Section 1 – PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Nickel Bare Wire

PRODUCT IDENTIFICATION: ROYAL 11-10
ROYAL 11-30
ROYAL 60-10
ROYAL 82-10
ROYAL 625-10
ROYAL C276-10
ROYAL 625-30
ROYAL 82-30
ROYAL 44-30

SPECIFICATION:
AWS A5.14
AWS A5.15

RECOMMENDED USE:
GTAW (Gas Tungsten Arc Welding) and GMAW (Gas Metal Arc Welding)

SUPPLIER:
Crown Alloys Company
30105 Stephenson Hwy.
Madison Heights, MI. 48071

TELEPHONE NUMBER:
(248) 588-3790

EMERGENCY NUMBER:
(800) 255-3924 (CHEMTREC)

WEBSITE:
www.crownalloys.com

Section 2 – HAZARDS IDENTIFICATION

2.1 Classification of the mixture
This product is placed on the market in solid form

2.1.1 Classification in accordance with GHS-US
Health, Skin corrosion/irritation, 1
Health, Specific target organ toxicity – Single exposure, 3
Health, Carcinogenicity, 1
Health, Specific target organ toxicity – Repeated exposure, 2

2.2 Label elements
GHS-US labelling

Hazard Pictograms (GHS-US):

Danger

Signal word (GHS-US):

Hazard statements (GHS-US):
H302 – Harmful if swallowed
H315 – Causes skin irritation
H317 – May cause an allergic skin reaction
H335 – May cause respiratory irritation
H336 – May cause drowsiness or dizziness
H350 – May cause cancer
H372 – Causes damage to organs through prolonged or repeated exposure
H400 – Very toxic to aquatic life
H412 – Harmful to aquatic life with long lasting effects

Precautionary statements (GHS-US):
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/vapors/spray
P261 – Avoid breathing dust/fume/gas/mist/vapors/spray
P264 – Wash thoroughly after handling
P270 – Do not eat, drink or smoke when using this product
P271 – Use only outdoors or in a well-ventilated area
P272 – Contaminated work clothing should not be allowed out of the workplace
P273 – Avoid release to the environment
P280 – Wear protective gloves/protective clothing/eye protection/face protection
P302+P352 – IF ON SKIN: Wash with plenty of soap and water
P304+P313 – IF EXPOSED OR CONCERNED: Get medical advice/attention
P304+P340 – IF INHALED: Remove person to fresh air and keep comfortable for breathing
P312 – Call a POISON CENTER or physician if you feel unwell
P314 – Get medical advice and attention if you feel unwell
P315 – If exposed or if you feel unwell
P321 – Specific treatment (see label)
P333+P313 – If skin irritation or rash occurs: Get medical advice/attention
P362+P364 – Take off contaminated clothing and wash it before reuse
P403+P233 – Store in a well-ventilated place. Keep container tightly closed
P405 – Store locked up
P501- Dispose of contents/container in accordance with local / regional / national / international regulations

2.3 Other hazards
No additional information available

2.4 Unknown acute toxicity (GHS-US)
No data available
Other hazards which do not result in GHS classification:

- Electrical shock can kill.
- Arc rays can injure eyes and burn skin.
- Welding arc and sparks can ignite combustibles and flammable materials.
- Overexposure to welding fumes and gases can be hazardous.

Read and understand the manufacturer’s instructions, Safety Data Sheets and the precautionary labels before using these alloys. Refer to Section 8.

Substance(s) formed under the conditions of use:

The welding fumes produced from these welding alloys may contain the following constituent(s) and/or their complex metallic oxides as well as solid particles or other constituents from the consumables, base metal, or base metal coating not listed below.

### Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS

#### 3.1 Substances

Not applicable

**Full text of H-phrases:** See section 16

#### 3.2 Mixture

**Reportable Hazardous Ingredients**

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>CAS-No.</th>
<th>Weight Percent (%)</th>
<th>GHS-US Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum and/or aluminum alloys (as Al)</td>
<td>7429-90-5</td>
<td>1.50 max.</td>
<td>Comb. Dust</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>7440-47-3</td>
<td>23.0 max.</td>
<td>Comb. Dust</td>
</tr>
<tr>
<td>Cobalt (Co)</td>
<td>7440-48-4</td>
<td>2.50 max.</td>
<td>Acute Tox. 4 (Oral), H302; Acute dust/mist 1; Eye Irrit. 2A, H319; Resp. Sens. 1B, H334; Skin Sens. 1, H317; Carc. 1B, H350; Repro. tox. 2, H361; Aquatic Acute 1, H400; Aquatic Chronic 1, H410</td>
</tr>
<tr>
<td>Copper (Cu)</td>
<td>7440-50-8</td>
<td>37.0 max.</td>
<td>Not classified</td>
</tr>
<tr>
<td>Iron (Fe)</td>
<td>7439-89-6</td>
<td>49.0 max.</td>
<td>Acute Tox. 4 (Oral), H302</td>
</tr>
<tr>
<td>Manganese (Mn)</td>
<td>7439-96-6</td>
<td>14.0 max.</td>
<td>Not classified</td>
</tr>
<tr>
<td>Molybdenum (Mo)</td>
<td>7439-98-7</td>
<td>17.0 max.</td>
<td>Not classified</td>
</tr>
<tr>
<td>Nickel (Ni)</td>
<td>7440-02-0</td>
<td>35.0 – 96.0</td>
<td>Skin Sens. 1, H317; Carc. 1B, H350; STOT RE 1, H372</td>
</tr>
<tr>
<td>Niobium (Nb)</td>
<td>7440-03-1</td>
<td>4.15 max.</td>
<td>Not classified</td>
</tr>
<tr>
<td>Silicon (Si)</td>
<td>7440-21-3</td>
<td>1.25 max.</td>
<td>Not classified</td>
</tr>
<tr>
<td>Tantalum (Ta)</td>
<td>7440-25-7</td>
<td>0.50 max.</td>
<td>Not classified</td>
</tr>
<tr>
<td>Titanium (Ti)</td>
<td>7440-32-6</td>
<td>3.50 max.</td>
<td>Not classified</td>
</tr>
<tr>
<td>Tungsten (W)</td>
<td>7440-33-7</td>
<td>4.50 max.</td>
<td>Not classified</td>
</tr>
<tr>
<td>Vanadium alloys (as V)</td>
<td>7440-62-2</td>
<td>0.35 max.</td>
<td>Not classified</td>
</tr>
</tbody>
</table>

**Composition Comments:** The term “Hazardous Ingredients” should be interpreted as a term defined in Hazard Communication standards and does not necessarily imply the existence of a welding hazard. These alloys may contain additional non-hazardous ingredients or may form additional compounds under the condition of use. Refer to Sections 2 & 8 for more information.

### Section 4 – FIRST AID MEASURES

#### 4.1 Description of first aid measures

**Ingestion:**

Unlikely due to the form of the product. Avoid hand, clothing, food, and drink contact with metal fume or powder which can cause ingestion of particulate during hand to mouth activities such as drinking, eating, smoking, etc. If ingested, do not induce vomiting. Contact a poison control center. Unless the poison control center advises otherwise, wash out mouth thoroughly with water. If symptoms develop, seek medical attention at once.

**Inhalation:**

Move to fresh air if breathing is difficult. If not breathing, perform artificial respiration. Seek medical assistance immediately.

**Skin Contact:**

Flush with soap and water for at least 15 minutes. For reddened or blistered skin, or thermal burns, obtain medical assistance.

**Eye Contact:**

Dust or fume from these alloys should be flushed from the eyes with clean, tepid water until transported to a medical facility. Do not rub eyes or keep eyes tightly closed. Obtain immediate medical assistance. Arc rays can injure eyes. If exposed, move victim to a dark room, remove contact lenses and cover eyes with a padded dressing and rest. Obtain medical assistance if symptoms persist.
4.2 Most important symptoms/effects, 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.

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

4.3 Indication of immediate medical attention and special treatment needed

No additional information available

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**Section 5 – FIRE-FIGHTING MEASURES**

**General Fire Hazards:** As shipped, this product is nonflammable. However, welding arc and sparks can ignite combustibles and flammable products. Read and understand American National Standard Z49.1, “Safety In Welding, Cutting and Allied Processes” and National Fire Protection Association NFPA 51B, “Standard for Fire Prevention During Welding, Cutting and Other Hot Work” before using this product.

**5.1 Extinguishing media**

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

**Unsuitable extinguishing media:** None known.

**5.2 Special hazards arising from the substance**

**Fire hazard:** Not flammable.

**Explosion hazard:** None known.

**5.3 Special protective equipment and precautions for firefighters**

**Special firefighting procedures:** Use standard firefighting procedures and consider the hazards of other involved materials.

**Special protective equipment for firefighters:** Firefighters should wear full protective gear.

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**Section 6 – ACCIDENTAL RELEASE MEASURES**

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

If airborne dust and/or fume is present, use adequate engineering controls and, if needed, personal protection to prevent overexposure. Refer to recommendations in Section 8.

**6.2 Environmental precautions**

Avoid release to the environment

**6.3 Methods and material for containment and cleaning up**

Clean up spills immediately, observing precautions in the personal protective equipment in Section 8. Avoid generating dust. Prevent product from entering any drains, sewers or water sources. Refer to Section 13 for proper disposal. Attempt to reclaim the product if possible.

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**Section 7 – HANDLING AND STORAGE**

**7.1 Precautions for safe handling**


**7.2 Conditions for safe storage, including any incompatibilities**

Store in closed original container in a dry place. Store away from incompatible materials. Store in accordance with local/regional/national regulations.

**7.3 Specific end use(s)**

For welding consumables and related products
### Section 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

#### 8.1 Control parameters

<table>
<thead>
<tr>
<th>Chemical Identity (CAS-No.)</th>
<th>ACGIH TLV (TWA)</th>
<th>OSHA PEL (TWA)</th>
<th>NIOSH REL</th>
<th>NIOSH STEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum (7429-90-5)</td>
<td>1.0 mg/m³ (respirable fraction)</td>
<td>5.0 mg/m³ (respirable dust as Al)</td>
<td>5.0 mg/m³ (respirable)</td>
<td>N/A</td>
</tr>
<tr>
<td>Chromium (7440-47-3)</td>
<td>0.5 mg/m³ [metal compound as Cr]</td>
<td>1.0 mg/m³ [metal compound as Cr]</td>
<td>0.5 mg/m³</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>0.05 mg/m³ [Cr(VI) inorganic compounds as Cr, water soluble]</td>
<td>0.005 mg(5 μg)/m³ [Cr(VI) inorganic compounds as Cr(VI), water soluble]</td>
<td>0.005 mg(5 μg)/m³</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>0.01 mg/m³ [Cr(VI) inorganic compounds as Cr, water insoluble]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cobalt (7440-48-4)</td>
<td>0.02 mg/m³</td>
<td>0.1 mg/m³</td>
<td>0.05 mg/m³</td>
<td>N/A</td>
</tr>
<tr>
<td>Copper (7440-50-8)</td>
<td>0.2 mg/m³ (fume, as Cu)</td>
<td>0.1 mg/m³ (fume, as Cu)</td>
<td>1 mg/m³</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>1.0 mg/m³ (dust and mists, as Cu)</td>
<td>1.0 mg/m³ (dust and mist, as Cu)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron (7439-89-6)</td>
<td>5.0 mg/m³ (as Fe2O3)</td>
<td>10.0 mg/m³ (fume, as Fe2O3)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Manganese (7439-96-5)</td>
<td>0.02 mg/m³ (elemental and inorganic compounds, as Mn – respirable fraction)</td>
<td>5.0 mg/m³ (fume, as Mn)</td>
<td>1 mg/m³</td>
<td>3 mg/m³</td>
</tr>
<tr>
<td></td>
<td>0.1 mg/m³ (elemental and inorganic compounds, as Mn – inhalable fraction)</td>
<td>Ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molybdenum (7439-98-7)</td>
<td>3.0 mg/m³ (respirable fraction, as Mo)</td>
<td>15.0 mg/m³ (total dust, as Mo)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>10.0 mg/m³ (inhalable fraction, as Mo)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nickel (7440-02-0)</td>
<td>1.5 mg/m³</td>
<td>1.0 mg/m³ (metal and insoluble compounds as Ni)</td>
<td>0.015 mg/m³</td>
<td>N/A</td>
</tr>
<tr>
<td>Niobium (7440-03-1)</td>
<td>10.0 mg/m³</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Silicon (7440-21-3)</td>
<td>Withdrawn</td>
<td>15.0 mg/m³ (total dust)</td>
<td>5.0 mg/m³ (respirable)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.0 mg/m³ (respirable fraction)</td>
<td>10.0 mg/m³ (total)</td>
<td></td>
</tr>
<tr>
<td>Titanium (7440-32-6)</td>
<td>10 mg/m³ as oxide dust</td>
<td>15 mg/m³ as oxide dust (total particulate)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Tungsten (7440-33-7)</td>
<td>5.0 mg/m³</td>
<td>5.0 mg/m³</td>
<td>10.0 mg/m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10.0 mg/m³ (STEL)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vanadium alloys (as V) (7440-82-2)</td>
<td>0.05 mg/m³</td>
<td>0.05 mg/m³</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

#### 8.2 Exposure controls

**Appropriate Engineering Controls:**

Use enough ventilation, local exhaust at the arc, or both to keep the fumes and gases from the worker's breathing zone & the general area. Maintain exposures below acceptable exposure levels (see Section 8.1). Use industrial hygiene air monitoring to ensure that your use of these products does not create exposures that exceed the recommended exposure limits. Always use exhaust ventilation in user operations such as high temperature cutting, grinding, welding and brazing. Train the welder to keep his head out of the fume plume. Confined spaces require adequate ventilation and/or air supplied respirators. Read and understand the manufacturer's instructions and the precautionary label on the product. See American National Standard Z49.1, Safety in Welding, Cutting, and Allied Processes, published by the American Welding Society, 8669 Doral Blvd. Suite 130, Doral, FL 33166 and OSHA Publication 2206 (29CFR1910), US Government Printing Office, Washington, D.C. 20402 for more details on many of the following.

**General information:**

- **Exposure Guidelines:** Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) are values published by the American Conference of Government Industrial Hygienists (ACGIH). ACGIH Statement of Positions Regarding the TLVs® and BEIs® states that the TLV-TWA should be used as a guide in the control of health hazards and should not be used to indicate a fine line between safe and dangerous exposures. See Section 10 for information on potential fume constituents of health interest. Threshold Limit Values are figures published by the American Conference of Government Industrial Hygienists.

**Eye/face protection:**

Wear helmet or use face shield with filter lens shade number 12 or darker for open arc processes. No specific lens shade recommendation for submerged arc processes. Shield others by providing screens and flash goggles.

**Skin/Hand protection:**

Wear protective gloves. Suitable gloves can be recommended by the glove supplier.

**Protective clothing:**

- Wear protective gloves. Suitable gloves can be recommended by the glove supplier.
- Wear protective clothing. Suitable protective clothing can be recommended by the glove supplier.
- Wear hand, head, and body protection which help to prevent injury from radiation, sparks and electrical shock. See 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. Wear dry gloves free of holes or split seams. Train the welder to not permit electrically live parts or electrodes to contact skin . . . or clothing or gloves if they are wet. Insulate yourself from the work piece and ground using dry plywood, rubber mats or other dry insulation.

**Respiratory Protection:**

Keep your head out of fumes. Use enough ventilation and local exhaust to keep fumes and gases from your breathing zone and the general area. An approved respirator should be used unless exposure assessments are below applicable exposure limits. Use respirable fume respirator or air supplied respirator when welding in confined space or where local exhaust or ventilation does not keep exposure below TLVs (see Section 8.1). Use only NIOSH approved respirators in accordance with 29 CFR 1910.134 – Respiratory Protection. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA’s Respiratory Protection Standard (1910.134-1998).
Hygiene measures: Do not eat, drink or smoke when using the product. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Cosmetics should not be applied in areas where exposures exist! Routinely wash work clothing and protective equipment to remove contaminants.

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, F1.2, F1.3 and F1.5, available from the American Welding Society, www.aws.org.

A SIGNIFICANT AMOUNT OF THE CHROMIUM IN THE FUMES CAN BE HEXAVALENT CHROMIUM, ALSO KNOWN AS Cr(VI), WHICH HAS A VERY LOW EXPOSURE LIMIT OF 0.005 mg/m³ (5 µg/m³). Monitor fume levels and Cr(VI) level. Train workers about the hazards of Cr(VI). Read and comply with OSHA’s permissible exposure limits for hexavalent chromium Cr(VI), Fed. Reg. 71 – 10099 (specifically 29 CFR 1910.1026, 29 CFR 1915.1026, and 29 CFR 1926.1126). For Cr(VI), OSHA requires: “The employer shall perform initial monitoring to determine the 8-hour TWA exposure for each employee on the basis of a sufficient number of personal breathing zone air samples to accurately characterize full shift exposure on each shift, for each job classification, in each work area”. Specialized equipment is required for monitoring Cr(VI) concentration in the workplace. OSHA Analytical Method Number ID-215 for area and breathing zone sampling and OSHA Analytical Method Number W4001 for wipe samples are listed on the OSHA website – www.osha.gov – as methods for measuring Cr(VI). This standard is complex and the employer should contact an occupational health professional for doing the Cr(VI) monitoring and all other fume monitoring.

EU RoHS (European Union Restriction of Hazardous Substances): Some of these nickel rods/wires contain Chromium. During welding these alloys will produce Cr(VI) (hexavalent chromium), however, the weld deposit does not contain Cr(VI) as it will all be in the zero valent state or as Cr(III) as an oxide. FINISHED PRODUCTS MANUFACTURED USING THESE NICKEL RODS/WIRES WILL NOT CONTAIN ANY Cr(VI).
Organic polymers may be used in the manufacture of various welding consumables. Overexposure to their decomposition byproducts may cause various health effects. 

### Other Effects:

- **Aspiration hazard (product):**
- **Specific target organ toxicity - repeated exposure (product):**
- **Reproductive toxicity (product):**
- **Carcinogenicity (product):**
- **Germ cell mutagenicity (product):**
- **Respiratory or skin sensitization (product):**
- **Serious eye damage/irritation (product):**
- **Skin corrosion/irritation (product):**
- **Repeated dose toxicity (product):**
- **Acute toxicity**

### Information on toxicological effects

#### Acute toxicity (list all possible routes of exposure):

<table>
<thead>
<tr>
<th>Specified substance: IRON</th>
<th>Specified substance: MANGANESE</th>
<th>Specified substance: SILICON</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 (oral, rat) = 98.6 mg/kg</td>
<td>ATE (oral) = 9000 mg/kg</td>
<td>ATE (oral) = 3160.0 mg/kg</td>
</tr>
<tr>
<td>ATE (oral) = 984.00 mg/kg</td>
<td>ATE (oral) = 9000.00 mg/kg</td>
<td>LD50 (oral, rat) = 3160 mg/kg</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specified substance: NICKEL</th>
<th>Specified substance: CHROMIUM (VI)</th>
<th>Specified substance: VANADIUM PENTOXIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 (oral, rat) &gt; 9000 mg/kg</td>
<td>LD50 (oral, rat) = 27.0 – 59.0 mg/kg</td>
<td>LD50 (oral, rat) = 221.1 – 715.7 mg/kg</td>
</tr>
<tr>
<td>Specified substance: COBALT</td>
<td>LD50 (oral, rat) = 215.9 – 1140 mg/kg</td>
<td>LC50 (inhalation, rat, 4h) = 10 mg/l</td>
</tr>
<tr>
<td>ATE (oral) = 215.90 mg/kg</td>
<td>ATE (dust/mist, 4h) = 0.01 mg/l</td>
<td></td>
</tr>
</tbody>
</table>

- **Repeated dose toxicity (product):** Not classified
- **Skin corrosion/irritation (product):** Not classified
- **Serious eye damage/irritation (product):** Not classified
- **Respiratory or skin sensitization (product):** May cause an allergic skin reaction
- **Germ cell mutagenicity (product):** Not classified
- **Carcinogenicity (product):** May cause cancer

#### National Toxicology Program (NTP) Status

- **Chromium (7440-3)**: 1B (Possibly carcinogenic to humans)
- **Vanadium Pentoxide (1314-62-1)**: Not classified
- **Nickel (7440-02-0)**: 2B (Possibly carcinogenic to humans)
- **Cobalt (7440-48-4)**: 2B (Possibly carcinogenic to humans)

#### International Agency for Research on Cancer (IARC) Monographs

- **Chromium (7440-47-3)**: 3 (Not classifiable as to its carcinogenicity to humans)
- **Vanadium Pentoxide (1314-62-1)**: 2B (Possibly carcinogenic to humans)
- **Nickel (7440-02-0)**: 2B (Possibly carcinogenic to humans)
- **Cobalt (7440-48-4)**: 2B (Possibly carcinogenic to humans)

#### Reproductive toxicity (product): Not classified

#### Specific target organ toxicity - single exposure (product): Not classified

#### Specific target organ toxicity - repeated exposure (product): Causes damage to organs through prolonged or repeated exposure

#### Aspiration hazard (product): Not classified

#### Other Effects: Organic polymers may be used in the manufacture of various welding consumables. Overexposure to their decomposition byproducts may result in discomfort such as metal fume fever, dizziness, nausea, or dryness or irritation of nose, throat, or eyes. May aggravate pre-existing respiratory problems (e.g., asthma, emphysema). Long-term (chronic) overexposure to welding fumes can lead to siderosis (iron deposits in lung), central nervous system effects, bronchitis and other pulmonary effects.

#### Symptoms related to the physical, chemical and toxicological characteristics under the condition of use:

- **Specified substance: CHROMIUM (VI) Inhalation:** Chromates may cause ulceration, perforation of the nasal septum, and severe irritation of the bronchial tubes and lungs. Liver damage and allergic reactions, including skin rash, have been reported. Asthma has been reported in some sensitized individuals. Skin contact may result in irritation, ulceration, sensitization, and contact dermatitis. Chromates contain the hexavalent form of chromium. Inhaling hexavalent chromium and its compounds are on the IARC and NTP lists as posing respiratory cancer risk, and are skin sensitizers with symptoms ranging from slight itch to severe dermatitis.

- **Specified substance: MANGANESE Inhalation:** Overexposure to manganese fumes may affect the brain and central nervous system, resulting in poor coordination, difficulty speaking, and arm or leg tremors. This condition can be irreversible.

- **Specified substance: NICKEL Inhalation:** Nickel and its compounds are on the IARC and NTP lists as posing respiratory cancer risk, and are skin sensitizers with symptoms ranging from slight itch to severe dermatitis.

- **Specified substance: COBALT Inhalation:** Repeated overexposure to cobalt compounds can produce reduced pulmonary function, diffuse nodular fibrosis of lungs and respiratory hypersensitivity.

### Additional toxicological information under the conditions of use:

#### Acute toxicity

<table>
<thead>
<tr>
<th>Specified substance: CHROMIUM (VI)</th>
<th>Specified substance: CARBON DIOXIDE</th>
<th>Specified substance: NITROGEN DIOXIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD50 (oral, rat) = 27 – 59 mg/kg</td>
<td>LCl0 (inhalation, human) = 90000 ppm/5 min.</td>
<td>LC50 (inhalation, rat) = 188 ppm/4h</td>
</tr>
<tr>
<td>LC50 (inhalation, rat) = 33 – 70 mg/m3 /4h</td>
<td>Specified substance: CARBON MONOXIDE</td>
<td>LC50 (inhalation, rat) = 50 ppm/30 min.</td>
</tr>
<tr>
<td></td>
<td>LC50 (inhalation, rat) = 1300 mg/l /4h</td>
<td></td>
</tr>
</tbody>
</table>
Additional toxicological information under the conditions of use (continued):

Carcinogenicity:

<table>
<thead>
<tr>
<th>Specified substance: Chromium (VI) or Hexavalent Chromium</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>International Agency for Research on Cancer (IARC) Monographs</td>
<td>1 (Carcinogenic to humans)</td>
</tr>
<tr>
<td>National Toxicology Program (NTP) Status</td>
<td>Known to be human carcinogen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specified substance: Chromium Oxide</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>International Agency for Research on Cancer (IARC) Monographs</td>
<td>3 (Not classifiable as to its carcinogenicity to humans)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specified substance: Nickel</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>International Agency for Research on Cancer (IARC) Monographs</td>
<td>2B (Possibly carcinogenic to humans)</td>
</tr>
<tr>
<td>National Toxicology Program (NTP) Status</td>
<td>Reasonably anticipated to be a Human Carcinogen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vanadium Pentoxide (1314-62-1)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>International Agency for Research on Cancer (IARC) Monographs</td>
<td>2B (Possibly carcinogenic to humans)</td>
</tr>
</tbody>
</table>

Section 12 – ECOLOGICAL INFORMATION

General Information: Contains substances which cause risk of hazardous effects to the environment.

Ecotoxicity

Acute hazards to the aquatic environment:

**Fish**

<table>
<thead>
<tr>
<th>Specified substance: ALUMINUM and/or aluminum alloys (as Al)</th>
<th>Specified substance: MOLYBDENUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 (Grass carp, white amur (Ctenopharyngodon idella), 96 h): 0.21 – 0.31 mg/l</td>
<td>LC50 (Rainbow trout, donaldson trout (Oncorhynchus mykiss), 96 h): 800 mg/l</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specified substance: IRON and/or iron alloys (as Fe)</th>
<th>Specified substance: COPPER and/or copper alloys and compounds (as Cu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 (Cyprinus carpio) [semi-static], 96 h): 0.56 mg/l</td>
<td>LC50 (Fathead minnow (Pimephales promelas), 96 h): 1.6 mg/l</td>
</tr>
<tr>
<td>LC50 (Morone saxatilis [static], 96 h): 13.6 mg/l</td>
<td>LC50 (Fathead minnow (Pimephales promelas), 96 h): 0.0068 – 0.0156 mg/l</td>
</tr>
<tr>
<td>LC50 (Fathead minnow (Pimephales promelas), 96 h): &gt;100 mg/l</td>
<td>LC50 (Fathead minnow (Pimephales promelas) [static], 96 h): &lt;0.3 mg/l</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specified substance: NICKEL</th>
<th>Specified substance: COBALT and compounds (as Co)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC50 (Fathead minnow (Pimephales promelas), 96 h): 2.916 mg/l</td>
<td>LC50 (Rainbow trout, donaldson trout (Oncorhynchus mykiss), 28 d): &gt;0.17 - &lt;15.61 mg/l</td>
</tr>
<tr>
<td>LC50 (Brachydanio rerio), 96 h): &gt;100 mg/l</td>
<td>LC50 (Brachydanio rerio) [static], 96 h): &gt;100 mg/l</td>
</tr>
<tr>
<td>LC50 (Cyprinus carpio) [semi-static], 96 h): 1.3 mg/l</td>
<td>Specified substance: MANGANESE</td>
</tr>
<tr>
<td>Specified substance: COPPER and/or copper alloys and compounds (as Cu)</td>
<td></td>
</tr>
<tr>
<td>EC50 (Fathead minnow (Pimephales promelas), 96 h): 0.0623 mg/l</td>
<td>EC50 (Water flea (Daphnia magna), 48 h): 0.102 mg/l</td>
</tr>
<tr>
<td>EC50 (Daphnia magna), 48 h): &gt;100 mg/l</td>
<td>EC50 (Water flea (Daphnia magna) [static], 48 h): 0.03 mg/l</td>
</tr>
<tr>
<td>EC50 (Pseudokirchneriella subcapitata), 72 h): 0.18 mg/l</td>
<td>EC50 (Pseudokirchneriella subcapitata) [static], 72 h): 0.0426 – 0.0535 mg/l</td>
</tr>
<tr>
<td>EC50 (Pseudokirchneriella subcapitata) [static], 96 h): 0.174 – 0.311 mg/l</td>
<td>EC50 (Pseudokirchneriella subcapitata) [static], 96 h): 0.031 – 0.054 mg/l</td>
</tr>
</tbody>
</table>

Aquatic Invertebrates

<table>
<thead>
<tr>
<th>Specified substance: NICKEL</th>
<th>Specified substance: COBALT and compounds (as Co)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOEC (Daphnia Magna): 5.6 mg/l</td>
<td>LOEC (Daphnia Magna): 4.4 mg/l</td>
</tr>
<tr>
<td>LC50 (Daphnia Magna): &gt;100 mg/l</td>
<td>LC50 (Daphnia Magna): &gt;100 mg/l</td>
</tr>
</tbody>
</table>

Chronic hazards to the aquatic environment:

Fish (product): Not classified
Aquatic Invertebrates (product): Not classified
Toxicity to Aquatic Plants

Specified substance: COPPER and/or copper alloys and compounds (as Cu) – LC50 (Green algae (Scenedesmus dimorphus), 3 d): 0.0623 mg/l

Persistence and Degradability

Biodegradation (product): No data available

Bioaccumulative Potential

Bioconcentration Factor (BCF) (product): No data available

Specified substance: NICKEL
Zebra mussel (Dreissena polymorpha), Bioconcentration Factor (BCF): 5,000 – 10,000 (Lotic) Bioconcentration factor calculated using dry weight tissue conc.

Specified substance: COBALT and compounds (as Co)
Brown shrimp (Penaeus aztecus), Bioconcentration Factor (BCF): > 2,250 - < 2,500 (static)

Specified substance: COPPER and/or copper alloys and compounds (as Cu)
Blue-green algae (Anacystis nidulans), Bioconcentration Factor (BCF): 36.01 (static)

Mobility in Soil: No data available

Other Adverse Effects: Very toxic to aquatic organisms
## Section 13 – DISPOSAL CONSIDERATIONS

**Waste disposal recommendations:** Prevent waste from contaminating surrounding environment. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with international/federal/state/local regulations. However, alloy wastes are normally collected to recover metal values.

## Section 14 – TRANSPORT INFORMATION

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

<table>
<thead>
<tr>
<th>14.1 UN number</th>
<th>Not a dangerous good in sense of transport regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.2 UN proper shipping name</td>
<td>Not applicable</td>
</tr>
<tr>
<td>14.3 Additional information</td>
<td>No supplementary information available</td>
</tr>
<tr>
<td>Overland transport</td>
<td>No additional information available</td>
</tr>
<tr>
<td>Transport by sea</td>
<td>No additional information available</td>
</tr>
<tr>
<td>Air transport</td>
<td>No additional information available</td>
</tr>
</tbody>
</table>

## Section 15 – REGULATORY INFORMATION

### 15.1 US Federal regulations

<table>
<thead>
<tr>
<th>Substance</th>
<th>Listed on the United States TSCA (Toxic Substances Control Act) inventory</th>
<th>Listed on SARA Section 313 (Specific toxic chemical listings)</th>
<th>SARA Section 313 - Emission Reporting</th>
<th>Listed on the United States TSCA (Toxic Substances Control Act) inventory</th>
<th>Listed on SARA Section 313 (Specific toxic chemical listings)</th>
<th>SARA Section 313 - Emission Reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 % (dust or fume only)</td>
</tr>
<tr>
<td>Aluminum</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>0.1 %</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
</tr>
<tr>
<td>Cobalt</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>0.1 %</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
</tr>
<tr>
<td>Manganese</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
</tr>
<tr>
<td>Iron</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
</tr>
<tr>
<td>Titanium</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
</tr>
<tr>
<td>Nickel</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
</tr>
<tr>
<td>Vanadium</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
</tr>
<tr>
<td>Tungsten</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
<td>Listed on the United States TSCA (Toxic Substances Control Act) inventory</td>
<td>Listed on SARA Section 313 (Specific toxic chemical listings)</td>
<td>1.0 %</td>
</tr>
</tbody>
</table>

### 15.2 US State regulations

<table>
<thead>
<tr>
<th>Substance</th>
<th>U.S. - California - Proposition 65 - Carcinogens List</th>
<th>U.S. - California - Proposition 65 - Developmental Toxicity</th>
<th>U.S. - California - Proposition 65 - Reproductive Toxicity - Female</th>
<th>U.S. - California - Proposition 65 - Reproductive Toxicity - Male</th>
<th>No significance risk level (NSRL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>Yes</td>
<td>U.S. - Massachusetts - Right To Know List</td>
<td>U.S. - Pennsylvania - RTK (Right to Know) List</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vanadium</td>
<td>Yes</td>
<td>U.S. - Massachusetts - Right To Know List</td>
<td>U.S. - Pennsylvania - RTK (Right to Know) List</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cobalt</td>
<td>Yes</td>
<td>U.S. - Massachusetts - Right To Know List</td>
<td>U.S. - Pennsylvania - RTK (Right to Know) List</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CROWN ALLOYS COMPANY

SAFETY DATA SHEET

Chromium (7440-17-3)  Manganese (7439-92-5)
U.S. - Massachusetts - Right To Know List  U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List  U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know List)  U.S. - Pennsylvania - RTK (Right to Know List)

Copper (7440-50-5)  Aluminum (7429-90-5)
U.S. - Massachusetts - Right To Know List  U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List  U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know List)  U.S. - Pennsylvania - RTK (Right to Know List)

Silicon (7440-21-3)  Titanium (7440-32-6)
U.S. - Massachusetts - Right To Know List  U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List  U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know List)  U.S. - Pennsylvania - RTK (Right to Know List)

Molybdenum (7439-98-7)  Tungsten (7440-33-7)
U.S. - Massachusetts - Right To Know List  U.S. - Massachusetts - Right To Know List
U.S. - New Jersey - Right to Know Hazardous Substance List  U.S. - New Jersey - Right to Know Hazardous Substance List
U.S. - Pennsylvania - RTK (Right to Know List)  U.S. - Pennsylvania - RTK (Right to Know List)

Section 16 – OTHER INFORMATION

SUPERSEDES LAST REVISION: 01/18/2011 (MSDS)

Full text of H-phrases (from Section 2)

Acute Tox. 4 (Oral)  Acute toxicity (oral), Category 4
Acute Aquatic 1  Hazardous to the aquatic environment — Acute Hazard, Category 1
Acute 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
Repr. Tox. 2  Reproductive toxicity, Category 2
Skin Sens. 1  Sensitisation — Skin, category 1
STOT RE 1  Specific target organ toxicity — Repeated exposure, Category 1
STOT RE 2  Specific target organ toxicity — Repeated exposure, Category 2
STOT SE 3  Specific target organ toxicity — Single exposure, Category 3
H302  Harmful if swallowed
H317  May cause an allergic skin reaction
H319  Causes serious eye irritation
H334  May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335  May cause respiratory irritation
H336  May cause drowsiness or dizziness
H350  May cause cancer
H351  Suspected of causing cancer
H361  Suspected of damaging fertility or the unborn child
H372  Causes damage to organs through prolonged or repeated exposure
H373  May cause 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

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