

CROWN ALLOYS

COMPANY

MATERIAL SAFETY DATA SHEET

Section 1 - COMPANY AND MATERIAL

PRODUCT TYPE: Zinc based alloy for torch soldering (TS) or gas tungsten arc welding (GTAW).

TRADE NAME: ROYAL KIRKROD

SPECIFICATION: N/A

CLASSIFICATION: N/A

VENDOR: Crown Alloys Company

ADDRESS: 30105 Stephenson Hwy.
Madison Heights, MI. 48071

TELEPHONE: (248) 588-3790

Emergency 24 hour telephone #

WEBSITE: www.crownalloys.com

CHEMTREC (800) 424-9300

DATE: January 24, 2006

Section 2 - HAZARDOUS INGREDIENTS

IMPORTANT! This section covers the material from which these products are manufactured. The fumes and gases produced when welding with normal use of these products are covered in Section 5 & 6.

Ingredient	CAS No.	OSHA - TWA PEL,mg/m ³	(ACGIH - TWA) ² TLV,mg/m ³	IDLH ¹ mg/m ³	Wt. %
Aluminum	7429-90-5	15 Total Dust 5 Respirable Fraction 5 Fume (Vacated 1989 PEL)	10.0 Dust 5.0 Fumes	NE	2.0 – 6.5
Copper	7440-50-8	0.1 Fume 1.0 Dusts & Mists	0.2 Fume 1.0 Dusts & Mists	100	1.0 – 5.5
Zinc	7440-66-6	5.0 (Fume), 5.0 (Total Dust), 15.0 (Dust, Respirable Dust), 5.0 (Dust, Respirable Dust, Vacated 1989 PEL), 10.0 Fume (STEL, Vacated 1989 PEL)	5.0 Fume 10.0 Dust 10.0 Fume (STEL)	500	Balance
Magnesium	7439-95-4	15.0 total particulate (oxide fume)	10.0 (oxide fume)	NE	1.0 max.

NE – Not Established

Single values shown are maximum.

NIOSH classifies welding fumes as carcinogens.

¹Immediately Dangerous to Life and Health – This level represents a concentration from which one can escape within 30 minutes without suffering escape-preventing or permanent injury.

²The ACGIH has an established exposure limit for Welding Fumes, Not Otherwise Classified. That Threshold Limit Value is 5 mg/m³.

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Section 3 - PHYSICAL and CHEMICAL CHARACTERISTICS

APPEARANCE AND COLOR: Royal Kirkrod is silver-gray metal that is odorless. It is shipped in various shapes and sizes.

SPECIFIC GRAVITY @ 20°C (water = 1): 6.68 g/cc
SOLUBILITY IN WATER: Insoluble

FREEZING/MELTING POINT: 728°F (387°C)
BOILING POINT @ 24 mm Hg: Approx. 2400°F (1314°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: Carbon Dioxide: YES / Dry Chemical: YES

DO NOT USE WATER ON MOLTEN METAL!

Large fires may be flooded with water from a distance.

SPECIAL FIRE FIGHTING PROCEDURES: Use NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing if involved in a fire.

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. Finely divided dust may form explosive mixture with air. NEVER DROP WATER OR LIQUIDS INTO MOLTEN SOLDER. Do not plunge damp or wet solder bars/pieces into molten solder. Flame will trace fine zinc dust. Product of combustion is **zinc oxide**.

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, and a variety of metal oxides.

MATERIALS WITH WHICH THE ROYAL KIRKROD IS INCOMPATIBLE: Strong acids, strong oxidizers, strong alkalis 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 the Royal Kirkrod is 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 aluminum, copper, magnesium, 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.
- **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 *over-exposure* for any component of these products.
- **INGESTION:** Severe ingestion *overexposure* to **copper** may be fatal, however ingestion is not a likely route of exposure for these solid rods.
- **INHALATION:** Excessive inhalation of user generated fumes from high temperature cutting, brazing or welding of the **Royal Kirkrod** 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). *Overexposure* to **magnesium oxide** fumes can cause respiratory tract irritation and fever, chills, shortness of breath and malaise (metal fume fever). *Temporary symptoms* can include fever, chills, nausea, vomiting, and muscular pain. *Excessive inhalation of zinc oxide* fumes may produce symptoms known as "zinc shakes" which are flu-like and usually cease when the individual is removed from the source.
 - **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 over-exposure* to finely divided **aluminum** powder has been reported as a cause of pulmonary fibrosis. It may also be implicated in Alzheimers disease. *Chronic overexposure* to **copper** dust may cause tiredness, stuffiness, diarrhea, vomiting and kidney and liver disorders. Chronic poisoning from copper will result in Wilson's disease, characterized by a hepatic cirrhosis, brain damage, demyelination, renal disease and copper deposition in the cornea.

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 this product 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, BRAZING OR SOLDERING!

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. **FOOD AND DRINK SHOULD NOT BE CONSUMED OR TOBACCO PRODUCTS USED NOR COSMETICS APPLIED IN AREAS WHERE EXPOSURES EXIST!**

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.

0 = Minimal Hazard	1 = Slight Hazard	2 = Moderate Hazard	3 = Serious Hazard	4 = Severe Hazard
NFPA RATING	Health*: 2	Flammability: 0	Reactivity: 2	Special: 1
HMIS RATING	Health*: 2	Flammability: 0	Reactivity: 2	Special: 1

*Chronic Hazard: Chronic (long-term) health effects may result from repeated overexposure.

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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. **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.

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 COPPER OXIDE: (CAS No. 1317-39-1) LD ₅₀ (oral, rat) = 470 mg/kg	OZONE: (CAS No. 10028-15-6) LC ₅₀ (inhalation, cat) = 34.5 ppm/3H	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

U.S. 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
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 SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): No component of this product is listed on the California Proposition 65 Lists. **WARNING: This product may contain chemicals, and when used for welding may produce fumes or gases containing chemicals, known to the State of California to cause cancer and/or 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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