



**INDIUM CORPORATION OF AMERICA ®\EUROPE®\ASIA-PACIFIC®  
INDIUM CORPORATION (SUZHOU) ®  
SAFETY DATA SHEET**

To better serve all of our customers Indium Corporation has generated one SDS for this groupings of products to be used within the United States as well as internationally. Some of the regulatory or safety information contained within may not be applicable to the customer's product or individual state or country. See alloy table for product listing.

### 1. PRODUCT AND COMPANY IDENTIFICATION

**Product Identifier:** INDALLOY METAL MIX CONTAINING BISMUTH

**SDS Number:** SDS-IN 004

**Revised Date:** 22 MARCH 2016

**Product Use:** INDUSTRIAL USE (MIXTURE) - METAL ALLOY CONSISTING OF BISMUTH MIXED WITH OTHER METAL ALLOYS (SEE ALLOY TABLE OF ALL MIXTURES). SOME INFORMATION IS NOT APPLICABLE TO EVERY POSSIBLE METAL COMBINATION.

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**2. HAZARDS IDENTIFICATION****PRIMARY ROUTES OF ENTRY:**

Eye Inhalation Skin Ingestion

**CARCINOGEN LISTED IN:**

NTP  IARC  OSHA  Not Listed  
(See Section 11)

**GHS:**

This information is provided as basic information. Review the metal combination being used and apply the applicable information. Some information and pictograms are not applicable to all metal combinations.

**General:**

(indium ,germanium, lead)



(lead, cadmium containing)

All others no pictogram.

Signal Word: Warning

**Hazard statement(s)**

H303	May be harmful if swallowed (lead) (cadmium)
H335	May cause respiratory irritation (indium)
H351	Suspected of causing cancer (lead)
H361	Suspected of damaging fertility or the unborn child (applicable to lead containing product)
H373	May cause damage to organs through prolonged or repeated exposure (applicable to lead containing product)
H410	Very toxic to aquatic life with long lasting effects (lead)(cadmium)
EUH201A	Warning! Contains lead (applicable only to the products listed that contain lead) Review listing.
EUH207	Warning! Contains cadmium. Dangerous fumes are formed during use. Comply with safety instructions. (Applicable only to cadmium containing products)

No GHS hazard statements for: bismuth/tin/silver/antimony/copper

**Precautionary statement(s)**

P261	Avoid breathing dust/fume/gas/mist/vapors/spray
P270	Do not eat, drink or smoke when using this product
P273	Avoid release to the environment
P280	Wear protective gloves/protective clothing/eye protection/face protection
P362 + P364	Take off contaminated clothing and wash before reuse
P301 + P314	IF SWALLOWED: Get Medical advice/attention if you feel unwell
P302 +P352	IF ON SKIN: Wash with plenty of soap and water
P304 + 341	IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
P305 + 351	IF IN EYES: Rinse continuously with water for several minutes (15 MINS)
P5012	Metal may have reclaim value. Contact recycler.

**POTENTIAL HEALTH EFFECTS:**

**Eye Contact:** Contact with powdered metal alloy or fume from molten metal may cause irritation. Severe eye damage may result from hot molten metal being splashed into the eyes. Wear safety glasses and face shield when working with molten metal. Dusts are irritating to eyes.

**Ingestion:** Ingestion of dust/vapor/fume may cause irritation or harm.

**Inhalation:** Inhalation of fume or dust may cause local irritation or harm to the respiratory system.

**Skin Contact:** Normal handling of solid metal should not cause any adverse health effects. Hot molten metal may cause burns to the skin. Wear protective equipment when handling molten metal. Antimony has been known to cause dermatitis. Zinc may cause irritation.

**Chronic:** TIN: Has been shown to increase incidence of sarcoma in animal tests. Chronic exposure may result in "stannosis" a mild form of pneumoconiosis.

LEAD: Prolonged exposure to vapors or fumes at higher temperatures may cause respiratory irritation and systematic lead poisoning. Symptoms of lead poisoning include headache, nausea, abdominal pain, muscle and joint pain and damage to the nervous system, blood system and kidneys.

SILVER: Chronic skin contact or ingestion of silver dust, salts or fume can result in a condition known as Argyria, a condition with bluish pigmentation of the skin and eyes.

INDIUM: May cause damage to respiratory system if inhaled over long exposure.

BISMUTH: May cause kidney damage.

COPPER: Overexposure to fumes may cause metal fume fever (chills, muscle aches, nausea, fever, dry throat, cough weakness, lassitude); metallic or sweet taste; discoloration of skin and hair.

CADMIUM: Overexposure can cause damage to the lungs and kidneys. Cadmium is a toxic metal and ingestion or inhalation of fumes and dust can be harmful. Included effects may be obstructive lung disease such as emphysema, bone demineralization, microfractures and osteomalacia, gastrointestinal symptoms, rhinitis and discoloration of the teeth.

ZINC: Heated zinc may give off zinc oxide fumes. Exposure includes dry throat, injury to mucous membrane, cough, aches chills, fever, nausea, vomiting.

**WARNING:** This product contains a chemical(s) known to the State of California to cause cancer and/or birth defects (or other reproductive harm). (lead/cadmium) Prop 65 Safe Drinking Water Standard.

**NOTE:** The Indium Corporation does not recommend, manufacturer, market or endorse any of its products for human consumption.

**WARNING:** This product may contain lead. Lead may be harmful to your health. US Federal law prohibits the use of leaded solders in making joints or fittings in any private or public water supply system. Keep out of the reach of children. Not intended for household use and should not be used by children.

### 3. COMPOSITION / INFORMATION ON INGREDIENTS

Product mixtures may contain some of the following ingredients. Review alloy table.

Components	% wt	CAS Registry #/EINECS	PEL mg/m <sup>3</sup>	TLV-TWA mg/m <sup>3</sup>	TLV-STEL mg/m <sup>3</sup>
<b>TIN</b>	*	7440-31-5/231-141-8			
		(US)	2	2	-
		(EU)	-	2	4
		(Singapore)	2	-	-
		(Canada)	-	2	4
<b>LEAD</b>	*	7439-92-1/231-100-4			
		(US)	0.05	0.05	-
		(EU)	-	0.15	-
		(Canada)	-	0.05	-
		(Singapore)	0.15	-	-
		(Mexico)	-	0.15	-
		(China)	-	0.05(dust) 0.03(fume)	-
<b>SILVER</b>	*	7440-22-4/231-131-3			
		(US)	0.01	0.1	-
		(EU)	-	0.1	-
		(Canada)	-	0.1	0.3
		(Singapore)	0.1	-	-
		(Mexico)	-	0.1	-
<b>INDIUM</b>	*	7440-74-6/231-180-0			
		(US)	0.1	0.1	-
		(EU)	-	0.1	0.3
		(Canada)	-	0.1	0.3
		(Singapore)	0.1	-	-
		(Mexico)	-	0.1	0.3
		(China)	-	0.1	0.3
<b>COPPER</b>	*	7440-50-8/231-159-6			
		(US)	0.1 (fume)	0.2 (fume)	-
		(EU)	-	0.2 (fume)	-
		(Singapore)	0.2(fume)	1(dust)	-

		(Mexico)	-	0.2	2
		(Canada)	N.E.	0.2 (fume)	0.6 (fume)
<b>BISMUTH</b>	*	7440-69-9/231-177-4	N.E.	N.E.	N.E.
<b>ANTIMONY</b>	*	7440-36-0/231-146-5			
		(US)	0.5	0.5	-
		(EU)	0.5	-	-
		(Singapore)	0.5	-	-
		(Mexico)	-	0.5	-
		(China)	-	0.5	-
		(Canada)	-	0.5	1.5
<b>ZINC</b>	*	7440-66-6/231-175-3	N.E.	N.E.	N.E.
<b>CADMIUM</b>	*	7440-43-9/231-152-8			
		(US)	0.005	0.01	-
		(EU)	0.025	-	-
		(Singapore)	0.05	-	-
		(China)	-	0.01	0.02
		(Canada)	-	0.05	0.2
<b>GERMANIUM</b>	*	7440-56-4/231-164-3	N.E.	N.E.	N.E.

N.E. = Not established

EU = European Union Occupational Exposure Limits

\*See Alloy Table

#### 4. FIRST AID MEASURES

**Eye Contact:** Hold eyelids apart and flush eyes with plenty of tepid water for at least 15 minutes. Seek medical attention if irritation persists.

**Ingestion:** If patient is conscious, ONLY induce vomiting as directed by trained personnel. NEVER give anything by mouth to an unconscious person. Seek medical attention immediately.

**Inhalation:** Remove to fresh air. If not breathing, give artificial respiration or oxygen by trained personnel. Seek immediate medical attention.

**Skin Contact:** Remove contaminated clothing. Wash affected area with soap and water. Wash clothing before reuse. If irritation persists, obtain medical attention.

## 5. FIRE FIGHTING MEASURES

**Flash Point:** Not established. **Method:** Not established.

**Auto-ignition Temperature:** Not established.

**Flammable Limits:** Limits not established. Massive metal is not flammable; however dust or powder may be considered to be a dust hazard.

**Extinguishing Media:** Use extinguishers appropriate for the surrounding fire conditions. Do not add water to molten metal.

**Special Fire Fighting** Firefighters must wear NIOSH approved self-contained breathing apparatus and Full protective clothing.

## 6. ACCIDENTAL RELEASE MEASURES

**Spill or Leak Procedures:** Contain spill. If molten, cool to allow metal to solidify. If a solid metal, wear gloves, pick up and return to process. If dust, wear recommended personal protective equipment including respiratory protection. DO NOT SWEEP. Use a vacuum, place in barrels and return to process if applicable. Use proper ventilation. Otherwise, dispose of following all Federal, State and Local regulations. In the EU refer to the Special Waste Regulations. Metal may have reclaim value.

## 7. HANDLING AND STORAGE

**Handling:** Only dry metals should be added to molten bath. If working with molten metals, or exposed to fume or dust, use appropriate personal protective equipment.

**Storage:** Store product in a cool, dry area away from incompatible materials.

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Engineering Controls:** Exhaust ventilation is recommended to control any air contaminants. Control concentration of all components so that their exposure levels are not exceeded. Use ventilation for example especially during heating, grinding, cutting, sanding, melting and any other types of work where exposure is possible.

### Personal protection:

**Eyes:** Chemical safety glasses/goggles and face shield with molten metal.

**Respirator:** An authority approved or compliant marked air-purifying respirator with a fume/dust chemical cartridge is recommended under certain circumstances where airborne concentrations are expected to be elevated. Additional respiratory protection may be required based on the work performed and the area in which the work is performed. Lead or cadmium work requires protection from exposure.

**Skin:** Gloves-leather or impervious (vinyl) type. Heat resistant gloves if handling hot metal. Safety type boots. Personal protective equipment is recommended when working with molten metal to avoid burns.

**Other:** Lab coat, safety shower and eye-wash fountain in work area. Avoid the use of contact lenses in high fume areas. Follow OSHA guidelines for lead and cadmium workers.

**Work/Hygienic** Maintain good housekeeping. Clean up spills immediately. Good personal hygiene is essential. Avoid eating, smoking or drinking in the work area. Wash hands thoroughly with soap and water immediately upon leaving the work area.

Follow standard lead or cadmium work practices when applicable.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Appearance:</b>	Silver grey solid metal	<b>Boiling Point:</b>	Not applicable.
<b>Odor:</b>	Odorless	<b>Melting Point:</b>	See Table
<b>Specific Gravity:</b>	See Table	<b>pH:</b>	Not applicable
<b>Vapor Pressure:</b>	Not applicable.	<b>Solubility in Water:</b>	Insoluble
<b>Vapor Density:</b>	(air=1) Not applicable.	<b>Flash Point:</b>	Not applicable

## 10. STABILITY AND REACTIVITY

<b>General:</b>	Stable.
<b>Conditions to Avoid:</b>	Not established.
<b>Incompatible Materials:</b>	Avoid contact with mineral acids.
<b>Hazardous Decomposition / Combustion:</b>	
Harmful organic fumes and toxic oxide fumes may form at elevated temperatures.	
<b>Hazardous Polymerization:</b>	Will not occur.

## 11. TOXICOLOGICAL INFORMATION

<b>Carcinogenicity: National Toxicity Program (NTP):</b>	Yes
Cadmium is listed as a known carcinogen.	
<b>Occupational Safety &amp; Health Administration (OSHA):</b>	Yes
Cadmium is listed. 1910.1027      Lead is listed. 1910.1025	
<b>U.N. International Agency for Research on Cancer (IARC):</b>	Yes
Lead and Lead compounds are listed as carcinogens.	
Cadmium is listed as carcinogen.	

<b>LD50:</b>	Not established	<b>LC50:</b>	Not established
<b>Other:</b> Chronic Toxicity: Lead and Cadmium can cause potential harm to the developing fetus.			

Copper - LD50 – intraperitoneal mouse 3.5 mg/kg.

Silver – LD50 oral – rat > 5,000 mg/kg

Bismuth – LD50 oral-rat 5,000 mg/kg

Antimony - LD50 oral – rat 7,000 mg/kg

Lead – Suspected human reproductive toxicant. May cause damage to organs through prolonged or repeated exposure. Reproductive toxicity – rat –inhalation, oral/ effects on newborn.

Cadmium – LD50 Oral – rat 225 mg/kg/ Inhalation LC50 – rat – 30h – 25 mg/m<sup>3</sup>

Cadmium suspected as a human reproductive toxicant. Signs and Symptoms of exposure to cadmium: damage to the lungs, kidney injury may occur, prolonged or repeated exposure can cause: vomiting/diarrhea/ lung irritation.

## 12. ECOLOGICAL INFORMATION

Product mixtures not tested.

Copper – Toxicity to daphnia and other aquatic invertibrates mortality NOEC – Daphnia 0.004 mg/l – 24h.

Antimony –. Toxicity to fish – mortality NOEC (sheepshead minnow) 6.2 mg/l – 96h. Toxic to aquatic organisms, may cause long term adverse effects in the aquatic environment.

Lead – Toxicity to fish – mortality LOEC – rainbow trout – 1.19 mg/l – 96h. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Bioaccumulation – Oncorhynchus kisutch – 2 weeks  
Bioconcentration factor (BCF): 12

Contains substances that are harmful to the aquatic environment.

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal of metal mixtures. Review product used and the alloy table. Recycle when possible.

Cadmium: toxicity to fish – mortality LOEC-Oncorhynchus myliss (rainbow trout) – 0.0015 mg/l-96h

LC50- Pimephales promelas (fathead minnow) – 1.0 ug/l – 96h

Toxicity to daphnia and other aquatic invertebrates- mortality NOEC-Daphnia- 0.019 mg/l – 24h/mortality

LOEC-Daphnia – 0.039 mg/l – 24h

## 13. DISPOSAL CONSIDERATION

**Waste Disposal Method:** Scrap metal alloy usually has value. Contact a commercial reclaimer for recycling. Otherwise, dispose of in accordance with all Federal, State and Local environmental regulations.

## 14. TRANSPORT INFORMATION

Transport in accordance with applicable regulations and requirements.

Not regulated under US DOT (United States Department of Transportation).

Solid metal mixtures are not hazardous under shipping regulations (ground/air/sea).

UN – none

Marine Pollutant: No

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Shipping of metal powders that contain lead or cadmium may be considered to be an environmental hazard.



Reportable spill quantity (RQ) in case of spill for lead is 10 lbs.  
Reportable spill quantity (RQ) in case of spill for cadmium is 10 lbs.  
Reportable spill quantity (RQ) in case of spill for silver is 1000 lbs  
Reportable spill quantity (RQ) in case of spill for zinc is 1000 lbs  
Reportable spill quantity (RQ) in case of spill for antimony is 5000 lbs.  
Reportable spill quantity (RQ) in case of spill for copper is 5000 lbs

Metal powders containing lead and or cadmium at or above 10 lbs/each in a single container:

UN 3077, Environmentally Hazardous Substance, 9, PG III



If less than the 10 lbs the product ships as non-hazardous.  
UN – none  
Marine Pollutant: No  
Review the product being shipped. Consult the alloy table.

## 15. REGULATORY INFORMATION

The information in this Safety Data Sheet meets the requirements of the United States Occupational Safety and Health Act and regulations promulgated hereunder (29 CFR 1910.1200 ET. SEQ.).

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation (CPR).

Canadian WHMIS: D2A – Materials Causing Other Toxic Effects – Very Toxic Material (Chronic) (Lead and Cadmium). D2B Materials Causing Other Toxic Effects (irritant).



Tin, Silver, Copper, Indium, Antimony, Zinc, Germanium, Bismuth: Uncontrolled product according to WHMIS classification criteria.

This product has been classified in accordance with the guidelines set by the Dept. of Industrial Health of the Republic of Singapore.

This product has been classified using the Chinese Occupational Exposure Limit for Hazardous Agents in the Workplace, GBZ2-2002.

This product has been classified in accordance with Mexican regulations NOM-018-STPS-2015 and NOM-010-STPS-2014

This product has been classified in accordance with: Malaysian – OCCUPATIONAL SAFETY AND HEALTH (CLASSIFICATION, LABELING AND SAFETY DATA SHEET OF HAZARDOUS CHEMICALS) REGULATION OCTOBER 2013 – (CLASS).

California PROP 65 (Safe Drinking Water Standard): WARNING : This product contains a chemical(s) known to the State of California to cause cancer and/or birth defects (or other reproductive harm). (lead/cadmium)

SARA 313 Listing – 40 CFR 372.65: Lead CAS# 7439-92-1, Silver CAS# 7440-22-4, Cadmium CAS# 7440-43-9  
Copper CAS# 7440-50-8, Antimony CAS# 7440-36-0, Zinc CAS# 7440-66-6

All ingredients are listed on the US EPA TSCA Inventory.

All ingredients are listed on the Canadian Domestic Substance List, the Chinese Chemical Inventory, the Philippines Inventory of Chemicals, the Korea Inventory of Existing Chemicals, the European Inventory of Existing

Commercial Chemical Substances, the New Zealand Inventory of Chemicals and the Australian Inventory of Chemicals.

EPA Genetic Toxicology Program – Lead CAS# 7439-92-1, Cadmium CAS# 7440-43-9

## 16. OTHER INFORMATION

<b>HMIS Hazard Rating:</b>	<b>Health:</b>	2
	<b>Fire:</b>	1
	<b>Physical Hazard:</b>	0

**Revised Date:** 22 MARCH 2016

**Prepared by:** Nancy Swarts, Indium Corporation of America

**Approved by:** Nancy Swarts, Indium Corporation of America

The information and recommendations contained herein are, to the best of The Indium Corporation of America's knowledge and belief, accurate and reliable as of the date issued. The Indium Corporation of America does not warrant or guarantee their accuracy or reliability, and The Indium Corporation of America shall not be liable for any loss or damage arising out of the user thereof. The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use. If buyer repackages this product, legal counsel should be consulted to insure proper health, safety and other necessary information is included on the container. The Indium Corporation does not recommend, manufacturer, market or endorse any of its products for human consumption.

# ALLOY TABLE

## **POSSIBLE METAL MIXTURES WITH BISMUTH**

INDALLOY (Metal)	%BISMUTH Bi	%TIN Sn	%LEAD Pb	%CADMIUM Cd REACH SVHC	%SILVER Ag	%INDIUM In	%ANTIMONY Sb	%COPPER Cu	%ZINC Zn	Germanium Ge	LIQUIDUS °C/°F	RoHS2* Compliance	DENSITY (gm/cm <sup>3</sup> )
16	44.7	11.3	22.6	5.3	-	16.1	-	-	-	-	52/126	No	9.16
17	49.14	11.55	17.92	0.5	-	20.89	-	-	-	-	56/133	No	9.01
18	30.78	-	-	7.5	-	61.72	-	-	-	-	61.5/143	No	8.02
19	32.5	16.5	-	-	-	51	-	-	-	-	60/140	Yes	7.88
21	49	15	18	-	-	18	-	-	-	-	69/156	No	9.00
22	50.5	12.4	27.8	9.3	-	-	-	-	-	-	73/163	No	9.67
23	50	12.5	25	12.5	-	-	-	-	-	-	73/163	No	9.6
24	50	12.5	24.95	12.5	0.05	-	-	-	-	-	73/163	No	9.59
25	48.5	-	-	10	-	41.5	-	-	-	-	77.5/172	No	8.49
26	50	9.3	34.5	6.2	-	-	-	-	-	-	78/172	No	9.89
27	54.02	16.3				29.68	-	-	-	-	81/178	Yes	8.47
28	50	3	39	8	-	-	-	-	-	-	82/180	No	10.13
29	50.31	1	39.2	8	-	1.49	-	-	-	-	85/185	No	10.15
31	50.31	1.5	39.2	7.99	-	1	-	-	-	-	89/192	No	10.15
32	50.9	15	31.1	1	-	2	-	-	-	-	89/192	No	9.63
33	51.08	-	39.8	8.12	-	1	-	-	-	-	91/196	No	10.21
34	52	15.33	31.67	1	-	-	-	-	-	-	92/198	No	9.7
35	50	4	39	7	-	-	-	-	-	-	93/199	No	10.11
36	51.45	15.2	31.35	-	-	2	-	-	-	-	93/199	No	9.64
37	52	15.3	31.7	-	-	1	-	-	-	-	94/201	No	9.70
38	52.5	15.5	32	-	-	-	-	-	-	-	95/203	No	9.71
39	52	18	30	-	-	-	-	-	-	-	96/205	No	9.60
40	50	19	31	-	-	-	-	-	-	-	99/210	No	9.53
41	50	22	28	-	-	-	-	-	-	-	100/212	No	9.44

INDALLOY (Metal)	%BISMUTH Bi	%TIN Sn	%LEAD Pb	%CADMIUM Cd	%SILVER Ag	%INDIUM In	%ANTIMONY Sb	%COPPER Cu	%ZINC Zn	Germanium Ge	LIQUIDUS C/F	RoHS2* Compliance	DENSITY (gm/cm <sup>3</sup> )
42	46	34	20	-	-	-	-	-	-	-	96/205	No	8.99
43	40.5	22.4	27.8	9.3	-	-	-	-	-	-	102/216	No	9.32
44	50	25	25	-	-	-	-	-	-	-	115/239	No	9.32
45	54	26	-	20	-	-	-	-	-	-	103/217	No	8.78
46	56	22	22	-	-	-	-	-	-	-	104/219	No	9.37
47	35.3	20.1	35.1	9.5	-	-	-	-	-	-	105/221	No	9.48
48	52.2	10	37.8	-	-	-	-	-	-	-	105/221	No	9.97
49	45	20	35	-	-	-	-	-	-	-	107/225	No	9.60
50	46	20	34	-	-	-	-	-	-	-	108/226	No	9.59
52	54.5	6	39.5	-	-	-	-	-	-	-	108/226	No	10.14
53	67	-	-	-	-	33	-	-	-	-	109/228	Yes	8.81
54	51.6	7	41.4	-	-	-	-	-	-	-	112/234	No	10.13
55	40	13.3	33.4	13.3	-	-	-	-	-	-	113/235	No	9.63
56	54.4	1	43.6	1	-	-	-	-	-	-	113/235	No	10.38
57	50	20	30	-	-	-	-	-	-	-	104/219	No	9.53
58	52.98	4.53	42.49	-	-	-	-	-	-	-	117/243	No	10.24
59	38.14	31.67	26.42	2.64	-	-	1.07	0.06	-	-	118/244	No	9.06
61	53.75	3.15	43.1	-	-	-	-	-	-	-	119/246	No	10.30
62	55	1	44	-	-	-	-	-	-	-	120/248	No	10.39
63	56.85	-	41.15	2	-	-	-	-	-	-	121/250	No	10.36
64	55	-	44	-	-	1	-	-	-	-	121/250	No	10.39
65	30.7	18.2	46	5.1	-	-	-	-	-	-	123/253	No	9.74
67	58	-	42	-	-	-	-	-	-	-	126/259	No	10.40
68	37	25	38	-	-	-	-	-	-	-	127/261	No	9.48
72	32	34	34	-	-	-	-	-	-	-	133/271	No	9.15

INDALLOY (Metal)	%BISMUTH Bi	%TIN Sn	%LEAD Pb	%CADMIUM Cd	%SILVER Ag	%INDIUM In	%ANTIMONY Sb	%COPPER Cu	%ZINC Zn	Germanium Ge	LIQUIDUS C/F	RoHS2* Compliance	DENSITY (gm/cm <sup>3</sup> )
73	56.84	41.16	2	-	-	-	-	-	-	-	133/271	No	8.60
74	38.41	30.77	30.77	-	0.05	-	-	-	-	-	135/275	No	9.21
75	57.42	41.58	1	-	-	-	-	-	-	-	135/275	No	8.58
76	36	31	32	-	1	-	-	-	-	-	136/277	No	9.22
78	36.45	31.5	31.75	0.25	0.05	-	-	-	-	-	136/277	No	9.20
79	55.1	39.9	5	-	-	-	-	-	-	-	136/277	No	8.67
80	36.5	31.75	31.75	-	-	-	-	-	-	-	137/279	No	9.19
81	28.5	28.5	43	-	-	-	-	-	-	-	137/279	No	9.43
83	30.8	30.8	38.4	-	-	-	-	-	-	-	139/282	No	9.30
84	5	45	32	18	-	-	-	-	-	-	139/282	No	8.63
85	33.33	33.33	33.34	-	-	-	-	-	-	-	143/289	No	9.16
86	60	-	-	40	-	-	-	-	-	-	144/291	No	9.31
89	21	37	42	-	-	-	-	-	-	-	152/306	No	9.16
93	45.45	-	54.55	-	-	-	-	-	-	-	160/320	No	10.59
95	16	48	36	-	-	-	-	-	-	-	162/324	No	8.78
97	14	43	43	-	-	-	-	-	-	-	163/325	No	9.02
98	10	50	40	-	-	-	-	-	-	-	167/333	No	8.77
99	21.5	27	51.5	-	-	-	-	-	-	-	170/338	No	9.58
101	20	30	50	-	-	-	-	-	-	-	173/343	No	9.47
102	12.6	39.93	47.47	-	-	-	-	-	-	-	176/349	No	9.13
105	25.5	60	14.5	-	-	-	-	-	-	-	180/356	No	8.25
111	4	40.5	55.5	-	-	-	-	-	-	-	197/387	No	9.21
117	44.7	8.3	22.6	5.3	-	19.1	-	-	-	-	47/117	No	9.16
136	49	12	18	-	-	21	-	-	-	-	58/136	No	9.01
139	95	5	-	-	-	-	-	-	-	-	251/484	Yes	9.64

INDALLOY (Metal)	%BISMUTH Bi	%TIN Sn	%LEAD Pb	%CADMIUM Cd	%SILVER Ag	%INDIUM In	%ANTIMONY Sb	%COPPER Cu	%ZINC Zn	Germanium Ge	LIQUIDUS C/F	RoHS2* Compliance	DENSITY (gm/cm <sup>3</sup> )
140	47.5	12.5	25.4	9.5	-	5	-	-	-	-	65/149	No	9.47
147	48	12.77	25.63	9.6	-	4	-	-	-	-	65/149	No	9.50
148	100	-	-	-	-	-	-	-	-	-	271/520	Yes	9.80
158	50	13.3	26.7	10	-	-	-	-	-	-	70/158	No	9.58
162	33.7	-	-	-	-	66.3	-	-	-	-	72/162	Yes	7.99
174	57	17	-	-	-	26	-	-	-	-	79/174	Yes	8.54
197	51.6	-	40.2	8.2	-	-	-	-	-	-	92/198	No	10.25
203	5	-	-	-	-	95	-	-	-	-	150/302	Yes	7.40
231	3.5	86.5	-	-	-	4.5	-	-	5.5	-	186/367	Yes	7.36
234	8	49.75	41.75	-	0.5	-	-	-	-	-	172/342	No	8.82
240	8	46	46	-	-	-	-	-	-	-	173/343	No	8.97
249	4.8	91.8	-	-	3.4	-	-	-	-	-	213/415	Yes	7.44
255	55.5	-	44.5	-	-	-	-	-	-	-	124/255	No	10.44
257	52	16	32	-	-	-	-	-	-	-	95.5/204	No	9.69
281	58	42	-	-	-	-	-	-	-	-	138/281	Yes	8.56
282	57	42	-	-	1	-	-	-	-	-	140/284	Yes	8.57
160-190	42.5	11.3	37.7	8.5	-	-	-	-	-	-	88/190	No	9.81
217-440	48	14.5	28.5	-	-	-	9	-	-	-	227/441	No	9.30
281-338	40	60	-	-	-	-	-	-	-	-	-	Yes	9.24
<b>Non standard alloy mixtures</b>													
NS	0.1	-	-	-	-	99.9	-	-	-	-	-	Yes	7.30
NS	0.5	-	-	-	-	99.5	-	-	-	-	-	Yes	7.31
NS	1	-	-	-	-	99	-	-	-	-	-	Yes	7.32
NS	2	-	-	-	-	98	-	-	-	-	-	Yes	7.34
NS	1	99	-	-	-	-	-	-	-	-	-	Yes	7.3

NS	1	96	-	-	2.5	-	-	0.5	-	-	-	Yes	7.38
NS	2.5	62	32.5	-	-	-	1	1	1	-	-	No	8.31
NS	3	89	-	-	-	-	-	-	8	-	-	Yes	7.32
NS	3.3	92.3	-	-	3.4	-	-	1	-	-	-	Yes	7.43
NS	7	91.3	-	-	1	-	-	0.7	-	-	-	Yes	7.45
NS	10	25	62	-	3	-	-	-	-	-	-	No	9.80
NS	28.6	31.4	39.4	-	0.6	-	-	-	-	-	-	No	9.29
INDALLOY (Metal)	%BISMUTH Bi	%TIN Sn	%LEAD Pb	%CADMIUM Cd	%SILVER Ag	%INDIUM In	%ANTIMONY Sb	%COPPER Cu	%ZINC Zn	Germanium Ge	LIQUIDUS C/F	RoHS2* Compliance	DENSITY (gm/cm <sup>3</sup> )
NS	31.5	65.5	-	-	-	-	-	-	3.0	-	-	Yes	7.92
NS	35	65	-	-	-	-	-	-	-	-	-	Yes	8.00
NS	35	50	15	-	-	-	-	-	-	-	-	No	8.50
NS	35	60	-	-	-	-	5	-	-	-	-	Yes	7.96
NS	37	60	-	-	-	-	3	-	-	-	-	Yes	8.02
NS	40	-	60	-	-	-	-	-	-	-	-	No	10.67
NS	43	42	-	15	-	-	-	-	-	-	-	No	8.41
NS	45.7	11.4	34.3	8.6	-	-	-	-	-	-	-	No	9.76
NS	47	17.7	35.3	-	-	-	-	-	-	-	-	No	9.67
NS	48	20	19	13	-	-	-	-	-	-	170/338	No	8.12
NS	50	50	-	-	-	-	-	-	-	-	-	Yes	8.35
NS	50	15.65	28.14	6.21	-	-	-	-	-	-	-	No	9.57
NS	53	42	-	-	-	-	5	-	-	-	-	Yes	8.38
NS	54	42	-	-	-	-	-	-	4	-	-	Yes	8.45
NS	54.5	1	44.5	-	-	-	-	-	-	-	-	No	10.40
NS	55	42	-	-	-	-	3	-	-	-	-	Yes	8.45
NS	56.5	40	-	-	-	-	3.5	-	-	-	-	Yes	8.48
NS	57	43	-	-	-	-	-	-	-	-	-	Yes	8.53
NS	57.6	42	-	-	0.4	-	-	-	-	-	-	Yes	8.54
NS	57.9	42	-	-	-	-	-	-	0.1	-	-	Yes	8.55



INDALLOY (Metal)	%BISMUTH Bi	%TIN Sn	%LEAD Pb	%CADMIUM Cd	%SILVER Ag	%INDIUM In	%ANTIMONY Sb	%COPPER Cu	%ZINC Zn	Germanium Ge	LIQUIDUS C/F	RoHS 2* Compliance	DENSITY (gm/cm <sup>3</sup> )
NS	59.5	40	-	-	-	-	-	0.5	-	-	-	Yes	8.60
NS	59.8	40	-	-	-	-	-	0.2	-	-	-	Yes	8.61
NS	60	40	-	-	-	-	-	-	-	-	-	Yes	8.61
NS	60.5	-	-	-	-	39.5	-	-	-	-	-	Yes	8.63
NS	69.5	15.5	-	-	-	15	-	-	-	-	-	Yes	8.87
NS	70	20	-	-	10	-	-	-	-	-	-	Yes	9.22
NS	70	30	-	-	-	-	-	-	-	-	-	Yes	8.88
NS	88.95	-	-	-	11	-	-	-	-	0.05	-	Yes	9.87
NS	89	-	-	-	11	-	-	-	-	500 ppm	-	Yes	7.53
NS	94.5	-	-	-	-	-	-	5.5	-	-	-	Yes	9.75
NS	95	-	-	-	5	-	-	-	-	-	-	Yes	9.83
NS	97.5	-	-	-	2.5	-	-	-	-	-	-	Yes	9.82
NS	98	-	-	-	-	-	-	-	2	-	-	Yes	9.73
NS	BISMUTH ALLOY MIXED WITH TIN AND DOPED WITH 0.1 – 1% ZINC ALLOY. % BISMUTH AND TIN WILL VARY										-	Yes	varies

**NS** = Non Standard Alloy Mix

\*RoHS 2 = Restriction of Hazardous Substances (review any applicable exemptions that may apply)  
European Standard Directive RoHS2 2011/65/EU

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