

ThyssenKrupp Materials NA, Inc.
MATERIAL SAFETY DATA SHEET
COPPER/COPPER ALLOYS

SECTION I. MATERIAL IDENTIFICATION

COMPANY ThyssenKrupp Materials NA, Inc. 22355 West Eleven Mile Road Southfield, Michigan 48033	RE-ISSUE DATE 2-Jan-06	IDENTIFICATION NUMBER N/A
TRADE NAME Copper/Copper Alloys	EMERGENCY PHONE NUMBER (248) 233-5681	PREPARED BY: L. J. Switaj
CHEMICAL NAME Copper	FORMULA DOT N/A	IDENTIFICATION NO. N/A

SECTION II HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	PHYSICAL	OSHA-PEL	ACGIH-TLV	ACGIH
ELEMENTS	Description	8-HR. - TWA	8-HR TWA (1988-89)	STEL (1988-89)
Aluminum	(Dust) (Fume)	15 mg/m3 5 mg/m3	10 mg/m3 5 mg/m3	
Antimony		0.5 mg/m3	0.5 mg/m3	
Arsenic		0.5 mg/m3	0.02 mg/m3	
Beryllium		0.002 mg/m3	0.002 mg/m3	0.005*
Bismuth telluride	(Dust)	15 mg/m3	15 mg/m3	
Boron oxide	(Dust)	15 mg/m3	10 mg/m3	
Cadmium	(Dust) (Fume)	0.2 mg/m3 0.05 mg/m3	0.05 mg/m3 0.05 mg/m3*	
Calcium oxide		5 mg/m3	5 mg/m3	
Carbon black		3.5 mg/m3	--	
Chromium		1 mg/m3	0.5 mg/m3	
Cobalt		0.05 mg/m3	0.1 mg/m3	
Copper	(Dust) (Fume)	1 mg/m3 0.1 mg/m3	1 mg/m3 0.2 mg/m3	
Iron		10 mg/m3	5 mg/m3 (As iron oxide fume)	
Lead ³		0.05 mg/m3	0.15 mg/m3	
Lithium hydride		0.025 mg/m3	.025 mg/m3	
Manganese	(Dust) (Fume)	5 mg/m3 --	5 mg/m3 1 mg/m3	3 mg/m3
Magnesium oxide	(Dust)	15 mg/m3	10 mg/m3	
Nickel		1 mg/m3	1 mg/m3	
Phosphorus		0.1 mg/m3	0.1 mg/m3	
Selenium		0.2 mg/m3	0.2 mg/m3	
Silicon	(Dust) (Fume)	10 mg/m3 5 mg/m3	10 mg/m3 ² --	
Silver		0.01 mg/m3	0.1 mg/m3	
Sulphur Dioxide		13 mg/m3	5 mg/m3	5/10 mg/m3
Tellurium		0.1 mg/m3	0.1 mg/m3	
Tin ²		2 mg/m3	2 mg/m3	0.2 mg/m3 (contemplated)
Titanium dioxide	(Dust)	15 mg/m3	10 mg/m3	
Zinc	(Dust) ¹ (Fume)	10 mg/m3 5 mg/m3	10 mg/m3 5 mg/m3	10 mg/m3
Zirconium		5 mg/m3	5 mg/m3	10 mg/m3

*Ceiling Limit
Note: antimony trioxide, beryllium, cadmium, chromium, cobalt-chromium alloy, lead and nickel have been identified as potential human carcinogens. # denotes a toxic chemical or chemicals subject to reporting requirements of Section 313 of Title III of the S.A.R.A. of 1986 and CFR Part 372.
¹ Value is for total dust containing no asbestos and less than 1% free silicon.
² Contemplated change to 0.2 STEL and 0.1 TWA.
³ Under court remand.
PEL=Permissible Exposure Limit

ThyssenKrupp Materials NA, Inc.
MATERIAL SAFETY DATA SHEET
COPPER/COPPER ALLOYS

SECTION III. PHYSICAL DATA

MATERIAL (At Normal Conditions) SOLID	APPEARANCE AND ODOR Silver or Yellow to Red; No Odor
MELTING POINT 1290° - 2260°F	SPECIFIC GRAVITY 7.45 - 9.00

SECTION IV. FIRE AND EXPLOSIVE

Flash Point: (Method Used) Not Applicable	Extinguishing Media: See Below
Flammable Limits (LEL-UEL) Not Applicable	Auto Ignition Temp.-Not Applicable
<p>Special Fire Fighting Procedures: Solid massive form is not combustible. Fire and explosion hazards. are moderate when material is in the form of dust and exposed to heat, flames, chemical reaction, or in contact with powerful oxidizers. Use special mixtures of dry chemical or sand. Firefighters should wear NIOSH/MSHA self-contained breathing apparatus and protective clothing. Molten metal may react violently with water.</p> <p>NFPA & HMIS Rating - Flammability: 0 Reactivity: 2 Health: 0 Special Hazards: 0</p>	

SECTION V. REACTIVITY DATA

STABILITY Stable	CONDITIONS TO AVOID Stable under normal conditions of transport and storage. Molten metal may react violently with water.	
HAZARDOUS DECOMPOSITION PRODUCTS Metal fume.	Incompatibility (Materials to Avoid): Acids, bases, and oxidizers.	Hazardous Polymerization: Will not occur.

SECTION VI. HEALTH HAZARD DATA

<p>Permissible exposure limits and threshold limit values. See Section II.</p> <p>Routes) of Entry: Inhalation: Yes; Skin: Yes; Ingestion: Yes</p> <p>Under normal handling conditions the solid alloy presents no significant health hazards. Processing of the alloy by dust or fume producing operation (grinding, buffing, heating, welding, etc.) may result in the potential for exposure to airborne metal particulates or fume. The exposure levels in Section II are relevant to fumes and dusts.</p>	
EFFECTS OF OVEREXPOSURE:	
Acute -	Dust or fume may cause irritation to the eyes, nose, or throat and may leave a metallic taste in the mouth. Inhalation of oxides of Manganese, or Copper may be manifested as flu-like symptoms commonly known as "metal fume fever". Phosphorous dust is considered a nuisance dust.
Chronic -	
Aluminum:	Inhalation of Aluminum Oxide fume or an accumulation of Silicon in the lungs may result in benign pneumoconiosis.
Antimony:	Antimony and its compounds are irritating to the skin and mucous membranes and are systemic poisons.
Beryllium:	Inhalation of beryllium dust or fume may cause chronic beryllium disease (CBD) and is a cancer hazard.
Cadmium:	Inhalation of cadmium fumes may cause respiratory irritation with a sore, dry throat and a metallic taste followed by a cough, chest pain, and difficulty in breathing. The liver, kidneys and bone marrow may be injured by the presence of the metal.
Cobalt:	Lung inflammation and damage, and diffuse pulmonary fibrosis from inhalation. Classified as a carcinogen by IARC.
Chromium:	May enter and affect the body through Inhalation, Ingestion, or skin contact. The National Toxicology Program (NTP) and the Internal Agency for Research on Cancer (IARC) report they possess sufficient evidence to establish a causal relationship for human cancer from Chromium.
Copper:	Inhalation may cause nose and throat irritation and metal fume fever and prolonged contact may cause dermatitis, discoloration of skin, hair and teeth.
Iron:	Inhalation of Iron Oxide fume or dust may result in a condition known as siderosis.
Lead	Lead compounds can be toxic when Ingested or inhaled. Lead is a cumulative poison and excessive exposure can have an adverse effect on human reproduction. Acute exposure to lead can be manifested as abdominal pain, nausea, constipation, anorexia, or vomiting, and in severe cases death.
Manganese:	Inhalation may result in symptoms such as headache, restlessness, neurological dysfunction, or muscular weakness.
Nickel:	Inhalation may result in inflammation of the respiratory tract and fever. The National Toxicology Program (NTP) and the International Agency for Research on Cancer (IARC) report they possess limited evidence for human cancer from Nickel and Nickel compounds
Silicon	An accumulation of Silicon in the lungs may result in benign pneumoconiosis.
Tin	May cause eye, skin, and respiratory system irritation.
Zinc	Dust or fume may cause irritation to the eyes, nose, or throat and may leave a metallic taste in the mouth. Inhalation of oxides may cause "metal fume fever"
Coatings	If coated with oil, contact may cause skin irritation/dermatitis
Welding Fume	Is listed as a possible carcinogen to humans.
NOTE:	Antimony trioxide, beryllium, cadmium, chromium, cobalt-chromium alloy, lead and nickel have been identified as potential human carcinogens.

ThyssenKrupp Materials NA, Inc.
MATERIAL SAFETY DATA SHEET
COPPER/COPPER ALLOYS

SECTION VII. EMERGENCY AND FIRST AID PROCEDURES

Inhalation	In the event of excessive exposure to dust or fume, remove the employee to fresh air. If breathing is difficult administer artificial respiration or oxygen. Obtain immediate medical assistance.
Skin:	Abrasions and cuts should be washed and closed by a clean compress and be immediately medically treated. Should skin irritation occur, wash affected area with mild soap and rinse with clean warm water. Obtain medical assistance.
Eyes:	Depending on the type and nature of exposure, relief may be obtained by fresh air or rinsing the eyes with clean water. Obtain medical assistance.
Medical Conditions Aggravated by Exposure:	Persons with a predisposition to respiratory disorders may be adversely affected by particulates or respiratory irritants generated during the mfg. process.

SECTION VIII. SPECIAL PROTECTION INFORMATION & CONTROL MEASURES

Note:	Consult your regional codes or Code of Federal Regulations, Title 29, Part 1910. Subpart G-Occupational Health and Environmental Control, Subpart I Personal Protective Equipment. Subpart P-Welding, Cutting, and Brazing, and Subpart Z-Toxic and Hazardous Substances. Certain welding type activities may produce hazardous substances such as carbon monoxide, ozone, phosgene in the presence of certain chemicals, or produce Inert suffocating atmospheres in addition to the production of ultraviolet radiation and/or noise.
Ventilation:	Additional air make up systems may be required if, local exhaust or ventilation systems are not sufficient to maintain exposure levels to contaminants below prescribed limits. When inhalation controls are not sufficient to reduce the exposure below the applicable exposure limit then use OSHA/NIOSH approved respiratory protection within the use limitations of the respirator.
Personal Protection:	To avoid contact use appropriate protective gloves or clothing to protect against cutting edges Appropriate heat shielding garments should be used for activities using or generating heat. Eyes should be protected by using safety glasses, goggles, helmet, face shield as appropriate to the operation
Precautions to be taken in handling and storage:	Be alert to sharp edges and unsecured Lifts.

SECTION IX. OTHER INFORMATION

SARA Section 313 Toxic Chemical List, de minimis Concentrations	
> 1.0%: Copper, Aluminum, Zinc, and Manganese	TSCA Status All components are listed on the TSCA inventory
> 0.1%: Chromium, Cobalt, Lead, and Nickel	CERCLA Hazardous Substances Chromium, Lead, Copper & Zinc
California Proposition 65	
	The state of California lists chromium (Hexavalent compounds), nickel, lead, and cobalt as chemicals known to cause cancer and reproductive toxicity. Cadmium, cadmium compounds, and lead may be present as impurities of the manufacturing process. Chromium (Hexavalent compounds) may be generated during certain manufacturing processes.

LIABILITY DISCLAIMER

The Information contained in this Material Safety Data Sheet (MSDS) is believed to be correct as it was obtained from sources which we believe are reliable, including "Threshold Limit Values & Biological Exposure Indices for 1988-1989" (American Conference of Government & Industrial Hygienists), Air Contaminates-Permissible Exposure Limits (Title 29 Code of Federal Regulations, part 1910.1000-OSHA (Cleveland Area Office) letter of 6/15/89. However, no representations, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications, hazards connected with the use of the material, or the results to be obtained from the use thereof. User assumes all risk and liability of any use, processing the material and handling of any material, variations in methods, conditions and equipment used to store, handle or process the material and hazards connected with the use of the material are solely the responsibility of the user and remain at his sole discretion.

Compliance with all applicable federal, state, and local laws and regulations remains the responsibility of the user, and the user has the responsibility to provide a safe workplace, to examine all aspects of its operation and to determine if or where precautions, in addition to those described herein, are required.

Note: The copper and copper alloy products are in solid form and will not result in an environmental exposure in such form. We cannot anticipate all the processes or applications to which this product might be subjected or which create exposures. The information supplied has been furnished by our suppliers and consequently, our company assumes no responsibility for the accuracy or completeness of the data contained herein.