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SECTION #1 - IDENTIFICATION

Product: Silver-Copper-Nickel-Zinc Brazing Alloys

Chemical Family: Brazing Filler Metal; Silver Solder
Chemical Formula: Alloys of silver, copper, nickel, and zinc

The information in this MDSD is applicable to the following products: Alloy 69-207, Braze 403, Braze 404, Braze 505, and Braze 541.

SECTION #2 - HAZARDOUS CHEMICAL COMPONENTS

Component: Copper
CAS Number: 7440-50-8
Percent of Mixture: 20.0 to 54.0
OSHA PELs:
Fume: 0.1 mg/m3 (TWA)
Dusts and mists: 1 mg/m3 (TWA)
ACGIH TLVs (1994-95):
Fume: 0.2 mg/m3 (TWA)
Dusts and mists: 1 mg/m3 (TWA)

Component: Nickel
CAS Number: 7440-02-0
Percent of Mixture: 1.0 to 5.0
OSHA PEL:
Metal & insoluble compounds, as Ni: 1 mg/m3 (TWA)
ACGIH TLVs (1994-95):
Metal & insoluble compounds, as Ni: 1 mg/m3 (TWA)

Component: Silver
CAS Number: 7440-22-4
Percent of Mixture: 1.5 to 54.0
OSHA PEL: 0.01 mg/m3 (TWA)
ACGIH TLV (1994-95):
Metal: 0.1 mg/m3 (TWA)

Component: Zinc
CAS Number: 7440-66-6
Percent of Mixture: 5.0 to 44.0
OSHA PEL:
ZnO fume: 5 mg/m3 (TWA)
ACGIH TLVs (1994-95):
ZnO fume: 5 mg/m3 (TWA)
10 mg/m3 (STEL)

SECTION #3 - PHYSICAL DATA

Melting Point: >1220 F >660 C
Vapor Pressure: N/A

SECTION #3 - PHYSICAL DATA Continued...

Solubility (H2O): Insoluble
Percent Volatiles: N/A

Appearance

Odorless white to light yellow metals in form of wire, rod, strip, powder, grain, or preformed shapes.

SECTION #4 - FIRE FIGHTING & EXPLOSION DATA

Fire and Explosion Hazards

In finely-divided form, these materials may ignite when exposed to flame or by reaction with incompatible materials (see Section #6 for incompatible materials). Fires or explosions involving these materials may release potentially toxic emissions of metal or metal oxide fumes (see Section #2 for hazardous components and/or reaction products).

Extinguishing Media

Use dry powder. Do not use water.

Special Fire Fighting Instructions

Use self-contained breathing apparatus with full-facepiece operated in pressure-demand or other positive pressure mode.

SECTION #5 - EXPOSURE EFFECTS and FIRST AID

Route of Exposure - Inhalation

Inhalation of the components and reaction byproducts of these products does not pose a significant risk to health when used according to instructions and with appropriate protective measures (see Section #8). The components and reaction byproducts have been reported to cause one or more of the following symptoms/effects when exposure has been excessively high and/or prolonged:

1. SILVER: Chronic exposure may produce argyria, a permanent blue-gray discoloration of the skin, eyes, mucous membranes, and the respiratory tract.

2. COPPER: Acute exposure may cause respiratory tract irritation, fever, muscle ache, chills, cough, weakness, and a metallic taste. Chronic exposure may cause damage to the liver, kidney, spleen, pancreas, and brain.

3. NICKEL: Acute exposure to nickel dust and fume may produce headache,

SECTION #5 - EXPOSURE EFFECTS and FIRST AID Continued...

Route of Exposure - Inhalation

nausea, vertigo, asthma, pulmonary fibrosis, and pulmonary edema. Chronic exposure to nickel may increase the risk of cancer to the nasopharygial region, lungs, prostate, and kidney.

4. ZINC: Acute exposure to zinc oxide fume may cause respiratory tract irritation and "metal fume fever", which is characterized by one or more of the following symptoms: metallic taste, dry throat, cough, chills, fever, tightness of chest, dyspnea, headache, nausea, vomiting, and fatigue.

First Aid - Inhalation

If signs and symptoms of toxicity are observed, remove subject from area, administer oxygen, and seek medical attention. Keep the subject warm and at rest. Perform artificial respiration if breathing has stopped.

Route of Exposure - Skin

Skin contact with these products in solid forms is not known to be hazardous In finely-divided forms, skin contact may produce localized irritation, skin discoloration, argyria, and contact and/or allergic dermatitis.

First Aid - Skin

Following repeated or prolonged contact, remove contaminated clothing. Wash affected area with large quantities of water for at least five minutes. Seek medical attention if necessary.

Route of Exposure - Eyes

Exposure of the eyes to these products in finely-divided form may produce localized argyria, irritation, conjunctivitis, and ulceration of the cornea.

First Aid - Eyes

Flush affected areas with water for at least 15 minutes. Seek medical assistance if necessary.

Route of Exposure - Ingestion

Ingestion of these products in finely-divided form may produce gastric irritation, vomiting, abdominal pain, hemorrhage, and diarrhea. Long-term chronic ingestion may produce damage to the liver, kidney, spleen, pancreas, musculoskeletal system, blood-forming organs, and central nervous system.

First Aid - Ingestion

SECTION #5 - EXPOSURE EFFECTS and FIRST AID Continued...

First Aid - Ingestion

If subject is conscious, induce vomiting. If unconscious or convulsive, seek immediate medical assistance.

Miscellaneous Toxicological Information

Nickel is classified as a potential human carcinogen by the following organizations (with respective subclassifications):

1. IARC (Group 1, carcinogenic to humans)
2. NIOSH (Carcinogen, no further classification)
3. NTP (Group 2, reasonably anticipated to be a carcinogen)

Nickel has also caused fetotoxic and teratogenic effects in experimental animal studies, and has produced mutagenic effects to cultured mammaliam cells in laboratory studies.

Neither silver, copper, nor zinc are classified as potential or demonstrated human carcinogens by IARC, NIOSH, NTP, OSHA, or ACGIH.

Health Conditions Aggravated By Exposure

Pre-existing pulmonary diseases (e.g., bronchitis, emphysema) may be aggravated by inhalation exposure to these products, particularly as fume. Exposure to nickel by inhalation and/or ingestion may aggravate pre-existing diseases of the kidney, hematopoetic system, central nervous system, and musculoskeletal system.

SECTION #6 - REACTIVITY & POLYMERIZATION

Conditions to Avoid (Stability)

Stable at room temperature. Silver and copper can form explosive acetylides upon contact with uncombusted acetylene.

Incompatible Materials

Strong oxidizers; Se; Te; Mg; chlorates; NH_3; HNO_3; azides, ethanol, ethylene imine; ClF_3; inorganic and organic peroxides; peroxyformic acid; chlorine and fluorine; permonosulfuric acid; CrO_3; Mn and Ca chlorides; CS_2; hydrazine mononitrate; nitrobenzene; $Fe(CO)_5$; seleninyl bromide.

SECTION #6 - REACTIVITY & POLYMERIZATION Continued...

Hazardous Decomposition Products

Heating to elevated temperatures may liberate metal/metal oxide fume.

Hazardous Polymerization: will not occur.

SECTION #7 - SPILL, LEAK, & DISPOSAL PROCEDURES

Steps to be Taken in The Event of Spills, Leaks, or Release

Clean up spilled material so as to minimize dispersion of dust. Wet sweeping or vacuuming using HEPA filtration are recommended methods.

Waste Disposal Methods

Return to manufacturer for reclaim.

SARA Title III Notifications and Information

SARA Title III - Hazard Classes: Acute Health Hazard
Chronic Health Hazard

SARA Title III - Section 313 Supplier Notification:

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

CAS #	Chemical Name	Percent of Mixture
7440-50-8	Copper	20.0 - 54.0
7440-02-0	Nickel	1.0 - 5.0
7440-22-4	Silver	1.5 - 54.0
7440-66-6	Zinc	5.0 - 44.0

This information must be included on all MSDSs that are copied and distributed for this material.

Other Environmental Information

Components materials and their respective reportable quantities under SARA Title III, Sec. 313 are as follows: Silver (1000 lbs.); Nickel (1 lb.); Copper (5000 lbs.); and Zinc (1000 lbs.). Nickel has a threshold planning quantity of 10,000 lbs.

SECTION #8 - SPECIAL PROTECTIVE MEASURES

Ventilation

Use mechanical local exhaust ventilation adequate to maintain airborne concentrations of all components and their decomposition products to within their respective OSHA PELs.

Eye Protection

Wear eye protection (safety glasses, dust-proof goggles) adequate to prevent eye contact with this material in finely-divided form and to prevent eye injury from the hazards of brazing. Plastic-frame spectacles with side shields and filter lenses (shade #3 or #4) are recommended.

Skin Protection

Wear appropriate protective gloves and clothing to prevent skin injuries from the hazards of brazing and/or for prolonged or repeated contact with finely-divided material. Avoid flammable fabrics.

Respiratory Protection

If an exposure level(s) exceeds its OSHA PEL(s), wear a NIOSH/MSHA-approved respirator having a configuration (class, type of facepiece, filter media, assigned protection factor, etc.) appropriate to the concentration(s) of the contaminant(s) generated. For guidance on the selection and proper use of respiratory protection, consult American National Standard ANSI Z88.2-1992. (ANSI, New York, NY 10036).

Other Protection

Brazing alloys may be used with a flux which, when heated, may emit irritating and/or toxic gases and fumes. Consult the MSDS for the specific flux in use to determine its hazards and appropriate protective measures.

Work/Hygienic Practices

To avoid ingestion of material, wash hands and face before eating, drinking, or consumption of tobacco.

SECTION #9 - SPECIAL PRECAUTIONS - STORAGE & HANDLING

Storage & Handling Conditions

Do not store in proximity to incompatible materials (see Section #6).

SECTION #10 - SHIPPING INFORMATION

Hazard Class: Not controlled by DOT, IATA, ICAO, or IMO regulations.

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