

SAFETY DATA SHEET



CROWN ALLOYS COMPANY

Section 1 – PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Copper-Tin Covered Electrode
PRODUCT IDENTIFICATION: ROYAL 3100
SPECIFICATION: N/A
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

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	STOT SE 3	H336
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

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
H336 – May cause drowsiness or dizziness
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

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

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

3.2 Mixture

Reportable Hazardous Ingredients

Chemical Identity	CAS-No.	Weight Percent (%)	GHS-US Classification
Copper (Cu)	7440-50-8	60.0 – 96.0	Comb. Dust Aquatic Acute 1, H400 Aquatic Chronic 3, H412
Iron (Fe)	7439-89-6	5.00 max.	Acute Tox. 4 (Oral), H302
Nickel (Ni)	7440-02-0	2.00 max.	Skin Sens. 1, H317 Carc. 1B, H350 STOT RE 1, H372 T; R48/23 – R43 – R40*
Tin (Sn)	7440-31-5	3.00 – 7.00	Not classified

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

Chemical Identity	CAS-No.	Weight Percent (%)	GHS-US Classification
Calcium carbonate, Limestone	1317-65-3	3.00 – 7.00	Not classified
Potassium cryolite	13775-52-5	0.50 – 1.50	Not classified
Sodium cryolite	15096-52-3	7.00 – 13.0	T; R48/23/25* Xn; R20/22* N; R51/53*
Sodium fluoride	7681-49-4	0.50 – 1.50	Acute Tox. 3, H301 Skin Irrit. 2, H315 Eye Irrit. 2, H319 T; R25* Xi; R36/38 – R32*
Sodium silicate	1344-09-8	1.00 – 5.00	Acute Tox. 4 (Oral), H302

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. If symptoms develop, seek medical attention at once.

Inhalation: Remove to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical assistance immediately.

Skin Contact: 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.

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Eye Contact: 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

Symptoms/injuries after inhalation: 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.

Symptoms/injuries after skin contact: Dusts may cause irritation. Chronic overexposure to fluorides may cause a skin rash.

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. 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

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

Unsuitable extinguishing media: None.

5.2 Special hazards arising from the substance

Fire hazard: 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.

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 (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.

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.

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.

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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
Copper (7440-50-8)	0.2 mg/m ³ (fume, as Cu) 1.0 mg/m ³ (dust and mists, as Cu)	0.1 mg/m ³ (fume, as Cu) 1.0 mg/m ³ (dust and mist, as Cu)	1 mg/m ³	N/A
Iron (7439-89-6)	5.0 mg/m ³ (as Fe ₂ O ₃) respirable fraction	10.0 mg/m ³ (fume, as Fe ₂ O ₃)	N/A	N/A
Nickel (7440-02-0)	1.5 mg/m ³ as metal (inhalable fraction)	1.0 mg/m ³ (metal and insoluble compounds as Ni)	0.015 mg/m ³	N/A
Tin (7440-31-5)	2.0 mg/m ³	2.0 mg/m ³	2.0 mg/m ³	N/A
Calcium carbonate (1317-65-3)	10.0 mg/m ³	5.0 mg/m ³ (dust)	N/A	N/A
Potassium cryolite (13775-52-5)	2.5 mg/m ³ (as F)	2.5 mg/m ³ (as F) 2.5 mg/m ³ (as F) (dust)	N/A	N/A
Sodium cryolite (15096-52-3)	2.5 mg/m ³ (as F)	2.5 mg/m ³ (as F) 2.5 mg/m ³ (as F) (dust)	N/A	N/A
Sodium fluoride (7681-49-4)	2.5 mg/m ³ (as F)	2.5 mg/m ³ (as F) 2.5 mg/m ³ (as F) (dust)	N/A	N/A
Sodium silicate (1344-09-8)	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.

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.

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Section 9 – PHYSICAL AND CHEMICAL PROPERTIES

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

Flammability limit - upper (%)	No data available
Flammability limit - lower (%)	No data available
Explosive limit - upper (%)	No data available
Explosive limit - lower (%)	No data available
Vapor pressure	Not applicable
Vapor density	Not applicable
Relative density	No data available
Solubility in water	Not soluble
Solubility (other)	No data available
Partition coefficient (n-octanol/water)	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	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/m³ 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

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.

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Information on toxicological effects

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

Specified substance: COPPER and compounds (as Cu) LD50 (oral, rat) = 481 mg/kg LC50 (inhalation, rat) > 5.11 mg/l/4 hr	Specified substance: CALCIUM CARBONATE LD50 (oral, rat) > 2000 mg/kg LC50 (inhalation, rat) > 3 mg/l/4 hr LD50 (dermal, rat) > 2000 mg/kg	Specified substance: IRON LD50 (oral, rat) = 98.6 g/kg ATE (oral) = 984.00 mg/kg LDLO (intraperitoneal, rabbit) = 20 mg/kg – no toxic effect noted
Specified substance: SODIUM SILICATE LD50 (oral, rat) = 1153 mg/kg ATE (oral) = 1153.00 mg/kg	Specified substance: NICKEL LD50 (oral, rat) > 9000 mg/kg LC50 (inhalation, rat) > 10.2 mg/l/1 hr	Specified substance: FLUORIDES (as F) LD50 (oral, rat) = 4250 mg/kg
Specified substance: TIN LD50 (oral, rat) = 700 mg/kg		

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

Nickel (7440-02-0)	
International Agency for Research on Cancer (IARC) Monographs	2B (Possibly carcinogenic to humans)
National Toxicology Program (NTP) Status	Reasonably anticipated to be a Human Carcinogen

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 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:

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.

Additional toxicological information under the conditions of use:

Acute toxicity

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

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

Specified substance: Nickel	
International Agency for Research on Cancer (IARC) Monographs	2B (Possibly carcinogenic to humans)
National Toxicology Program (NTP) Status	Reasonably anticipated to be a Human Carcinogen

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Section 12 – ECOLOGICAL INFORMATION

Eco-toxicity

Acute hazards to the aquatic environment:

Fish

Specified substance: COPPER and compounds (as Cu) 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): <0.3 mg/l	Specified substance: NICKEL LC50 (Fathead minnow (Pimephales promelas), 96 h): 2.916 mg/l LC50 (Brachydanio rerio), 96 h): >100 mg/l LC50 (Cyprinus carpio) [semi-static], 96 h): 1.3 mg/l
Specified substance: IRON and/or iron alloys (as Fe) LC50 (Cyprinus carpio) [semi-static], 96 h): 0.56 mg/l	Specified substance: CALCIUM CARBONATE LC50 (Rainbow trout (Oncorhynchus mykiss), 96 h): > 100/kg
Specified substance: SODIUM SILICATE LC50 (Western mosquitofish (Gambusia affinis), 96 h): 1,800 mg/l	

Aquatic Invertebrates

Specified substance: SODIUM SILICATE EC50 (Water flea (Ceriodaphnia dubia), 48 h): 22.94 – 49.01 mg/l	Specified substance: COPPER and compounds (as Cu) EC50 (Water flea (Daphnia magna), 48 h): 0.102 mg/l EC50 (Pseudokirchneriella subcapitata) [static], 72 h): 0.0426 – 0.0535 mg/l
Specified substance: NICKEL EC50 (Water flea (Daphnia magna), 48 h): 1 mg/l EC50 (Pseudokirchneriella subcapitata), 72 h): 0.18 mg/l EC50 (Pseudokirchneriella subcapitata) [static], 96 h): 0.174 – 0.311 mg/l EC50 (Daphnia magna), 48 h): >100 mg/l	EC50 (Daphnia Magna) [Static], 48 h): 0.03 mg/l EC50 (Pseudokirchneriella subcapitata) [static], 96 h): 0.031 – 0.054 mg/l
Specified substance: CALCIUM CARBONATE EC50 (Water flea (Daphnia magna), 48 h): > 100/kg	Specified substance: POTASSIUM LC50 (Long fingernail clam (Musculium transversum), 48 h): 518 mg/l

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
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Persistence and Degradability

Biodegradation (product): No data available

Bioaccumulative Potential

Bioconcentration Factor (BCF)

Specified substance: COPPER and compounds (as Cu) Blue-green algae (Anacystis nidulans), Bioconcentration Factor (BCF): 36.01 (Static)	Specified substance: NICKEL 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



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Section 15 – REGULATORY INFORMATION

15.1 US Federal regulations

Nickel (7440-02-0) 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: 0.1%	Copper (7440-50-8) 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: 1.0 %
Iron (7439-89-6) Listed on the United States TSCA (Toxic Substances Control Act) inventory	Sodium silicate (1344-09-8) Listed on the United States TSCA (Toxic Substances Control Act) inventory
Calcium carbonate (1317-65-3) Listed on the United States TSCA (Toxic Substances Control Act) inventory	Silicon (7440-21-3) Listed on the United States TSCA (Toxic Substances Control Act) inventory
Tin (7440-31-5) 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.)

Nickel (7440-02-0) U.S. - California - Proposition 65 - Carcinogens List Yes U.S. - Massachusetts - Right To Know List U.S. - Minnesota - Hazardous Substance List	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)
Copper (7440-50-8) 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		Fluorides (as F) (16984-48-8) U.S. - New Jersey Worker and Community Right-to-Know Act U.S. - Pennsylvania - RTK (Right to Know) List		
Silicon (7440-21-3) U.S. - New Jersey Worker and Community Right-to-Know Act U.S. - Massachusetts - Right To Know List U.S. - Minnesota - Hazardous Substance List U.S. - Pennsylvania - RTK (Right to Know) List		Tin (7440-31-5) 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		
Potassium (7440-09-7) U.S. - New Jersey Worker and Community Right-to-Know Act U.S. - Pennsylvania - RTK (Right to Know) List				
Calcium carbonate (1317-65-3) 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		

Section 16 – OTHER INFORMATION

SUPERSEDES LAST REVISION: 12/23/2015 (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)



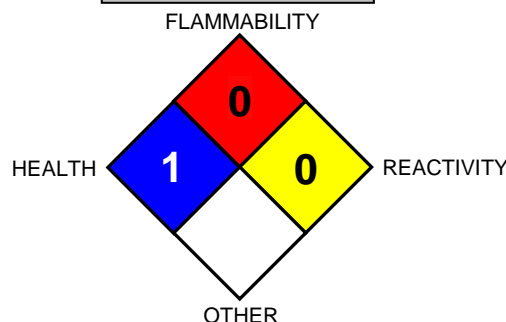
NATIONAL FIRE PROTECTION ASSOCIATION:

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. 3 (Oral)	Acute toxicity (oral), Category 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
STOT SE 3	May cause drowsiness or dizziness
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

H301	Toxic if swallowed
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
H336	May cause drowsiness or dizziness
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: (Sodium Cryolite)	R20/22 – Harmful by inhalation and if swallowed 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.
Sodium Fluoride:	R25 – Toxic if swallowed. R32 – Contact with acids liberates very toxic gas. R36/38 – Irritating to eyes and skin.

Full text of S-phrases (from Section 3)

Nickel:	S2 – Keep out of the reach of children. S36/37/39 – Wear suitable protective clothing, gloves and eye/face protection. S45 – In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S61 – Avoid release to the environment. Refer to special instructions / Safety data sheet.
Sodium Hexafluoroaluminate: (Sodium Cryolite)	S1/2 – Keep locked up and out of the reach of children S22 – Do not breathe dust. S37 – Wear suitable gloves. S45 – In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). S61 – Avoid release to the environment. Refer to special instructions/Safety Data Sheets
Sodium Fluoride:	S1/2 – Keep locked up and out of the reach of children S22 – Do not breathe dust. S36 – Wear suitable clothing. S45 – In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

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