

**SAFETY DATA SHEET**



**CROWN ALLOYS COMPANY**

**Section 1 – PRODUCT AND COMPANY IDENTIFICATION**

**PRODUCT NAME:** Aluminum Bronze Covered Electrode  
**PRODUCT IDENTIFICATION:** CROWN ALB-20  
**SPECIFICATION:** E CuAl-A2  
**RECOMMENDED USE:** SMAW (Shielded Metal Arc Welding)  
**SUPPLIER:** Crown Alloys Company  
30105 Stephenson Hwy.  
Madison Heights, MI. 48071  
**TELEPHONE NUMBER:** (248) 588-3790  
**EMERGENCY NUMBER:** Call CHEMTREC Day or Night 1-800-424-9300 / +1 703-527-3887  
**WEBSITE:** [www.crownalloys.com](http://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**

Acute Tox. 4 (Oral)	H302	Carc. 1B	H350
Skin Irrit. 2	H315	Carc. 2	H351
Skin Sens. 1	H317	Repr. Tox. Lact.	H362
Eye Irrit. 2A	H319	STOT RE 1	H372
STOT SE 3	H335	Aquatic Acute 1	H400
		Aquatic Chronic 3	H412

**2.2 Label elements**

**GHS-US labelling**

**Hazard Pictograms (GHS-US):**



GHS07



GHS08



GHS09

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

Danger

**Hazard statements (GHS-US):**

H302 – Harmful if swallowed  
H317 – May cause an allergic skin reaction  
H315 – Causes skin irritation  
H319 – Causes serious eye irritation  
H335 – May cause respiratory irritation  
H350 – May cause cancer  
H351 – Suspected of causing cancer  
H362 – May cause harm to breast-fed children  
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  
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  
P285 – In case of inadequate ventilation wear respiratory protection  
P301+P312 – If swallowed: Call a poison center or physician if you feel unwell  
P302+P352 – IF ON SKIN: Wash with plenty of soap and water  
P305+P351+P338 – IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
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 – If swallowed, rinse mouth  
P333+P313 – If skin irritation or rash occurs: Get medical advice/attention  
P337+P313 – If eye irritation persists: Get medical advice/attention  
P362+P364 – Take off contaminated clothing and wash it before reuse  
P391 – Collect spillage  
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

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**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:

Chemical Identity	CAS-No.	Chemical Identity	CAS-No.	Chemical Identity	CAS-No.
Carbon Dioxide	124-38-9	Ozone	10028-15-6	Nickel	7440-02-0
Carbon Monoxide	630-08-0	Nitrogen Dioxide	10102-44-0	Fluorides (as F)	16984-48-8

**Section 3 – COMPOSITION / INFORMATION ON INGREDIENTS**

**3.1 Substances**

Not applicable

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

Full text of **R**-phrases\*: See section 16

**3.2 Mixture**

**Reportable Hazardous Ingredients**

Chemical Identity	CAS-No.	Weight Percent (%)	GHS-US Classification
Aluminum (Al)	7429-90-5	6.50 – 9.50	Comb. Dust
Copper (Cu)	7440-50-8	80.0 – 95.0	Comb. Dust Aquatic Acute 1, H400 Aquatic Chronic 3, H412
Iron (Fe)	7439-89-6	0.50 – 5.00	Acute Tox. 4 (Oral), H302
Lead (Pb)	7439-92-1	0.02 max.	Carc. 1B, H350
Manganese (Mn)	7439-96-5	0.50 max.	Comb. Dust
Nickel (Ni)	7440-02-0	0.50 max.	Skin Sens. 1, H317 Carc. 1B, H350 STOT RE 1, H372 T; R48/23 – R43 – R40*
Silicon (Si)	7440-21-3	1.50 max.	Not classified
Tin (Sn)	7440-31-5	0.50 max.	Not classified
Zinc (Zn)	7440-66-6	0.50 max.	Not classified

Other components which may be present: **Flux**

Sodium silicate	6834-92-0	27.0	Not classified
Petroleum coke	64743-05-1	1.80	Not classified
Cryolite (as Fluoride)	15096-52-3	51.0	T; R48/23/25* Xn; R20/22* N; R51/53*
Magnesite	546-93-0	5.10	Not classified
Silica sand	7631-86-9	3.20	Not classified
Feldspar	68476-25-5	2.70	Not classified

The decomposition of this flux coating during the welding process should not produce levels of the above components in amounts above the permissible exposure limit. However, if used in improperly ventilated or exhausted areas use approved (NIOSH) respirators only.

Fluorides are highly irritating to the eyes, nose and throat. Overexposures have been associated with cumulative bone damage. Long-term silica exposure is associated with a lung disease called silicosis. The degree of the hazard depends upon the concentration, size and length of exposure. Incomplete combustion may produce carbon monoxide and/or carbon dioxide: odorless, colorless gases which are asphyxiants.

None of the coating components are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR Part 372.

This material is classified as not hazardous under OSHA regulations

**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.

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## Section 4 – FIRST AID MEASURES

### 4.1 Description of first aid measures

<b>Ingestion:</b>	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. If symptoms develop, seek medical attention at once.
<b>Inhalation:</b>	Remove to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical assistance immediately.
<b>Skin Contact:</b>	Wash affected area with soap and water to remove dust or particles. If a rash develops, see a physician. For skin burns from arc radiation or thermal burns, promptly flush with cold water. Get medical attention for burns or for irritations that persist.
<b>Eye Contact:</b>	Dust or fume from this alloy 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

<b>Symptoms/injuries after inhalation:</b>	No adverse effects are expected from welding consumables until they are welded. 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. Individuals with Wilson's disease are at increased risk of copper poisoning. Acute (short-term) exposure to copper may cause respiratory tract irritation, fever, muscle ache, chills, weakness, cough, and a metallic taste. Copper poisoning can result in hemolytic anemia and kidney, liver and spleen damage. 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 nickel compounds in the fume can cause metallic taste, nausea, tightness of chest, fever, and allergic reaction. Fluoride compounds produced may cause eye and skin burns, and pulmonary edema bronchitis. Exposure to extremely high levels of fluorides can cause abdominal pain, diarrhea, muscular weakness, and convulsions. In extreme cases it can cause loss of consciousness and death. Chronic overexposure to fluorides can cause serious bone erosion, excessive calcification of the bone and calcification of the ribs, pelvis and spinal column.
<b>Symptoms/injuries after skin contact:</b>	Dusts may cause irritation. Chronic overexposure to fluorides may cause a skin rash.
<b>Symptoms/injuries after eye contact:</b>	Causes eye irritation.
<b>Symptoms/injuries after ingestion:</b>	Not an anticipated route of exposure during normal product handling. May be harmful if ingested. Ingestion of large amounts of copper may be fatal.

### 4.3 Indication of immediate medical attention and special treatment needed

No additional information available

## 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

<b>Suitable extinguishing media:</b>	Use extinguishing media appropriate for surrounding fire.
<b>Unsuitable extinguishing media:</b>	None.

### 5.2 Special hazards arising from the substance

<b>Fire hazard:</b>	Not flammable. When involved in a fire, this product may generate irritating fumes containing copper, iron compounds, metal oxides, nickel compounds and a variety of metal compounds. The molten material can present a significant thermal hazard to firefighters.
<b>Explosion hazard:</b>	None known.

### 5.3 Special protective equipment and precautions for firefighters

<b>Special firefighting procedures:</b>	Use standard firefighting procedures and consider the hazards of other involved materials.
<b>Special protective equipment for firefighters:</b>	Firefighters should wear full protective gear (self-contained breathing apparatus) as fumes or vapors may be harmful.

## 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. Do not flush residue into waterways.

### 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**

Avoid inhaling welding fumes. Keep formation of airborne dusts to a minimum. Provide appropriate exhaust ventilation at places where dust is formed. Some individuals can develop an allergic reaction to certain materials. Read and understand the manufacturer's instruction 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, <http://pubs.aws.org> and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, [www.gpo.gov](http://www.gpo.gov).

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

Keep material **sealed and dry** before use and do not remove product identification label or warning label. 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**

Chemical Identity (CAS-No.)	ACGIH TLV (TWA)	OSHA PEL (TWA)	NIOSH REL	NIOSH STEL
<b>Aluminum</b> (7429-90-5)	1.0 mg/m <sup>3</sup> (respirable fraction, dust) 1.0 mg/m <sup>3</sup> (respirable fraction, fume)	15.0 mg/m <sup>3</sup> (total dust as Al) 5.0 mg/m <sup>3</sup> (respirable fraction, fume)	5.0 mg/m <sup>3</sup> (respirable) 10.0 mg/m <sup>3</sup> (total)	N/A
<b>Copper</b> (7440-50-8)	0.2 mg/m <sup>3</sup> (fume, as Cu) 1.0 mg/m <sup>3</sup> (dust and mists, as Cu)	0.1 mg/m <sup>3</sup> (fume, as Cu) 1.0 mg/m <sup>3</sup> (dust and mist, as Cu)	1 mg/m <sup>3</sup>	N/A
<b>Iron</b> (7439-89-6)	5.0 mg/m <sup>3</sup> (as Fe <sub>2</sub> O <sub>3</sub> ) respirable fraction	10.0 mg/m <sup>3</sup> (fume, as Fe <sub>2</sub> O <sub>3</sub> )	N/A	N/A
<b>Lead</b> (7439-92-1)	0.05 mg/m <sup>3</sup>	50 µg/m <sup>3</sup>	N/A	N/A
<b>Manganese</b> (7439-96-5)	0.02 mg/m <sup>3</sup> (elemental and inorganic compounds, as Mn – respirable fraction) 0.1 mg/m <sup>3</sup> (elemental and inorganic compounds, as Mn – inhalable fraction)	5.0 mg/m <sup>3</sup> (fume, as Mn) Ceiling	1 mg/m <sup>3</sup>	3 mg/m <sup>3</sup>
<b>Nickel</b> (7440-02-0)	1.5 mg/m <sup>3</sup> as metal (inhalable fraction) 0.2 mg/m <sup>3</sup> as insoluble compounds (inhalable fraction)	1.0 mg/m <sup>3</sup> (metal and insoluble compounds as Ni)	0.015 mg/m <sup>3</sup>	N/A
<b>Silicon</b> (7440-21-3)	10.0 mg/m <sup>3</sup> (total dust)	15.0 mg/m <sup>3</sup> (total dust) 5.0 mg/m <sup>3</sup> (respirable fraction)	5.0 mg/m <sup>3</sup> (respirable) 10.0 mg/m <sup>3</sup> (total)	N/A
<b>Tin</b> (oxide & inorganic compounds) (7440-31-5)	0.1 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup>	N/A	N/A
<b>Zinc</b> (oxide) (7440-66-6)	10.0 mg/m <sup>3</sup> (total dust) 2.0 mg/m <sup>3</sup> (fume)	15.0 mg/m <sup>3</sup> (total dust) 5.0 mg/m <sup>3</sup> (fume)	N/A	10 mg/m <sup>3</sup>
<b>Sodium silicate</b> (6834-92-0)	Not listed	Not listed	N/A	N/A
<b>Petroleum coke</b> (64743-05-1)	Not listed	Not listed	N/A	N/A
<b>Cryolite (as Fluoride)</b> (15096-52-3)	2.5 mg/m <sup>3</sup> (as F)	2.5 mg/m <sup>3</sup> (as F) 2.5 mg/m <sup>3</sup> (as F) (dust)	N/A	N/A
<b>Magnesite</b> (546-93-0)	Not listed	Not listed	N/A	N/A
<b>Silica sand</b> (7631-86-9)	0.1 mg/m <sup>3</sup>	10.0 mg/m <sup>3</sup> % SiO <sub>2</sub> +2	N/A	N/A
<b>Feldspar</b> (68476-25-5)	Not listed	Not listed	N/A	N/A

**8.2 Exposure controls**

**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.

**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.

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**8.2 Exposure controls (continued)**

- 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 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 not to 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 TLV's (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](http://www.aws.org).

**Section 9 – PHYSICAL AND CHEMICAL PROPERTIES**

<b>Appearance</b>	Solid copper alloy rod covered with extruded flux
<b>Physical state</b>	Solid
<b>Form</b>	Solid rod
<b>Color</b>	Tan/gray flux coating
<b>Odor</b>	No odor
<b>Odor threshold</b>	No data available
<b>pH</b>	Not applicable
<b>Melting point/freezing point</b>	> 1,800°F (> 1,000°C)
<b>Flammability (solid, gas)</b>	No data available
<b>Flash Point</b>	Not applicable
<b>Evaporation rate</b>	Not applicable
<b>Initial boiling point and boiling range</b>	No data available

<b>Flammability limit - upper (%)</b>	No data available
<b>Flammability limit - lower (%)</b>	No data available
<b>Explosive limit - upper (%)</b>	No data available
<b>Explosive limit - lower (%)</b>	No data available
<b>Vapor pressure</b>	Not applicable
<b>Vapor density</b>	Not applicable
<b>Relative density</b>	No data available
<b>Solubility in water</b>	Not soluble
<b>Solubility (other)</b>	No data available
<b>Partition coefficient (n-octanol/water)</b>	No data available
<b>Auto-ignition temperature</b>	No data available
<b>Decomposition temperature</b>	No data available
<b>Viscosity</b>	Not applicable

**Section 10 – STABILITY AND REACTIVITY**

**10.1 Reactivity**

This product is non-reactive under normal conditions of use, storage and transport.

**10.2 Chemical stability**

This product is stable under normal conditions.

**10.3 Possibility of hazardous reactions**

Will not occur.

**10.4 Conditions to avoid**

Uncontrolled exposure to extreme temperatures and incompatible materials such as acids or strong bases. Contact with these chemicals could cause the generation of gas.

**10.5 Incompatible materials**

Strong acids, strong oxidizers, strong bases, mineral acids, some halogenated compounds, phosphorus and mercury.

**10.6 Hazardous decomposition products**

Welding/brazing fumes and gases can't be classified simply. The composition and quantity of both are dependent upon the metal being welded/brazed and the rods used. Coatings on the metal being welded/brazed (such as paint, plating, or galvanizing), the number of welders, the volume of the work area, the quality and the amount of ventilation, the position of the welder's head with respect to the gas plume, the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities), the process and procedures, as well as the welding/brazing consumables.

When this copper alloy electrode is consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 3. 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, coatings, etc., as noted above. Gaseous reaction products may include carbon monoxide and carbon dioxide. Ozone and nitrogen oxides may be formed by the radiation from an arc, in addition to the shielding gases like argon and helium, whenever they are employed. Reasonably expected fume constituents of this copper alloy electrode would include: Complex oxides of iron, silicon, carbon dioxide, carbon monoxide, ozone and nitrogen oxides. Fluorides and hydrogen fluorides will also be present. The fume limit for copper, fluorides and/or nickel may be reached before the general welding fume limit of 5 mg/m<sup>3</sup> is reached. 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 "Method for Sampling Airborne Particles Generated by Welding and Allied Processes" and "Characterization of Arc Welding Fume" available from the American Welding Society, 8669 Doral Blvd. Suite 130, Doral, FL 33166

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**Section 11 – TOXICOLOGICAL INFORMATION**

**Information on likely routes of exposure**

- Ingestion:** Health injuries from ingestion are not known or expected under normal use.
- Inhalation:** Potential chronic health hazards related to the use of welding consumables are most applicable to the inhalation route of exposure. Refer to Inhalation statements in this section.
- Skin Contact:** Arc rays can burn skin. Skin cancer has been reported.
- Eye Contact:** Arc rays can injure eyes.

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

- Inhalation:** Short-term (acute) overexposure to welding fumes 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. Fluoride compounds produced may cause eye and skin burns, and pulmonary edema bronchitis. Exposure to extremely high levels of fluorides can cause abdominal pain, diarrhea, muscular weakness, and convulsions. In extreme cases it can cause loss of consciousness and death. Chronic overexposure to fluorides can cause serious bone erosion, excessive calcification of the bone and calcification of the ribs, pelvis and spinal column.

**Information on toxicological effects**

**Acute toxicity** (list all possible routes of exposure): Harmful if swallowed

<b>Specified substance: TIN</b> LD50 (oral, rat) = 700 mg/kg	<b>Specified substance: MANGANESE</b> LD50 (oral, rat) = 9000 mg/kg ATE (oral) = 9000000.0 mg/kg	<b>Specified substance: SILICON</b> ATE (oral) = 3160.0 mg/kg LD50 (oral, rat) = 3160 mg/kg
<b>Specified substance: SODIUM SILICATE</b> LD50 (oral, rat) = 1153 mg/kg ATE (oral) = 1153.00 mg/kg	<b>Specified substance: NICKEL</b> LD50 (oral, rat) > 9000 mg/kg LC50 (inhalation, rat) > 10.2 mg/l/1 hr	<b>Specified substance: FLUORIDES (as F)</b> LD50 (oral, rat) = 4250 mg/kg
<b>Specified substance: IRON</b> LD50 (oral, rat) = 98.6 g/kg ATE (oral) = 984.00 mg/kg LDLO (intraperitoneal, rabbit) = 20 mg/kg – no toxic effect noted TDLO (oral, child) = 77 mg/kg; brain, gastrointestinal tract, blood effects	<b>Specified substance: COPPER and compounds (as Cu)</b> LD50 (oral, rat) = 481 mg/kg LC50 (inhalation, rat) > 5.11 mg/l/4 hr	

- Repeated dose toxicity (product):** Not classified as far as this product is concerned, however, copper may cause eye and respiratory irritation. High exposure to copper dust may cause gastrointestinal effects due to oral ingestion. Nickel has been shown in one study to cause severe lung and kidney damage following exposure to extremely high levels of nickel powder.
- 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, although nickel has been shown to cause chromosomal aberrations and in vitro and in vivo testing has shown that nickel is genotoxic (ASTDR).
- Carcinogenicity (product):** May cause cancer

<b>Lead (7439-92-1)</b>	
International Agency for Research on Cancer (IARC) Monographs	2A (Probably carcinogenic to humans)
National Toxicology Program (NTP) Status	3 (Reasonably anticipated to be a Human Carcinogen)
<b>Nickel (7440-02-0)</b>	
International Agency for Research on Cancer (IARC) Monographs	2B (Possibly carcinogenic to humans)
National Toxicology Program (NTP) Status	3 (Reasonably anticipated to be a Human Carcinogen)

- Reproductive toxicity (product):** These components are not reported to produce reproductive effects in humans. Clinical studies on test animals exposed to relatively high doses of the copper components of this product indicate adverse reproductive effects.

- Specific target organ toxicity - single exposure (product):** May cause drowsiness or dizziness. May cause respiratory irritation.
- Specific target organ toxicity - repeated exposure (product):** This product may cause damage to organs through prolonged or repeated exposure.

**Individual Constituents:**  
**Aluminum** - There is some evidence that aluminum may accumulate in the body with long-term exposure. Lung changes have been reported in workers exposed to high levels of aluminum dust. Some studies have indicated that there may be subtle neurological effects following long-term exposure to aluminum.

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**Section 11 – TOXICOLOGICAL INFORMATION (continued)**

**Specific target organ toxicity - repeated exposure (product):**

**Iron** - Prolonged exposure may lead result in iron deposits in the lung, a condition known as siderosis

**Manganese** - Inflammatory changes in the lung were found in monkeys exposed to manganese dioxide via inhalation for 10 months. At high exposure levels (greater than 5 mg/m<sup>3</sup>), manganism (chronic manganese poisoning) has been reported in workers. Symptoms of manganism include sleepiness, weakness in the legs, a mask-like facial appearance, emotional disturbances and a spastic gait. High levels of pneumonia have also been reported in workers inhaling large amounts of manganese dust and fume. In some studies, manganese has been associated with longer reaction times, hand steadiness and eye-hand coordination. Effects appear to be more pronounced with exposures to respirable sized particles.

**Nickel (elemental and nickel oxide)** - Animal studies have shown lung changes and inflammation.

**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 a condition known as polymer fume fever. Polymer fume fever usually occurs within 4 to 8 hours of exposure with the presentation of flu like symptoms, including mild pulmonary irritation with or without an increase in body temperature. Signs of exposure can include an increase in white blood cell count. Resolution of symptoms typically occurs quickly, usually not lasting longer than 48 hours.

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

<p><b>Specified substance: MANGANESE</b> <b>Inhalation:</b> 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.</p>	<p><b>Specified substance: NICKEL</b> <b>Inhalation:</b> 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.</p>
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**Additional toxicological information under the conditions of use:**

**Acute toxicity**

<p><b>Specified substance: FLUORIDES (as F)</b> LD50 (oral, rat) = 4,250 mg/kg</p>	<p><b>Specified substance: CARBON DIOXIDE</b> LCLo (inhalation, human) = 90000 ppm/5 min.</p> <p><b>Specified substance: CARBON MONOXIDE</b> LC50 (inhalation, rat) = 1300 mg/l /4h</p>	<p><b>Specified substance: NITROGEN DIOXIDE</b> LC50 (inhalation, rat) = 88 ppm/4h</p> <p><b>Specified substance: OZONE</b> LCLo (inhalation, human) = 50 ppm/30 min.</p>
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**Carcinogenicity:**

The International Agency for Research on Cancer (IARC) has classified welding fumes as possibly carcinogenic to humans (group 2B).

<b>Lead (7439-92-1)</b>	
International Agency for Research on Cancer (IARC) Monographs	2A (Probably carcinogenic to humans)
National Toxicology Program (NTP) Status	3 (Reasonably anticipated to be a Human Carcinogen)
<b>Specified substance: Nickel</b>	
International Agency for Research on Cancer (IARC) Monographs	2B (Possibly carcinogenic to humans)
National Toxicology Program (NTP) Status	3 (Reasonably anticipated to be a Human Carcinogen)

**Section 12 – ECOLOGICAL INFORMATION**

**Eco-toxicity**

**Acute hazards to the aquatic environment:**

**Fish**

<p><b>Specified substance: COPPER and compounds (as Cu)</b> LC50 (Fathead minnow (Pimephales promelas), 96 h): 1.6 mg/l LC50 (Fathead minnow (Pimephales promelas), 96 h): 0.0068 – 0.0156 mg/l LC50 (Fathead minnow (Pimephales promelas) [static], 96 h): &lt;0.3 mg/l</p>	<p><b>Specified substance: NICKEL</b> LC50 (Fathead minnow (Pimephales promelas), 96 h): 2.916 mg/l LC50 (Brachydanio rerio), 96 h): &gt;100 mg/l LC50 (Cyprinus carpio) [semi-static], 96 h): 1.3 mg/l EC50 (Daphnia magna), 48 h): &gt;100 mg/l EC50 (Daphnia magna) [static], 48 h): 1 mg/l</p>
<p><b>Specified substance: IRON and/or iron alloys (as Fe)</b> LC50 (Cyprinus carpio) [semi-static], 96 h): 0.56 mg/l</p>	<p><b>Specified substance: SODIUM SILICATE</b> LC50 (Western mosquitofish (Gambusia affinis), 96 h): 1,800 mg/l</p>
<p><b>Specified substance: ALUMINUM and/or aluminum alloys (as Al)</b> LC50 (Grass carp, white amur (Ctenopharyngodon idella), 96 h): 0.21 – 0.31 mg/l</p>	<p><b>Specified substance: LEAD</b> LC50 (Cyprinus carpio) [semi-static], 96 h): 0.44 mg/l LC50 (Oncorhynchus mykiss) [flow-through], 96 h): 1.17 mg/l</p>

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**Section 12 – ECOLOGICAL INFORMATION (continued)**

**Aquatic Invertebrates**

<b>Specified substance: NICKEL</b> EC50 (Water flea (Daphnia magna) [static], 48 h): 1 mg/l EC50 (Water flea (Daphnia magna), 48 h): >100 mg/l EC50 (Pseudokirchneriella subcapitata), 72 h): 0.18 mg/l EC50 (Pseudokirchneriella subcapitata) [static], 96 h): 0.174 – 0.311 mg/l		<b>Specified substance: COPPER and/or copper alloys &amp; compounds (as Cu)</b> EC50 (Water flea (Daphnia magna), 48 h): 0.102 mg/l EC50 (Pseudokirchneriella subcapitata) [static], 72 h): 0.0426 – 0.0535 mg/l EC50 (Pseudokirchneriella subcapitata) [static], 96 h): 0.031 – 0.054 mg/l EC50 (Daphnia Magna) [Static], 48 h): 0.03 mg/l	
<b>Specified substance: LEAD</b> EC50 (Water flea (Daphnia magna), 48 h): 600 µg/l	<b>Specified substance: SODIUM SILICATE</b> EC50 (Water flea (Ceriodaphnia dubia), 48 h): 22.94 – 49.01 mg/l	<b>Specified substance: MANGANESE</b> EC50 (Water flea (Daphnia magna), 48 h): 40 mg/l	

**Chronic hazards to the aquatic environment:**

**Fish (product):** Not classified  
**Aquatic Invertebrates (product):** Not classified

**Toxicity to Aquatic Plants**

<b>Specified substance: COPPER and/or copper alloys and compounds (as Cu) - LC50</b> (Green algae (Scenedesmus dimorphus), 3 d): 0.0623 mg/l
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**Persistence and Degradability**

**Biodegradation (product):** No data available

**Bioaccumulative Potential**

**Bioconcentration Factor (BCF)**

<b>Specified substance: COPPER and compounds (as Cu)</b> Blue-green algae (Anacystis nidulans), Bioconcentration Factor (BCF): 36.01 (Static)	<b>Specified substance: NICKEL</b> Zebra mussel (Dreissena polymorpha), Bioconcentration Factor (BCF): 5,000 - 10,000 (Lotic) Bioconcentration factor calculated using dry weight tissue conc
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**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

**14.1 UN number**

Not a dangerous good in sense of transport regulations

**14.2 UN proper shipping name**

Not applicable

**14.3 Additional information**

**Other information:** No supplementary information available

**Overland transport:**

No additional information available

**Transport by sea:**

No additional information available

**Air transport:**

No additional information available

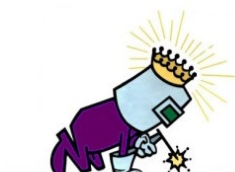
**Section 15 – REGULATORY INFORMATION**

**15.1 US Federal regulations**

<b>Nickel (7440-02-0)</b> Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on SARA Section 313 (Specific toxic chemical listings) SARA Section 313 - Emission Reporting: <b>0.1%</b>	<b>Copper (7440-50-8)</b> Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on SARA Section 313 (Specific toxic chemical listings) SARA Section 313 - Emission Reporting: <b>1.0 %</b>
<b>Iron (7439-89-6)</b> Listed on the United States TSCA (Toxic Substances Control Act) inventory	<b>Sodium silicate (1344-09-8)</b> Listed on the United States TSCA (Toxic Substances Control Act) inventory



**SAFETY DATA SHEET**



**CROWN ALLOYS COMPANY**

**15.1 US Federal regulations (continued)**

<b>Lead (7439-92-1)</b> Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on SARA Section 313 (Specific toxic chemical listings) SARA Section 313 - Emission Reporting: <b>0.1 %</b>	<b>Aluminum (7429-90-5)</b> Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on SARA Section 313 (Specific toxic chemical listings) SARA Section 313 - Emission Reporting: <b>1.0 % (dust or fume only)</b>
<b>Silicon (7440-21-3)</b> Listed on the United States TSCA (Toxic Substances Control Act) inventory	<b>Manganese (7439-96-5)</b> Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on SARA Section 313 (Specific toxic chemical listings) SARA Section 313 - Emission Reporting: <b>1.0 %</b>
<b>Zinc (7440-66-6)</b> Listed on the United States TSCA (Toxic Substances Control Act) inventory Listed on SARA Section 313 (Specific toxic chemical listings)	<b>Tin (7440-31-5)</b> Listed on the United States TSCA (Toxic Substances Control Act) inventory

**15.2 US State regulations**

**WARNING:** This product contains or produces a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm). (California Health and Safety Code Section 25249.5 et seq.)

<b>Nickel (7440-02-0)</b>				
U.S. - California - Proposition 65 - Carcinogens List <b>YES</b>	U.S. - California - Proposition 65 - Developmental Toxicity	U.S. - California - Proposition 65 - Reproductive Toxicity - Female	U.S. - California - Proposition 65 - Reproductive Toxicity - Male	No significance risk level (NSRL)
U.S. - Massachusetts - Right To Know List U.S. - Minnesota - Hazardous Substance List		U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List		
<b>Lead (7439-92-1)</b>				
U.S. - California - Proposition 65 - Carcinogens List <b>YES</b>	U.S. - California - Proposition 65 - Developmental Toxicity <b>YES</b>	U.S. - California - Proposition 65 - Reproductive Toxicity - Female <b>YES</b>	U.S. - California - Proposition 65 - Reproductive Toxicity - Male <b>YES</b>	No significance risk level (NSRL)
U.S. - Massachusetts - Right To Know List U.S. - Minnesota - Hazardous Substance List		U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List		
<b>Tin (7440-31-5)</b>		<b>Manganese (7439-96-5)</b>		
U.S. - Massachusetts - Right To Know List U.S. - Minnesota - Hazardous Substance List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List		U.S. - Massachusetts - Right To Know List U.S. - Minnesota - Hazardous Substance List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List		
<b>Copper (7440-50-8)</b>		<b>Aluminum (7429-90-5)</b>		
U.S. - Massachusetts - Right To Know List U.S. - Minnesota - Hazardous Substance List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List		U.S. - Massachusetts - Right To Know List U.S. - Minnesota - Hazardous Substance List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List		
<b>Zinc (7440-66-6)</b>		<b>Fluorides (as F) (16984-48-8)</b>		
U.S. - Massachusetts - Right To Know List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List		U.S. - New Jersey Worker and Community Right-to-Know Act U.S. - Pennsylvania - RTK (Right to Know) List		
<b>Silicon (7440-21-3)</b>				
U.S. - Massachusetts - Right To Know List U.S. - Minnesota - Hazardous Substance List U.S. - New Jersey - Right to Know Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List				

**SAFETY DATA SHEET**



**CROWN ALLOYS COMPANY**

**Section 16 – OTHER INFORMATION**

**SUPERSEDES LAST REVISION:** 03/15/2018 (SDS)

HMIS RATING (Hazardous Materials Information System)			
Health (blue) - 2	Flammability (red) - 0	Reactivity (yellow) - 0	Protective Equipment - X (See Sections 4, 8 & 10)

Health Hazard: 2 (moderate acute or significant chronic exposure hazard)

Flammability Hazard: 0 (minimal hazard)

Reactivity Hazard: 0 (normally stable)

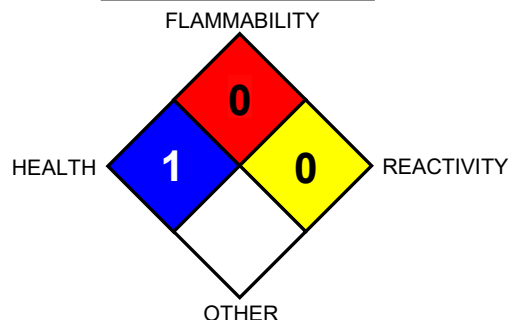
**NATIONAL FIRE PROTECTION ASSOCIATION:**

Health Hazard: 0 (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); 1 (materials that on exposure under fire conditions could cause irritation or minor residual injury); 2 (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); 3 (materials that can on short exposure cause serious temporary or residual injury); 4 (materials that under very short exposure causes death or major residual injury).

Flammability Hazard: Refer to definitions for "HMIS RATING (Hazardous Materials Information System)"

Reactivity Hazard: Refer to definitions for "HMIS RATING (Hazardous Materials Information System)"

**NFPA RATING**



**DEFINITIONS OF TERMS**

- ACGIH** - American Conference of Governmental Industrial Hygienists
- CAS No.** - Chemical Abstracts Service Number
- EPA** - Environmental Protection Agency
- GHS** - Globally Harmonized System
- IARC** - International Agency for Research on Cancer
- LC50** - Lethal Concentration (50 percent kill)
- LCLO** - Lowest published lethal concentration
- LD50** - Lethal dose (50 percent kill)
- LDLO** - Lowest published lethal dose
- NIOSH** - National Institute of Occupational Safety and Health

- NTP** - National Toxicology Program
- OSHA** - U.S. Occupational Safety and Health Administration
- PEL** - Permissible Exposure Limit
- SARA** - Superfund Amendments and Reauthorization Act
- STEL** - Short Term Exposure Limit
- TCLo** - the lowest concentration to cause a symptom
- TDLo** - the lowest dose to cause a symptom
- TLV** - Threshold Limit Value
- TSCA** - Toxic Substances Control Act
- TWA** - Time Weighted Average

**Full text of H-phrases (from Section 2 & 3)**

- Acute Tox. 4 (Oral)** Acute toxicity (oral), Category 4
- Skin Irrit. 2** Skin corrosion/irritation, Category 2
- Skin Sens. 1** Sensitisation — Skin, Category 1
- Eye Irrit. 2A** Eye Irritation, Category 2
- STOT SE 3** May cause respiratory irritation
- Carc. 1B** Carcinogenicity, Category 1B
- Carc. 2** Carcinogenicity, Category 2
- Repr. Tox. Lact.** Reproductive Toxicity, Lactation
- STOT RE 1** Specific target organ toxicity — Repeated exposure, Category 1
- Aquatic Acute 1** Hazardous to the aquatic environment — Acute Hazard, Category 1
- Aquatic Chronic 3** Hazardous to the aquatic environment — Chronic Hazard, Category 3

- H302** Harmful if swallowed
- H315** Causes skin irritation
- H317** May cause an allergic skin reaction
- H319** Causes serious eye irritation
- H335** May cause respiratory irritation
- H350** May cause cancer
- H351** Suspected of causing cancer
- H362** May cause harm to breast-fed children
- 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

**Full text of R-phrases (from Section 3)**

- Nickel:**
  - R40 – Limited evidence of a carcinogenic effect.
  - R43 – May cause sensitization by skin contact.
  - R48/23 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation.
- Sodium Hexafluoroaluminate:** R20/22 – Harmful by inhalation and if swallowed
- (Sodium Cryolite)**
  - R48/23/25 – Toxic: Danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
  - R51/53 – Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

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