

Date: October 1, 2000

Revision: 4

MATERIAL SAFETY DATA SHEET

IMPORTANT: Read this MSDS before handling and disposing of this product and pass this information on to employees, customers, and users of this product.

ANSONIA COPPER & BRASS, INC.

75 Liberty Street
Ansonia, Connecticut 06401

Telephone: (203)732-6600

SECTION I - MATERIAL IDENTIFICATION

Copper and Brass Alloys - Wire, rod, large diameter tubing and scrap metal.

Section 313 Supplier Notification - Copper and brass alloys contain listed "toxic chemicals" which are subject to Toxic Release Inventory (TRI) reporting under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA). The reportable chemicals are underlined in Section II. For additional information on reporting requirements, contact the RCRA/EPCRA hot line at 800-535-0202.

SECTION II - HAZARDOUS INGREDIENTS

| | CAS Number | | OSHA-PEL 8-hr TWA | ACGIH-TLV 8-hr TWA | ACGIH STEL |
|-----------------------------------------|----------------------------|---------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------|
| <u>Aluminum</u> | (7429-90-5) | (Dust)(1)(2) (Dust)(5) | Total Dust = 15 mg/m ³ Resp. Dust = 5 mg/m ³ | 10 mg/m ³ 5 mg/m ³ | -- -- |
| <u>Arsenic</u> | (7440-38-2) | (1)(4) | 0.010 mg/m ³ | 0.01 mg/m ³ | -- |
| <u>Cadmium</u> | (7440-43-9) (1306-19-0) | (Dust)(1) (Fume)(2) | 0.005 mg/m ³ 0.005 mg/m ³ | Total Dust = 0.01 mg/m ³ Resp. Dust = 0.002 mg/m ³ | -- -- |
| <u>Chromium</u> Metal & Insol. Salts | (7440-47-3) | (1)(3) | 1.0 mg/m ³ | 0.5 mg/m ³ | -- |
| <u>Copper</u> | (7440-50-8) | (Dust)(1) (Fume)(1) | 1 mg/m ³ 0.1 mg/m ³ | 1 mg/m ³ 0.2 mg/m ³ | -- -- |
| Iron | (1309-37-1) | (2) (Fume) | 10 mg/m ³ | 5 mg/m ³ | -- |
| <u>Lead</u> | (7439-92-1) | (Dust)(Fume) | 0.05 mg/m ³ | 0.05 mg/m ³ | -- |
| <u>Manganese</u> | (7439-96-5) | (Dust)(1)(3) (Fume)(1) | 5 mg/m ³ 5 mg/m ³ | -- -- | -- 3 mg/m ³ |
| <u>Nickel</u> | (7440-02-0) | (1) | 1 mg/m ³ | -- | -- -- |
| <u>Phosphorus</u> | (7723-14-0) | (1) | -- | 0.1 mg/m ³ | -- |
| Silicon | (7440-21-3) | (1)(Dust) (5) | Dust Total = 15 mg/m ³ Resp. Dust = 5 mg/m ³ | 10 mg/m ³ | -- |
| <u>Silver</u> | (7440-22-4) | (1) (4) | 0.01 mg/m ³ | 0.1 mg/m ³ 0.01 mg/m ³ | -- -- |
| Tellurium | (13494-80-9) | (1)(3) | 0.1 mg/m ³ | 0.1 mg/m ³ | -- |
| Tin | (7440-31-5) | (1) | 2 mg/m ³ | 2 mg/m ³ | -- -- |
| <u>Zinc</u> | (7440-66-6) | (2) Fume | 5 mg/m ³ | 5 mg/m ³ | 10 mg/m ³ |
| Zirconium | (7440-67-7) | (3) | 5 mg/m ³ | 5 mg/m ³ | 10 mg/m ³ |

(1) As Metal -- (2) As Oxide -- (3) As Compounds -- (4) As Soluble Compounds -- (5) As Respirable Dust

NOTE: Arsenic, cadmium, chromium, lead and nickel have been identified as potential human carcinogens.

SECTION III - PHYSICAL DATA

| | | | |
|--------------------------|---------------------------|---------------------------------|-------------------------|
| Physical Form: | Solid* | Specific Gravity: | 7.4 - 9.0 |
| Boiling Point: | Not Applicable | Vapor Density: | Not Applicable |
| Freeze-Melt Temperature: | Approximately 1500-2260°F | Solubility in H ₂ O: | Insoluble |
| Vapor Pressure: | Not Applicable | Color: | Silver or Yellow to Red |
| Evaporation Rate: | Not Applicable | Odor: | None |

*Metal residues may include dust and flakes as oxides.

SECTION IV - FIRE AND EXPLOSION DATA

Flash Point: (Method Used) Not Applicable Auto Ignition Temp.: Not Applicable Flammable Limits: (LEL-UEL) Not Applicable

Solid massive form is not combustible under normal conditions. Fire and explosion hazards are moderate when material is in the form of dust and fine powder and exposed to heat, flames, sparks, chemical reaction or in contact with oxidizers, acids, caustics, alkali. Do not allow dust and fine powder to accumulate. Avoid generating ignition sources, sparks and flame in areas of dust and fine powder accumulations and airborne concentrations.

Extinguishing Media: Smother with suitable Class D dry powder, dry sand or specialized dry powders for metal fires. Do not use water, moist sand, other liquids, foam or halogenated extinguishing agents on burning or molten metal. Fire may also be isolated and allowed to burn itself out. Do not disturb burning metal while extinguishing the fire. Use fire fighting methods and media as appropriate for surrounding material.

Special Fire Fighting Instructions: Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus with full face mask and full protective clothing. Avoid spreading powder or dust fires. Dust clouds may be explosive. Take all appropriate steps to prevent formation of a dust cloud.

Unusual Fire and Explosion Hazards:

- Never put water or liquids on molten metal. *It will explode.* Avoid melting wet metal; it may explode. This material or its dust can react with strong oxidizing agents, which can liberate hydrogen gas which may be explosive.
- Copper forms a potentially explosive reaction with the following: acetylene compounds, ammonium nitrate, 3-bromopropyne, ethylene oxide and lead azide.
- In the presence of halogenates, copper powder may be explosive with heat, percussion or friction. If left standing for a long time, a readily explosive peroxide (white deposit) may form. In the presence of wet acetylene and ammonia, copper forms explosive acetylides.

Hazardous Combustion Products: Metals involved in a fire at very high temperatures or in a molten metal state produce fume, gas, va, and/or dust that may be toxic and/or respiratory irritants.

SECTION V - REACTIVITY DATA

Stability: Stable under normal conditions.

Conditions to Avoid: Stable under normal conditions of transport and storage. Molten metal may react violently with water. During storage, avoid exposure to strong acids, bases, oxidizers and the materials indicated below in the incompatibility section as it relates to the material composition.

Hazardous Decomposition or Byproducts: Metal fume, metal oxide fume and vapors.

Hazardous Polymerization: Will not occur.

Incompatibility (Materials to Avoid):

Copper - Reacts violently and is incompatible with acetylene, chlorine, chlorates, sodium azide, halogens, halogenates, peroxides, hydrogen sulfide, bromates, hydrozoic acid, iodates, chloride, potassium oxide, ammonium nitrate, phosphorous, lead azide, fluorine, ethylene oxide, hydrazic acid, acetylinic compounds, 3-bromopropene, ClF₃, hydrazine mononitrate, oxygen difluoride, oxidizers, alkalis, alkalines, 1-bromo-2-propyne. Avoid contact with acids. Burns spontaneously in chlorine gas. Magnesium and copper dust or mist are incompatible. Before remelting material, it must be free of moisture.

Aluminum - Reacts with water, some acids, potassium hydroxide, sodium hydroxide and alkalis to produce flammable hydrogen gas. In contact with halogenated compounds can produce violent reactions and/or explosions. Avoid contact with water, alkalis, acids, bases, oxidizing agents, bromates, iodates, ammonium nitrate and halogenated compounds. The molten metal may explode on contact with water. If remelted, moisture present in cavities or on external surfaces may cause an explosion. Bulk aluminum dust when damp may heat spontaneously. Lead, iron oxides, or copper in contact with aluminum particles, may react vigorously releasing heat if there is a source of ignition or intense heat. Corrodes in contact with acids and other metals. Ignition may occur if powders are mixed with halogens, carbon disulfide or methyl chloride.

Arsenic - Incompatible and can react with zinc, halogens, silver nitrate, CrO₃, Na₂O₂, NCl₃, bromine azide, oxidizers, platinum, dirubidium acetylide palladium. Hydrogen gas can react with inorganic arsenic to form arsine, a highly toxic gas. High toxic fumes are emitted if arsenic comes in contact with acid or acid fumes or is heated. Oxidizing materials and arsenic can react violently.

Cadmium - Reacts violently with potassium, actively with oxidizing materials and is incompatible with strong oxidizers, zinc, sulfur, seleni ammonium nitrate, hydrazoic acid, tellurium and other acids.

SECTION V - REACTIVITY DATA (continued)

Chromium - Reacts violently with nitric oxide, potassium chlorate, lithium, ammonium nitrate, hydrogen peroxide and sulfur dioxide. Incompatible with oxidizers and alkalis. Chromium powder will explode spontaneously in air. Dust will burn or explode in contact with ammonium nitrate.

Iron - Incompatible and will react violently with calcium hypochlorite, chlorine, ClF_3 , fluorine, H_2O_2 , nitrous oxide, phosphorus, sodium carbide, H_2SO_4 , ammonium nitrate and heat, ammonium peroxodisulfate, chloric acid, trifluoride, chloroformamidinium, nitrate, bromine penta fluoride and heat (with iron powder), air and oil (with iron dust), sodium acetylide, dinitrogen tetraoxide, hydrogen peroxide (with iron powder), nitryl fluoride and heat, peroxyformic acid, potassium perchlorate, potassium dichromate, sodium peroxide (at 240°F), polystyrene and friction of spark (iron powder). Mixtures of iron dust with air and water may ignite on drying.

Lead - Incompatible and may react with strong oxidizers, hydrogen peroxide and acids, trioxane and hydrogen peroxide, chlorine trifluoride, ammonium nitrate, sodium acetylide, NaN_3 , Zr, disodium acetylide

Manganese - Incompatible and can react violently with fluorine, nitric acid, airborne aluminum, hydrogen peroxide, chlorine, water, steam, nitrous oxide, sulfur dioxide, phosphorus vapor, acids, and oxidizers. Contact with water, steam, mineral acids will generate flammable hydrogen gas. Contact with other incompatibles creates high temperatures and a glowing appearance.

Nickel - Incompatible and can react violently with fluorine, ammonium nitrate, hydrazine, hydrogen with dioxane, HN_3 , performic acid, phosphorus, selenium, sulfur, titanium with potassium perchlorate, strong acids, combustibles like wood, nickel nitrate, methanol, hydrogen, non-metals, oxidants, aluminum, hydrazoic acid, iron, chlorine, peroxides, iodates, bromates, chlorates, sodium azide, copper nitrogen dioxide, acetylene, chlorine, trifluoride. Strong acids in contact with nickel produce flammable hydrogen gas.

Phosphorus - Incompatible with peroxides, oxidizing materials, potassium chlorates, potassium permanganate, air, sulfur, strong caustics, halogens, reducing materials. Phosphorus ignites spontaneously in air. Heated phosphorus emits highly toxic fumes of (PO_4) .

Silicon - Incompatible and will react with chlorine, fluorine, oxidizers, calcium, cesium carbide, alkaline carbonates, Al and PbO, calcium, Cs_2C_2 , COF_2 , IF_5 , MnF_3 , Rb_2C_2 , FNO, AgF, Nak alloy, heat plus water or steam.

Silver - Incompatible with acetylene, ammonia, hydrogen peroxide, bromo-azide, chlorine, trifluoride, ethyleneimine oxalic acid, tartaric acid, acetylene compounds, aziridine, bromine azide 3-bromopropyne, carboxylic acids, copper and ethyleneglycol, electrolytes and zinc, ethanol and nitric acid, ethylene oxide, ethyl hydroperoxide, ethyleneimine, iodoform, nitric acid, ozonides, peroxomonosulfuric acid, peroxyformic acid.

Tellurium - Incompatible and may react with oxidizers, chlorine, cadmium, fluorine, interhalogens, potassium, sodium, platinum, tin, zinc, hexalithium disilicide, silver bromate, silver iodate, chlorine trifluoride, lithium silicide and acid solution. Metals that will displace hydrogen should be avoided.

Tin - Incompatible with chlorine, turpentine, acids, alkalis, Br_2 , BrF_3 , ClF_3 , $\text{Cu}(\text{NO}_3)_2$, K_2O_2 and sulfur.

Zinc - Incompatible with strong oxidizers, acids, cadmium, chlorine, trifluoride, fluorides, chromic trioxide chlorides, hydrazine mononitrate, water, sulfur, sodium peroxide, tellurium, sodium hydroxide, selenium, performic acid, potassium nitrate, ammonium nitrate, chlorates, barium dinitrate, barium dioxide. Hydrogen gas may be created if acids and zinc come in contact.

Zirconium - Incompatible with hydro fluoric and hydrofluoric-nitric acids, nitryl fluoride, FNO_2 , potassium nitrate, oxidizers, fluorine, chlorine, bromine, iodine, and halo-carbon, carbon tetrachloride, carbon tetrafluoride and freons.

SECTION VI - HEALTH HAZARD DATA

Health Hazard data does not exist for this material. Major individual component data is given instead. Each alloy's major component given by weight can be used as a rough guide to the alloy's likely significance.

Summary of Acute Hazards: Respiratory tract irritation, metal fume fever, eye irritation.

Summary of Chronic Hazards and Special Effects: See below, "Effects of Overexposure."

General Comments: Symptoms of metal fume fever may last 24 to 48 hours and may include a sweet or metallic taste in the mouth, dryness and irritation of the throat, cough, shortness of breath, chest pain, nausea, vomiting, weakness, fatigue, muscle and joint pain, chills, sweating and fever. The nickel component may cause skin sensitization and eye irritation. Salts of metal components have demonstrated mutagenic potential in several bioassays. But the health significance of these results is not known. Use good personal hygiene. Wash hands with mild soap and water before eating, drinking, smoking, or before leaving work after contact with metal dust or fume.

Permissible Exposure Limits and Threshold Limit Values: See Section II.

Route(s) of Entry: Inhalation - Yes. Skin - Yes. Ingestion - Yes. Eye Contact - Yes.

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. Breathing these fumes or dust may present potentially significant health hazards. The exposure levels in Section II are relevant to fumes and dust.

Effects of Overexposure:

Aluminum - Excessive exposure to aluminum fume and dust has been associated with lung disease, but this effect is probably due to simultaneous silica exposure.

Arsenic - Arsenic compounds can be absorbed into the body from industrial exposures, especially by inhalation and ingestion. Signs of toxicity are dermal lesions, conjunctivitis, upper respiratory tract irritation, nausea, vomiting, peripheral neuritis and occasionally anemia. Arsenic in combination with promoters such as sulfur dioxide, metal oxide fumes and smoking has caused respiratory cancer. Arsenic has been identified as a carcinogen by NTP and IARC.

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. Bronchitis, pneumonitis, and pulmonary edema have been reported as a result of the irritation of the fumes. Headaches, dizziness, loss of appetite, and weight loss have also been reported, and the liver, kidneys and bone marrow may be

SECTION VI - HEALTH HAZARD DATA (continued)

injured by the presence of the metal. Continued exposure to lower levels of cadmium has resulted in chronic poisoning characterized by irreversible lung damage and kidney damage. A single high level exposure to cadmium can cause severe lung irritation which may be fatal. Cadmium is also a suspected human carcinogen.

Chromium - In some workers, chromium compounds act as allergens and may cause dermatitis and may also produce pulmonary sensitization. Chromic acid and chromates have a direct corrosive effect on the skin and the mucous membranes of the upper respiratory tract. Although rare, there may be the possibility of skin and pulmonary sensitization. IARC has determined that there is sufficient evidence of increased lung cancer among workers in the chromate-producing industry and possible chromium alloy workers. This determination is supported by sufficient evidence for carcinogenicity to animals and possible mutagenicity testing of Cr or VI compounds.

Copper - Melting, grinding, cutting of copper may produce fumes or dust exposure, and breathing these fumes or dust may present potentially significant health hazards. Fumes of copper may cause metal fume fever with flu-like symptoms, diarrhea, and skin and hair discoloration. While industrial dermatitis has not been reported, keratinization of the hands and the soles of the feet has been reported. Systemically as well, copper dust and fume cause irritation of the upper respiratory tract, metallic taste in the mouth, and nausea. Copper fragments in the cornea may cause cataracts, discoloration or loss of an eye.

Iron - The inhalation of iron oxide fumes or dust may cause an apparent benign pneumoconiosis which is called siderosis. This disease is reported to be disabling but makes x-ray diagnosis of other lung conditions difficult or impossible.

Lead - Short Term Exposure: Lead is an accumulative poison. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include decreased physical fitness, fatigue, sleep disturbance, headache, aching bones and muscles, constipation, abdominal pains, and decreasing appetite. The effects are reversible and complete recovery is possible. Inhalation of large amounts of lead may lead to seizures, coma and death.

Lead - Long Term Exposure: Long term exposure can result in a buildup of lead in the body and more severe symptoms. These include anemia, pale skin, a blue line at the gum margin, decreased hand-grip strength, abdominal pain, severe constipation, nausea, vomiting, and paralysis of the wrist joint. Prolonged exposure may also result in kidney damage. If the nervous system is affected, usually due to very high exposures, the resulting effects include severe headache, convulsions, coma, delirium, and death. Alcohol ingestion and physical exertion may bring on symptoms. Continued exposure can result in decreased fertility and/or increased chances of miscarriage or birth defects.

Manganese - Chronic manganese poisoning may result from inhalation of dust or fume. The central nervous system is the chief site of the injury. Chronic manganese poisoning is not a fatal disease although it is extremely disabling. Some individuals may be hypersusceptible to manganese. Freshly formed manganese fume has caused fever and chills similar to metal fume fever.

Nickel - The most common ailment arising from contact with nickel or its compounds is an allergic dermatitis known as "nickel itch" which usually occurs when the skin is moist. Generally nickel and most salts of nickel do not cause systemic poisoning, but nickel has been identified as a suspected carcinogen. Nickel intoxication may result in nasal and lung cancer.

Phosphorus - Phosphorus can be absorbed through the skin, respiratory tract and the gastrointestinal tract. Direct eye contact may cause ocular damage. Inhalation of vapors (oxide) has caused respiratory tract irritation. Chronic intoxication includes gastrointestinal distress and garlic breath.

Silicon - Accumulation in lungs may be responsible for benign pneumoconiosis, but is not considered to be responsible for pulmonary functional impairment or respiratory symptoms.

Silver - Chronic occupational exposure to silver results in argyria, a permanent pigmentation (gray to purple) of the skin and eyes. Inhalation of silver may localize the argyria in the respiratory tract with chronic bronchitis as the only symptom.

Tellurium - Inhalation of tellurium fume in quantities results in a metallic taste and garlic breath, gastrointestinal distress, dry-mouth and somnolence.

Tin - The inhalation of inorganic tin fumes or dust may cause an apparent benign pneumoconiosis called stannosis which is reported not to be disabling.

Zinc (as Oxide) - Zinc is very low in toxicity, but inhalation of fumes may cause "metal fume fever". Onset of symptoms may be delayed 4-12 hours and include irritation of the nose, mouth and throat, cough, stomach pain, headache, nausea, vomiting, metallic taste, chills, fever, pains in the muscles and joints, thirst, bronchitis or pneumonia and a bluish tint to the skin. These symptoms go away in 24-48 hours and leave no effect.

Zirconium - Zirconium may cause a skin sensitization reaction.

Note: Arsenic, cadmium, chromium, lead and nickel have been identified as potential human carcinogens.

Emergency First Aid Procedures:

Eye Contact: Flush well with running water to remove particulate. Get medical attention.

Skin Contact: Vacuum off excess dust. Wash well with soap and water.

Inhalation: Remove to fresh air. Get medical attention. Metal fume fever may be treated symptomatically.

Ingestion: Seek medical attention if large quantities of material have been ingested.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING OR USE

Chemical Exposure: Metal dust and fume exposure should be minimized when alloys are subject to grinding, cutting, extreme heat or other forms of metal working. Avoid breathing dust or fume by ensuring adequate ventilation and/or wearing personal protective equipment when necessary. Refer to other sections for additional information.

Safe Handling and Storage: Do not store near strong acids, bases or oxidizing agents or incompatible materials as described in Section V above. Prevent exposure to rainwater, which may result in storm water pollution.

Steps to be Taken in Case Material is Released or Spilled: In outdoor areas, copper and brass alloys should be collected or covered promptly in order to prevent exposure to storm water. Heavy metals may leach from exposed alloys and contribute to storm water pollution.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING OR USE (continued)

Waste Disposal: Copper and brass byproducts such as turnings, shavings and dust should be recycled whenever possible. If landfilled, incinerated or otherwise disposed of, certain alloys which contain lead, cadmium, or chromium may be classified as RCRA hazardous wastes, as determined by the TCLP analytical test method. These products may also be classified as hazardous waste in some states because they contain other metals such as nickel, zinc and copper.

SECTION VIII - CONTROL MEASURES**Respiratory Protection:**

Engineering or administrative controls should be used to reduce exposures below the PEL/TLV. If exposure exceeds the PEL/TLV, use NIOSH or MSHA approved respirator protective equipment for the specific contaminant (dust/fume/mist). An industrial hygienist, safety engineer, or other qualified personnel, should be consulted. Approved breathing equipment may be required for non-routine and emergency use.

Ventilation: Local exhaust ventilation is required when dust, fumes or mists are generated. Local and general exhaust ventilation should be used to keep airborne concentrations of dust, fumes or mists below the PEL, TLV and explosive limits.

Protective Gloves: Required for melting, pouring, grinding, cutting or welding operations. Select glove approved for the specific operation. Barrier creams may be necessary to prevent sensitization and dermatitis.

Eye Protection: Required for melting, pouring, grinding, cutting or welding operations. Minimum requirement of approved safety glasses with side shields or goggles for these operations. Melting, pouring and welding may require special eye or face protection including face shields, helmets, or specially tinted glass. Grinding operations may also require face shields. Safety eye-wash stations should be provided near work areas. Special precautions should be taken for contact lens wearers.

Other Protective Clothing or Equipment: Use both primary and secondary personal protective equipment and special heat and molten metal resistant clothing for metal splash, spilling, etc. Severe burns will result if proper personal protective equipment is not used and procedures are not followed. Full protective clothing as appropriate for chips, dust, powder and high heat. Safety shoes, foundry boots, leggings, coveralls, gauntlets, helmets, hearing protection, etc., as needed. Other equipment required depending upon operations and good safety practices.

Work/Hygiene Practices: No eating, drinking or use of tobacco products in work areas. Wash hands and face after skin contact and before eating, drinking, use of tobacco products and rest room use. Do not wear contaminated clothing during eating, drinking, tobacco and rest room use. Take a shower and change clothes at the end of the shift or after very soiling conditions. Avoid contamination of clothing. All contaminated protective clothing must be left at the plant. Launder all other work clothing separately from other household laundry. Train employees in good work and hygiene procedures. If necessary, pre-employment medical evaluations should be provided. Avoid inhalation and ingestion. Follow good housekeeping and personal hygiene procedures. Follow OSHA, federal, state or local standards for lead and cadmium. Do not use air hose to clean personnel or machines.

Engineering Controls: Worker exposure to hazardous conditions and airborne contaminants must be evaluated and minimized through use of feasible engineering and administrative controls. Utilize personal protective equipment if other controls are not feasible or as a redundant control measure. Use process enclosures, local and/or general ventilation to keep airborne dust fumes and mists below PEL's and TLV's. If ventilation is used to remove dust generated by grinding, cutting or other operations, special ventilation procedures may be necessary to avoid explosion hazards in the ducts (i.e., maintain dust concentrations below lower explosive limits). See NFPA and other related standards.

SECTION IX - ADDITIONAL PRECAUTIONS**Handling Storage and Decontamination Procedures:**

Good housekeeping must be practiced during storage, transfer, handling and use to avoid excessive dust accumulation. Apply recommendations of NFPA 49^o for copper alloys.

DISCLAIMER OF LIABILITY

The information in this MSDS was obtained from sources which we believe are reliable. HOWEVER, THE INFORMATION IS PROVIDED WITHOUT ANY WARRANTY, EXPRESS OR IMPLIED, REGARDING ITS CORRECTNESS.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control, and MAY be beyond our knowledge. FOR THIS AND OTHER REASONS, WE DO NOT ASSUME RESPONSIBILITY AND EXPRESSLY DISCLAIM LIABILITY FOR LOSS, DAMAGE OR EXPENSE ARISING OUT OF OR IN ANY WAY CONNECTED WITH THE HANDLING, STORAGE, USE OR DISPOSAL OF THE PRODUCT.

ANSONIA COPPER & BRASS, INC.

MSDS CCA

Date: October 1, 2000, Rev. 4

COPPER/COPPER ALLOYS

Alloy Compositions
(For MSDS Use Only)

Components (Percent)

| Alloy | Copper | Zinc | Lead | Tin | Nickel | Manganese | Silicon | Aluminum | Iron | Phosphorus | Chromium | Tellurium | Other |
|-----------------|--------|----------|---------|---------|--------|-----------|---------|----------|---------|------------|----------|-----------|----------------|
| 101, 102, 110 | 100 | - | - | - | - | - | - | - | - | - | - | - | - |
| 103, 122 | REM | - | - | - | - | - | - | - | - | <1 | - | - | - |
| 104, 105, 107 | REM | - | - | - | - | - | - | - | - | - | - | - | Silver <1 |
| 1450, 1452 | REM | - | - | - | - | - | - | - | - | <1 | - | <1 | - |
| 150 | REM | - | - | - | - | - | - | - | - | - | - | - | Zirconium <1 |
| 1620, 1621, 165 | REM | - | - | <1 | - | - | - | - | - | - | - | - | Cadmium .6-1.2 |
| 1815 | REM | - | - | - | - | - | - | - | - | - | .5-1.5 | - | Zirconium <1 |
| 182 | REM | - | - | - | - | - | - | - | - | - | .8-1.2 | - | - |
| 1870 | REM | - | .8-1.2 | - | - | - | - | - | - | - | - | - | - |
| 1880, 189 | REM | - | - | <1 | - | <1 | <1 | - | - | - | - | - | - |
| 1914, 1916 | REM | - | .4-1.2 | - | .8-1.2 | - | - | - | - | <1 | - | - | - |
| 210, 220, 226 | REM | 4-14 | - | - | - | - | - | - | - | - | - | - | - |
| 230, 234, 240 | REM | 14-21.5 | - | - | - | - | - | - | - | - | - | - | - |
| 260, 270, 272 | REM | 28.5-38 | - | - | - | - | - | - | - | - | - | - | - |
| 314, 316, 320 | REM | 8.5-15.0 | 1.3-2.5 | - | .7-1.2 | - | - | - | - | - | - | - | - |
| 3180 | 87-91 | REM | - | - | .7-1.2 | - | - | - | - | <1 | - | <1 | - |
| 340, 344, 345 | 62-65 | REM | .8-2.5 | - | - | - | - | - | - | - | - | - | - |
| 353, 360 | 60-63 | REM | 1.5-3.7 | - | - | - | - | - | - | - | - | - | - |
| 371, 377 | 58-62 | REM | .6-2.5 | - | - | - | - | - | - | - | - | - | - |
| 385, 3858 | 55-60 | REM | 2.5-3.5 | - | - | - | - | - | - | - | - | - | - |
| 462, 464, 485 | REM | 35-41 | 1.3-2.2 | .5-1.0 | - | - | - | - | - | - | - | - | - |
| 507, 510 | REM | - | - | 1.5-5.8 | - | - | - | - | - | <1 | - | - | - |
| 534, 544 | REM | 0-4.5 | .8-4.5 | 3.8-5.8 | - | - | - | - | - | <1 | - | - | - |
| 610, 618 | REM | - | - | <1 | - | - | - | 7-10 | .7-1.3 | - | - | - | - |
| 630 | REM | - | - | - | 4-5.5 | - | - | 9-11 | 2.0-3.5 | - | - | - | - |
| 634, 642, 6421 | REM | - | - | - | - | - | .2-2.2 | 2.6-7.6 | - | - | - | - | - |
| 651 | REM | - | - | - | - | <1 | .8-2.0 | - | - | - | - | - | - |
| 655, 656, 661 | REM | <1 | <1 | - | - | .5-1.4 | 2.8-3.6 | - | - | - | - | - | - |
| 6733 | 60-73 | REM | .4-1.0 | - | - | 2.0-3.5 | .5-1.5 | - | - | - | - | - | - |
| 675, 676 | 50-60 | REM | - | .5-1.5 | - | <1 | - | - | .4-2.0 | - | - | - | - |
| 6943, 6971 | 76-83 | REM | .7-1.4 | - | - | - | 2.6-4.0 | - | - | - | - | - | Arsenic <.1 |
| 706, 715 | REM | - | - | - | 9-32 | .2-1.0 | - | - | .7-1.8 | - | - | - | - |
| 773 | 46-50 | REM | - | - | 9-11 | - | <1 | - | - | - | - | - | - |
| 7940 | 60-64 | REM | - | - | 11-13 | <1 | - | - | - | - | - | <1 | - |

< = Less than

REM = Remainder