

CROWN ALLOYS

COMPANY

MATERIAL SAFETY DATA SHEET

Section 1 – COMPANY AND MATERIAL IDENTIFICATION

PRODUCT TYPE: Aluminum Bronze electrodes for shielded metal arc welding (SMAW).

TRADE NAME: ALB-20

CLASSIFICATION: N/A

SPECIFICATION: N/A

VENDOR: Crown Alloys Company

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DATE: March 29, 2004

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 Sections 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	15.0 (Total Dust) 5.0 Respirable Fraction 5 Fume (Vacated 1989 PEL)	10.0 Dust 5.0 Fumes	NE	6.0 – 11.0
Copper	7440-50-8	0.1 Fume 1.0 Dusts and Mists	0.2 Fume 1.0 Dusts and Mists	100	50 – 100
Iron Oxide	1309-37-1	10.0	5.0	2500	5.0 max.
Silicon	7440-21-3	15.0 (Total Dust) 5.0 (Respirable Fraction) 10.0 (Total Dust)	10.0	NE	1.5 max.
Tin	7440-31-5	2.0	2.0	100	1.0 max.
Cryolite ⁴	15096-52-3	2.5	2.5	250	51.0 max.
Feldspar ⁴	68476-25-5	NE	NE	NE	2.7 max.
Magnesite ⁴	546-93-0	15.0 (Total Dust) 5.0 (Respirable Fraction)	10.0	NE	5.1 max.
Petroleum Coke ⁴	64743-05-1	NE	NE	NE	1.8 max.
Silica Sand ⁴ (For Silica-Amorphous: Diatomaceous, earth CAS# 61790-53-2)	7631-86-9	20 mppcf* or 80 mg/m ³ % SiO ₂ 6.0 (Vacated 1989 PEL)	10.0 (Inhalable Particulate) 3.0 (Respirable Particulate)	3000	3.2 max.
Sodium Silicate ⁴	1344-09-8	NE	5.0	NE	26.9 max.

¹ Immediately 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.

⁴Flux Constituent. The Weight Percent values are for the flux coating only.

*millions of particles per cubic foot of air

NIOSH classifies welding fumes as carcinogens.

NE – Not Established

² The 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: This product consists of a solid core wire or rod which is flux-coated and is odorless.

The following information is for copper, the main component of this product:

SPECIFIC GRAVITY @ 20°C (water = 1): 8.94 g/cc
SOLUBILITY IN WATER; Insoluble

FREEZING/MELTING POINT: 1981°F (1083°C)
BOILING POINT @ 24 mm Hg: 4703°F (2595°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 containing copper, aluminum, iron, and other metal oxides. 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: Elevated temperatures may produce fumes containing copper, iron, and other metal oxides.

MATERIALS WITH WHICH THIS ALUMINUM BRONZE ELECTRODE IS INCOMPATIBLE: Strong acids, strong oxidizers, halogens and acid chlorides.

Hazardous Decomposition Products

Welding fumes and gases can not be classified simply. The composition and quantity of both are dependent upon the metal being welded and the rods used. Coatings on the metal being welded (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 consumables. When this aluminum bronze electrode 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 AWS, 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 and/or tin may be reached before the general limit for welding fumes (TLV 5 mg/m³) is reached.**

Section 6 - HEALTH HAZARD DATA

- **Medical conditions aggravated by exposure to this product:** Skin, respiratory, pancreas and liver disorders may be aggravated by prolonged overexposures 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 welding operations can be irritating to the eyes. Contact with the molten metal will burn the contaminated eyes. This electrode contains **cryolite**. Thermal decomposition of **cryolite** can generate **fluoride compounds**, which are toxic and can cause burns in extreme cases. Burns from **fluoride compounds** can be delayed.
- **INGESTION:** Repeated or prolonged ingestion exposures to > 50-100 mg of **iron** per day can result in deposition of **iron** in the body tissues, which can cause disease. Severe ingestion *overexposure* to **copper** may be fatal.
- **SKIN:** Contact of the rod form of these products with the skin is not anticipated to be irritating. Fumes generated during welding 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. This electrode contains **cryolite**. Thermal decomposition of **cryolite** can generate **fluoride compounds**, which are toxic and can cause burns in extreme cases. Burns from **fluoride compounds** can be delayed and can penetrate to the bone. *Chronic overexposure* may result in blood disorders (anemia), and skin and hair discoloration. 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.
- **INHALATION:** Excessive inhalation of user generated fumes from high temperature welding of this alloy 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. Inhalation of large amounts of particulates generated by this product during metal processing operations may result in pneumoconiosis (a disease of the lungs). Repeated *overexposures* to the dusts or fumes generated by these electrodes during welding operations may have adverse effects on the lungs with possible pulmonary edema and emphysema. Some of the other health effects are listed below:

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Section 6 - HEALTH HAZARD DATA (continued)

- **INHALATION: (HEALTH HAZARD)**
 - **Aluminum dust/fines and fumes** are a low risk by inhalation. For standard operations (milling, cutting, grinding), **aluminum dust** should be treated as a nuisance dust as defined by the ACGIH.
 - *Overexposure* to **copper fumes** may produce metal fume fever. Symptoms of metal fume fever resemble the flu and include sweating, fever, headache, chills, muscle aches, nausea, vomiting, weakness, and tiredness.
 - Inhalation of dusts and fumes of **iron** can cause metal fume fever. Symptoms of metal fume fever can be delayed 24-48 hours. Inhalation of excessive **iron oxide fumes** or dusts can lead to irritation of the respiratory tract. Prolonged inhalation of **iron oxide** for periods of 6 to 10 years is known to cause siderosis which appears to be a benign pneumoconiosis.
 - Welding processes generate fumes and an intense ultraviolet radiation that results in the formation of ozone and oxides of nitrogen. Exposure to *low* levels of **ozone** can cause irritation of the eyes, nose and throat. Inhalation can cause chest tightness, headache, shortness of breath, cough, wheeze and narrowing of airways. Symptoms disappear when removed from exposure.
 - Exposure to *high* levels of **ozone** may cause acute respiratory distress with shortness of breath, pulmonary changes, hemorrhage and pulmonary edema. Symptoms of pulmonary edema may be delayed for one or more hours. Exposure of test animals and human tissue to high concentrations has shown chromosomal changes, reproductive effects, blood changes, and death from lung congestion.
 - High concentrations of **silicon dust** will cause some irritation to the nose and throat. Inhalation of crystalline silica over a long period can cause silicosis.

Section 7 - PRECAUTIONS FOR SAFE HANDLING & USE/APPLICABLE **CONTROL MEASURES**

VENTILATION AND ENGINEERING CONTROLS: Maintain exposures below the acceptable exposure levels (see Section 2 & 5). 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 & 5). 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).

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. If molten material contaminates the skin, immediately begin decontamination with cold, running water. Minimum flushing is for 15 minutes. 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 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: Treat symptoms and eliminate overexposure.

Section 9 - TOXICOLOGICAL INFORMATION

Below are human toxicological data available for the components of these products present in concentration greater than 1%.

COPPER: (Cas No. 7440-50-8) TDLo (oral, human) = 120 µg/kg; gastrointestinal tract effects	IRON: TDLo (oral, child) = 77 mg/kg;BAH gastrointestinal tract, blood effects IRON OXIDE: (CAS No. 1309-37-1) LD ₅₀ (intraperitoneal, rat) = 5500 mg/kg	OZONE: (CAS No. 10028-15-6) LC ₅₀ (inhalation, cat) = 34.5 ppm/3H SODIUM SILICATE: (Cas No. 1344-09-8) LD ₅₀ (oral, rat) = 1153 mg/kg Skin Irritancy (human) = 250 mg/24 hours Severe
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SUSPECTED CANCER AGENT: The components of the ALB-20 are listed as follows:

- **COPPER:** EPA-D (Not Classifiable as to Human Carcinogenicity)
- **CRYOLITE (as a Fluoride Compound):** ACGIH TLV-A4 (Not Classifiable as a Human Carcinogen); IARC-3 Unclassifiable as to Carcinogenicity in Humans)
- **IRON OXIDE:** IARC Group 3 (Not Classifiable as to Carcinogenicity to Humans); ACGIH-TLV-A4 (Not Classifiable as a Human Carcinogen)
- **SILICA SAND:** IARC Group 3 (Not Classifiable as to Carcinogenicity to Humans)

The remaining components of the ALB-20 electrode are not found on the following lists: FEDERAL, OSHA Z LIST, NTP, and CAL/OSHA and therefore are not considered to be, cancer-causing agents by these agencies.

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

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, TC_o, LCLo, and LCo – the lowest dose (or concentration) to cause lethal or toxic effects.
SARA – Superfund Amendments and Reauthorization Act ACGIH – American Conference of Governmental Industrial Hygienists
LD₅₀ & LC₅₀ – These values are the amount of a substance given to the stated species that causes 50% of that species to die.

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