



## SAFETY DATA SHEET

### SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

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

**SDS Number:** SDS-IN 004

**Revised Date:** 19 NOVEMBER 2018

**1.2 Relevant identified uses of the substance or mixture and uses advised against**

**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. Note: this SDS covers various metal mixtures.

**1.3 Details of the supplier of the safety data sheet**

**MANUFACTURER/SUPPLIER/IMPORTER:**

**In America:**

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**1.4 Emergency telephone number****FOR CHEMICAL EMERGENCY ONLY PHONE \*:****CHEMTREC 24 hrs.****USA: 1 (800) 424-9300****Outside USA: +1 (703) 527-3887****In China: Emergency 86+ 4008417580****\* Used only for spill/leak/fire/exposure/accident****ALL OTHER INQUIRIES: TOLL FREE: +1-800-448-9240 Indium Corporation****SECTION 2. HAZARDS IDENTIFICATION****PRIMARY ROUTES OF ENTRY:**

Eye   
Inhalation   
Skin   
Ingestion   
 NTP   
 IARC   
 OSHA   
Not Listed

**Carcinogen listed in****2.1 Classification of substance or mixture:****2.2 Label Elements:**

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. Labeling according to Regulation (EC) No. 1272/2008

General:



(indium ,germanium, lead)



(lead, cadmium containing)

All others no pictogram. No GHS hazard statements for: bismuth/tin/silver/antimony/copper

Signal Word: Warning

Hazard statement(s)

H303	May be harmful if swallowed (lead) (cadmium)
H330	Fatal if inhaled (cadmium)
H335	May cause respiratory irritation (indium)
H341	Suspected of causing genetic defects (cadmium)
H350	May cause cancer (cadmium)
H351	Suspected of causing cancer (lead)
H361	Suspected of damaging fertility or the unborn child (applicable to lead containing product)
H372	Causes damage to organs through prolonged or repeated exposure (cadmium)
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.

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Classification:

Acute toxicity, oral (Category 5) (lead/cadmium)  
 Specific target organ toxicity, single exposure, respiratory tract irritation (Category 3) (indium)  
 Carcinogenicity (Category 2) (lead)  
 Carcinogenicity (Category 1B) (cadmium)  
 Reproductive toxicity (Category 2) (lead/cadmium)  
 Specific target organ toxicity, repeated exposure (Category 2) (lead)  
 Specific target organ toxicity, repeated exposure (Category 1) (cadmium)  
 Germ cell mutagenicity (Category 2) (cadmium)  
 Hazardous to aquatic environment, long term hazard (Category 1) (lead/cadmium)

Solid metal as received does not pose a hazard.

### **2.3 OTHER HAZARDS:**

#### **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. Dust are irritating to eyes.

**Ingestion:** Ingestion of dust may cause headache, nausea, abdominal pain, fatigue and pain in the legs, arms and joints. May be harmful.

**Inhalation:** Inhalation of fume or dust may cause local irritation to the respiratory system. Inhalation of fume or dust may cause headache, nausea, abdominal pain, fatigue and pain in the legs, arms and joints. Inhalation can be harmful. Inhalation of cadmium fume can cause metal fume fever.

**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. Protect skin when grinding/cutting, may cause irritation. 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. Signs and symptoms of exposure – anemia.

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

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

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

**BISMUTH:** May cause kidney damage.

**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.

## SECTION 3. COMPOSITION / INFORMATION ON INGREDIENTS

### 3.2 Mixture:

Components	% wt	CAS Registry #/ EINECS#
TIN	*	7440-31-5/231-141-8
LEAD	*	7439-92-1/231-100-4
SILVER	*	7440-22-4/231-131-3
COPPER	*	7440-50-8 /231-159-6
INDIUM	*	7440-74-6/231-180-0
BISMUTH	*	7440-69-9/231-177-4
ANTIMONY	*	7440-36-0/231-146-5
ZINC	*	7440-66-6/231-175-3
CADMIUM	*	7440-43-9/231-152-8
GERMANIUM	*	7440-56-4/231-164-3

\* See Alloy Table for breakdown of percentages of alloy mixtures

<http://www.indium.com>

## SECTION 4. FIRST AID MEASURES

### 4.1 Description of 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.

### 4.2 Most important symptoms and effect, both acute and delayed:

Exposure to metal fumes may cause irritation to the respiratory system. Long term exposure by inhalation to metal fumes may cause illness such as metal fume fever. Exposure to lead or cadmium fume may cause harm. Sign of lead

overexposure is anemia.

**4.3 Indication of any immediate medical attention and special treatment needed:**

No specific special treatment information is available on this mixture. Review data provided in this document to understand the hazards when working with the product. No other information is available at this time.

## SECTION 5. FIRE FIGHTING MEASURES

**5.1 Extinguishing Media:** Use extinguishers appropriate for the surrounding fire conditions. Water, CO2, foam media.

**5.2 Special hazards arising from the substance or mixture:**  
May produce toxic fumes of carbon monoxide if burning or metal oxide fumes.

**5.3 Advice for Firefighters** Fire fighters must wear approved self-contained breathing apparatus and full protective clothing.

Material product is not flammable. Metal dust in air could pose a flammable dust issue. No other information is available.

## SECTION 6. ACCIDENTAL RELEASE MEASURES

**6.1 Personal precautions, protective equipment and emergency procedures:**

**For non-emergency personnel:**

Keep away from the spill. Remove sources of ignition. Keep exhaust ventilation system running. In the event of a fire evacuate area.

**For emergency responders:**

Wear safety glasses, gloves when cleaning up any spill. Other equipment may be necessary based on the immediate area and other chemicals unrelated to the product that may be in use. Adequate ventilation should be available. Keep unnecessary personnel away from area during clean up. Solid metal can easily be cleaned up. Do not sweep. Vacuum solids and avoid creating dust in air.

**6.2 Environmental Precautions:** Metals are not generally suited for release to any body of water including drains. Avoid release to environment.

**6.3 Methods and material for containment and cleaning up:**

Spill or leak procedures: Solid metal can be picked up and placed into metal container. If hot allow to cool then place into metal container. Recycle metal.

**6.4 Reference to other sections:** See Section 8 for exposure levels.

## SECTION 7. HANDLING AND STORAGE

**7.1 Precautions For Safe Handling:**

Keep containers tightly closed when not in use. Use care to avoid spills. Wear appropriate personal protective equipment when working or handling product. Always thoroughly wash your hands after handling this product. DO NOT touch or rub eyes until hands are washed. Do not eat, drink or smoke when handling this product. Utilize exhaust ventilation when heating product. Emissions contain metal fumes.

**7.2 Conditions for Safe Storage, including any incompatibilities:**

**Storage Precautions:** Store product in tightly capped original containers in a cool, dry area. Refer to product label and product data sheet for specific storage temperature requirements.  
Rotate stock to ensure use before expiration date.

**7.3 Specific End Use(s):** Soldering applications and other applications.

## SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

### 8.1 Control Parameters:

			<u>TWA</u>	<u>STEL</u>
		<u>CAS#/EINECS#</u>	mg/m <sup>3</sup>	mg/m <sup>3</sup>
<b>TIN</b>	*	7440-31-5/231-141-8		
		(UK)	2	4
		(Belgium)	2	-
		(Germany)	2	-
		(Netherlands)	2	-
		(Spain)	2	-
		(Poland)	2	-
<b>LEAD</b>	*	7439-92-1/231-100-4		
		(UK)	0.15	-
		(France)	0.1	-
		(Spain)	0.15	-
		(Italy)	0.15	-
		(Portugal)	0.05	-
		(Finland)	0.1	-
		(Denmark)	0.05	-
		(Austria)	0.1	0.4
		(Switzerland)	0.1	0.8
		(Poland)	0.05	-
		(Norway)	0.05	-
		(Ireland)	0.15	-
<b>SILVER</b>	*	7440-22-4/231-131-3		
		(UK)	0.1	0.3

		(Belgium)	0.1	-
		(France)	0.1	-
		(Germany)	0.1	-
		(Netherlands)	0.1	-
		(Spain)	0.1	-
		(Poland)	0.05	-
<b>COPPER</b>	*	7440-50-8 /231-159-6		
		(UK)	0.2 (fume)	0.6(fume)
		(France)	2	0.2(fume)
		(Belgium)	1	-
			0.2(fume)	
		(Spain)	1	-
			0.2(fume)	
		(Portugal)	1	0.2(fume)
		(Netherlands)	0.1	-
		(Finland)	1	-
			0.1	
		(Denmark)	1	-
			0.1	
		(Austria)	1	4
			0.1(fume)	0.4
		(Switzerland)	0.1	0.2
		(Norway)	1	0.1
		(Ireland)	1	2
			0.2 (fume)	
		(Poland)	0.2	-
<b>BISMUTH</b>	*	7440-69-9/231-177-4		
		(UK)	N.E.	N.E.
<b>ANTIMONY</b>	*	7440-36-0/231-146-5		
		(UK)	0.5	-
		(France)	0.5	-
		(Belgium)	0.5	-
		(Spain)	0.5	-

		(Portugal)	0.5	-
		(The Netherlands)	0.5	-
		(Finland)	0.5	-
		(Denmark)	0.5	-
		(Austria)	0.5	5
		(Switzerland)	0.5	-
		(Poland)	0.5	-
		(Norway)	0.5	-
		(Ireland)	0.5	-
<b>INDIUM</b>	*	7440-74-6/231-180-0		
		(UK)	0.1	0.3
		(Belgium)	0.1	-
		(Spain)	0.1	-
		(Portugal)	0.1	-
		(Finland)	0.1	-
		(Denmark)	0.1	-
		(Austria)	0.1	0.2
		(Switzerland)	0.1	-
		(Norway)	0.1	-
		(Ireland)	0.1	0.3
<b>CADMIUM</b>	*	7440-43-9/231-152-8		
		(UK)	0.025	0.075
		(Belgium)	0.01	-
		(Spain)	0.002	-
		(Portugal)	0.01	-
		(Finland)	0.02	-
		(Austria)	0.03	-
		(Denmark)	0.05	-
		(Poland)	0,01	-
		(Norway)	0.05	0.15
		(Bulgaria)	0.05	-
		(Ireland)	0.025	-
		(Estonia)	0.05	-



(Greece)	0.025	0.1
(Hungary)	-	0.015 ceiling
(Latvia)	0.01	0.05
(Romania)	0.05	-
(Russia)	0.01	0.05
(Slovak Republic)	0.15	0.1

<b>GERMANIUM</b>	*	7440-56-4/231-164-3	N.E.	N.E.	N.E.
<b>ZINC</b>	*	7440-66-6/231-175-3	N.E.	N.E.	N.E.

\*See alloy table

N.E. = Not established

STEL = Short term exposure level

TWA= time weighted average

## 8.2 Exposure Controls:

**Engineering Controls:** Use with proper equipment with adequate exhaust ventilation and other safety features specifically designed for use with solder applications or other industrial uses. Control concentration of all components with established exposure limits so they are not exceeded. Use exhaust ventilation when heating product. Air emission control equipment may be necessary based on the local governmental requirements for contaminants entering the atmosphere. Emissions contain metal fumes. Do not breathe metal fumes. May contain harmful levels of metal fumes.

### Personal protection:

**Eyes:** Chemical safety glasses/goggles. Face shield for molten metal.

**Respiratory:** An approved or EU compliant CE marked air-purifying respirator with a fume/organic chemical cartridge is recommended under certain circumstances (i.e. when re-flowing manually on a plate instead of a ventilated re-flow furnace) where airborne concentrations are expected to be elevated or exceed exposure limits.

**Skin:** Compatible chemical resistant gloves. Recommend a nitrile disposable or other chemical glove. Hot gloves for handling molten metal.

**Other:** Lab coat, eye-wash fountain in work area. Avoid the use of contact lenses in high fume areas.

**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 as established under governmental guidelines, if and when applicable.

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties:

<b>Appearance:</b>	Solid metal	<b>Boiling Point/Range:</b>	Not determined
<b>Odor:</b>	None.	<b>Melting Point/Freezing Point:</b>	Not applicable
<b>Odor Threshold:</b>	Not established	<b>Evaporation Rate:</b>	Not applicable
<b>Specific Gravity:</b>	See alloy table	<b>pH:</b>	Not applicable
<b>Vapour Pressure:</b>	Not applicable.	<b>Solubility in Water:</b>	Insoluble
<b>Vapour Density:</b>	(air=1) Not applicable.	<b>Partition coefficient:</b>	Not established

<b>Relative Density:</b>	Not established	<b>Flammability:</b>	Not applicable
<b>Flash Point:</b>	Not applicable	<b>Method:</b>	Not applicable
<b>Auto-ignition Temperature:</b>	Not applicable	<b>Flammable Limits:</b>	Limits not established
<b>UEL/LEL Limits:</b>	Not applicable	<b>Decomposition Temp:</b>	Not applicable
<b>Viscosity:</b>	Not established	<b>Explosive properties:</b>	Not applicable
<b>Oxidizing Properties:</b>	Not established		

**9.2 Other Information:** Above data for the whole mixture.

## SECTION 10. STABILITY AND REACTIVITY

- 10.1 Reactivity:** Stable.
- 10.2 Chemical Stability:** Stable
- 10.3 Possibility of Hazardous Reactions:** Not established
- 10.4 Conditions To Avoid:** None known
- 10.5 Incompatible Materials:** Avoid contact with acids, bases or oxidizing agents.
- 10.6 Hazardous Decomposition / Combustion:** Harmful organic fumes and toxic oxide fumes may form at elevated temperatures. Metal oxide fumes.
- 10.7 Hazardous Polymerization:** Will not occur.

## SECTION 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects:

<b>Acute toxicity:</b>	Not established	<b>Mutagenicity:</b>	Not established
<b>Irritation:</b>	Not established	<b>Toxicity for Reproduction:</b>	Not Established
<b>Corrosivity:</b>	Not applicable	<b>Absence of specific data:</b>	None available (not tested)
<b>Sensitization:</b>	Not available		
<b>Repeated dose toxicity:</b>	Not established		
<b>Carcinogenicity:</b>	Not established		
<b>Likely Routes of Entry:</b>	eyes (irritation) /skin (irritation) /inhalation (irritation/harmful) ingestion (may be harmful)		
<b>Interactive effects:</b>	None known		

### Symptoms related to the physical, chemical and toxicological characteristics:

May cause irritation or harm by inhalation.

### Delayed and immediate effects as well as chronic effects from short and long-term exposure:

Exposure to lead or cadmium fume, if applicable, may cause harm by inhalation and ingestion. Chronic exposures to lead or cadmium fume, if applicable, can cause potential harm to the developing fetus. Lead or cadmium exposure can be toxic.

**Mixture verses substance information:** None known

### Other Information:

<b>Carcinogenicity:</b>	<b>NTP:</b> Yes - cadmium is listed as a known carcinogen (National Toxicity Program)
<b>Listing</b>	<b>OSHA:</b> Yes – 1910.1027 (cadmium) (US Occupational Safety & Health Administration) and 1910.1025 (lead)
	<b>IARC:</b> Yes - Lead and lead compounds and cadmium are listed as carcinogens. (International Agency for Research on Cancer)

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

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

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.

## SECTION 12. ECOLOGICAL INFORMATION

Product mixtures not tested.

**12.1 Toxicity:** No information available

**12.2 Persistence and degradability:** No information available

**12.3 Bioaccumulative potential:** No information available

**12.4 Mobility in soil:** No information available

**12.5 Results of PBT and vPvB assessments:** No data is available

**12.6 Other adverse effects:** No information is available for mixture. Avoid release to 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

Copper – Toxicity to daphnia and other aquatic invertebrates 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.

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

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.

## SECTION 13. DISPOSAL CONSIDERATION

**13.1 Waste treatment method:** Scrap metal alloy usually has value. Contact a commercial reclaimer for recycling. Otherwise, dispose of in accordance with environmental regulations. Containerize material and classify according to applicable regulations. No pre-treatment on site is recommended. Do not dispose of down any drain or waterway. Utilize the same personal protective equipment as the user when handling for disposal.

**RoHS (Restriction of Hazardous Substances):** Product mixtures do not contain any PBB or PBDB brominated compounds.

Note that product mixtures do contain lead and or cadmium and are therefore not compliant with RoHS. Users should review their particular use for any applicable exemptions that may apply. Review alloy table for products.

Follow applicable waste rules and hazards of assessment for classification (hazard group category) for disposal. Lead = (H5/H10/H14).

## SECTION 14. TRANSPORT INFORMATION

Transport in accordance with applicable international regulations and requirements.

### Solid metal

Not regulated/non - hazardous under US DOT (United States Department of Transportation).

Not regulated/non - hazardous under international shipping requirements.

- 14.1 UN Number:** None
- 14.2 UN proper shipping name:** None
- 14.3 Transport hazard class(s):** None
- 14.4 Packing group:** None
- 14.5 Environmental hazards:** None
- 14.6 Special precautions for user:** None
- 14.7 Transport in bulk:** Not applicable

Marine pollutant: No

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:

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

## SECTION 15. REGULATORY INFORMATION

### **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:**

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.).

All ingredients are listed on the USEPA TSCA Inventory.

All ingredients are listed on EINECS.

Safety data sheet was developed using EC 1907/2006 amended as of 20 May 2010 EU No 453/2010 and information as stated under regulation EC No 1272/2008 CLP Regulation.

GHS = Global Harmonized System

CLP= Classification, labeling and packaging

Product does not contain any substances ozone depleting substances and therefore not subject to EC 2037/2000.

**15.2 Chemical safety assessment:** None performed for mixture.

## SECTION 16. OTHER INFORMATION

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

**Revised Date:** 19 NOVEMBER 2018

**Prepared by:** Nancy Swarts, The Indium Corporation of America, nswarts@indium.com

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

Changes provided on this SDS were based on the requirements of EU No. 453/2010 of May 20, 2010 regarding amendments to EC No. 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).

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.

**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	RoHS2/3* 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

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	RoHS2/3* Compliance	DENSITY (gm/cm <sup>3</sup> )
41	50	22	28	-	-	-	-	-	-	-	100/212	No	9.44
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

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	RoHS2/3* Compliance	DENSITY (gm/cm <sup>3</sup> )
72	32	34	34	-	-	-	-	-	-	-	133/271	No	9.15
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



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	RoHS2/3* Compliance	DENSITY (gm/cm <sup>3</sup> )
139	95	5	-	-	-	-	-	-	-	-	251/484	Yes	9.64
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
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

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	RoHS2/3* Compliance	DENSITY (gm/cm <sup>3</sup> )
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
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

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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	-	-	-	-	-	20	10	-	-	-	Yes	8.86
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

\*RoHS 3- products do not contain any listed phthalates

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