratory tract irritation, skin rash.
- Copper: Irritation of the eyes, nose and throat, metal fume fever.
- Iron: Pulmonary affects siderosis.
- Manganese: Bronchitis, pneumonitis, lack of coordination.
- Molybdenum: Respiratory tract irritation, possible liver and kidney damage, bone deformity.
- Nickel: Lesions of the skin and mucous membranes; possibly cancer of the nose or lungs-bronchogenic carcinoma.
- Phosphorous: Necrosis of the mandible.
- Selenium: Nasal and bronchial irritation, gastrointestinal disturbances, garlic breath odor.
- Sulfur: (As sulfur dioxide) Edema of the lungs.
- Titanium: No chronic debilitating symptoms indicated.
- ColumbiuM/Tantalum: No chronic debilitating symptoms indicated.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with chronic respiratory disorders (i.e.: asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fumes or airborne particulate matter exposure.

OCCUPATIONAL EXPOSURE LIMITS: See Products Ingredients Section I. Chromium and Nickel have been identified by the National Agency for Research on Cancer (IARC) and/or the National Toxicology Program (NTP) as potential cancer causing agents.

VI. ENVIRONMENTAL

SPILL OR LEAK PROCEDURES: Fine turnings and small chips should be swept or vacuumed. Scrap metal can be reclaimed for re-use.

WASTE DISPOSAL METHOD: Used or unused products should be disposed of in accordance with Federal, State or Local Laws and Regulations. Disposer must comply with Federal, State and Local disposal or discharge laws.

VII. ADDITIONAL INFORMATION

In welding, precautions should be taken for airborne contaminants which may originate from components of the welding rod. Arc or spark generated when welding or burning could be a source of ignition for combustion and flammable materials.

DISCLAIMER

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