

CROWN ALLOYS **COMPANY**

Section 3 - PHYSICAL and CHEMICAL CHARACTERISTICS

APPEARANCE AND COLOR: These products consist of odorless, light yellow to dark brown solid metal rods or wire.

The following information is for copper, a main component of these products:

SPECIFIC GRAVITY @ 20°C (water = 1): 8.3 – 8.5 g/cc **FREEZING/MELTING POINT:** 1600 – 1900°F (871 – 1038°C)
SOLUBILITY IN WATER: Insoluble **BOILING POINT @ 24 mm Hg:** 4703°F (2595°C)

The following information is for zinc, a main component of these products:

SPECIFIC GRAVITY @ 20°C (water = 1): 7.14 g/cc **FREEZING/MELTING POINT:** 786°F (419°C)
SOLUBILITY IN WATER: Insoluble **BOILING POINT @ 24 mm Hg:** Approx. 1665°F (907°C)

Section 4 - FIRE and EXPLOSION HAZARD DATA

FLAMMABLE PROPERTIES: Non-flammable as *shipped*. Brazing flame, welding arc and sparks can ignite combustibles and flammables. Refer to American National Standard Z49.1 "Safety in Welding and Cutting" and "Safe Practices" Code: SP, published by the American Welding Society for fire prevention during the use of welding, brazing and allied procedures.

FLAMMABLE LIMITS (in air by volume, %): Lower (LEL): Not Applicable Upper (UEL): Not Applicable

FLASH POINT: Not Flammable

AUTOIGNITION TEMPERATURE: Not Flammable

FIRE EXTINGUISHING MATERIALS: Water Spray: YES / Carbon Dioxide: YES / Halon: YES / Foam: YES / Dry Chemical: YES
Other: Any "ABC" Class

UNUSUAL FIRE AND EXPLOSION HAZARDS: When involved in a fire, this product may generate irritating fumes and a variety of metal compounds. The molten material can present a significant thermal hazard to firefighters.

Section 5 - STABILITY AND REACTIVITY DATA

STABILITY: Stable

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Uncontrolled exposure to extreme temperatures and incompatible materials.

DECOMPOSITION PRODUCTS: Thermal decomposition products can include copper, zinc, aluminum, lead and nickel compounds and a variety of metal oxides.

MATERIALS WITH WHICH THESE COPPER WELDING ALLOYS IS INCOMPATIBLE: Strong acids, strong oxidizers and some halogenated compounds and mercury.

Hazardous Decomposition Products

Welding/brazing fumes and gases can not 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 these copper welding alloys are consumed, the fume and gas decomposition products generated are different in percent and form from the ingredients listed in Section 2. Decomposition products of normal operation include those originating from the volatilization, reaction, or oxidation of the materials shown in Section 2, plus those from the base metal, 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.

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, 550 N.W. LeJeune Road, Miami, FL 33126.

Reasonably expected decomposition products from normal use of these products include a **complex of the oxides of the materials listed in Section 2, as well as carbon monoxide, carbon dioxide, ozone (TLV 0.1 ppm ceiling and PEL 0.1 ppm), nitric oxide (TLV 25 ppm and PEL 25 ppm) and nitrogen dioxide (TLV 3, 5 ppm STEL and PEL 5 ppm ceiling). The fume limit for copper, manganese, nickel and/or zinc may be reached before the general limit for welding fumes (TLV 5 mg/m³) is reached.**

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Section 6 - HEALTH HAZARD DATA

- **Medical conditions aggravated by exposure to this product:** Skin, respiratory, pancreas, kidney and liver disorders may be aggravated by prolonged *overexposure* to the dusts or fumes generated by these products.
- **EYES:** Contact with the rod form of these products can be physically damaging to the eye (i.e., foreign object). Fumes generated during brazing operations can be irritating to the eyes. Contact with the molten metal will burn the contaminated eyes. Due to the presence of **nickel**, prolonged exposure could cause conjunctivitis (inflammation of the mucous membranes of the eyes).
- **SKIN:** Contact of the rod form of these products with the skin is not anticipated to be irritating. Rare cases of allergic contact dermatitis have been reported in people working with **copper dust**. Fumes generated during brazing operations can be irritating to the skin. Symptoms of skin *overexposure* may include irritation and redness. Prolonged or repeated skin *overexposure* may lead to allergic contact dermatitis. Contact with molten metal will burn contaminated skin. Skin absorption is not known to be a significant route of *overexposure* for any component of these products.
- **INGESTION:** Severe ingestion *overexposure* to **copper** may be fatal.
- **INHALATION:** Excessive inhalation of user generated fumes from high temperature cutting, brazing or welding of these alloys may, depending on the specific features of the process used, pose a long term health hazard. The IARC has concluded that welding fumes are possibly carcinogenic to humans. Some of the other health effects are listed below:
 - **SHORT TERM (ACUTE):** Inhalation of **copper oxide** and **zinc oxide** fumes can cause metal fume fever. Initial symptoms of metal fume fever can include a metallic or sweet taste in the mouth, dryness or irritation of the throat, and coughing. Later symptoms (after 4-48 hours) can include sweating, shivering, headache, fever, chills, thirstiness, muscle aches, nausea, vomiting, weakness and tiredness. Inhalation of large amounts of particulates generated by these products during metal processing operations can result in pneumoconiosis (a disease of the lungs). Hypersensitivity to **nickel** is common, and can cause pulmonary asthma and pneumonitis.
 - **LONG TERM (CHRONIC):** Repeated *overexposure* to the dusts or fumes generated by these products during brazing operations may have adverse effects on the lungs with possible pulmonary edema and emphysema (life threatening lung injuries). Chronic overexposure to **copper** dust may cause tiredness, stuffiness, diarrhea, vomiting and kidney and liver disorders. The U.S. National Toxicology Program has listed **nickel** and seven **nickel compounds** as reasonably anticipated to be a carcinogen based on the production of injection-site tumors in experimental animals. **Nickel compounds** are listed as carcinogenic to humans by the IARC. **Lead** (present in some of these products in trace amounts) is a suspected human carcinogen. Exposure to high levels of **airborne lead** may produce symptoms of anemia, insomnia, weakness, constipation, nausea and abdominal pain. Prolonged exposure may result in kidney and nervous system involvement. Women of child-bearing age should avoid exposure to **lead** due to post natal effects. Refer to Section 9 (Toxicological Information) for further information.

Section 7 - PRECAUTIONS FOR SAFE HANDLING & USE/APPLICABLE

CONTROL MEASURES

VENTILATION AND ENGINEERING CONTROLS: Maintain exposures below the acceptable exposure levels (see Section 2). 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, 550 N.W. LeJeune Road, Miami, FL 33126 and OSHA Publication 2206 (29CFR1910), US Government Printing Office, Washington, D.C. 20402 for more details on many of the following.

RESPIRATORY PROTECTION: 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 2). 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). NIOSH respiratory protection recommendations for copper are provided as follows:

CONCENTRATION

Up to 5 mg/m³
Up to 10mg/m³

Up to 25 mg/m³
Up to 50mg/m³

Up to 100 mg/m³

RESPIRATORY EQUIPMENT

Dust and mist respirator

Dust and mist respirator except single-use and quarter-mask respirator (if not present as a fume); or a Supplied Air Respirator (SAR).

Powered air-purifying respirator with dust and mist filter; or SAR operated in a continuous-flow mode.

Full-facepiece respirator with high-efficiency particulate filter; or full-facepiece Self-Contained Breathing Apparatus (SCBA); or full-facepiece SAR; or powered air-purifying respirator with tightfitting facepiece and high-efficiency particulate filter.

Positive pressure, full facepiece SAR.

FOR MAXIMUM SAFETY, BE CERTIFIED FOR AND WEAR A RESPIRATOR AT ALL TIMES WHEN WELDING OR BRAZING!

EYE PROTECTION: Ensure eyewash/safety shower stations are available near areas where these products are used. Wear safety glasses, goggles or face-shield with filter lens of appropriate shade number (per ANSI Z49.1-1988, "Safety in Welding and Cutting").

PROTECTIVE CLOTHING: Wear head, hand, and body protection which help to prevent injury from radiation, sparks, and electrical shock. See ANSI Z49.1. As a minimum this includes welder's gloves, protective face shield, dark substantial clothing, and may include arm protectors, aprons, hats, and shoulder protection.

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting these products ON YOU or IN YOU. Wash hands after handling these products. Do not eat or drink while handling these products.

WASTE DISPOSAL METHOD: Prevent waste from contaminating surrounding environment. Discard any product, residue, disposable container or liner in an environmentally acceptable manner, in full compliance with federal, state and local regulations. However, alloy wastes are normally collected to recover metal values.

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Section 8 - FIRST AID MEASURES

- **EYE EXPOSURE:** Flush eyes with plenty of water or saline for at least 15 minutes. Consult a physician.
- **SKIN EXPOSURE:** Wash thoroughly with soap and water. Consult a physician if irritation persists.
- **INHALATION EXPOSURE:** Remove to fresh air. Check for clear airway, breathing and presence of pulse. Provide CPR for persons without pulse or respirations. Consult a physician immediately.
- **INGESTION EXPOSURE:** Ingestion is not a likely route of exposure for these rods. If the flux is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. DO NOT INDUCE VOMITING, unless directed by medical personnel. Have victim rinse mouth with water, if conscious. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or unable to swallow.
- **RECOMMENDATIONS TO PHYSICIANS:** Very heavy intoxication with **lead** (present in some of these products in trace amounts) can sometimes be detected by formation of a dark line on the gum margins, the so-called "lead line". Treat symptoms and eliminate overexposure. Be observant for renal problems and encephalopathy in the event of chronic overexposures. **Zinc** is antagonistic to the toxic effects of **lead**. Refer to the OSHA Lead Standard (29 CFR 1910.1025; paragraph J) for specific information on Medical Surveillance requirements (i.e. Biological Monitoring, Medical examinations and consultations, blood tests and re-examination protocol).

Section 9 - TOXICOLOGICAL INFORMATION

TOXICITY DATA: Presented below are human toxicological data available for the components of these products present in concentration greater than 1%. Other data for animals are available for the components of these products, but are not presented in this MSDS.

COPPER: TDLo (oral, human) = 120 µg/kg - gastrointestinal tract effects	IRON: TDLo (oral, child) = 77 mg/kg;BAH gastrointestinal tract, blood effects MANGANESE: TCLo (inhalation, man) =2300µg/m ³ BRN, central nervous system effects	ZINC: SkinIrritancy (human)=300µg/3days intermittent; mild TCLo(inhalation,human)=124mg/m ³ 50 minutes; pulmonary system, skin effects
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Section 10 – REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: The components of these products are subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Aluminum (fume or dust)	No	No	Yes
Copper	No	Yes	Yes
Lead	No	Yes	Yes
Manganese	No	No	Yes
Nickel	No	Yes	Yes (fume or dust)
Phosphorous	Yes	Yes	Yes
Zinc	No	Yes	Yes (fume or dust)

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for the components of these products. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lbs (4,540 kg) therefore applies, per 40 CFR 370.20.

CALIFORNIA PROPOSITION 65: WARNING: This product contains or produces a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code 25249.5 et seq.)

Section 11 – DEFINITIONS OF TERMS

CAS No. - Chemical Abstracts Service Number PEL - Permissible Exposure Level TLV - Threshold Limit Value
TWA - Time Weighted Average STEL - Short Term Exposure Limit IARC – International Agency for Research on Cancer
NIOSH – National Institute of Occupational Safety and Health OSHA – U.S. Occupational Safety and Health Administration
TDLo – the lowest dose to cause a symptom TCLo – the lowest concentration to cause a symptom
TDo, LDLo, and LDo, or TC, TCo, LCLo, and LCo – the lowest dose (or concentration) to cause lethal or toxic effects.
SARA – Superfund Amendments and Reauthorization Act

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