Material Safety Data Sheet (MSDS)
Bronze Castings – Manganese and Leaded Manganese Bronze Alloys
MSDS#: 1401
Rev: 0
Rev Date: 10/29/08

PART I: *What is the material and what do I need to know in an emergency?*

SECTION 1 — PRODUCT IDENTIFICATION & COMPANY INFORMATION

PRODUCT NAME:
Bronze Castings – Manganese and Leaded Manganese Bronze Alloys

PRODUCT IDENTIFICATION NUMBERS UNS ALLOY DESIGNATIONS:
C86100, C86200, C86300, C86400, C86500, CC86700, and C86800

MANUFACTURER'S NAME: Multi-Cast Corporation	STREET ADDRESS: 225 East Linfoot Street
EMERGENCY TELEPHONE NO. : 419-335-0010	MAILING ADDRESS: P.O. Box 111
TELEPHONE NO.: 419-335-0010	CITY, STATE, ZIP CODE: Wauseon, OH 43567
FAX NO.: 419-337-4263	E-MAIL ADDRESS/WEB SITE: castings@multi-cast.com / www.multi-cast.com

SECTION 2 – HAZARD IDENTIFICATION

OVERVIEW:

There are no health hazards from these castings in solid form. The solid casting is not flammable.

Dust and fume from processing can cause irritation of eyes, skin and respiratory tract; lung disease and other systemic effects.

- Dust or fumes generated by machining, grinding, or welding of the casting may produce airborne contaminants, primarily aluminum, cobalt, copper, iron, lea, manganese, nickel, tin and zinc. Also, see the MSDS for the welding rod being used.
- Grinding castings that have not been cleaned or that contain embedded sand may generate significant amounts of dust containing free silica.
- Other metals in the alloy that are present in small amounts should not present a hazard if aluminum and copper dust and fume are adequately controlled.

Explosion / fire hazards may be present when:

- Aluminum dust or fines are dispersed in the air.
- Aluminum chips, dust or fines are in contact with water, chlorinated solvents or certain metal oxides.

POTENTIAL HEALTH EFFECTS:

EYES:	Grinding or machining of castings may generate flying metal particles that may cause eye irritation or injury.
SKIN:	Dermatitis or irritation is possible from skin contact with cobalt, nickel and zinc.
INGESTION:	Ingestion of particulate can occur during hand to mouth activities such as eating, drinking and smoking. Ingestion of lead can cause anemia, nervous system damage, kidney damage, reproductive effects, lung and stomach cancer.
INHALATION:	Prolonged or repeated exposure to dust or fumes from these castings may cause the following health effects: **Aluminum:** Irritation of the respiratory tract. **Cobalt:** Respiratory sensitization, asthma, scarring of the lungs and damage to the heart muscle. **Copper:** Nose and throat irritation, metal fume fever and gastrointestinal tract irritation **Iron:** Overexposure the iron oxide fume over a long period of time can cause siderosis, sometimes called "iron pigmentation" of the lung. It can be seen on a chest x-ray but causes little or no disability. **Lead:** Anemia, nervous system damage, kidney damage, reproductive effects, lung and stomach cancer. **Manganese:** Central nervous system impairment. **Nickel:** Lung and nasal cancer **Tin:** Respiratory irritation. Prolonged inhalation of tin dust or fume may produce distinctive changes in the lung with no apparent disability or complications. **Zinc:** Inhalation of zinc fume may cause metal fume fever with flu-like symptoms

Note: Prolonged breathing of excessive amounts of silica dust, which may be on or embedded in the surface of castings, can cause silicosis or other health effects including lung cancer.

ENVIRONMENTAL EFFECTS:

Environmental effects may be possible depending on conditions of use.

SECTION 3 – COMPOSITION / INFORMATION ON INGREDIENTS

Section 3A – Information on Ingredients				
MATERIAL	**Wt %**	**CAS NUMBER**	**ACGIH TLV mg/m³**	**OSHA PEL mg/m³**
Aluminum (Al)	0.5 – 7.5	7429-90-5		
Total Dust			10	15
Respirable Dust			N\E	5
Cobalt (Co)	0.0 – 4.0	7440-48-4		
Metal Dust and Fume			N/E	0.1
Elemental and Inorganic Compounds			0.02	N/E
Cooper (Cu)	55.0 – 68.0	7440-50-8	1	1
Iron (Fe)	0.4 – 4.0	1309-37-1	N/E	N/E
Lead (Pb)	1.0 – 8.0	7439-92-1	0.05	30µg/m^{3}AL 50µg/m^{3}PEL
Manganese (Mn)	0.1 – 5.0	7439-96-5	N/E	N/E
Nickel (Ni)	0.0 – 4.0	7440-02-0	1.5(I)	1
Tin (Sn)	<0.2 – 1.5	7440-31-5	2	2
Zinc (Zn)	17.1 – 42.0	7440-66-6	N/E	N/E
Section 3B – Potential Byproducts of Welding, Cutting, or Further Processing				
Aluminum Oxide		1344-28-1		
Total Dust			10	15
Respirable Dust			N/E	5
Copper Compounds		7440-50-8		
Fume (Cu)		various	0.2	0.1
Dust and Mist (Cu)		various	1	1
Lead Compounds Inorganic Compounds (Pb)		7439-92-1	0.05	30µg/m^{3}AL 50µg/m^{3}PEL*
Manganese Compounds		7439-96-5		
Manganese fume and Inorganic			0.2	5 (C)
Nickel Compounds				
Insoluble compounds (Ni)		various	0.2(I)	1
Soluble compounds (Ni)		various	0.1(I)	0.5
Nickel oxide (NiO)		1313-99-1	0.2(I)	1
Tin Compounds				
Organic Compounds (Sn)		various	0.1	0.1
Tin Oxide & inorganic Compounds (except SnH_4)		various	2	N/E
Inorganic Compounds, except oxides (Sn)		various	N/E	2
Tin Oxides (Sn)		18282-10-5, 21651-19-4	2.0	N/E
Zinc (Zn)		7440-66-6	N/E	N/E
Zinc Oxide Total Dust		1314-13-2	N/E	N/E
Zinc Oxide Respirable Dust		1314-13-2	2	2
Zinc Oxide Fume		1314-13-2	N/E	N/E

TERMS

N/E = Non Established
TLV = Threshold Limit Value / American Conference of Industrial Hygienists (ACGIH) 8 hour time weighted average
PEL = Permissible Exposure Limit / OSHA 8 hour time weighted average
AL = OSHA Action Level
mg/m³ = milligrams per cubic meter
µg/m³ = micrograms per cubic meter
STEL = Short Term Exposure Limit
(CEL) = Ceiling Limit
(I) = Inhalable fraction
(R) = Respirable fraction

Section 3C – Carcinogen Classification of Ingredients / Potential Byproducts						
INGREDIENT	**OSHA**	**NTP**	**IARC**	**ACGIH**	**EPA**	**TARGET ORGAN**
Aluminum	NL	NL	NL	NL	NL	
Cobalt Alloys	NL	NL	NL	NL	NL	
Cobalt and Compounds (Co)	NL	NL	2B	NL	NL	Lung
Cobalt and Inorganic Compounds (Co)	NL	NL	NL	A3	NL	

Copper (Cu)	NL	NL	NL	NL	D	GI Tract
Iron Oxide (Fe_2O_3)	NL	NL	3	A4	NL	
Lead (Pb)	NL	R	2A (Inorganic Compounds)	A3 (Inorganic Compounds)	B2	Lung, Stomach, Liver, Kidney
Manganese (Mn)	NL	NL	NL	NL	D	
Nickel, Insoluble compounds (Ni) Nickel, Soluble compounds (Ni) Nickel, Elemental (Ni) Nickel Oxide (NiO)	NL NL NL NL	K K R K	NL NK 2B 1	A1 A4 A5 A1	NL NL NL N	Lung, Nasal
Tin (Sn) Tin Oxide (OSn) & Inorganic Compounds Except Hydride	NL NL	NL NL	NL NL	NL NL	NL NL	--
Zinc Oxide (ZnO)	NL	NL	NL	NL	D	Lung, Throat

OSHA – Occupational Safety & Health Administration

Y = Listed as a Human Carcinogen

NTP – National Toxicology Program

K = Known to be a Human Carcinogen

R = Reasonably Anticipated to be a Human Carcinogen (RAHC)

IARC – International Agency for Research on Cancer

1 = Carcinogen to Humans

2A = Probably Carcinogenic to Humans

2B = Possibly Carcinogenic to Humans

3 = Unclassified as Carcinogenic to Humans

4 = Probably not Carcinogenic to Humans

NL = Not Listed

ACGIH – American Conference of Govermental Industrial Hygienists

A1 = Confirmed human Carcinogen

A2 = Suspected Human Carcinogen

A3 = Confirmed Animal Carcinogen

A4 = Not Classifiable as a Human Carcinogen

A5 = Not Suspected as a Human Carcinogen

EPA – U.S. Environmental Protection Agency

A = Human Carcinogen

K = Known Human Carcinogen

D = Not Classified as to Human Cacinogenicity. No Data Available

B1 = Probable Human Carcinogen. Sufficient Evidence from Epidemiology Studies

L = Likely to Product Cancer in Humans

B2 = Probable Human Carcniogen. Sufficient Evidence from Animal Studies

PART II: *What should I do if a hazardous situation occurs?*

SECTION 4 – FIRST AID MEASURES

EYES: Flush eyes with plenty of water or eye wash solution. Embedded metal particles should be removed by a trained individual such as a nurse or physician.

SKIN: If a rash develops, seek medical attention. Cuts or puncture wounds with embedded beryllium or beryllium compounds should be immediately and thoroughly cleansed by a medical practitioner

INGESTION: Not normally applicable.

INHALATION: If problems develop move to fresh air and seek medical attention.

SECTION 5 – FIRE & EXPLOSION DATA

FLAMMABLE PROPERTIES:

Castings in a solid form will not burn or explode. However, finely divided metal dust may burn or explode.

EXTINGUISHING MEDIA:

Use Class D extinguishing agents on dusts, fines or molten metal. Use coarse water spray on chips and turnings. DO NOT USE Halogenated agents on small chips, dusts or fines.

PROTECTION OF FIREFIGHTERS:

Firefighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing as appropriate for the surrounding fire.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Accidental release measures do not apply to solid castings. Dust collected from machining, welding, etc. may be classified as a hazardous waste. Consult federal, state, and local regulations.

PART III: How can I prevent hazardous situations from occurring?

SECTION 7 – HANDELING & STORAGE

RECOMMENDED STORAGE:

No special storage requirements needed. If possible keep dry.

PROCEDURES FOR HANDLING:

For castings with sharp edges, wear appropriate work gloves. When handling heavy castings wear appropriate foot protection. Hot and cold aluminum castings are not visually different.

SECTION 8 – EXPOSURE CONTROLS & PERSONAL PROTECTION

ENGINEERING CONTROLS:

No specific controls are needed when the casting is in a solid state. If welding, grinding or machining, local exhaust to maintain concentrations below PEL's and TLV's. Refer to Section 3 for exposure guidelines.

If ventilation is not adequate, wear a NIOSH approved dust and fume respirator.

If work is to be done in a confined space use appropriate confined space procedures (OSHA Standard 29 CFR 1910.146).

Grinding castings that have not been cleaned or that contain embedded sand may generate significant amounts of dust containing free silica, which can cause silicosis. Good local ventilation is frequently required to prevent over-exposure in this situation. If good ventilation is not available, use a NIOSH approved respirator.

PERSONAL PROTECTION:

Gloves:	Work gloves are advisable for handling castings.
Eye:	Safety glasses with side shields and/or face shield for particles (grinding). Welding goggles or welding helmet for cutting or welding.
Respiratory:	If an exposure limit is exceeded, a NIOSH approved half-face dust/mist respirator may be worn for up to ten times the exposure limits. A full piece dust/mist respirator may be worn for up to fifty times the exposure limit. For emergencies or instances where the exposure levels are not known, use a full face piece with positive pressure, air supplied respirator
Footwear:	Foot protection must be worn to protect against foot injury when heavy castings are handled.
Clothing:	Wear appropriate protective clothing if arc-air gouging, cutting or welding castings.
Other:	If noise is at or above 85 dBA, hearing protection should be worn. Refer to OSHA Standard 29 CFR 1910.95.

SECTION 9 – PHYSICAL & CHEMICAL PROPERTIES

PHYSICAL STATE: Solid	APPEARANCE: Yellow / Orange in Color
ODOR: None	VAPOR DENSITY: Not Applicable
MELTING POINT: 1981°F (1083°C) for Copper	SPECIFIC GRAVITY: 8.95
BOILING POINT: 4703°F (2595°C) for Copper	VAPOR PRESSURE: Not Applicable
FLASH POINT: Not Applicable for Solid Castings	EVAPORATION RATE: Not Applicable
FLAMMABILITY: Not Flammable	SOLUBILTY IN WATER: Insoluble
UPPER AND LOWER FLAMMABILITY LIMITS: Not Applicable for Solid Castings	pH: Not Applicable
AUTO IGNITION TEMPERATURE: Not Applicable	PERCENT VOLATILE BY VOLUME: Not Applicable
DECOMPOSITION TEMPERATURE: Not Applicable	PARTITION COEFFICIENT: Not Applicable

SECTION 10 – STABILITY & REACTIVITY

CHEMICALLY STABLE: Yes	CONDITIONS TO AVOID: Contact with chlorinated hydrocarbons

INCOMPATILITY:

Metal dust can burn or explode and must be protected from ignition sources such as grinding sparks, etc. Under some conditions, metal dust is incompatible with some oxidizing conditions and may be incompatible with oxidizers, acids and water and may ignite or explode.

CONDITIONS OF REACTIVITY: None	IMPACT / SHOCK SENSITIVITY: Not Applicable
HAZARDOUS DECOMPOSITION PRODUCTS: None	HAZARDOUS POLYMERIZATION: Not Applicable

PART IV: Is there any other useful information about this material?

SECTION 11 – TOXICOLOGY INFORMATION

No toxicological information is available for solid castings. There are extensive toxicological data available on the various components of this material. An adequate representation of all these data is beyond the scope of this document.

SECTION 12 – ECOLOGICAL INFORMATION

No ecological information is available for solid castings. There are extensive ecological data available on the various components of this material. An adequate representation of all these data is beyond the scope of this document.

SECTION 13 – DISPOSAL CONSIDERATIONS

Reuse or recycle material whenever possible. Dispose of according to federal, state and local regulations.

SECTION 14 – TRANSPORTATION INFORMATION

USA DEPARTMENT OF TRANSPORTATION (DOT) - HM181: Not Regulated	SHIPPING NAME: Not Regulated
CANADIAN TRANSPORT DANGEROUS GOODS (TDG):	UN / NA #:

Not Regulated	Not Regulated
HAZARD CLASS: Not Regulated	PACKING GROUP: Not Regulated
LABEL(S) REQUIRED: No	SPECIAL SHIPPING INFORATION: Not Applicable
INTERNATIONAL TRANSPORTATION REGULATIONS: Not Applicable	

SECTION 15 – REGULATORY INFORMATION

USA - OSHA (Hazard Communication Standard):

Reference 29 CFR 1910.1200, 1910.1000 and 1910.1025. A finished casting is an article as defined in the OSHA Hazard Communication Standard 29CFR 1910.1200 (c). Dust or fumes generated by cleaning, machining, grinding, or welding of the casting may produce airborne contaminants, such as aluminum, cobalt, copper, iron, lead, manganese, nickel, tin, zinc and silica.

USA - EPA (Toxic Substances Control Act – TSCA):

All constituents of these products are already on the TSCA inventory list or are excluded from listing.

USA - EPA (SARA Title III):

The following constituents, **Aluminum dust or fume, Cobalt, Copper, Lead, Manganese, Nickel, and Zinc dust or fume** make this product subject to reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 72. Quantity threshold amounts are 25,000 pounds for manufacturing, importing or processing and 10,000 pounds for otherwise used.

CANADA - WHMIS (Workplace Hazardous Materials Information System):

This MSDS has been prepared according to the hazard criteria of the Controlled Product Regulations (CPR) and the MSDS contains the information required by the CPR.

CEPA (Canadian Environmental Protection Act):

Lead and Nickel Oxide are on the CEPA Toxic Substances List

CANADIAN DSL (Domestic Substance List) Inventory Status:

All components of these products are on the DSL Inventory.

EINECS No. (European Inventory of Commercial Chemical Substances):

All components of these products are on the EINECS list.

RoHS (Restriction of Hazardous Substances):

Castings containing lead may be regulated by

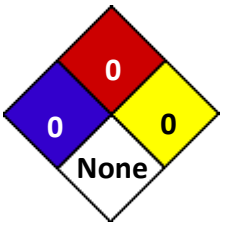
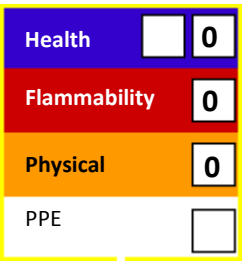
CALIFORNIA PROPOSITION 65:

WARNING: This product contains or produces chemicals known to the State of California to cause cancer and birth defects (or other reproductive harm). (California Health & Safety Code 25248.5 et seq.)

U.S. STATE REGULATORY INFORMATION:

Some of the components listed in Section 3 may be covered under specific state regulations.

SECTION 16– OTHER INFORMATION

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) RATINGS: For Castings in Solid Form	**HAZARDOUS MATERIALS INFORMATION SYSTEM (HMIS) RATINGS:** For Castings in Solid Form
	

OSHA STANDARD 29 CFR 1910.1200:

All needed label information is displayed in this MSDS.

Note:

This data is offered in good faith as typical values and not as a product specification. No warranty either expressed or implied is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review the recommendations in specific context of the intended use and determine if they are appropriate.

MSDS SHEET PREPARED BY: Joshua Stollar MSDS Coordinator / Engineer	REVISION: 0 DATE: 10/29/08