

**EMERGENCY PHONE: 1-618-258-5167**

THIS MATERIAL SAFETY DATA SHEET (MSDS) KIT HAS BEEN PREPARED IN COMPLIANCE WITH THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200.

**PRODUCT NAME: CLAD ALLOY 8848**

(OLIN MSDS No: 00867.0001)

This clad alloy contains multiple metal layers. Attached are Material Safety Data Sheets (MSDS) for the following metal products:

**Inner Layer - 72% - Copper Alloy**  
**Outer Layer - 28% - Phosphor Bronze**

THE INFORMATION IN THE ENCLOSED MSDSs 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 BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF AN MSDS IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT OLIN AT THE PHONE NUMBER BELOW TO MAKE CERTAIN THAT THE MSDS IS CURRENT.

**MSDS Control Group**  
**Olin Brass**  
427 North Shamrock Street  
East Alton, IL 62024-1197  
Phone Number: (618) 258-5003  
[www.olinbrass.com](http://www.olinbrass.com)

Olin MSDS No.: 00001.0001  
 Revision No.: 15

Review Date: 1/1/11  
 Revision Date: 1/1/09

**1. PRODUCT AND COMPANY IDENTIFICATION**

**Product Name:** COPPER ALLOY  
**Chemical Name:** Mixture - Metal Alloy  
**Synonyms:** Copper, UNS/CDA Alloy Nos. C10000-C15599 (except 15815)  
**Chemical Family:** Copper  
**Formula:** Not applicable - mixture  
**Product Use:** Metallurgical Products

<b>COMPANY</b>	MSDS Control Group	<b>TECHNICAL</b>	<b>EMERGENCY TELEPHONE NUMBER:</b>
<b>ADDRESS</b>	Olin Brass 427 North Shamrock St. East Alton, IL 62024-1197 www.olinbrass.com	<b>INFORMATION:</b> 618-258-5003	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	99.75 - 100	231-159-6	None	None

OSHA REGULATORY STATUS: In solid form, not hazardous. Dust or fume: irritant

**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 AND RESPIRATORY TRACT IRRITATION. USE ONLY WITH ADEQUATE VENTILATION. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. WASH THOROUGHLY AFTER HANDLING.

<u>HAZARD RATINGS (for dust or fume)</u>	Degree of hazard (0 = low, 4 = extreme)		
<u>Hazardous Materials Identification System (HMIS)</u>	Health: 1	Flammability: 0	Physical Hazard: None

National Fire Protection Association (NFPA) Mixture. Not rated.

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 is 100 mg/m <sup>3</sup> .

POTENTIAL HEALTH EFFECTS

ACUTE 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:** 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.

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

CHRONIC EFFECTS: Prolonged or repeated skin contact with dust may cause more severe irritation or dermatitis. Prolonged or repeated inhalation of dust or fume may cause more severe

irritation and possibly lung damage.

**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**

<i>PROPERTY</i>	<i>VALUE</i>	<i>PROPERTY</i>	<i>VALUE</i>
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 <sup>3</sup> (fume), 1 mg/m <sup>3</sup> (dusts and mists)	0.1 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dusts and mists)	Austria, Belgium, Canada: 0.2 mg/m <sup>3</sup> (fumes), 1 mg/m <sup>3</sup> (dusts) Denmark: 1.0 mg/m <sup>3</sup> (dust and powder) Germany (MAK): 0.1 mg/m <sup>3</sup> (fume), 1 mg/m <sup>3</sup> (dusts and mists)

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:	Red metallic	Vapor Density (air = 1):	Not applicable
Odor:	None	Boiling Point (°F):	No data
Molecular Weight:	Not applicable - Mixture	Melting point:	L:1080-1090°C (1976-1995°F) S:965-1085°C (1769-1985°F)
Physical State:	Solid	Specific gravity (g/cc):	8.94
pH:	Not applicable	Bulk Density	8.94 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: Not affected by mechanical impact or shock or by electrical discharge.

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:

<u>For Product:</u> The toxicological properties of this product have	<u>For Components</u>
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		Copper	Boron
Oral LD <sub>50</sub>	Believed to be > 5 g/kg	3.5 mg/kg (mouse, intraperitoneal)	650 mg/kg (rat)
Dermal LD <sub>50</sub>	Believed to be > 2 g/kg	375 mg/kg (rabbit, subcutaneous)	No data
Inhalation LC <sub>50</sub>	Believed to be slightly to moderately toxic	No data	No data
Irritation	Eye and respiratory irritant, sensitizer	Respiratory irritant	No data

SUBCHRONIC/ CHRONIC TOXICITY:

No information for product.

CARCINOGENICITY:

This product is not known or reported to be carcinogenic by IARC, NTP, OSHA, or EPA.

MUTAGENICITY:

This product is not known or reported to be mutagenic.

REPRODUCTIVE, TERATOGENICITY, OR  
DEVELOPMENTAL EFFECTS:

This product is not known or reported to cause reproductive or developmental effects. Boron in the form of boric acid has caused testicular damage and reproductive effects in laboratory animals.

NEUROLOGICAL EFFECTS:

This product is not known or reported to cause neurological effects.

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.

MOBILITY:

No data

PERSISTANCE/DEGRADABILITY:

No data

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
<u>PROPER SHIPPING NAME:</u>	Not regulated					
<u>HAZARD CLASS:</u>						
<u>UN NO.:</u>						
<u>PACKING GROUP:</u>						
<u>LABEL:</u>						
<u>REPORTABLE QUANTITY:</u>						

**15. REGULATORY INFORMATION**

*US FEDERAL*

TSCA	The components of this product are listed on the Toxic Substance Control Act inventory.				
CERCLA:	Copper, R.Q.= 5000 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				
SARA 313 Hazard Class:	<u>Health:</u> For dust or fume only	Acute - Yes, Chronic - No	<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

*EUROPEAN REGULATIONS*

This material in its massive solid form is not required to be labeled under EC regulations.

German WGK Classification: Not classified

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

**16. OTHER INFORMATION**

REVISIONS: Update to composition 1/1/04

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.

Olin MSDS No.: 0010.0001  
Revision No.: 12

Review Date: 1/1/11  
Revision: 1/1/09

**1. PRODUCT AND COMPANY IDENTIFICATION**

**Product Name:** PHOSPHOR BRONZE ALLOYS  
**Chemical Name:** Metal Alloy  
**Synonyms:** Copper Tin Phosphorus Alloys; UNS/CDA Alloy Nos. C50000 - C52999  
**Chemical Family:** Copper  
**Formula:** Not applicable - mixture  
**Product Use:** Metallurgical Products

<b>COMPANY ADDRESS</b>	MSDS Control Group Olin Brass 427 North Shamrock St. East Alton, IL 62024-1197 www.olinbrass.com	<b>TECHNICAL INFORMATION:</b> 618-258-5003	<b>EMERGENCY TELEPHONE NUMBER:</b> 1-618-258-5167
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**2. COMPOSITION/INFORMATION ON INGREDIENTS**

CAS Number	Components	% By Weight	EINECS/ ELINCS #	EU Classification	
				Symbol	R-Phrase
7440-50-8	Copper	89 - 99	231-159-6	None	None
7440-31-5	Tin	0.5 - 11	231-141-8	None	None
7440-48-4	Cobalt	0 - 0.15	231-158-0	Xn	R 42/43
7440-66-6	Zinc	0 - 3.0	231-175-3	F (as dust or powder)	R 15-17
7440-02-0	Nickel	0 - 0.4	231-111-4	Xn	R 40-43

OSHA REGULATORY STATUS: In solid form, not hazardous. Dust or fume: carcinogen, irritant, lung toxin, 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. EXPOSURE TO DUST OR FUMES CAN CAUSE RESPIRATORY SYSTEM DAMAGE. MAY CAUSE AN ALLERGIC SKIN AND/OR RESPIRATORY REACTION. CONTAINS MATERIALS WHICH MAY CAUSE CANCER. USE ONLY WITH ADEQUATE VENTILATION. AVOID CONTACT WITH EYES, SKIN AND CLOTHING. WASH THOROUGHLY AFTER HANDLING.

<u>HAZARD RATINGS (for dust or fume)</u>	Degree of hazard (0 = low, 4 = extreme)
<u>Hazardous Materials Identification System (HMIS)</u>	Health: 2*      Flammability: 0      Physical Hazard: None

National Fire Protection Association (NFPA) Mixture. Not rated.

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 tin is 100 mg/m <sup>3</sup> . The IDLH for nickel is 10 mg/m <sup>3</sup> . The IDLH for cobalt is 20 mg/m <sup>3</sup> .

POTENTIAL HEALTH EFFECTS

ACUTE 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 severe 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, but may be delayed in onset.

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

**CHRONIC EFFECTS:** Prolonged or repeated skin contact with dust may cause more severe irritation or dermatitis. Prolonged or repeated inhalation of dust or fume may cause more severe irritation and possibly lung damage. Chronic exposure to dust or fume 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 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 lung and nasal cancers and prolonged occupational exposures to high concentrations of nickel.

**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:

*Shelf Life Limitations:* None known.

*Incompatible Materials for* None known.

*Packaging:*

*Incompatible Materials for Storage* None known.

*or Transport:*

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 <sup>3</sup> (fume), 1 mg/m <sup>3</sup> (dusts and mists)	0.1 mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dusts and mists)	Austria, Belgium, Canada: 0.2 mg/m <sup>3</sup> (fumes), 1 mg/m <sup>3</sup> (dusts) Denmark: 1.0 mg/m <sup>3</sup> (dust and powder) Germany (MAK): 0.1 mg/m <sup>3</sup> (fume), 1 mg/m <sup>3</sup> (dusts and mists)
7440-31-5	Tin	2 mg/m <sup>3</sup>	2 mg/m <sup>3</sup>	U.K. (LTEL): 5 mg/m <sup>3</sup> Austria & Germany (MAK), Belgium, Finland, Denmark, The Netherlands, Poland, Switzerland: 2 mg/m <sup>3</sup> Hungary, Norway: 1 mg/m <sup>3</sup>
7440-48-4	Cobalt	0.02 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup>	Austria: Group A2 carcinogen, skin & resp. sensitizer Canada (BC): 0.02 mg/m <sup>3</sup> , K3, Z, A Canada (Alberta & others): 0.05 mg/m <sup>3</sup> Denmark: 0.02 mg/m <sup>3</sup> Germany: MAK - 2 (Sah)
7440-66-6	Zinc	None established	None established	None established
7440-02-0	Nickel	1.5 mg/m <sup>3</sup> (inhalable)	1 mg/m <sup>3</sup>	Germany, MAK = 1 mg/m <sup>3</sup> Canada (B.C.), Czechoslovakia, Denmark, Norway - 0.05 mg/m <sup>3</sup> , K1, sensitizer Poland = 0.25 mg/m <sup>3</sup> Ireland, Sweden, Switzerland, U.K. = 0.5 mg/m <sup>3</sup> Belgium, Canada (Alberta & others), Finland, Japan, Mexico, Netherlands - 1 mg/m <sup>3</sup> Portugal = 1.5 mg/m <sup>3</sup>

If this product is heated and fumes are generated, zinc oxide fumes could be formed. The ACGIH TLV and OSHA PEL for zinc oxide fume is 5 mg/m<sup>3</sup>.

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:	Red metallic	Vapor Density (air = 1):	Not applicable
Odor:	None	Boiling Point (°F):	No data
Molecular Weight:	Not applicable - Mixture	Melting point:	L:1000 - 1075°C (1830-1970°F) S:845-1035°C (1550-1900°F)
Physical State:	Solid	Specific gravity (g/cc):	8.84
pH:	Not applicable	Bulk Density	8.8 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: Not affected by mechanical impact or shock or by electrical discharge.  
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: (dust or fume):		For Components				
		Copper	Cobalt	Zinc	Tin	Nickel
Oral LD <sub>50</sub>	Believed to be moderately toxic	3.5 mg/kg (mouse, intra-peritoneal)	6.171 g/kg (rat)	No data	No data	> 5 g/kg (rat)
Dermal LD <sub>50</sub>	Believed to be > 2 g/kg	375 mg/kg (rabbit, subcutaneous)	No data	No data	No data	> 7.5 g/kg (rabbit subcutaneous)
Inhalation LC <sub>50</sub>	Believed to be slightly to moderately toxic	No data	165 mg/m <sup>3</sup> (30-min., rat, cobalt oxides)	No data	No data	> 12 mg/kg (rat, intra-tracheal)
Irritation	Believed to be a respiratory irritant	Respiratory irritant	Respiratory irritant, skin and respiratory sensitizer	Eye irritant	No data	Respiratory irritant, skin sensitizer

SUBCHRONIC/ CHRONIC TOXICITY: No information for product.

CARCINOGENICITY: IARC lists cobalt and cobalt compounds as possibly carcinogenic to humans, Group 2B. In laboratory animal studies, chronic exposure to high concentrations of nickel has caused an increase in lung and nasal tumors. 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.

MUTAGENICITY: This product is not known or reported to be mutagenic. 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. 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 known or reported to cause neurological effects.

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.

Nickel: 96 hr LC<sub>50</sub>, rainbow trout = 31.7 mg/L; 96 hr LC<sub>50</sub>, fathead minnow = 3.1 mg/L; 72 hr EC<sub>50</sub>, freshwater algae (4 species): = 0.1 mg/L; 96 hr LC<sub>50</sub>, *Daphnia* = 0.51 mg/L

MOBILITY: No data

PERSISTANCE/DEGRADABILITY: No data

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
<u>PROPER SHIPPING NAME:</u>	Not regulated					
<u>HAZARD CLASS:</u>						
<u>UN NO.:</u>						
<u>PACKING GROUP:</u>						
<u>LABEL:</u>						
<u>REPORTABLE QUANTITY:</u>						

**15. REGULATORY INFORMATION**

*US FEDERAL*

TSCA	The components of this product are listed on the Toxic Substance Control Act inventory.				
CERCLA:	Copper, R.Q.= 5000 lbs.; Nickel, R.Q. = 100 lbs.; Zinc, R.Q. = 1000 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, Nickel, Zinc (fume or dust)				
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
Tin	Not listed	Not listed	X	X	Not listed
Zinc	Not listed	X	Not listed	X	X
Cobalt	X	X	X	X	X
Nickel	X	X	X	X	X

\*"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 nickel at > 0.1%, and cobalt at > 0.2%, this material is classified as **Xn, Harmful**. 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: Copper, Cobalt, Nickel

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.