

Saru Silver Alloy Private Limited

MATERIAL SAFETY DATA SHEET

SECTION 1 MATERIAL IDENTIFICATION AND USE

MATERIAL NAME IDENTIFIER: Copper Based Brazing Alloys		
<i>Manufacturer's Name:</i> Saru Silver Alloy Private Limited		<i>Street Address:</i> 3, Saru Nagar Sardhana Road
<i>City:</i> MEERUT	<i>Province/State/Country:</i> U.P. (INDIA)	<i>Emergency Phone No:</i> +91-121-2555433, 2555932
<i>Supplier's Name:</i>		<i>Street Address:</i>
<i>City:</i>	<i>Province/State/Country:</i>	<i>Emergency Phone No:</i>
Chemical Name: Silver Brazing Filler Metal	Chemical Family: Cadmium-Free Silver Brazing Alloys	Chemical Formula: Refer To Chart
Molecular Weight: N/Avl.	Trade Names, Synonyms: Refer To Chart	Material Use: Filler Metals For Brazing

SECTION 2 HAZARDOUS CHEMICAL COMPONENTS

Chemical Component	CAS Number	(Refer to filler metal chart below for nominal composition %)
SILVER (Ag)	7440-22-4	ACGIH: TLVs (2000) 0.1 mg/m ³ TWA (metal) OSHA PEL: 0.01 mg/m ³ TWA LD 50 N/Avl. LC 50 N/Avl.
COPPER (Cu)	7440-50-8	ACGIH: TLVs (2000) 0.2 mg/m ³ TWA (fume); 1.0 mg/m ³ TWA (dusts & mists) OSHA PELs: 0.1 mg/m ³ TWA (fume); 1.0 mg/m ³ TWA (dusts & mists) LD 50 470 mg/kg oral-mouse LC 50 N/Avl.
ZINC (Zn)	7440-66-6	ACGIH: TLVs (2000) 5.0 mg/m ³ TWA as ZnO fume; 10 mg/m ³ STEL as ZnO fume 10.0 mg/m³ TWA as ZnO fume OSHA PEL: 5.0 mg/m ³ (TWA) LD 50 7950 oral-mouse LC 50 N/Avl.
MANGANESE (Mn) (red allotropic form)	7439-96-5	ACGIH: TLVs (2000) 0.2 TWA (elemental & inorganic compounds, as Mn) OSHA PEL: 5 mg/m ³ ceiling LD 50 9 gm/kg oral-rat LC 50 N/Avl.
SILICON (Si) 7440-21-3		ACGIH: TLV/TWA 10.0 mg/m ³ LD 50 3,160 mg/m ³ oral-rat LC 50 N/Avl.
TIN (Sn) 7440-31-5		ACGIH: TLVs (2000) 2.0 mg/m ³ TWA (metal, oxide, and inorganic compounds, as Sn) OSHA PEL: 2.0 mg/m ³ TWA LD 50 72 mg/kg oral-mouse LC 50 15 mg/m³/10m inhal.-Monkey
NICKEL (Ni)	7440-02-0	ACGIH: TLVs (2000) 1.5 mg/m ³ TWA (metal)(inhalable fraction); 0.2 mg/m³ TWA (insoluble compounds, as Ni)(inhalable fraction) OSHA PEL: 1.0 mg/m ³ (TWA) metal & insoluble compounds as Ni LD 50 N/Avl. LC 50 N/Avl.

SARU SILVER BRAZING FILLER METALS CHART

FILLER METAL NAME	AWS / SFA CLASS	Nominal Composition, %					Solidus (Melt Point)		Liquidus (Flow Point)		Brazing Range °C	Specific Gravity
		Cu	Zn	Ni	Si	Others	°F	°C	°F	°C		
SIBRO	-	60	39.7	-	0.3	-	1635-890	1652-900	890-900	8.4		
MANBRO	-	60	39.6	-	0.2	Mn 0.2	1652-900	1675-915	900-915	8.4		
NIBRO	RBCuZn-D	50	39.7	10	0.3	-	1635-890	1685-920	890-920	8.7		
NIBROSIL	-	50	39.7	9	0.3	Ag 1	-	-	-	8.7		
F.BRONZE	-	57	39	-	-	Mn 2, CO 2	1635-890	1705-930	890-930	-		
C.N.S.	-	96.6	-	2.70	0.70	-	1994-1090	2015-1100	1090-1100	-		
TINBRO 1	-	94	-	-	-	6Sn, 0.2P	1670-910	1905-1040	910-1040	8.7		
TINBRO 2	-	88	-	-	-	12Sn, 0.2P	1517-825	1815-990	825-990	8.6		
CUPRO	Bcu-1	100	-	-	-	-	1980-1083	1980-1083	1083	8.9		

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SARU SILVER BRAZING FILLER METALS CHART

FILLER METAL NAME	AWS / SFA CLASS	Nominal Composition, %					Solidus (Melt Point) °F °C	Liquidus (Flow Point) °F °C	Brazing Range °C	Specific Gravity g/cm3
		Cu	Zn	Ni	Si	Others				
SARU 681	RBCuZn C	59	38.75	-	0.1	1Sn, 0.8Fe, 0.35Mn	1590-866	1630-888	866-888	8.4
BRASS 5446	RBCuZn-A	54	46	-	-	-	1615-880	1635-890	880-890	8.3
SARU 470	-	59	39.75	-	0.25	1Sn	1600-870	1635-890	870-890	8.4

SECTION 3 PHYSICAL DATA

Physical State: Gas Liquid Solid **Odour & Appearance:** No Odour; Solid Metal Wire, Strip, Powder, Paste
Odour Threshold (ppm): N/Avl. **Vapour Pressure (mm.Hg):** N/Avl. **Vapour Density (AIR=1):** Solid-N/Appl.
Evaporation Rate: Solid - N/Appl. **Boiling Point (°C):** Solid - N/Appl. **Freezing Point (°C):** Solid - N/Appl.
% Volatile (By Volume): N/Appl. **Solubility In Water (20°C):** Insoluble **pH:** N/Appl.
Specific Gravity: Refer To Chart **Coeff.-Water Oil Disp.:** N/Appl.

SECTION 4 FIRE AND EXPLOSION DATA

Flammability: Yes No **If yes, under which conditions?**
 Dust, powder and fumes are flammable when exposed to flame or by chemical reaction with oxidizing agents (*see Section 5 for incompatible materials*). Fires or explosions involving these alloys may release potentially toxic emissions of metal or metal oxide fumes (*see Section 2 for hazardous components*).
Means Of Extinction: Dry powder for metal fires. Do not use water on dust, powder or fume fires.
Special Procedures: Use self-contained breathing apparatus with full face-piece operated in pressure demand or other positive pressure mode.
Flashpoint(°C) & Method: Solid Metal - Non-Flammable **Upper Explosion Limit (% By Volume):** N/Appl.
Lower Explosion Limit (%By Volume): Solid Metal-N/Appl. **Auto Ignition Temperature (°C):** Solid Metal - N/Appl.
TDG Flammability Classification: None **Hazardous Combustion Products:** Solid Metal - N/Appl.
Sensitivity To Impact Explosion Data: N/Appl. **Rate Of Burning:** N/Appl.
Explosive Power: N/Appl. **Sensitivity To Static Discharge:** N/Appl.

SECTION 5 REACTIVITY DATA

***** AVOID DISPERSION OF FINELY DIVIDED PARTICLES IN AIR *****

Chemical Stability: Yes No **If yes, under which conditions?** Normal Ambient Environment.
Incompatibility With Other Substances: Yes No **If yes, which ones?**
 Strong Oxidizers; Se; Te; Mg; Chlorates; NH₃; HNO₃; Azides; Ethanol; Ethylenimine; ClF₃; Inorganic and Organic Peroxides; Peroxyformic Acid; Chlorine and Fluorine; Permonosulphuric Acid; CrO₃; Mn and Ca Chlorides; CS₂; Hydrazine Mononitrate; Nitrobenzene; Fe (CO)₅; Seleninyl Bromide.
Reactivity And Under What Conditions: Stable under normal temperatures and pressures.
Hazardous Decomposition Products: Hazardous polymerization will not occur. Upon heating, danger is mostly from inhalation of metal (oxide) fumes. Overexposure to elemental oxide fumes or dust can cause nausea and metal fume fever. Use hooded exhaust ventilation to carry all fumes away from work area and, if necessary, use air supplied respirator (*see Section 7*). Thought should be given to the heating methods, flux and base metals being joined which could emit fumes on heating depending on their particular chemistry.
Avoid overheating (*see chart, Brazing Range*).

SECTION 6 TOXICOLOGICAL PROPERTIES

Route Of Exposure: **Inhalation** Inhalation of the components of these products are not known to present a significant risk to health when used according to instructions and with appropriate protective measures (*see Section 7*). Inhalation of the component/elements has been reported to cause one or more of the following symptoms/effects upon excessively high and/or prolonged inhalation/exposure.

SILVER:
Acute May cause grey discoloration of mucous membranes.
Chronic May produce argyria, a permanent blue-grey discoloration of the skin, eyes, mucous membranes, and the respiratory tract.

COPPER:
Acute Acute exposure to dust or fume 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.

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.
Chronic Exposure unlikely.

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SECTION 6 (Cont'd) TOXICOLOGICAL PROPERTIES

CADMIUM:	Acute	Acute exposure to cadmium oxide fume by inhalation may produce pneumonitis, tracheobronchitis, and pulmonary edema.
	Chronic	Continued overexposure to cadmium (dust or fume) may produce gastrointestinal symptoms, anemia, rhinitis, discolouration of teeth, micro fractures, kidney disease and cancer.
NICKEL:	Acute	Dust or fumes may produce headache, nausea, vertigo, asthma, and pulmonary edema.
	Chronic	May increase the risk of cancer to the nasopharynx, lungs, prostate, and kidney.

Miscellaneous Toxicological Information

Cadmium is regulated as a carcinogen by the Occupational Safety and Health Administration per 29CFR 1910.1027. It is also classified as a potential human carcinogen by the following organizations (with respective sub-classifications):

1. IARC (Group 1)
2. NTP (Groups 2A & 2B)

Cadmium has been found to cause reproductive abnormalities, including reduced birth weights, reduced viability, and behavioural alterations among offspring of female rodents. Male rodents exposed to Cadmium have been found to have testicular damage, reduction in sperm counts, and reduced fertility. Cadmium has also produced mutagenic effects in mammalian cell cultures.

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

1. IARC (Group 2B)
2. NTP (Group 2B)

Nickel has also produced fetotoxic and teratogenic effects in animal studies, and mutagenic responses in mammalian cell cultures. Neither Silver, Copper, Phosphorous, 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 materials, particularly as fume. Exposure to nickel by inhalation and/or ingestion may aggravate pre-existing disease of the liver, kidneys, central nervous system, and musculoskeletal system.

Route Of Exposure

Skin: In solid form, materials are not known to be hazardous. In finely divided form, skin contact may produce localized irritation, localized argyria, skin discolouration, and contact or allergic dermatitis.

Eyes: Exposure of the eyes to finely divided form of these materials may produce localized argyria, irritation, conjunctivitis, and ulceration of the cornea.

Ingestion: Finely divided form of these materials 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.

LD 50 Of Material Specify Species And Route: N/Avl.	LC 50 Of Material Specify Species: N/Avl.	Exposure Limit Of Material: N/Avl.	Irritancy Of Material: N/Avl.
Sensitizing Capability Of Material: N/Avl.	Carcinogenicity Of Material: N/Avl.	Reproductive Effects Of Material: N/Avl.	Synergistic Materials: N/Avl.

SECTION 7 PREVENTATIVE MEASURES

Personal Protective Equipment: Personal protective equipment will be required when using these materials. The nature of the processing activity will determine what form of equipment is necessary, i.e., safety glasses, respirator, protective clothing, etc. Personal protective equipment should not be substituted for proper handling and engineering controls.

Gloves: Wear appropriate protective gloves to prevent injury from the hazards of brazing and/or repeated contact with finely divided material. Avoid flammable fabrics.

Respiratory: Local exhaust, mechanical ventilation, and/or respiratory equipment may be required to maintain a protection factor appropriate to the airborne concentrations of the contaminants generated and provide sufficient clean air for breathing. If exposure levels exceed OSHA PELs, wear a NIOSH/MSHA-approved respirator (or other approving authority) for protection from the airborne contaminants. All adjacent persons in the immediate vicinity of brazing or "soldering" operations shall be similarly protected as necessary by ventilation or approved respirators.

Eyes: 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 safety spectacles with side shields and filter lenses (shade #3 or #4) are recommended.

Footwear: Refer to workplace safety regulations.

Clothing: Avoid flammable fabrics. Wear appropriate clothing to prevent skin injuries from the hazards of brazing.

Other Protection: Practice good housekeeping and personal hygiene procedures. To avoid ingestion of material, wash hands and face before eating, drinking, or consumption of tobacco. Brazing alloys may be used with a separately applied 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. For general guidance, refer to American National Standards Institute (ANSI) Z49.1, "Safety in Welding and Cutting" (American Welding Society, Miami, FL 33135).

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SECTION 7 (Cont'd)

PREVENTATIVE MEASURES

Engineering Controls: Adequate ventilation, sinks, showers, and eyewash stations should be provided. The best industrial control practice is to maintain concentrations of all chemical fumes and dusts as low as is practical.

Leak And Spill Procedure: If metal is molten, allow to solidify and cool. Clean up any spilled material so as to minimize dispersion of dusts. Wet sweeping or vacuuming using HEPA, or similarly approved filtration, are recommended methods.

Waste Disposal: Return to manufacturer for reclaim. **Sara Title III - Hazard Classes:** Acute Health Hazard; Chronic Health Hazard

Handling Procedure And Equipment: Avoid heating above brazing range (*see chart, Section 2*) as excessive fumes may result. Zinc boils at 1665°F/910°C) Use sufficient flux or atmosphere to protect the metals and minimize oxidation/vapourization during use.

Storage Requirements: Avoid storage near incompatible materials (*see also Section 5*). Also avoid conditions which create toxic fumes or dusts. Wash exposed skin after handling material. Stable at room temperature.

Special Shipping Information: No special requirements.

WHMIS Classification: Class D, Division 2, Subdivision B.

SECTION 8

FIRST AID MEASURES

Emergency And First Aid Procedures

Inhalation: Move victim to fresh air at once. Give oxygen if breathing is laboured, artificial respiration if victim is not breathing. Keep person warm and quiet. Get medical attention immediately.

Skin: Contact in solid forms is not known to be hazardous. If clothing is contaminated with finely divided particles, remove. Wash affected area with large quantities of water for at least 5 minutes. Get medical attention if necessary.

Eyes: Flush immediately with large amounts of water for at least 15 minutes while lifting the lower and upper eyelids. If irritation continues, get medical attention.

Ingestion: If person is conscious, give large amounts of water and induce vomiting. Seek medical attention. If person is unconscious or convulsive, get immediate medical attention.

*****SEEK MEDICAL ATTENTION IN ALL CASES OF EXPOSURE*****

SIGNS AND SYMPTOMS OF EXPOSURE:

Acute
Inhalation: Chills, fever, aching muscles, sneezing, dry throat, coughing, constriction of throat, nausea, irritation of nose and trachea, discolouration of mucous membranes, difficulty in breathing, chest pain, headache.

Skin: Particles may cause irritation, pain, nausea, vomiting.

Eyes: Particles may cause irritation, redness, itching.

Ingestion: Nausea, vomiting, headache, diarrhea, fever, abdominal pain.

Chronic

Inhalation: Cough, difficulty in breathing, laryngitis, discolouration of mucous membranes, kidney and liver disorders.

Skin: May cause argaria, discolouration, contact dermatitis and/or allergic sensitization among hyper-susceptible individuals.

Eyes: Irritation. May cause, particularly in powder form, argaria, conjunctivitis, and/or ulceration of the cornea.

Ingestion: May cause damage to the liver, kidneys, musculoskeletal system and nervous system.

Medical Conditions Generally Aggravated By Exposure: (*see Section 6*).

Sources Used: Canadian Centre For Occupational Health And Safety, Hamilton, Ontario; American Welding Society, Miami, Florida; ACGIH, Cincinnati, Ohio;

Additional Information: The information contained herein is only for the manufactured product. The composition and hazards of any resultant fumes due to heating methods, filler metal alloy, flux and base metals employed may vary significantly. Brazing fumes consist of various airborne substances which may create hazards to health when they are inhaled or swallowed. The degree of hazard to the worker(s) in the work area depends upon the composition of the total fume, the concentration of contaminants in the breathing air and the time-length of exposure to it. It is the responsibility of the user/employer to ensure the suitability of the material use and that TLV, TWA, and STEL values are not exceeded. Assessment of the possible exposure to the worker(s) to hazardous fumes, when required, should be carried out by a competent person and may involve air concentration measurements

SECTION 9

PREPARATION DATE OF MSDS

PREPARED BY: Marketing Department	PHONE NO: +91-121-2555433	DATE: Revised 3/03
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