

Olin MSDS No.: 00012.0001
Revision No.: 12

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1. PRODUCT AND COMPANY IDENTIFICATION

Product Name: ALUMINUM BRONZE ALLOYS
Chemical Name: Metal alloy
Synonyms: Copper Aluminum Alloys, UNS/CDA Alloy Nos. C60000 - C64699
Chemical Family: Copper
Formula: Not applicable - mixture
Product Use: Metallurgical Products

COMPANY ADDRESS MSDS Control Group
 Olin Brass
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 East Alton, IL 62024-1197
 www.olinbrass.com

TECHNICAL INFORMATION:
 618-258-5003

EMERGENCY TELEPHONE NUMBER:
 1-618-258-5167

2. COMPOSITION/INFORMATION ON INGREDIENTS

CAS Number	Components	% By Weight	EINECS/ ELINCS #	EU Classification	
				Symbol	R-Phrase
7440-50-8	Copper	62 - 100	231-159-6	None	None
7440-21-3	Silicon	0 - 2.2	231-130-8	None	None
7440-48-4	Cobalt	0 - 0.55	231-158-0	Xn	R 42/43
7429-90-5	Aluminum	5.0 - 15.0	231-072-3	None	None
7440-02-0	Nickel	0 - 6.0	231-111-4	Xn	R 40-43
7440-38-2	Arsenic	0 - 0.35	231-148-6	T	R 23/25
7439-89-6	Iron	0 - 5.5	231-096-4	None	None
7439-92-1	Lead	0 - 0.1	231-100-4	None	None
7439-96-5	Manganese	0 - 14.0	231-105-1	None	None

OSHA REGULATORY STATUS: In solid form, not hazardous. Dust or fume: irritant, lung , blood, kidney, reproductive and developmental toxin, neurotoxin, carcinogen, sensitizer

In solid form, this material is not hazardous. Dust and fumes are hazardous materials.

3. HAZARDS IDENTIFICATION

WARNING!

EXPOSURE TO DUST OR FUMES CAN CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION. CONTAINS A MATERIAL WHICH MAY CAUSE KIDNEY, BLOOD AND DEVELOPMENTAL EFFECTS. CONTAINS MATERIALS WHICH MAY CAUSE NERVOUS SYSTEM EFFECTS. MAY CAUSE AN ALLERGIC SKIN AND/OR RESPIRATORY REACTION. CONTAINS MATERIALS WHICH CAN CAUSE CANCER. USE ONLY WITH ADEQUATE VENTILATION. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. WASH THOROUGHLY AFTER HANDLING.

HAZARD RATINGS (for dust or fume)
 Hazardous Materials Identification System (HMIS)

Degree of hazard (0 = low, 4 = extreme)

National Fire Protection Association (NFPA)

Health: 2*
 Mixture. Not rated.

Flammability: 0

Physical Hazard:
 None

HUMAN THRESHOLD RESPONSE DATA

<u>Odor Threshold:</u>	Unknown
<u>Irritation Threshold:</u>	Unknown
<u>Immediately Dangerous to Life or Health (IDLH) Value(s):</u>	The IDLH for this product is not known. The IDLH for copper and lead is 100 mg/m ³ . The IDLH for manganese is 500 mg/m ³ .

POTENTIAL HEALTH EFFECTSACUTE EFFECTS

Eye: Dust or fume can cause irritation consisting of redness, swelling, and pain. May cause conjunctivitis with repeated exposures.

Skin: Material not expected to be absorbed through the skin. Contact with dust may cause mild irritation consisting of redness and/or swelling.

Inhalation: Harmful if inhaled. Inhalation of high concentrations of powder, dust, or fume may cause respiratory and nasal irritation, coughing, and difficulty breathing. Inhalation of high concentrations of metallic copper dusts or fumes may cause nasal irritation and/or nausea, vomiting and stomach pain. The metal fume may also produce influenza-like symptoms, known as metal fume fever. Symptoms of this reaction may include metallic taste, runny nose, nausea, fever and chills. These effects usually disappear within 24 hours.

Ingestion: Ingestion of large amounts of dust may cause nausea, diarrhea and or stomach pain.

CHRONIC EFFECTS:

Prolonged or repeated skin contact with powder or dust may cause more severe irritation or dermatitis. Prolonged or repeated inhalation of powder, dust or fume may cause more severe irritation and possibly lung damage. Chronic exposure to dust or powder may also lead to the development of permanent, severe, obstructive or fibrotic lung disease characterized by coughing, wheezing, and shortness of breath. Repeated exposure may cause an allergic skin reaction consisting of itching, redness, swelling, and rash or urticaria (hives) in sensitized individuals. Prolonged or repeated inhalation of powder, dust or fume may cause an allergic type of asthma reaction characterized by wheezing, coughing, and extreme breathing difficulty in sensitized individuals. Ingestion of large amounts of cobalt may affect the heart, but this type of exposure is not anticipated under normal occupational conditions. Epidemiological studies in humans have shown an association between increased incidences of lung and skin cancer and prolonged exposures to high concentrations of arsenic. Arsenic is classified as a known human carcinogen. Epidemiological studies in humans have shown an association between lung and nasal cancers and prolonged occupational exposures to high concentrations of nickel. Chronic exposure to lead can cause kidney damage, anemia, reproductive effects, developmental effects and permanent nervous system damage in humans including changes in cognitive function. Chronic exposure to very high concentrations of manganese dust has caused nervous system effects including muscle weakness, tremors, and behavioral changes.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Exposure to dust or fume may aggravate an existing dermatitis, asthma, emphysema, or other respiratory disease.

POTENTIAL ENVIRONMENTAL EFFECTS: None known. Product has not been tested for environmental properties.

4. FIRST AID MEASURES

EYE CONTACT: Immediately flush out fume and dust particles with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If eye irritation develops, call a physician at once.

SKIN CONTACT: If exposed to dust or fumes, wash skin with plenty of water. Remove contaminated clothing and shoes and launder before reuse. If skin irritation or rash develops and persists or recurs, get medical attention.

INHALATION: If symptoms of lung irritation occur (coughing, wheezing or breathing difficulty), remove from exposure area to fresh air immediately. If breathing has stopped, perform artificial respiration. Keep affected person warm and at rest. Get medical attention.

INGESTION: Not a likely route of exposure for finished metal alloy. If dust is ingested, immediately drink water to dilute. Consult a physician if symptoms develop.

NOTE TO PHYSICIANS: There is no specific antidote to the active ingredients in this product; use symptomatic treatment.

5. FIRE FIGHTING MEASURES

PROPERTY	VALUE	PROPERTY	VALUE
Explosive	No	Flammable	No
Combustible	No	Pyrophoric	No
Flash Point (°C):	Not applicable	Burning Rate of Material:	Not applicable
Lower Explosive Limit:	Not applicable	Autoignition Temp.:	Not applicable
Upper Explosive Limit:	Not applicable	Flammability Classification: (defined by 29 CFR 1910.1200)	Not applicable

UNUSUAL FIRE AND EXPLOSION HAZARDS: Dust may cause an ignitable and/or an explosive atmosphere.
EXTINGUISHING MEDIA: For localized powder fires, smother with dry sand, dry dolomite, sodium chloride or soda ash. Use fire-extinguishing media appropriate to fight surrounding fire.
SPECIAL FIREFIGHTING PROCEDURES: None required.

6. ACCIDENTAL RELEASE MEASURES

FOR ALL TRANSPORTATION ACCIDENTS, CALL (618)258-5167. In dust form, this product may be an explosion hazard. Remove all sources of ignition. Dust or fume may be suppressed by the use of a local exhaust system. Dispose of per guidelines under Section 13, WASTE DISPOSAL.

7. HANDLING AND STORAGE

HANDLING: Avoid dispersion of dust in air.
STORAGE: No special requirements.
Shelf Life Limitations: None known.
Incompatible Materials for Packaging: None known.
Incompatible Materials for Storage or Transport: None known.
OTHER PRECAUTIONS: Do not shake clothing, rags or other items to remove dust. Dust should be removed by washing or HEPA vacuuming.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

CAS #	CHEMICAL NAME	ACGIH TLV	OSHA PEL	INTERNATIONAL OELS
7440-50-8	Copper	0.2 mg/m ³ (fume), 1 mg/m ³ (dusts and mists)	0.1 mg/m ³ (fume) 1 mg/m ³ (dusts and mists)	Austria, Belgium, Canada: 0.2 mg/m ³ (fumes), 1 mg/m ³ (dusts) Denmark: 1.0 mg/m ³ (dust and powder) Germany (MAK): 0.1 mg/m ³ (fume), 1 mg/m ³ (dusts and mists)
7440-02-0	Nickel	1.5 mg/m ³ (inhalable)	1 mg/m ³	Germany, MAK = 1 mg/m ³ Canada (B.C.), Czechoslovakia, Denmark, Norway - 0.05 mg/m ³ , K1, sensitizer Poland = 0.25 mg/m ³ Ireland, Sweden, Switzerland, U.K. = 0.5 mg/m ³ Belgium, Canada (Alberta & others), Finland, Japan, Mexico, Netherlands - 1 mg/m ³ Portugal = 1.5 mg/m ³
7440-48-4	Cobalt	0.02 mg/m ³	0.1 mg/m ³	Austria: Group A2 carcinogen, skin & resp. sensitizer Canada (BC): 0.02 mg/m ³ , K3, Z, A Canada (Alberta & others): 0.05 mg/m ³ Denmark: 0.02 mg/m ³ Germany: MAK - 2 (Sah)
7440-21-3	Silicon*	10 mg/m ³	15 mg/m ³	Belgium, Denmark, France,

CAS #	CHEMICAL NAME	ACGIH TLV	OSHA PEL	INTERNATIONAL OELS
				Netherlands, U.K. - 10 mg/m ³ Switzerland - 4 mg/m ³
7429-90-5	Aluminum*	10 mg/m ³	15 mg/m ³	Belgium, France, Hungary, Sweden - 5 mg/m ³ (resp. dust) Germany, Switzerland - 6 mg/m ³ Denmark, Netherlands, U.K. - 10 mg/m ³
7440-38-8	Arsenic	0.01 mg/m ³	0.01 mg/m ³	Germany, MAK - 1 mg/m ³ Austria, Belgium, Finland, Japan, Holland, Czechoslovakia, Hungary and Poland - 0.5 mg/m ³ Italy - 0.25 mg/m ³ Switzerland, Canada (Alberta & others) - 0.2 mg/m ³ Sweden - 0.05 mg/m ³ Canada (B.C.), Denmark = 0.01 mg/m ³ , K1
7439-89-6	Iron	None established	None established	None established
7439-92-1	Lead	0.05 mg/m ³	0.05 mg/m ³	Austria, Denmark, Germany, Sweden, Switzerland: 0.1 mg/m ³ Norway, Poland: 0.05 mg/m ³
7439-96-5	Manganese	Dust: 0.03 mg/m ³ (inhalable) Fume: 0.03 mg/m ³ (respirable)	Ceiling: 0.5 mg/m ³	Belgium, Denmark, Finland, France, Switzerland, U.K. - 1 mg/m ³ Sweden - 2.5 mg/m ³ Germany (MAK) - 0.5 mg/m ³

*This substance is regulated by OSHA as a Particulate Not Otherwise Regulated (PNOR). The exposure limits listed for both OSHA and ACGIH refer to total dust; the OSHA PEL for the respirable fraction is 5 mg/m³.

ENGINEERING CONTROLS:

Local exhaust ventilation is recommended if significant dusting occurs or fumes are generated. Otherwise, use general exhaust ventilation.

EYE / FACE PROTECTION:

Use safety glasses.

SKIN PROTECTION:

Wear impervious (cut-resistant) gloves and other protective clothing (aprons, coveralls) as appropriate to prevent skin contact when using this product. If generating a dust, wash thoroughly after handling, especially before eating, drinking, or smoking.

RESPIRATORY PROTECTION:

Respiratory protection not normally needed. If dusting occurs or fumes are generated above the PEL/TLV, use a NIOSH-approved half-face or full-face respirator equipped with High Efficiency Particulate (HEPA) filter cartridges.

GENERAL HYGIENE CONSIDERATIONS:

Do not eat, drink, or smoke while using this product in dust form.

9. PHYSICAL AND CHEMICAL PROPERTIES

PROPERTY	VALUE	PROPERTY	VALUE
Appearance:	Orange metallic	Vapor Density (air = 1):	Not applicable
Odor:	None	Boiling Point (°F):	No data
Molecular Weight:	Not applicable - Mixture	Melting point:	L:1030°C (1885°F) S:1000°C (1830°F)
Physical State:	Solid	Specific gravity (g/cc):	8.28
pH:	Not applicable	Bulk Density	8.28 g/cc
Vapor Pressure (mm Hg):	Not applicable	Viscosity (cps):	Not applicable
Vapor Density	Not applicable	Decomposition Temperature:	Not applicable
Solubility in Water (20 °C):	Negligible	Evaporation Rate:	Not Applicable
Volatiles, Percent by volume:	Not applicable	Octanol/water partition coefficient:	Unknown

10. STABILITY AND REACTIVITY

STABILITY: Stable under normal temperatures and pressure.
CONDITIONS TO AVOID: Avoid contact with carbon monoxide, particularly at temperatures between 50°C and 300°C, to prevent formation of nickel carbonyl which is toxic and a carcinogen.
MATERIALS TO AVOID: Acetylene, chlorine
HAZARDOUS DECOMPOSITION PRODUCTS: When heated to decomposition, may produce metal oxides and fumes. Inhalation of high concentrations of metal fumes may cause a condition known as "metal fume fever" which is characterized by flu-like symptoms.
HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

POTENTIAL EXPOSURE ROUTES: For dust: ingestion, inhalation, and eye contact. For fume: inhalation and eye contact. The finished alloy metal is not hazardous.

ACUTE ANIMAL TOXICITY DATA:

For Product:		For Components								
		Copper	Iron	Cobalt	Sili-con	Nickel	Lead	Arse-nic	Alumi-num	Man-ganese
Oral LD ₅₀	Believed to be > 5 g/kg	3.5 mg/kg (mouse, intra-peritoneal)	30 g/kg (rat)	6.171 g/kg (rat)	3.16 g/kg (rat)	> 5 g/kg (rat)	No data	763 mg/kg (rat)	No data	9 g/kg (rat)
Dermal LD ₅₀	Believed to be > 2 g/kg	375 mg/kg (rabbit, subcutaneous)	No data	No data	No data	> 7.5 g/kg (rabbit subcutaneous)	No data	No data	No data	No data
Inhalation LC ₅₀	Believed to be slightly to moderately toxic	No data	No data	165 mg/m ³ (30-min., rat, cobalt oxides)	No data	> 12 mg/kg (rat, intratracheal)	No data	No data	> 1000 mg/m ³ (4 hr, rat)	No data
Irritation	Eye and respiratory irritant, sensitizer	Respiratory irritant	Eye irritant	Respiratory irritant, skin and respiratory sensitizer	Eye, skin, respiratory irritant	Respiratory irritant, skin sensitizer	Not irritating	No data	Mild eye and skin irritant	Mild eye and skin irritant

SUBCHRONIC/ CHRONIC TOXICITY: No information for product. Lead has caused blood, kidney and nervous system damage in laboratory animals.

CARCINOGENICITY: Arsenic is listed as a known human carcinogen by IARC (Group 1), OSHA, NTP and EPA. IARC lists cobalt and cobalt compounds as possibly carcinogenic to humans, Group 2B. The International Agency for Research on Cancer (IARC) has classified nickel as possibly carcinogenic to humans, group 2B. The National Toxicology Program (NTP) classifies nickel as a known human carcinogen. The International Agency for Research on Cancer (IARC) lists lead as possibly carcinogenic to humans, group 2B.

MUTAGENICITY: This product is not known or reported to be mutagenic. Lead has been shown to be mutagenic in several *in vitro* assays. Nickel has been shown to be mutagenic in *in vitro* studies.

REPRODUCTIVE, TERATOGENICITY, OR DEVELOPMENTAL EFFECTS:

This product is not known or reported to cause reproductive or developmental effects. Lead has been shown to affect fetal development including birth defects and reduce male reproductive function in laboratory animals. Exposure of male rats to high concentrations of nickel caused testicular degeneration. However, symptoms of systemic toxicity, including severe weight loss, were also observed at the same concentrations indicating that the testicular effects were secondary to the frank toxicity.

NEUROLOGICAL EFFECTS:

This product is not know or reported to cause neurological effects. Lead has caused peripheral and central nervous system damage and behavioral effects in laboratory animals. Chronic exposure to very high concentrations of manganese dust has caused nervous system effects including muscle weakness, tremors, and behavioral changes in humans.

INTERACTIONS WITH OTHER CHEMICALS WHICH ENHANCE TOXICITY:

None known or reported.

12. ECOLOGICAL INFORMATION

ECOTOXICITY: No data is available on this product. Individual constituents are as follows:

- Copper: The toxicity of copper to aquatic organisms varies significantly not only with the species, but also with the physical and chemical characteristics of the water, such as its temperature, hardness, turbidity and carbon dioxide content. Copper concentrations varying from 0.1 to 1.0 mg/l have been found by various investigators to be not toxic for most fish. However, concentrations of 0.015 to 3.0 mg/l have been reported as toxic, particularly in soft water to many kinds of fish, crustaceans, mollusks, insects, and plankton.
- Lead: LC₅₀ (48 hrs.) to bluegill (*Lepomis macrochirus*) is reported to be 2 - 5 mg/l. Lead is toxic to waterfowl.
- Nickel: 96 hr LC₅₀, rainbow trout =31.7 mg/L; 96 hr LC₅₀, fathead minnow = 3.1 mg/L; 72 hr EC₅₀, freshwater algae (4 species): = 0.1 mg/L; 96 hr LC₅₀, *Daphnia* = 0. 5l mg/L
- Arsenic: *Daphnia magna*, 48 hr. LC₅₀ = 3.8 mg/L; Fathead minnow, 96 hr LC₅₀ = 9.9 mg/L

- MOBILITY:** Dissolved lead may migrate through soil.
- PERSISTANCE/DEGRADABILITY:** Not biodegradable. Lead may persist and accumulate in the environment.
- BIOACCUMULATION:** No data.

13. DISPOSAL CONSIDERATIONS

If this product becomes a waste, it DOES NOT meet the criteria of a hazardous waste as defined under 40 CFR 261, in that it does not exhibit the characteristics of hazardous waste of Subpart C, nor is it listed as a hazardous waste under Subpart D. Care must be taken to prevent environmental contamination from the use of this material. The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and non-hazardous wastes. This product may be a candidate for metal reclamation.

14. TRANSPORT INFORMATION

	U.S. DOT	RID/ADR	IMDG	IATA	IMO	Canada TDG
PROPER SHIPPING NAME:	Not regulated					
HAZARD CLASS:						
UN NO.:						
PACKING GROUP:						
LABEL:						
REPORTABLE QUANTITY:						

15. REGULATORY INFORMATION

US FEDERAL

TSCA	The components of this product are listed on the Toxic Substance Control Act inventory.
CERCLA:	Arsenic, R.Q. = 1 lb.; Copper, R.Q.= 5000 lbs.; Nickel, R.Q. = 100 lbs.; Lead, R.Q. = 10 lbs. (No reporting is required if diameter of the pieces of metal is equal to or exceeds 100 micrometers (0.004 inches).

SARA 313:	Copper, Cobalt, Arsenic, Nickel, Aluminum (fume or dust), Lead, Manganese				
SARA 313 Hazard Class:	<u>Health:</u> For dust or fume only	Acute - Yes, Chronic - Yes	<u>Fire:</u> None	<u>Reactivity:</u> None	<u>Release of Pressure:</u> None
SARA 302 EHS List:	None of the components of this product are listed.				

*RQ = Reportable Quantity

STATE RIGHT-TO-KNOW STATUS

Component	*CA Prop. 65	New Jersey	Pennsylvania	Massachusetts	Michigan
Copper	Not listed	X	X	X	X
Nickel	X	X	X	X	X
Cobalt	X	X	X	X	X
Aluminum	Not listed	X	X	X	Not listed
Silicon	Not listed	Not listed	X	X	Not listed
Arsenic	X	X	X	X	X
Iron	Not listed	Not listed	Not listed	Not listed	Not listed
Lead	X	X	X	X	X
Manganese	Not listed	X	X	X	Not listed

* "WARNING: This product contains detectable amounts of a chemical(s) known to the State of California to cause cancer and/or birth defects or other reproductive harm."

EUROPEAN REGULATIONS

Because this material contains arsenic at > 0.2% this material is classified as: **T, Toxic; N, Dangerous for the environment.** However, this material in its massive solid form is not required to be labeled under EC regulations.

German WGK Classification: Unknown

CANADIAN REGULATIONS

DSL LIST: The components of this product are on the DSL or are exempt from reporting under the New Substances Notification Regulations.

IDL: Cobalt, Copper, Arsenic, Nickel, Lead, Manganese and Aluminum

WHMIS: This product is considered to be a manufactured article and therefore not subject to WHMIS requirements.

16. OTHER INFORMATION

PREPARED BY: Olin Brass

NOTICE: THE INFORMATION IN THIS MSDS SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. OLIN BRASS BELIEVES THIS INFORMATION TO BE RELIABLE AND CURRENT AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS.

17. Document Review

This document reviewed annually.