Section 2 – Hazardous Ingredients

**IMPORTANT** - This section covers the hazardous materials from which this product is manufactured. The fumes and gases produced during welding with normal use of this product are also addressed in Section 5. The term "hazardous" in this section should be interpreted as a term required and defined in OSHA Hazard Communication Standard (29 CFR Part 1910).

### Table of Hazardous Ingredients

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Group A</th>
<th>% Weight</th>
<th>Group B</th>
<th>Group C</th>
<th>CAS No.</th>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>55-95</td>
<td>&lt;5</td>
<td>60-98</td>
<td>1-15</td>
<td>7439-89-6</td>
<td>5.0 (R)</td>
<td>5.0 (R) - Fe2O3</td>
</tr>
<tr>
<td>Chromium (1)</td>
<td>1-40</td>
<td>0-40</td>
<td>1-15</td>
<td>7440-47-3</td>
<td>1.0 - Metal</td>
<td>0.5 - Metal</td>
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<tr>
<td>Manganese and Mn Compounds (1)</td>
<td>1-25</td>
<td>&lt;1</td>
<td>7439-96-5</td>
<td>5.0 CL - Fume</td>
<td>3.0 STEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Columbium</td>
<td>0-10</td>
<td>&lt;5</td>
<td>7440-03-1</td>
<td>5.0 (R)</td>
<td>3.0 (R)</td>
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<td></td>
</tr>
<tr>
<td>Vanadium (3)</td>
<td>0-10</td>
<td>1-70</td>
<td>0-20</td>
<td>7440-02-0</td>
<td>1.0 - Metal</td>
<td>1.0 (I) - Metal</td>
<td></td>
</tr>
<tr>
<td>Nickel (1)</td>
<td>0-10</td>
<td>&lt;5</td>
<td>7440-03-8</td>
<td>5.0 (R)</td>
<td>3.0 (R)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Titanium</td>
<td>0-10</td>
<td>&lt;2</td>
<td>7440-32-6</td>
<td>5.0 (R)</td>
<td>3.0 (R)</td>
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<tr>
<td>Molybdenum</td>
<td>0-10</td>
<td>0-20</td>
<td>7439-98-7</td>
<td>5.0 (R)</td>
<td>3.0 (R)</td>
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<tr>
<td>Fluorides</td>
<td>0-10</td>
<td>&lt;5</td>
<td>7789-75-5</td>
<td>5.0 - as Fume</td>
<td>2.5 as F</td>
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<tr>
<td>Titanium Dioxide</td>
<td>0-10</td>
<td>5-15</td>
<td>13463-67-7</td>
<td>15.0 Dust</td>
<td>10.0</td>
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<tr>
<td>Silicon</td>
<td>&lt;5</td>
<td>&lt;1</td>
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<td>5.0 (R)</td>
<td>3.0 (R)</td>
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<tr>
<td>Tungsten</td>
<td>0-10</td>
<td>0-7</td>
<td>7440-33-7</td>
<td>5.0 (R)</td>
<td>5.0, 10 STEL - Insoluble compounds</td>
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<tr>
<td>Tungsten Carbide</td>
<td>50-65</td>
<td>50-65</td>
<td>12070-12-1</td>
<td>NL</td>
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<tr>
<td>Aluminum (3)</td>
<td>0-2</td>
<td>&lt;10</td>
<td>7429-90-5</td>
<td>5.0 (R)</td>
<td>1.0 (R)</td>
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<tr>
<td>Calcium Carbonate</td>
<td>0-2</td>
<td>&lt;10</td>
<td>1317-65-3</td>
<td>5.0 (R)</td>
<td>3.0 (R)</td>
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<td></td>
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<tr>
<td>Boron</td>
<td>0-5</td>
<td>0-5</td>
<td>7440-42-8</td>
<td>5.0 (R)</td>
<td>3.0 (R)</td>
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<td></td>
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<tr>
<td>Zirconium and Zr Compounds</td>
<td>0-3</td>
<td>&lt;1</td>
<td>7440-67-7</td>
<td>5.0 - Fume</td>
<td>5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper (1)</td>
<td>0-1</td>
<td>&lt;1</td>
<td>7440-50-8</td>
<td>1.0 - Dust</td>
<td>1.0 - Dust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cobalt (1)</td>
<td>0-50</td>
<td>0-10</td>
<td>7440-48-4</td>
<td>0.1 - Dust &amp; Fume</td>
<td>0.02 - Dust &amp; Fume</td>
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<td></td>
</tr>
<tr>
<td>Silica (Amorphous Silica Fume)</td>
<td>0-5</td>
<td>&lt;5</td>
<td>14808-60-9</td>
<td>0.1 (R)</td>
<td>0.025 (R) (A2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>69012-64-2</td>
<td>8.0</td>
<td>3 (R)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(R) – Respirable Fraction  (I) – Inhalable Fraction  CL - Ceiling Limit  STEL – Short time exposure limit

(A1) – Confirmed Human Carcinogen  (A2) – Suspected Human Carcinogen

(1)SARA – Reportable material under section 313 of SARA. (2)SARA – Reportable material under section 313 of SARA only in fibrous form

The exposure limit for welding fume has been established at 5 mg/m³ with OSHA's PEL and ACGIH's TLV. The individual complex compounds within the fume may have lower exposure limits than the general welding fume PEL/TLV. An Industrial Hygienist, the OSHA Permissible Exposure Limits For Air Contaminants (29 CFR 1910.1000), and the ACGIH Threshold Limit Values should be consulted to determine the specific fume constituents present and their respective exposure limits.

Section 3 – Physical Data

These products as shipped are nonhazardous, nonflammable, nonexplosive and nonreactive.

Section 4 – Fire and Explosion Hazard Data

Welding arc and sparks, and the use of oxy-fuel torches, can ignite combustibles and flammables. Refer to American National Standard Z49.1 for fire prevention during the use of welding and allied procedures.

Section 5 – Reactivity Data – Hazardous Decomposition Products

Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedures and electrodes used. **Most fume ingredients are present as complex oxides and compounds and not as pure metals.** Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being welded (such as paint, plating or galvanizing), the number of welders and the volume of the work area, the quality and amount of ventilation, the position of the welder's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities).

When the electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2. Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation of the materials shown in Section 2, plus those from the base metal and coating, etc., as noted above. Monitor for the materials identified in Section 2. Reasonably expected decomposition products from normal use of these products include a complex of the oxides of the materials listed in Section 2. Fumes from the use of these products may contain manganese, chromium, nickel, fluorides, calcium oxides, amorphous silica fume, vanadium, tungsten, copper, and cobalt whose exposure limits are lower than the 5 mg/m3 PEL/TLV for general welding fume. Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc. One recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample inside the welder's helmet if worn or in the worker's breathing zone. [See ANSI/AWS F1.1, available from the "American Welding Society", P.O. Box 351040, Miami, FL 33135. Also, from AWS is F1.3 "Evaluating Contaminants in the Welding Environment - A Sampling Strategy Guide", which gives additional advice on sampling.]
Section 6 – Exposure Limits - Health Hazard Data

EFFECTS OF EXPOSURE:

Electric arc welding may create one or more of the following health hazards: ARC RAYS can injure eyes and burn skin. ELECTRIC SHOCK can kill. See Section 7. FUNGUS AND GASES can be dangerous to your health. PRIMARY ROUTES OF ENTRY are the respiratory system, eyes, and/or skin.

SHORT-TERM (ACUTE) OVEREXPOSURE EFFECTS:

WELDING FUMES - May result in discomfort such as dizziness, nausea or dryness or irritation of nose, throat or eyes.
IRON, IRON OXIDE - None are known. Treat as nuisance dust or fume.
CHROMIUM - Inhalation of fume with chromium (VI) compounds can cause irritation of the respiratory tract, lung damage and asthma-like symptoms. Swallowing chromium (VI) salts can cause severe injury or death. Dust on skin can form ulcers. Eyes may be burned by chromium (VI) compounds. Allergic reactions may occur in some people.
MANGANESE - Metal fume fever characterized by chills, fever, upset stomach, vomiting, irritation of the throat and aching of body. Recovery is generally complete within 48 hours.
COLUMBIUM - Dust or fumes may cause irritation of the respiratory system, skin and eyes.
VANADIUM - Overexposure to the oxide causes green tongue, cough, metallic taste, throat irritation and eczema.
NICKEL, NICKEL COMPOUNDS - Metallic taste, nausea, tightness in chest, metal fume fever, allergic reaction.
TITANIUM DIOXIDE - Irritation of respiratory system.
MOLYBDENUM - Irritation of the eyes, nose and throat.
FLUORIDES - Fluoride compounds evolved may cause skin and eye burns, pulmonary edema and bronchitis.
SILICA (AMORPHOUS) - Dust and fumes may cause irritation of the respiratory system, skin and eyes.
TUNGSTEN - Dust may cause irritation of the skin and eyes. Inhalation of dust may cause acute airways obstructive asthma which is reversible overexposure. Symptoms are tightening chest and productive cough.
ALUMINUM OXIDE - Irritation of the respiratory system.
CALCIUM DIOXIDE - Dust or fumes may cause irritation of the respiratory system, skin and eyes.
BORON OXIDE - Irritation of the nose, throat, eyes and skin.
ZIRCONIUM - May cause irritation of the eyes, nose and throat due to mechanical effects.
COPPER - Metal fume fever characterized by metallic taste, tightness of chest and fever. Symptoms may last 24 to 48 hours following overexposure.
COBALT - Pulmonary irritation, cough, dermatitis, weight loss.

LONG-TERM (CHRONIC) OVEREXPOSURE EFFECTS:

WELDING FUMES - Excess levels may cause bronchial asthma, lung fibrosis, pneumoconiosis or “siderosis.”
IRON, IRON OXIDE FUMES - Can cause siderosis (deposits of iron in lungs) which some researchers believe may affect pulmonary function. Lungs will clear in time when exposure to iron and its compounds are reduced. Iron and magnetite (Fe3O4) are not regarded as fibrogenic materials.
CHROMIUM - Ulceration and perforation of nasal septum may occur with symptoms resembling asthma. Studies have shown that chromate production workers exposed to hexavalent chromium compounds have an excess of lung cancers. Chromium (VI) compounds are more readily absorbed through the skin than chromium (III) compounds. Good practice requires the reduction of employee exposure to chromium (III) and (VI) compounds.
MANGANESE - Long-term overexposure to manganese compounds may affect the central nervous system. Symptoms may be similar to Parkinson's Disease and can include slowness, changes in handwriting, muscular tremor, and cramps and less commonly, tremor and behavioral changes. Employees who are overexposed to manganese compounds should be seen by a physician for early detection of neurological problems.
COLUMBIUM - No adverse long term health effects have been reported in the literature.
VANADIUM - Prolonged overexposure to vanadium pentoxide can cause nasal catarrh or nose bleeds and chronic respiratory problems.
NICKEL, NICKEL COMPOUNDS - Lung fibrosis or pneumoconiosis. Studies of nickel refinery workers indicated a higher incidence of lung and nasal cancers.
TITANIUM DIOXIDE - Pulmonary irritation and slight fibrosis.
MOLYBDENUM - Prolonged overexposure may result in loss of appetite, weight loss, loss of muscle coordination, difficulty in breathing and anemia.
FLUORIDES - Serious bone erosion (Osteoporosis) and mottling of teeth.
SILICA (AMORPHOUS) - Research indicates that silica is present in welding fume in the amorphous form. Long term overexposure may cause pneumoconiosis. Noncrystalline forms of silica (amorphous silica) are considered to have little fibrotic potential.
TUNGSTEN - Long term overexposure may cause pulmonary fibrosis characterized by a rapid onset of cough, sputum and dyspnea on exertion.
ALUMINUM OXIDE - Pulmonary fibrosis and emphysema.
CALCIUM DIOXIDE - Prolonged overexposure may cause ulceration of the skin and perforation of the nasal septum, dermatitis and pneumonia.
BORON OXIDE - No chronic effects are known.
ZIRCONIUM - May cause pulmonary fibrosis and pneumoconiosis.
COPPER - Copper poisoning has been reported in the literature from exposure to high levels of copper. Liver damage can occur due to copper accumulating in the liver characterized by cell destruction and necrosis. High levels of copper may cause anemia and jaundice. High levels of copper may cause central nervous system damage characterized by nerve fiber separation and cerebral degeneration.
COBALT - Repeated exposure to cobalt compounds can produce reduced pulmonary function, diffuse nodular fibrosis of lungs and respiratory hypersensitivity. IARC considers cobalt compounds as possibly carcinogenic to humans (GROUP 2B).

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:

Persons with pre-existing impaired lung functions (asthma-like conditions).

EMERGENCY AND FIRST AID PROCEDURES:

Call for medical aid. Employ first aid techniques recommended by the American Red Cross.

Eyes & Skin: If irritation or flash burns develop after exposure, consult a physician.

CARCINOGENICITY:

Chromium VI, cobalt, and nickel compounds must be considered carcinogens according to OSHA (29 CFR 1910.1200). Chromium VI compounds are classified as IARC Group 1 and NTP Group 1 carcinogens. Nickel compounds are classified as IARC Group 1 and NTP Group 2 carcinogens. Cobalt compounds are classified as IARC Group 2B carcinogens. Welding fumes must be considered as possible carcinogens under OSHA (29 CFR 1910.1200).

CALIFORNIA PROPOSITION 65:

WARNING: This product contains or produces a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm).

Postle Industries, LLC believes this data to be accurate and to reflect qualified expert opinion regarding current research. However, Postle Industries LLC cannot make any expressed or implied warranty as to this information.