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

- 1.1 Product Name:** COBALT ALLOYS CAOTED, BARE AND CORED
Product Identification: ECoCr-C #1 Coated, ECoCr-A #6 Coated, ECoCr-B #12 Coated, ECoCr-E #21 Coated, ERCoCr-C #1 Bare, ERCoCr-A #6 Bare, ERCoCr-B #12 Bare, ERCoCr-E #21 Bare, ERCCoCr-C #1 Cored, ERCCoCr-A #6 Cored, ERCCoCr-B #12 Cored, ERCCoCr-E #21Cored
Product Specification: **AWS A5.13, A5.21**
- 1.2 Relevant identified uses of the substance or mixture and uses advised against:**
1.2.1 Relevant identified uses: For welding consumables and related products.
1.2.2 Uses advised: **Reference the [7. Handling and storage]**
- 1.3 Details of the supplier of the safety data sheet:**
Supplier: DURA MAX
 King of Prussia, PA 19406
Emergency telephone number: **1-888-426-4851 POISON CONTROL HOTLINE**
Email: info@duramax.net

SECTION: 2 HAZARDS IDENTIFICATION

- 2.1 Classification of the mixture:**
 * **The product is placed on the market in solid form**
General Hazard Statement: Solid metallic products are generally classified as "articles" and do not constitute a hazardous material in solid form under the definitions of the OSHA Hazard Communication Standard (29 CFR 1910.1200). Any articles manufactured from these solid products would be generally classified as non-hazardous. However some hazardous elements contained in these products can be emitted under certain processing conditions such as but not limited to: burning, melting, cutting, grinding, sawing, brazing, grinding, machining, milling, and welding. Products in the solid state present no fire or explosion hazard. Small chips, fines, and dust may ignite readily, though. The following classification information is for the hazardous elements which may be released during processing.
- 2.1.1 Classification in accordance with GHS-US**
- | | | | |
|-----------------------|------|-------------------|-------|
| Acute Tox. 4 (Oral) | H302 | STOT SE 3 | H335 |
| Acute Tox. 4 (Dermal) | H312 | Carc. 1B | H350i |
| Skin Irrit. 2 | H315 | Carc. 2 | H351 |
| Skin Sens. 1 | H317 | Repr. Tox 2 | H361f |
| Eye Irrit. 2A | H319 | STOT RE 1 | H372 |
| Eye Irrit. 2B | H320 | Aquatic Acute 1 | H400 |
| Acute dust/mist 1,2 | H330 | Aquatic Chronic 1 | H410 |
| Resp. Sens. 1B | H334 | Aquatic Chronic 3 | H412 |

2.2 Label elements:

GHS-US labeling

Hazard Pictograms (GHS-US):



GHS07



GHS08



GHS09

Signal word (GHS-US): **Danger**

Hazard statements (GHS-US):

- H302** Harmful if swallowed
- H312** Harmful in contact with skin
- H315** Causes skin irritation
- H317** May cause an allergic skin reaction
- H319** Causes serious eye irritation
- H320** Causes eye irritation
- H330** Fatal if inhaled
- H334** May cause allergy or asthma symptoms or breathing difficulties if inhaled
- H335** May cause respiratory irritation

- H350i** May cause cancer by inhalation
- H351** Suspected of causing cancer.
- H361f** Suspected of damaging fertility
- H372** Causes damage to organs through prolonged or repeated exposure
- H400** Very toxic to aquatic life
- H410** Very toxic to aquatic life with long lasting effects
- H412** Harmful to aquatic life with long lasting effects.

Precautionary statements:

- P201** Obtain special instructions before use
- P202** Do not handle until all safety precautions have been read and understood.
- P260** Do not breathe dust/fume/gas/mist/vapours/spray
- P261** Avoid breathing dust/fume/gas/mist/vapours/spray
- P264** Wash thoroughly after handling
- P270** Do not eat, drink or smoke when using this product.
- P272** Contaminated work clothing should not be allowed out of the workplace
- P273** Avoid release into the environment
- P280** Wear protective gloves/protective clothing/eye protection/face protection.
- P301+P312** IF SWALLOWED: call a POISON CENTER or doctor/physician if you feel unwell.
- P302+P352** IF ON SKIN: Wash with plenty of soap and water
- P308+P313** If exposed or concerned: Get medical advice/attention.
- P314** Get medical advice and attention if you feel unwell
- P321** Specific treatment (see label)
- P330** Rinse mouth
- P333+P313** If skin irritation or a rash occurs: Get medical advice/attention
- P362+P364** Take off contaminated clothing and wash before reuse
- P391** Collect spillage
- P405** Store locked up
- P501** Dispose of contents and container in accordance with local/regional/national/international regulations.

2.3 Hazards not otherwise classified (HNOC):

Welding Hazards: CAUTION. Welding will create fumes which may be toxic. If welding is performed on plated or coated materials such as galvanised or painted steel, excessive fume may be produced which contains additional hazardous components, and may result in metal fume fever or other health effects. The product and work surface will be hot during and after welding. Electric shock can kill. Arc Rays can injure eyes and burn skin.

Other Hazards: May be harmful if swallowed. Causes mild skin irritation. Very toxic to aquatic life with long lasting effects. Very toxic to aquatic life.

Unknown Acute Toxicity (GHS-US): 37.65% of the mixture consists of ingredient(s) of unknown toxicity.

SECTION: 3 COMPOSITION/INFORMATION ON INGREDIENTS

- 3.1 Substances:** No data available
Full text of H-phrases: see section 16
- 3.2 Mixtures:** The mixture contains dangerous substances:

| Substance name | Product Identifier (CAS No) | % Percent | GHS-US classification |
|-------------------------------|--------------------------------|------------|---|
| Limestone (Calcium carbonate) | CaCO ₃ 1317-65-3 | 0.0 - 10.0 | Not Classified |
| Chromium | Cr 7440-47-3 | 24.0-50.0 | Acute Tox. 4 Oral (H302); Acute Tox. 4 Skin (H312); Skin Irrit. 2 (H315); Eye Irrit. 2B (H320) |
| Cobalt | Co 7440-48-4 | 25.0-50.0 | Acute Tox. 4 Oral (H302), Acute dust/mist 1 (H330), Eye Irrit. 2A (H319), Resp. Sens. 1B (H334), Skin Sens. 1 (H317), Carc. 1B (H350i), Repr. Tox 2 (H361f), Aquatic Acute 1 (H400), Aquatic Chronic 1 (H410) |
| Fluorspar | CaF ₂ 7789-75-5 | 0.0-5.0 | Acute Tox. 4 Oral (H302) |

| | | | | |
|------------------|-------------------|------------|----------|---|
| Iron | Fe | 7439-89-6 | 0.0-5.0 | Acute Tox. 4 Oral (H302) |
| Nickel | Ni | 7440-02-0 | 0.0-4.0 | Skin Sens. 1 (H317), Carc. 1B (H350i), STOT RE 1 (H372), Aquatic Chronic 3 (H412) |
| Potassium Oxide | K ₂ O | 12136-45-7 | 0.0-2.0 | Acute Tox. 4 Oral (H302) |
| Silica / Quartz | SiO ₂ | 14808-60-7 | 0.0-7.0 | Carc. 1A (H350); STOT SE 3 (H335); STOT RE 1 (H372) |
| Sodium Oxide | Na ₂ O | 1313-59-3 | 0.0-2.0 | Carc. 1A (H350); STOT SE 3 (H335); STOT RE 1 (H372) |
| Carbon | C | 7440-44-0 | 0.0-3.0 | Not Classified |
| Silicon | Si | 7440-21-3 | 0.0-2.0 | Not Classified |
| Molybdenum | Mo | 7439-98-7 | 0.0-7.0 | Not Classified |
| Manganese | Mn | 7439-96-5 | 0.0-2.0 | Not Classified |
| Titanium dioxide | TiO ₂ | 13463-67-7 | 5.0-15.0 | Carc. 2 (H351) |
| Tungsten | W | 7440-33-7 | 0.0-16.0 | Not Classified |

SECTION: 4 FIRST AID MEASURES

4.1 Description of first aid measures:

General Advice: If symptoms persist, call a physician. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get in eyes, on skin, or on clothing. In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

First-aid measures after inhalation: Move to fresh air. If breathing is irregular or stopped, administer artificial respiration. Oxygen or artificial respiration if needed. Get medical attention. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation.

First-aid measures after skin contact: Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. Wash off immediately with soap and plenty of water. Seek medical attention if irritation develops or persists.

First-aid measures after eye contact: Immediately flush eyes with water and continue washing for at least 15 minutes. Obtain medical attention if discomfort persists.

First-aid measures after ingestion: Do NOT induce vomiting. Drink plenty of water. Rinse mouth. If symptoms persist, call a physician. Get immediate medical attention.

Self-protection of the first aider: Self-protection of the first aider. Wear suitable gloves.

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

Symptoms/injuries after inhalation: Short-term (acute) overexposure to the gases, fumes, and dusts may include irritation of the eyes, lungs, nose, and throat. Some toxic gases associated with welding may cause pulmonary edema, asphyxiation, and death.

Acute overexposure may include signs and symptoms such as watery eyes, nose and throat irritation, headache, dizziness, difficulty in breathing, frequent coughing, or chest pain. The presence of chromium/chromate in fume can cause irritation of nasal membranes and skin. The presence of nickel compounds in fume can cause metallic taste, nausea, tightness of chest, fever, and allergic reaction. Excessive inhalation or ingestion of manganese can produce manganese poisoning. Overexposure to manganese compounds may affect the central nervous system, symptoms of which are languor, sleepiness, muscular weakness, emotional disturbances, and spastic gait resembling Parkinsonism. These symptoms can become progressive and permanent if not treated. Excessive inhalation of fumes may cause "Metal Fume Fever" with Flu-like symptoms such as chills, fever, body aches, vomiting, sweating, etc.

Symptoms/injuries after skin contact: Dusts may cause irritation.

Symptoms/injuries after eye contact: Causes eye irritation or damage.

Symptoms/injuries after ingestion: Not an anticipated route of exposure during normal product handling. May be harmful if ingested.

4.3 Indication of any immediate medical attention and special treatment needed: No data available.

Notes to Physician: Treat symptomatically. May cause sensitization by inhalation and skin contact. May cause sensitization of susceptible persons.

SECTION: 5 FIREFIGHTING MEASURES

5.1 Extinguishing media:

Suitable extinguishing media: Use extinguishing media appropriate for surrounding fire.

Unsuitable extinguishing media: No data available.

5.2 Special hazards arising from the substance or mixture: Fire may produce irritating or poisonous gases. Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Thermal decomposition can lead to release of irritating and toxic gases and vapors. May cause sensitization by inhalation and skin contact Carbon oxides.

Fire hazard: Not flammable

Explosion hazard: None known

5.3 Advice for firefighters: In the event of fire, wear self-contained breathing apparatus and full protective gear.

Component Information:

| Substance name | CAS number | Extinguishing Media for Fires (Suitable) | Extinguishing Media for Fires (Unsuitable) |
|----------------|------------|---|--|
| Chromium | 7440-47-3 | Use extinguishing media appropriate for surrounding fire. | Do not use carbon dioxide, which may form an explosive mixture with powdered chromium. |
| Silicon | 7440-21-3 | SMALL FIRES: Dry chemical, sand, water spray, foam.; LARGE FIRES: Water spray, fog, foam | ----- |

SECTION: 6 ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures:

For non-emergency personnel: Wear appropriate personal protective equipment as specified in Section 8. Ensure adequate ventilation.

For emergency responders: No data available.

6.2 Environmental precautions: Avoid release into the environment. Avoid dispersal of spilled material and contact with soil, ground and surface water drains and sewers. See Section 12 for additional Ecological Information.

6.3 Methods and material for containment and cleaning up: Take up mechanically. Collect the material in labeled containers and dispose of according to local and regional authority requirements.

6.4 Reference to other sections: See Section 7 for information of safe handling. See Section 8 for information on personal protection equipment. See Section 13 for disposal information.

SECTION: 7 HANDLING AND STORAGE

7.1 Precautions and safe handling: Welding may produce dust, fumes and gases hazardous to health. Avoid breathing dust, fumes and gases. Use adequate ventilation. Keep away from sources of ignition. Avoid contact with skin, eyes and clothing. Do not eat, drink and smoke in work areas.

7.2 Conditions for safe storage, including and incompatibilities: Keep out of reach of children. Store in cool, dry and well-ventilated place. Keep away from incompatible materials. Keep away from heat and open flame.

7.3 Specific end use(s): For welding consumables and related products.

SECTION: 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters: Exposure limits were not established for this product

| Substance name | CAS number | USA-ACGIH TLV | USA-OSHA PEL | USA-NIOSH IDLH |
|-------------------------------|------------|---|---|---|
| Cobalt | 7440-48-4 | 0.02 mg/m ³ TWA | 0.1 mg/m ³ TWA (dust and fume) | 20 mg/m ³ IDLH (dust and fume) |
| Chromium | 7440-47-3 | 0.5 mg/m ³ TWA | 1 mg/m ³ TWA | 250 mg/m ³ IDLH |
| Tungsten | 7440-33-7 | 10 mg/m ³ STEL 5 mg/m ³ TWA | ----- | ----- |
| Nickel | 7440-02-0 | 1.5 mg/m ³ TWA (inhalable fraction) | 1 mg/m ³ TWA | 10 mg/m ³ IDLH |
| Iron | 7439-89-6 | 5 mg/m ³ TWA | 5 mg/m ³ TWA | ----- |
| Silicon | 7440-21-3 | ----- | 15 mg/m ³ TWA (total dust); 5 mg/m ³ TWA (respirable fraction) | not listed |
| Molybdenum | 7439-98-7 | 10 mg/m ³ TWA (inhalable fraction); 3 mg/m ³ TWA (respirable fraction) | not listed | 5000 mg/m ³ IDLH |
| Manganese | 7439-96-5 | 0.02 mg/m ³ TWA (respirable fraction); 0.1 mg/m ³ TWA (inhalable fraction) | ----- | 500 mg/m ³ IDLH |
| Limestone (Calcium carbonate) | 1317-65-3 | 2 mg/m ³ (Respirable Factor) | 5 mg/m ³ TWA (Respirable Factor) | ----- |
| Fluorspar | 7789-75-5 | 2.5 mg/m ³ | 2.5 mg/m ³ | ----- |
| Potassium Oxide | 12136-45-7 | 3 mg/m ³ (Respirable Factor) | 5 mg/m ³ (Respirable Factor) | ----- |
| Silica / Quartz | 14808-60-7 | 0.1 mg/m ³ (Respirable Factor) | 0.025 mg/m ³ (Respirable Factor) | ----- |

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| | | | | |
|-------------------------|------------|--|---|-------|
| Sodium Oxide | 1313-59-3 | 3 mg/m ³ (Respirable Factor) | 5 mg/m ³ (Respirable Factor) | ----- |
| Titanium dioxide | 13463-67-7 | 10 mg/m ³ | 15 mg/m ³ | ----- |

8.2 Other Exposure Guidelines: Hexavalent Chrome may be formed during welding.

| Substance name | CAS number | Derived No Effect Level (DNEL) | Predicted No Effect Concentration (PNEC) |
|-------------------|------------|--|---|
| Cobalt | 7440-48-4 | 0.04 mg/m ³ long term local inhalation | 2.36 µg Co/l (AF 3) marine water; 0.74 µg/l (AF 3) fresh water |
| Chromium | 7440-47-3 | 0.5 mg/m ³ local inhalation | ----- |
| Tungsten | 7440-33-7 | 5.8 mg/m ³ systemic inhalation | Tungsten 0.338 mg/l freshwater; 0.0338 mg/l marine water; 2.17 mg/kg soil; 11 mg/kg food |
| Nickel | 7440-02-0 | 0.05 mg/m ³ local inhalation; 0.05 mg/m ³ systemic inhalation | 0.0035-0.0218 mg/l freshwater; 0.0023 mg/l marine water |
| Iron | 7439-89-6 | 3 mg/m ³ local inhalation | ----- |
| Carbon | 7440-44-0 | 10 mg/m ³ systemic inhalation | ----- |
| Molybdenum | 7439-98-7 | 11.17 mg/m ³ longterm local inhalation | ----- |
| Manganese | 7439-96-5 | 0.2 mg/m ³ systemic inhalation | ----- |

8.3 Engineering Controls

Appropriate engineering controls: Local exhaust and general ventilation must be adequate to meet exposure standards. Showers and Eyewash Stations.

8.4 Individual Protection Measures, such as Personal Protective Equipment

Hand protection: Wear welding gloves. The product and work surface will be hot during and after welding. Ensure adequate protection is in place to stop individuals from burning themselves.

Eye protection: Wear helmet or face shield with filter lens of appropriate shade number. See ANSI/ASC Z49.1 Section 4.2. Provide protective screens and flash goggles, if necessary, to shield others.

Skin and body protection: Wear head and body protection, which help to prevent injury from radiation, sparks, flame and electrical shock. See ANSI Z49.1. At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection, as well as dark substantial clothing. Train the employee not to touch live electrical parts and to insulate him/herself from work and ground. Welders should not wear short sleeve shirts or short pants.

Respiratory protection: Use only with adequate ventilation. 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. Do not eat, drink or smoke when using this product. Regular cleaning of equipment, work area and clothing is recommended. Keep away from food, drink and animal feeding stuffs. Avoid contact with skin, eyes and clothing. Wash hands before breaks and at the end of workday.

8.5 Biological Standards

| Substance name | CAS number | USA ACGIH -BEI |
|----------------|------------|---|
| Cobalt | 7440-48-4 | 15 µg/L Medium: urine Time: end of shift at end of workweek Parameter: Cobalt (nonspecific) |

SECTION: 9 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties:

| | | | |
|---------------------------|------------------|---------------------------------------|-----------------------------------|
| Physical State: | - Solid | Appearances: | - Rods or wire |
| Odor: | - Odorless | Melting point / Melting range: | - 1285 - 1395 °C / 2340 - 2540 °F |
| Flash point: | - Not applicable | Vapor Pressure: | - Not applicable |
| Vapor Density: | - Not applicable | Water Solubility: | - Insoluble in water |
| Dynamic viscosity: | - Solid | Density: | - 8.44 g/cm ³ |

9.2 Other information:

VOC Content(%) Not Applicable

| Substance name | CAS number | Mol. Weight | Water Solub. | Vap. Press. | Vap. Dens. | pH Val. | Autoign. Temp. | Evap. Rate | Boil. Temp. |
|----------------|------------|-------------|--------------|------------------------|------------|---------|----------------|------------|-------------|
| Cobalt | 7440-48-4 | 58.93 g/mol | --- | 0.00007 hPa at 1050 °C | --- | --- | --- | --- | 2870 °C |

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| Chromium | 7440-47-3 | 51.99 g/mol | --- | --- | --- | --- | --- | --- | 2642 °C |
|-------------------|------------|-------------------------------------|--------------------|-------------------------|------------------|-------------------------------------|--------------|-------|-----------------------|
| Molybdenum | 7439-98-7 | 95.95 g/mol | 0 mg/L at 20°C | --- | --- | --- | --- | --- | 4612 °C at 101.3 hPa |
| Nickel | 7440-02-0 | 58.69 g/mol | --- | 1 mmHg at 1810 °C | --- | --- | --- | --- | --- |
| Silicon | 7440-21-3 | 28.08 g/mol | <1 mg/L | --- | --- | --- | --- | --- | --- |
| Iron | 7439-89-6 | 55.84 g/mol | --- | 0.000001 hPa at 25 °C | --- | --- | >100 °C | --- | --- |
| Manganese | 7439-96-5 | 54.93 g/mol | --- | 1 mmHg at 1292 °C | --- | --- | --- | --- | --- |
| Carbon | 7440-44-0 | 12.01 g/mol | --- | --- | --- | --- | 300 - 500 °C | --- | --- |
| Tungsten | 7440-33-7 | 183.84 g/mol | --- | 0.00000001hPa at 1700°C | --- | --- | --- | --- | --- |
| Substance name | CAS number | Density VALUE | Melt. Temp. | Flash Point | Water Sol. | Bulk Dens. | Odor | State | Color |
| Cobalt | 7440-48-4 | 8.85 - 8.9g/cm ³ at 20°C | < 1495 °C | --- | soluble | --- | --- | --- | --- |
| Chromium | 7440-47-3 | 7.19 g/cm ³ at 20 °C | 1900 °C | --- | insoluble | --- | --- | --- | Grey |
| Molybdenum | 7439-98-7 | 10.2 g/cm ³ at 20 °C | 2617 °C (sublimes) | --- | insoluble | --- | --- | --- | --- |
| Nickel | 7440-02-0 | 8.9 g/cm ³ at 25 °C | --- | --- | insoluble | --- | --- | --- | --- |
| Silicon | 7440-21-3 | 2.33 g/cm ³ at 25 °C | 1410 °C | --- | --- | --- | --- | --- | Dark Grey; Dark Brown |
| Iron | 7439-89-6 | 7.87 g/cm ³ at 25 °C | 1539 °C | --- | insoluble | 3000 - 4000 kg/m ³ | --- | --- | --- |
| Carbon | 7440-44-0 | --- | ≥ 3500 °C | --- | insoluble | 0.25 -0.75kg/m ³ at 20°C | --- | --- | --- |
| Tungsten | 7440-33-7 | 19.3 g/cm ³ at 20 °C | 3422 °C | --- | slightly soluble | 2100 - 9000 kg/m ³ | --- | --- | --- |

SECTION: 10 STABILITY AND REACTIVITY

- 10.1 Reactivity:** Stable under normal conditions
- 10.2 Chemical stability:** The product is stable under normal conditions. When using it may produce dangerous fumes and gases.
- 10.3 Possibility of hazardous reactions:** None under normal processing.
- 10.4 Conditions to avoid:** Keep away from sources of heat (e.g. hot surfaces), sparks and open flames.
- 10.5 Incompatible materials:** Acids. Strong oxidizing agents.
- 10.6 Hazardous decomposition products:** Thermal decomposition can lead to release of toxic/corrosive gases and vapors. Welding fumes and gases cannot be classified simply. The composition and quantity of both are dependent upon the metal being welded, the process, procedure and welding consumables used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coating on the metal being welded (i.e. paint, painting, galvanizing), the number of welders, the volume of the work area, the quality and the amount of ventilation, the position of the welders head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from the cleaning and degreasing activities).
- When an electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 3. Fume and gas decomposition, and not the ingredients in the electrode, are important. The concentration of a given fume or gas component may decrease or increase by many times the original concentration. Also, new compounds not in the electrodes may form.
- Decomposition products of normal operation include those originating from the volatilization, reaction or oxidation of the materials shown in Section 3, plus those from the base metal coating, etc., as noted above. Reasonable expected fume constituents of this product would include: Complex oxides of iron, manganese, silicon, chromium, nickel, columbium, molybdenum, copper, carbon dioxide, carbon monoxide, ozone and nitrogen oxides. Some products will also contain antimony, barium, molybdenum, aluminum, columbium, magnesium, strontium, tungsten, and or zirconium. Fume limit for chromium, nickel and or manganese may be reached before limit of 5 mg/m³ of general welding fumes is reached.
- Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from the arc. Determine the composition and quantity of fumes and gases to which workers are exposed by taking an air sample from inside the welder's helmet if worn or in the worker's breathing zone. Improve ventilation if exposures are not below limits. See ANSI/AWS F1.1, F1.3 and F1.5, available from the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

SECTION: 11 TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects:

Acute toxicity: Harmful if swallowed

Inhalation: May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Eye Contact: May cause eye irritation with susceptible persons.

Skin contact: Repeated or prolonged skin contact may cause allergic reactions with susceptible persons. Prolonged contact may cause redness and irritation. Prolonged skin contact may defat the skin and produce dermatitis. May cause sensitization by skin

Ingestion: Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea. Ingestion may cause irritation to mucous membranes.

| Substance name | CAS number | LD50 oral | LD50 Dermal | LC50 Inhalation (mg/l) |
|----------------|------------|------------------|----------------------------------|------------------------|
| Chromium | 7440-47-3 | >5000 mg/kg bw | Data waiving-sutdy unjustified | >5.41 mg/l/air |
| Cobalt | 7440-48-4 | 550 mg/kg bw | >2000 mg/kg bw | 0.05 mg/l |
| Tungsten | 7440-33-7 | >2000 mg/kg bw | >2000 mg/kg bw | >5.4 mg/l/air |
| Nickel | 7440-02-0 | >9000 mg/kg bw | Data waiving-other justification | NOAEC >=10.2 mg/l/air |
| Iron | 7439-89-6 | 984 mg/kg rat | -- -- | -- -- |
| Carbon | 7440-44-0 | >10000 mg/kg rat | -- -- | -- -- |
| Silicon | 7440-21-3 | 3160 mg/kg bw | >5000 mg/kg bw | Acutely Non Toxic |
| Molybdenum | 7439-98-7 | >2000 mg/kg bw | Not Classified | >3.92 mg/l/air |
| Manganese | 7439-96-5 | >2000 mg/kg bw | Data waiving-sutdy unjustified | >5.14 mg/l/air |

Information on toxicological effects

| Substance name | CAS number | U.S. ACGIH - Critical Effects |
|----------------|------------|--|
| Chromium | 7440-47-3 | skin and upper respiratory tract irritation |
| Cobalt | 7440-48-4 | asthma: myocardial effects; pulmonary function |
| Tungsten | 7440-33-7 | lower respiratory tract irritation |
| Nickel | 7440-02-0 | dermatitis; pneumoconiosis |
| Manganese | 7439-96-5 | CNS impairment |

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion/irritation: Repeated or prolonged contact may cause allergic reactions, redness and irritation

Serious eye damage/irritation: May cause eye irritation with susceptible persons

Respiratory: May cause allergy or asthma symptoms or breathing difficulties if inhaled

Germ cell mutagenicity: Not classified

Carcinogenicity: May cause cancer. This product contains one or more substances which are classified by IARC as carcinogenic to humans (Group I), probably carcinogenic to humans (Group 2A) or possibly carcinogenic to humans (Group 2B).

| Substance name | CAS number | Agency | Risk Factor |
|----------------|------------|--|--|
| Cobalt | 7440-48-4 | ACGIH | A3- Confirmed Animal Carcinogen with Unknown Relevance to Humans |
| | | IARC Group | 2B- Possibly carcinogenic to humans |
| | | National Toxicology Program (NTP) Status | Clear evidence in rodents tested |
| Chromium | 7440-47-3 | ACGIH | A4- Not classifiable as a Human Carcinogen |
| | | IARC Group | 3- Not classifiable as to its carcinogenicity to humans |
| | | National Toxicology Program (NTP) Status | Long term exposure technical reports were not prepared |
| Tungsten | 7440-33-7 | National Toxicology Program (NTP) Status | Short term exposure studies in progress |
| Nickel | 7440-02-0 | ACGIH | A5- Not Suspected as a Human Carcinogen |
| | | IARC Group | 1- Carcinogenic to humans |
| | | IARC Group | 2B- Possibly carcinogenic to humans |
| | | National Toxicology Program (NTP) Status | 3- Reasonably anticipated to be Human Carcinogen |

Reproductive toxicity: Contains a known or suspected reproductive toxin. Prolonged exposure may cause chronic effects. CNS and psychiatric effects, Parkinson-like symptoms. Languor, sleepiness and weakness in legs. A stolid masklike appearance of face, emotional disturbances such as uncontrollable laughter and spastic gait with tendency to fall in walking and findings in more advanced cases. Repeated contact may cause allergic reactions in very susceptible persons. Avoid repeated exposure. Repeated or prolonged skin contact may cause skin irritation and/or dermatitis and sensitization of susceptible persons. Repeated or prolonged exposure may cause central nervous system damage. Contains a known or suspected reproductive toxin. This product contains one or more substances which are classified by IARC as carcinogenic to humans (Group I), probably carcinogenic to humans (Group 2A) or possibly carcinogenic to humans (Group 2B).

Chronic toxicity:

Target organ effects: Blood, Central Nervous System (CNS), Central Vascular System (CVS), Eyes, Kidney, Liver, Lungs, Nasal Cavities, Respiratory System, Skin.

Neurological effects: Repeated or prolonged exposure may cause central nervous system damage. Prolonged or excessive exposure to manganese in dust or fume may cause irreversible central nervous system damage (Manganism). Symptoms resemble Parkinson's disease and include tremors, impaired speech, mask like face and impaired movement.

Numerical measures of toxicity: No data available

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

ATE mix (oral): 508 mg/kg
ATE mix (dermal): 5 mg/kg
ATE mix (inhalation-gas): 10 mg/l

SECTION: 12 ECOLOGICAL INFORMATION

- 12.1 Ecology Toxicity:** 96% of the mixture consists of components(s) of unknown hazards to the aquatic environment
- 12.2 Persistence and degradability:** No additional information available.
- 12.3 Bioaccumulative potential:** No additional information available.
- 12.4 Results of PBT and vPvB assessment:** The components in this formulation do not meet the criteria for classification as PBT or vPvB
- 12.5 Other adverse effects:** No additional information available.

SECTION: 13 DISPOSAL CONSIDERATIONS

- 13.1 Waste treatment methods:** It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations. It must undergo special treatment, e.g. at suitable disposal site, to comply with local regulations.
- 13.2 Waste from residues/unused products:** Reuse or recycle. Recover or recycle if possible. Dispose of in accordance with local regulations.
- 13.3 Contaminated packaging:** Empty containers should be taken to an approved waste handling site for recycling or disposal.
- 13.4 California waste Status:** This product contains one or more substances that are listed with the State of California as a hazardous waste.

| Substance name | CAS number | CALIFORNIA HAZARDOUS WASTE STATUS |
|----------------|------------|-----------------------------------|
| Chromium | 7440-47-3 | Toxic; Corrosive; Ignitable |
| Cobalt | 7440-48-4 | Toxic; Ignitable |
| Nickel | 7440-02-0 | Toxic; Ignitable |
| Molybdenum | 7439-98-7 | Ignitable |
| Manganese | 7439-96-5 | Ignitable |

SECTION: 14 TRANSPORT INFORMATION

In accordance with DOT / ADR / RID / ADNR / IMDG / ICAO / IATA

- 14.1 UN Number:** Not a dangerous good in sense of transport regulations
- 14.2 UN proper shipping name:** Not applicable

| Substance name | CAS number | U.S. - DOT Reportable Quantities | DOT Marine Pollutant | DOT Severe Marine Pollutant |
|----------------|------------|---|----------------------|-----------------------------|
| Chromium | 7440-47-3 | 5000 lbs RQ (The RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 µm (0.004 inches).); 2270 kg RQ (The RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 µm (0.004 inches).) | ----- | ----- |
| Nickel | 7440-02-0 | 100 lbs RQ (The RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 µm (0.004 inches).); 45.4 kg RQ (The RQ for these hazardous substances is limited to those pieces of the metal having a diameter smaller than 100 µm (0.004 inches).) | ----- | ----- |

SECTION: 15 REGULATORY INFORMATION

15.1 US Federal Regulations:

| Substance name | CAS number | WEIGHT% | U.S. Toxic Substances Control Act (TSCA) | SARA 313- Threshold Values |
|----------------|------------|-----------|--|----------------------------|
| Chromium | 7440-47-3 | 24.0-50.0 | Present | Present |
| Cobalt | 7440-48-4 | 25.0-50.0 | Present | Present |
| Tungsten | 7440-33-7 | 0.0-16.0 | Present | ----- |
| Nickel | 7440-02-0 | 0.0-4.0 | Present | ----- |
| Iron | 7439-89-6 | 0.0-5.0 | Present | ----- |
| Carbon | 7440-44-0 | 0.0-3.0 | Present | ----- |
| Silicon | 7440-21-3 | 0.0-2.0 | Present | ----- |
| Molybdenum | 7439-98-7 | 0.0-7.0 | Present | ----- |
| Manganese | 7439-96-5 | 0.0-2.0 | Present | ----- |

SARA 311/312 Hazard

| | |
|-----------------------------------|-----|
| Acute Health Hazard | yes |
| Chronic Health Hazard | yes |
| 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)

| Substance name | CAS number | CWA- Reportable Quantities | CWA- Toxic Pollutants | CWA- Priority Pollutants | CWA-Hazardous Substances |
|----------------|------------|----------------------------|-----------------------|--------------------------|--------------------------|
| Chromium | 7440-47-3 | Not Applicable | Present | Present | Not Applicable |
| Nickel | 7440-02-0 | Not Applicable | Present | Present | Not Applicable |

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)

| Substance name | CAS number | Hazardous Substances RQs | Extremely Hazardous Substances RQs | RQ |
|----------------|------------|--|------------------------------------|--|
| Chromium | 7440-47-3 | 5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm) | ----- | 5000 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 2270 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm) |
| Nickel | 7440-02-0 | 100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm) | ----- | 100 lb final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm); 45.4 kg final RQ (no reporting of releases of this hazardous substance is required if the diameter of the pieces of the solid metal released is >100 µm) |

15.2 US State Regulations:

California Proposition 65: This product contains the following Proposition 65 chemicals:

| Substance name | CAS number | California - Proposition 65 - Carcinogens List | California - Proposition 65 - Developmental Toxicity | California - Proposition 65 - Reproductive Toxicity | California - 22 CCR - Toxic and Extremely Hazardous Carcinogenic Wastes |
|----------------|------------|---|---|--|---|
| Cobalt | 7440-48-4 | Carcinogen, initial date 7/1/92 (powder) | ----- | ----- | ----- |
| Nickel | 7440-02-0 | Carcinogen, initial date 10/1/89 (metallic) | ----- | ----- | ----- |

15.3 US State Right-to-Know Regulations:

| Substance name | CAS number | New Jersey | Massachusetts | Pennsylvania |
|-------------------|------------|-------------------------|--|---|
| Cobalt | 7440-48-4 | sn 0520 | Present | Environmental hazard (fume) Present |
| Chromium | 7440-47-3 | sn 0432 | Carcinogen; Extraordinarity Hazardous | Environmental hazard; Special Hazardous Substance Present |
| Tungsten | 7440-33-7 | sn 1959 | Present | Present |
| Nickel | 7440-02-0 | sn 1341 (dust and fume) | Carcinogen; Extraordinarity Hazardous | Environmental hazard; Special Hazardous Substance Present |
| Silicon | 7440-21-3 | sn 3125 (powder) | Present (dust, exempt when encapsulated or if particulates are not present and cannot be substantially generated through use of the product) | Present |
| Molybdenum | 7439-98-7 | sn 1309 | Present | Present |
| Manganese | 7439-96-5 | sn 1155 (dust and fume) | Present | Environmental Hazard Present |

SECTION: 16 OTHER INFORMATION

Full text of H-phrases:

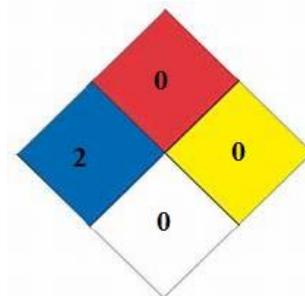
| | |
|-----------------------|---|
| Acute Tox. 4 (Oral) | Acute toxicity (oral), Category 4 |
| Acute Tox. 4 (Dermal) | Acute toxicity (Dermal), Category 4 |
| Acute dust/mist 1 | Acute toxicity (Inhalation), Category 1 |
| Aquatic Acute 1 | Hazardous to the aquatic environment — Acute Hazard, Category 1 |
| Aquatic Chronic 1 | Hazardous to the aquatic environment — Chronic Hazard, Category 1 |
| Aquatic Chronic 3 | Hazardous to the aquatic environment — Chronic Hazard, Category 3 |
| Carc. 1A | Carcinogenicity, Category 1A |
| Carc. 1B | Carcinogenicity, Category 1B |
| Carc. 2 | Carcinogenicity, Category 2 |
| Eye Irrit. 2A | Serious eye damage/eye irritation, Category 2A |
| Eye Irrit. 2B | Serious eye damage/eye irritation, Category 2B |
| Repr. Tox 2 | Reproductive toxicity, Category 2 |
| Resp. Sens. 1B | Sensitisation — Respiratory, Category 1B |
| Skin Sens. 1 | Sensitisation — Skin, Category 1 |
| Skin Irrit. 2 | Skin corrosion/irritation, Category 2 |
| STOT SE 3 | Specific target organ toxicity — Single exposure, Category 3, |
| STOT RE 1 | Specific target organ toxicity — Repeated exposure, Category 1 |
| H302 | Harmful if swallowed |
| H312 | Harmful in contact with skin |
| H315 | Causes skin irritation |
| H317 | May cause an allergic skin reaction |

| | |
|-------|---|
| H319 | Causes serious eye irritation |
| H320 | Causes eye irritation |
| H330 | Fatal if inhaled |
| H334 | May cause allergy or asthma symptoms or breathing difficulties if inhaled |
| H335 | May cause respiratory irritation |
| H350 | May cause cancer |
| H350i | May cause cancer by inhalation |
| H351 | Suspected of causing cancer. |
| H361f | Suspected of damaging fertility |
| H372 | Causes damage to organs through prolonged or repeated exposure |
| H400 | Very toxic to aquatic life |
| H410 | Very toxic to aquatic life with long lasting effects |
| H412 | Harmful to aquatic life with long lasting effects. |

NFPA health hazard: 2 - Intense or continued exposure could cause temporary incapacitation or possible residual injury unless prompt medical treatment is given.

NFPA fire hazard: 0 - Materials that will not burn.

NFPA reactivity: 0 - Normally stable, even under fire exposure conditions, and are not reactive with water.



HMIS III Rating

Health: 2- Moderate Hazard - Temporary or minor injury may occur

Flammability: 0- Minimal Hazard

Physical: 0- Minimal Hazard

We believe that the information contained herein is believed to be true and accurate as of the date of this SDS. All statements or suggestions are made without any warranty, expressed or implied, regarding the accuracy of the information, the hazard connected with the use of this material or the results to be obtained for use thereof. As the condition or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any use of this material. It is the user's obligation to determine the conditions of safe use of these products.

All chemical products can in fact present unknown risks to health, safety and / or the environment, even in relation to the different operating conditions, and they must therefore be used with care. For this reason we cannot guarantee that the risk described in this form are the only foreseeable risks. The user must therefore satisfy himself as to the particular conditions under which it is intended to be use in. Moreover, it must be noted that the user is obliged to comply with all the legislative, administrative and regulatory provisions regarding the product and its use in terms of occupational hygiene and safety, and environmental protection, apart from the information given in the form, given purely as guidance.

Technical Department