CONTENTS DESCRIPTION OF MATERIAL SAFETY DATA SHEETS

These definitions are intended for use with Material Safety Data Sheets supplied by O'Fallon Casting. Questions concerning these sheets should be directed to:

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SECTION I - PRODUCT IDENTIFICATION

Chemical Name: A name consistent with the nomenclature system of the International Union of Pure & Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS).
Trade Name: The name the product is sold by, i.e., the product name.
Chemical Family: A general designation for a group of elements or compounds.
Formula: The scientific designation for an element or compound.

SECTION II - HAZARDOUS CONSTITUENTS

Constituent(s): The chemical component(s) of the product. A hazardous constituent is a chemical which is a physical hazard or health hazard.
Percent: The amount of component or range present in the product and expressed on a weight basis.
CAS Number: A specific chemical identification number assigned by the Chemical Abstracts Service. The lack of a CAS Number for any given chemical or mixture indicates that a number may not have been assigned.
NIOSH RTECS Number: The National Institute for Occupational Safety & Health (NIOSH) Registry of Toxic Effects of Chemical Substances (RTECS) Access Number for a specific element or compound's toxicological data.
OSHA PEL: The Occupational Safety & Health Administration (OSHA) Permissible Exposure Limit (PEL) - usually a time weighted average (TWA) ceiling limit (C) or maximum peak exposure limit (P) expressed as PPM (parts per million) or as Mg/M^3 (milligrams per cubic meter).
ACGIH TLV: The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) - in many cases, identical to the OSHA PEL ACGIH also recommends a short term exposure limit (STEL) for certain substances that should not be exceeded at any time.

SECTION III – PHYSICAL PROPERTIES

Freezing Point: The temperature at which a liquid changes to a solid. A range may be given.
Melting Point: The temperature at which a solid changes to a liquid. A range may be given.
Boiling Point: The temperature at which a liquid changes to a vapor. Usually expressed at sea level pressure(760mmHg)
Sublimes @: The temperature at which a solid changes directly to vapor.
Evaporation Rate: Indicated as faster or slower than Ethyl Ether unless stated.
Appearance and Odor: A description of the product in terms of form, color, odor, etc.
Vapor Pressure(mmHg): The pressure of a saturated vapor above a liquid expressed as mmHg at 20˚C, unless stated at a different temperature.
Vapor Density(Air=1): The relative density of a vapor or gas compared to a equal volume of air. Air is equivalent to 1.0.
Specific Gravity(H_2O=1): The ratio of the weight of a volume of material to the weight of an equal volume of water. Water is equivalent to 1.0 @ 4˚C. The term "DENSITY" describes the concentration of matter as the mass per unit of volume, e.g., pounds/cubic inch.
Solubility In Water: The degree to which a material is capable of dissolving in water.
% Volatiles By Volume: The volumetric percentages of volatile compounds in a product.

SECTION IV - FIRE, EXPLOSION AND REACTIVITY INFORMATION

Flash Point (With Test Method): The lowest temperature at which a vapor/air mixture will propagate a flame above the surface of the material being tested.

Flammable (explosive) Limits VN%:

LEL: LOWER EXPLOSION LIMIT: The lowest vapor concentration in air at which ignition by spark or flame will occur.

UEL: UPPER EXPLOSION LIMIT: The highest vapor concentration in air at which ignition by spark or flame will occur.

Extinguishing Media: The type of fire extinguishing media to be used taking into account the type of chemical and its flammable characteristics.

Special Fireflghting Procedures: Indicates equipment to protect firemen from toxic products of combustion.

Unusual Fire and explosion Hazards: Chemical changes that may occur under heat or fire conditions.

General Reactivity: The tendency of a material to undergo chemical reaction with the release 0' energy.

Incompatibility (Materials to Avoid): Materials which could cause dangerous reactions.

Hazardous Decomposition Products: The breakdown of a material into compounds or elements that may have specific hazard properties different than the original material.

SECTION V . HEALTH HAZARD INFORMATION

Primary Route(s) of Exposure:

Inhalation: The breathing in of a gas, dust, fume, vapor, or mist as a contribution to exposure.

Ingestion: The swallowing of a substance as a contribution to exposure.

Skin: The contribution to exposure by the cutaneous route, either skin absorption or skin contact.

Eyes: The effect of chemical exposure on the eye.

Toxicity: The available toxicological data usually expressed as lethal dose or lethal concentration of the material or its components. Most toxicity test results are from exposure tests conducted on animals, such as rats or mice, and caution is recommended in making direct comparison to human beings.

Effect of Overexposure:

Acute: Rapid effects of exposure with severe symptoms.

Chronic: Effects due to exposure that develop slowly over a long period of time or which recur frequently.

Carcinogenic References: Available references which indicate the potential for a material to cause cancer in man or animals. Medical Conditions Aggravated By Exposure: Medical conditions that warrant consideration regarding exposure to a toxic substance.

SECTION VI. EMERGENCY &: FIRST AID PROCEDURES

Inhalation: Emergency action to address adverse effects due to inhalation of a hazardous material.

Ingestion: Emergency action to address adverse effects due to ingestion of a hazardous material.

Skin: Emergency action to address adverse effects due to skin contact or absorption of a hazardous material. Eyes: Emergency action to address adverse effects or injury to the eye due to contact with a hazardous material.

SECTION VII-INDUSTRIAL HYGIENE CONTROL MEASURES

Ventilation: Recommended type of ventilation for control of gases or particulate.

Respiratory Protection: General information on the type of respiratory protection recommended.

Protective Gloves: Recommendation for protection to prevent hand contact with the material.

Eye Protection: Recommendation to protect against eye injury.

Other Protective Equipment: Other personal protective equipment (PPE) such as clothing, safety shoes, etc. that may be appropriate to protect against injury or exposure.

Recommended Monitoring Procedures:

Environmental Surveillance: Personal air sampling or related procedures to evaluate exposure of an individual.

Medical Surveillance: Biological monitoring or related tests/examinations to evaluate the effects of exposure to an individual.

SECTION VIII. ENVIRONMENTAL PROTECTION INFORMATION

Step. To Be Taken If Material Is Released Or Spilled: Specifically refers to containment, cleanup and control.
Waste Disposal Method: Refers to recommended disposal practices or applicable regulatory requirements when known.
Environmental Hazards: Refers to information such as aquatic or vegetative toxicity, ambient air pollution concerns, etc. which are available from regulatory or published technical services.
Environmental Hazards: Refers to information such as aquatic or vegetative toxicity, ambient are pollution concerns, etc. which are available from regulatory or published technical service.

O'FALLON CASTING
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MATERIAL SAFETY DATA SHEET

This Material Safety Data Sheet (MSDS) provides information on a specific group of manufactured metal products. Since these metal products share a common physical nature and constituents, the data presented are applicable to alloys as listed by the indicated alloy numbers in the following table.

"Many substances do not have a unique exposure limit. The absence of an exposure limit does not lessen consideration for exposure risk. In the absence of specific information, professional judgment may be required.

MSDA IDENTIFICATION NUMBER	DATE ISSUED / DATE REVISED	ISSUED BY	EMERGENCY PHONE
C200	**11-15-85** / **6/18/04**	**O'Fallon Casting**	NUMBER 636-272-6176 CHEMTREC: 800.424.9300

I. PRODUCT IDENTIFICATION

CHEMICAL NAME	CHEMICAL FAMILY	TRADE NAME	FORMULA
Copper Casting	**Alloy**	**N.A.**	**See Table For Percentages**

II. HAZARDOUS CONSTITUENTS

CONSTITUENT	NOMINAL PERCENT CONTENT OF ELEMENTAL CONSTITUENTS FOR ALLOW DESIGNATION SHOWN											CAS NUMBER	NIOSH RTECS NUMBER	EXPOSURE LIMITS (AS MG/M3)	
														OSHA PEL	ACIGH TLV
ALLOY NO.	**836**	**854**	**861**	**862**	**863**	**874**	**903**	**954**	**955**	**815**	**855**				
COPPER	84.0-86.0	65.0-70.0	86.0-68.0	60.0-66.0	60.0-66.0	79.0 Min.	86.0-89.0	83.0 Min.	78.0 Min.	REM	59.0-63.0	7440-50-8	GL 5325 000	DUST 1.0 FUME.1	DUST 1.0 (2.0 STEL) FUME 2.0
ALUMINUM	.005	.35	4.5-5.5	3.0-4.9	5.0-7.5	.8	.005	10.0-11.5	10.0-11.5	.1 MAX	-	7429-90-5	BO 0330 000	NONE	DUST 10.0 FUME 1.0
ZINC	4.0.6.0	24.0-32.0	17.0-25.0	22.0-28.0	22.0-28.0	12.0.16.0	3.0.5.0	-	-	.1 MAX	REM	7440-66-6	ZG 8600 000		FUME 10.
TIN	4.0-6.0	.5-1.5	.2	.2	.2	-	7.9-9.0	-	-	.1 MAX	.20	7440-31-5	XP 7320 000		2. TWA (4. STEL)
LEAD	4.0-6.0	1.5-3.8	.2	.2	.2	.10	.3	-	-	.02 MAX	.20	7439-92-1	OF 7525 000	.030 (Action) .050 TWA	.15 (.45 STEL)
NICKEL	1.0	1.0	-	1.0	1.0	-	1.0	2.5	3.0-5.5	-	.20	7440-20-0	OR 5950 000	1.0	1.0
IRON	.30	.7	2.0-4.0	2.0-4.0	2.0-4.0	-	.2	3.0-5.0	3.0'5.0	.1 MAX	.20	1309-37-1	NO 7400 000	10.0	FUME 5.0 IRON OXIDE
SILICON	.005	.05	-	-	-	2.5-4.0	.005	-	-	.15MAX	-	7440-21-3	VW 0400 000	NONE	TOTAL DUST 10.0 RESPIRABLE 5.0
MANGANESE	-	-	2.5-5.0	2.5-5.0	2.5-5.0	-	-	.5	3.5	-	.20	7439-96-5	OO 9275 000	5.0 CEILING	DUST 5.0 (3.0STEL) FUME 1.0
PHOSPHORUS	.05	-	-	-	-	-	.05	-	-	-	-	7723-14-0	TH 3500 000		.1 TWA (.3 STEL)
SULFUR	.08	-	-	-	-	-	.05	-	-	-	-	7704-34-9	WS 4200 000	NONE	NONE
MAGNESIUM	-	-	-	-	-	-	.2	-	-	-	-	7439-95-4	OM 2100 000		10 TWA
ANTIMONY	.25	-	-	-	-	-	-	-	-	.005	-	7440-36-0	CC 4025 000		.5 TWA
CHROMIUM	-	-	-	-	-	-	-	-	-	.4-1.5	-	7440-47-3	GB 4200 000	1.0	.5

III. PHYSICAL PROPERTIES	
FREEZING POINT: Not Applicable	VAPOR PRESSURE (mmHg): Not Applicable
MELTING POINT: see Section II	VAPOR DENSITY (AIR=1): Not Applicable
BOILING POINT: Not Applicable	SPECIFIC GRAVITY (Hz0=1): See Section II
SUBLIMES @: Not Applicable	SOLUBILITY IN WATER: None
EVAPORATION RATE: Not Applicable	% VOLATILES BY VOLUME: None
APPEARANCE AND ODOR: Solid Silver Gray to Brass Color No Odor	

IV. FIRE, EXPLOSION AND REACTIVITY INFORMATION	
FLASH POINT (WITH TEST METHOD) None	FLAMMABLE (EXPLOSIVE) LIMITS VN% LEL: None UEL: None
EXTINGUISHING MEDIA	This alloy is noncombustible. Use extinguishing media appropriate to the surrounding fire.
SPECIAL FIREFIGHTING PROCEDURES	If this material is reduced to powder form, caution must be used to prevent fire or explosion. To extinguish a metal powder fire use dry sand, dry graphite or other class "D' fire extinguishing powder.
UNUSUAL FIRE AND EXPLOSION HAZARDS	No unusual fir or explosion hazards are associated with this material.
GENERAL REACTIVITY	This alloy is a stable material.
INCOMPATIBILITY (MATERIALS TO AVOID)	Avoid contact with mineral acids and oxidizing agents which may generate hydrogen gas; the evolution of hydrogen may be an explosion hazard.
HAZARDOUS DECOMPOSITION PRODUCTS	Various elemental metals and metal. oxides may be generated from melting or dross handling operations. Refer to Section II for permissible exposure limits.

V. HEALTH HAZARD INFORMATION	
PRIMARY ROUTE(S) OF EXPOSURE	INHALATION: Inhalation of metal dust, fume or powder may result from melting, dross handling, casting, welding, grinding, crushing or similar operations which generate airborne metal particulate during use of this material.
	INGESTION: Hand, clothing, food and drink contact with metal dust, fume or powder can cause ingestion of particulate during hand to mouth activities such as eating, drinking, smoking, nail biting, etc.
	SKIN: In some sensitive individuals, skin contact with this material may cause an allergic response if elements such as cobalt, copper and nickel are present. In the form of metal dust or powder, skin contact or abrasion may also cause irritation or dermatitis.
	EYES: Particulate metal (dust, fume or powder) may be dangerous to the. and surrounding tissue. Airborne particulate (chips, dust or powder) Is always a potential problem as well as inserting fingers into the eye socket If the hand or clothing Is contaminated with metal particulate.
TOXICITY	There is no information on the toxicity of this alloy. Under normal handling and use of the solid form of this material there are few health hazards. Cutting, welding, melting, grinding, etc. of this material will produce dust, fume or particulate containing the component elements of this material. Exposure to the dust, fume or particulate may present significant health hazards which are referable to the elemental constituents in Section II.

EFFECTS OF OVEREXPOSURE	ACUTE: The metal dust and fumes of those elements in Section II can cause irritations to the skin, eye and mucous membranes. Contact with cobalt, copper and nickel may cause allergic skin reactions. As dust, powder or fume, exposure which abrades the skin can cause irritation and dermatitis. Injury to the eyes is generally a result of particulate Irritation or mechanical injury to the cornea or conjunctiva by dust or particulate. excessive Inhalation of copper and nickel can cause respiratory irritation, cough, bronchitis, chills, "fume fever" and asthma-like symptoms.
	CHRONIC: Respiratory disease with symptoms ranging from shortness of breath and cough to permanent disability due to loss of lung function, fibrosis or subsequent effects on the heart may be caused by excessive exposure to dust or fumes containing beryllium, cobalt and nickel. Inhalation or ingestion of lead in excess concentrations can cause lead poisoning. Beryllium, lead and nickel metal and certain compounds have been linked to nasal, bronchial and lung cancers. Inhalation of beryllium in excess concentrations can cause a serious lung disease: berylliosis. Chronic health effects specific to en element(s) may be difficult to detect due to the numerous elemental constituents in this alloy.
CARCINOGENIC REFERENCES	Beryllium, nickel and lead metal and some of their compounds have been listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. Detailed information from these sources may be obtained from the following: IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man; Geneva. WHO, IARC 1972-1977 (Multivolume work) 49 Sheridan Street, Albany, NY 12219. Third Annual Report on Carcinogens, Summary, September, 1983 NTP 82-330 NTP Public Information Office, MD B2-04 Box 12233, Research Triangle Park, NC 27709.
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE	Individuals who may have had allergic reaction or sensitivity to metals such as cobalt, copper and nickel may encounter skin rash or dermatitis If skin contact with this product occurs. Persons with impaired pulmonary function. airway diseases and conditions such as asthma, emphysema. chronic bronchitis, etc. may incur further disability if excessive concentrations of dust or fume are inhaled. If prior damage or disease to the Neurological (nervous), Circulatory, Hematological (blood) or Renal (kidney) systems has occurred, proper screening or examinations should be conducted on Individuals who may be exposed to further risk if handling and use of this material causes excessive exposure.

VI. EMERGENCY AND FIRST AID PROCEDURES	
INHALATION	Breathing difficulty caused by Inhalation of dust or fume requires removal to fresh air. If breathing has stopped, perform artificial respiration and obtain medical assistance at once.
INGESTION	Swallowing metal powder or dust can be treated by having the affected person swallow large quantities of water and attempting to induce vomiting if conscious. Obtain medical assistance at once.
SKIN	Skin cuts and abrasions can be treated by standard first aid. Skin contamination with dust or powder can be removed by washing with soap and water. If Irritation persists obtain medical assistance.
EYES	Dust or powder should be flushed from the eyes with copious amounts of clean water. If Irritation persists obtain medical assistance. Contact lenses should not be worn if working with metal dusts or powders.

VII. INDUSTRIAL HYGIENE CONTROL MEASURES		
VENTILATION	Local exhaust ventilation should be used to control exposure to airborne dust and fume whenever possible.	
RESPIRATORY PROTECTION	Use NIOSH approved respirators as specified by an Industrial Hygienist or qualified Safety Professional. Lung function tests are recommended for users of negative pressure devices.	
PROTECTIVE GLOVES	Wear gloves to prevent metal cuts and skin abrasions particularly during handling of wrought forms, solid metal sheet, strip or tube.	
EYE PROTECTION	Wear safety glasses when risk of eye injury is present particularly during machining, grinding. welding, powder handling etc.	
OTHER PROTECTIVE EQUIPMENT	Protective clothing such as uniforms, disposable coveralls, safety shoes, etc. may be required during metal handling operations as appropriate to the circumstances of exposure.	
RECOMMENDED MONITORING PROCEDURES	ENVIRONMENTAL SURVEILLANCE: Exposure to the elements identified in Section II can be best determined by having air samples taken in the employee breathing zone, work area or department.	MEDICAL SURVEILLANCE: Lung function tests, chest x-rays and routine physical examinations may be useful to determine effects of dust or fume exposure.

VIII. ENVIRONMENTAL PROTECTION INFORMATION	
STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	In solid form this material poses no special cleanup problems. If this material is in powder or dust form. Cleanup should be conducted with a vacuum system utilizing a high efficiency particulate air filtration system. Caution should be taken to minimize airborne generation of powder or dust and avoid contamination of air and water. Properly label all materials collected in waste container.
WASTE DISPOSAL METHOD	Prior to disposal consider if the material has recovery value. State or federal regulations may require specific labeling, packing. storage. transportation and disposal procedures. Contact an Environmental Engineer or consultant familiar with waste disposal regulations.
ENVIRONMENTAL HAZARDS	In solid form this material poses no special environmental problems. Metal powders or dusts may have significant impact on air and water quality. Airborne emissions, spills and releases to the environment (discharge to streams. sewer systems. ground water, surface soil, etc.) should be controlled immediately. If such potential for a spill or release exists it is advisable to develop an emergency spill response plan.