

Saru Silver Alloy Private Limited

MATERIAL SAFETY DATA SHEET

SECTION 1 MATERIAL IDENTIFICATION AND USE

MATERIAL NAME IDENTIFIER: Cadmium Free 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.
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
		Ag	Cu	Zn	Others	°F	°C	°F	°C		
SILVER 925	BAG-19	92.5	7.3	-	0.20Li	1400-760	1635-890	760-890	10.2		
SILVER 85	BAG-23	85	-	-	15 Mn	1760-960	1780-970	960-970	9.4		
SILVER 83	-	83	15	2	-	1435-780	1525-830	780-830	10.2		
SILVER 75	-	75	22	3	-	1365-740	1425-775	740-775	10		
SILVER 72	BAG-8	72	28	-	-	1435-779	1435-779	779	10		
SILVER 715	-	71.5	28	-	0.5Ni	1435-780	1465-795	780-795	10		
SILVER 70	BAG-10	70	20	10	-	1270-690	1365-740	690-740	9.8		
SILVER 67	-	67	23	10	-	1295-700	1345-730	700-730	9.7		
SILVER 65	-	65	28	-	5Mn, 2Ni	1385-750	1565-850	750-850	9.9		
SILVER 64	BAG-9	64	20	16	-	1270-690	1330-720	690-720	9.7		
SILVER 63	BAG-21	63	28.5	-	2.5Ni, 6Sn	1270-690	1475-800	690-800	9.9		
SILVER 61	-	61	29	10	-	1270-690	1355-735	690-735	-		
SILVER 601Sn	-	60	23	14	3Sn	1150-620	1265-685	620-685	9.6		

Saru Silver Alloy Private Limited

MATERIAL SAFETY DATA SHEET

SARU SILVER BRAZING FILLER METALS CHART

FILLER METAL NAME	AWS / SFA CLASS	Nominal Composition, %				Solidus (Melt Point)		Liquidus (Flow Point)		Brazing Range	Specific Gravity
						°F	°C	°F	°C		
SILVER 60	-	60	26	14	-	1285-695	1350-730	695-730	9.5		
SILVER 60Sn	BAG-18	60	30	-	10Sn	1115-600	1325-720	600-720	-		
SILVER 575	-	58	32	-	7Sn, 3Mn	1125-605	1345-730	605-730	9.9		
SILVER 560	BAG-7	56	22	17	5Sn	1150-620	1200-650	620-650	9.5		
SILVER 55Sn (Cd Free)	-	55	21	22	2Sn	1150-620	1220-660	620-660	9.4		
SILVER 561	BAG-13a	56	42	-	2Ni	1420-770	1640-895	770-895	9.8		
SILVER 54	BAG-13	54	40	5	1Ni	1340-725	1575-855	725-855	9.7		
SILVER 5050	-	50	50	-	-	1385-750	1600-870	750-870	9.7		
SILVER 50N(CdFree)	BAG-24	50	20	28	2Ni	1220-660	1385-750	660-750	9		
SILVER 50 (Cd Free)	BAG-6	50	34	16	-	1270-688	1425-774	688-774	9.4		
SILVER 45Sn	BAG-36	45	27	25	3Sn	1180-640	1255-680	640-680	9.2		
SILVER 45 (Cd Free)	BAG-5	45	30	25	-	1240-670	1365-740	670-740	9.2		
SILVER 43 (Cd Free)	-	43	37	20	-	1275-690	1420-770	690-770	9.1		
SILVER 40 (with Sn)	BAG-28	40	30	28	2 Sn	1180-640	1290-700	640-700	9.1		
SILVER 40 (Cd Free)	-	40	30	30	-	1245-675	1340-725	675-725	8.8		
SILVER 4002	-	40	58	-	2Ni	-	-	-	-		
SILVER 38Sn	BAG-34	38	32	28	2Sn	1200-650	1325-720	650-720	8.8		
SILVER 35(Cd Free)	BAG-35	35	32	33	-	1260-680	1385-750	680-750	9		
SILVER 34Sn	-	34	36	27	3Sn	1170-630	1350-730	630-730	9		
SILVER 30 (Cd Free)	BAG-20	30	38	32	-	1260-680	1410-765	680-765	8.9		
SILVER 30 (with Sn)	-	30	36	32	2 Sn	1200-650	1385-750	650-750	8.9		
SILVER 25Sn	BAG-37	25	40	33	2Sn	1260-680	1400-760	680-760	8.7		
SILVER 25 (Cd Free)	-	25	41	34	-	1295-700	1475-800	700-800	8.8		
SILVER 25Ni	BAG-26	25	38	33	2Ni, 2Mn	1305-705	1475-800	705-800	8.6		
SILVER 20	-	20	44	35.9	0.1Si	1275-690	1490-810	690-810	8.7		
SILVER 12 (Cd Free)	-	12	48	40	-	1475-800	1530-830	800-830	8.5		
SILVER 09	-	9	53	38	-	1410-765	1656-850	765-850	8.6		
SILVER 07	-	7	85	-	8Sn	1225-665	1805-985	665-985	9.1		
SILVER 5 (Cd Free)	-	5	55	39.9	0.1Si	1510-820	1600-870	820-870	8.4		
SILVER 4(CdFree)	-	4	56	39.7	0.3Si	1600-870	1635-890	870-890	-		
SILVER 2	-	2	58	39.9	0.1Si	1615-880	1635-890	880-890	-		
SILVER 1	-	1	60	38.9	0.1Si	1635-890	1655-900	890-900	-		

SECTION 3

PHYSICAL DATA

Physical State: Gas Liquid Solid

Odour Threshold (ppm): N/Avl.

Evaporation Rate: Solid - N/Avl.

% Volatile (By Volume): N/Avl.

Specific Gravity: Refer To Chart

Odour & Appearance: No Odour; Solid Metal Wire, Strip, Powder, Paste

Vapour Pressure (mm.Hg): N/Avl.

Boiling Point (°C): Solid - N/Avl.

Solubility In Water (20°C): Insoluble

Coeff.-Water Oil Disp.: N/Avl.

Vapour Density (AIR=1): Solid-N/Avl.

Freezing Point (°C): Solid - N/Avl.

pH: N/Avl.

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

Lower Explosion Limit (%By Volume): Solid Metal-N/Avl.

TDG Flammability Classification: None

Sensitivity To Impact Explosion Data: N/Avl.

Explosive Power: N/Avl.

Upper Explosion Limit (% By Volume): N/Avl.

Auto Ignition Temperature (°C): Solid Metal - N/Avl.

Hazardous Combustion Products: Solid Metal - N/Avl.

Rate Of Burning: N/Avl.

Sensitivity To Static Discharge: N/Avl.

Saru Silver Alloy Private Limited

MATERIAL SAFETY DATA SHEET

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.

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, discoloration 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 discoloration, 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.

Saru Silver Alloy Private Limited

MATERIAL SAFETY DATA SHEET

SECTION 6 (Cont'd) TOXICOLOGICAL PROPERTIES

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.

LD₅₀ Of Material Specify Species And Route: N/Avl.	LC₅₀ 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).

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:**

Saru Silver Alloy Private Limited

MATERIAL SAFETY DATA SHEET

SECTION 8 (Cont'd)

FIRST AID MEASURES

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