

## SAFETY DATA SHEET

Current Revision: 2, 6/27/2017	Prepared By: Ben Ward, Product Engineer
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### I. IDENTIFICATION

<b>EMERGENCY PHONE:</b> <p style="text-align: center;"><b>CHEMTREC- (800) 424-9300</b> <b>CCN 19481</b></p>	Salem Fabrication Supplies 5901 Gun Club Road Winston-Salem, NC 27103 Information: <b>(800) 234-1982</b>
<b>PRODUCT NAME:</b> Salem Ultra-Pure 117° Alloy	
<b>SYNONYMS:</b> Bismuth alloy, lead, tin, indium, and cadmium alloy.	

**Recommended Use:**

Base metal alloys for optical lens manufacturing.

**Restrictions:**

N/A

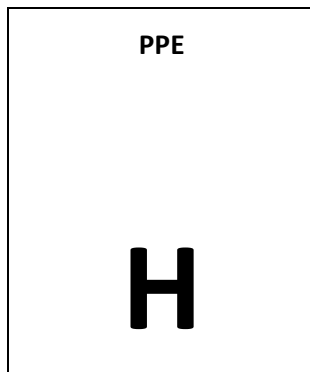
### II. HAZARD IDENTIFICATION

**Classification (§1910.1200):**

N/A

**Signal Word/Symbols:**

WARNING



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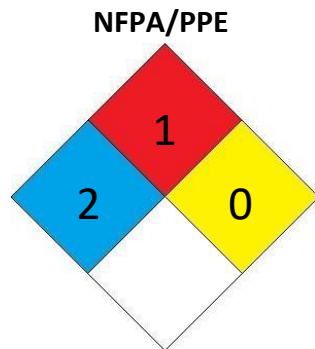
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**Hazard Statement:**

**POTENTIAL HEALTH EFFECTS:**

LEAD: Inhalation or ingestion of lead dust or fumes may result in headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and leg, arm, joint pain, and irritation of the upper respiratory tract and the lungs.

CADMIUM: Inhalation of CdO Fume produces Metal Fume Fever: throat dryness, cough, headache, vomiting, chest pains, and chills. TIN: may cause fever, stomach cramps, nausea, or diarrhea in large doses. Stannosis – a benign pneumoconiosis – may result from excessive Tin exposure.

No adverse effects with either metallic INDIUM OR BISMUTH. Dust from all may irritate the eyes.

**CHRONIC HEALTH HAZARDS:**

Prolonged exposure to Lead may cause central nervous system damage (e.g., fatigue, headaches, tremors, and hypertension), gastrointestinal disturbances, anemia, kidney dysfunction and possible reproductive effects. Pregnant women should be protected from excessive exposure to prevent lead crossing the placental barrier and causing infant neurological disorder. Prolonged excessive absorption of inorganic lead by ingestion or inhalation of dust and fumes is characterized by abdominal pain or what is sometimes referred to as “lead colic”, metallic taste in mouth, loss of weight, pains in the muscles, and muscular weakness. Prolonged absorption of lead or its inorganic compounds results in

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severe gastrointestinal disorders (e.g. constipation, anorexia, colic) and anemia. More serious intoxication prompts neuromuscular disorders and encephalopathy. Lead primarily distributes into kidney, liver, and the erythrocytes. The onset of symptoms is usually abrupt. Chronic inhalation of Cadmium dust and fume has caused renal tubular dysfunction as evidenced by proteinuria. Other disorders have included pulmonary emphysema, anemia, bone demineralization and impotency. Possible lung damage and chronic respiratory distresses upon exposure to Indium Oxide.

**CARCINOGENICITY:**

Lead is classified as an A3 Carcinogen by the ACGIH and as a 2B Carcinogen by IARC. Cadmium is classified as a carcinogen by, OSHA, ACGIH, NTP and IARC.

**ENVIRONMENTAL EFFECTS:**

This substance may be hazardous to the environment. Special attention should be given to air and water. In the food chain important to humans, bioaccumulation takes place, specifically in plants and water organisms, especially shellfish. (See Ecological Information, Section 12)

**EXPLOSIVE PROPERTIES:**

No risk of fire or explosion in normal handling conditions **Precautionary**

**Statement:**

When melting the temperature should be kept as low as possible.

**Miscellaneous Hazards:**

Contains lead which can accumulate in the body. Lead is absorbed into the body through inhalation of spray mist or by ingestion.

**Unknown Acute Toxicity Statement:**

Knowledge about health hazard is incomplete. The product contains a substance/a chemical group which is suspected of having harmful long-term effects. Contains a substance which could be potentially carcinogenic.

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### III.COMPOSITION

CHEMICAL NAME:	COMMON NAMES:	CAS:	% BY WEIGHT:
Bismuth		7440-69-9	44.7
Lead		7439-92-1	22.6
Indium		7440-74-6	19.1
Tin		7440-31-5	8.3
Cadmium		7440-43-9	5.3

#### Classified Impurities and Additives:

N/A

### IV.FIRST AID MEASURES

#### Inhalation:

Remove subject from exposure area to fresh air. If breathing has stopped, give artificial respiration. Medical oxygen may be administered, if available, where breathing is difficult. Seek medical attention immediately.

#### Skin Contact:

Dust: Remove contaminated clothing and wash affected area with soap and warm water. Seek medical attention if irritation develops or persists. Molten Metal: Flush contact area to solidify and cool but do not attempt to remove encrusted material or clothing. Cover burns and seek medical attention immediately.

#### Eye Contact:

Flush with warm, running water, including under the eyelids, to remove dust particle(s). If irritation persists seek medical treatment.

#### Ingestion:

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If victim is conscious and can swallow, dilute stomach contents with 2 – 4 cupfuls of water or milk. Induce vomiting in a conscious individual. Seek immediate medical attention.

#### **Symptoms/Effects:**

**Skin/Eyes:** Contact with lead dust or fumes may cause local irritation but would not cause tissue damage.

**Inhalation:** Inhalation of lead dust or fumes may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An acute short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposure of this magnitude is rare. Kidney damage, as well as anemia, can occur from acute exposure.

**Ingestion:** Symptoms due to ingestion of lead dust or fume would be similar to those from inhalation. Other health effects such as metallic taste in the mouth and constipation or bloody diarrhea might also be expected to occur.

#### **Level Of Medical Attention Needed:**

Seek medical attention if exposed.

## **V. FIRE-FIGHTING MEASURES**

#### **Suitable Extinguishing Media:**

Extinguish with Class D Extinguisher: Dry Powder Type, Sand, Carbon Dioxide, and Foam.

**Unsuitable Extinguishing Media:** DO NOT use water to extinguish if possible.

#### **Specific Hazards:**

Massive metal is not flammable or combustible. Finely-divided lead dust or powder is a moderate fire hazard and moderate explosion hazard when dispersed in the air at high concentrations and exposed to heat, flame, or incandescents. Explosions may also occur upon contact with certain incompatible materials (see Stability and Reactivity, Section 10).

#### **Special Protective Equipment:**

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Avoid breathing vapors. Fight fires from safe distance using approved NIOSH respirator and standard fire protective equipment.

## VI. ACCIDENTAL RELEASE MEASURES

### Personal Precautions:

Try to avoid creation of dust. Persons responding to an accidental release should wear protective clothing, gloves, and a respirator (see Section 8)? Close-fitting safety goggles may be necessary in some circumstances to prevent eye contact with bismuth metal, dust or fume. Where molten metal is involved, wear heat-resistant gloves and suitable clothing for protection from hot-metal splash as well as a respirator to protect against inhalation of lead fume. Workers should wash and change clothing following cleanup.

### Protective Equipment:

Wear protective clothing as described in Section 8 of this safety data sheet.

### Emergency Procedures:

N/A

### Methods for Cleanup/Removal:

Control source of release if possible to do so safely. Restrict access to the area until completion of clean-up. Clean up spilled material immediately, observing precautions in Section 8, Personal Protection. Molten metal should be allowed to cool and harden before cleanup. Once solidified, wear gloves, pick up and return to process. If dust, wear recommended personal protective equipment (see Section 8) and use methods which will minimize dust generation (e.g., vacuum solids). Return uncontaminated spilled materials to the process if possible. Place contaminated material in suitable containers for recovery or disposal. Treat or dispose of waste material in accordance with all local, state/provincial, and national requirements. Minimize the creation of dust.

## VII. HANDLING AND STORAGE

### Handling Precautions:

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Follow usual precautions for handling chemicals. Do not use near any type of food, feed, tobacco, or beverage. Remove all soiled and contaminated clothing prior to leaving work. Wash hands before eating, smoking, or using bathroom facilities, before breaks and at the end of work. When melting the temperature should be kept as low as possible. Remove all soiled and contaminated clothing.

**Safe Storage Conditions:**

Keep in closed container and store in a cool, dry place.

**Incompatibilities:**

Bismuth is incompatible with aluminum, BrF<sub>3</sub>, Acids, NOF, Ammonium Nitrate, HClO<sub>x</sub>, Chlorine, IF<sub>3</sub>, Nitric Acid, HClO<sub>4</sub>. Tin is incompatible with Bromine and Chlorine plus heat, sodium, and potassium peroxides, and with perchloric acid which may react with incandescence, heat, or explosion. Lead reacts vigorously with strong oxidizers, such as ammonium nitrate, sodium azide, sodium carbide, zirconium, hydrogen peroxide and chlorine trifluoride, and active metals, such as sodium and potassium. Powdered lead metal in contact with disodium acetylide, chlorine trifluoride, sodium carbide or fused ammonium nitrate poses a risk of explosion. Solutions of sodium azide in contact with lead metal can form lead azide, which is a detonating compound. Cadmium dust can react vigorously with oxidizing materials and is incompatible with strong oxidizers, sulfur, selenium and tellurium. For your protection, the specific chemical used in your manufacturing process should be evaluated for possible incompatibility with this product.

**VIII.EXPOSURE CONTROLS AND PROTECTIVE EQUIPMENT**

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<b>OSHA PEL:</b> N/A	<b>ACGIH TLV:</b> TWA Bismuth: Not Applicable Lead: 0.15 mg/m <sup>3</sup> Tin: 2 mg/m <sup>3</sup> Indium: 0.1 mg/m <sup>3</sup> Cadmium: 0.05 mg/m <sup>3</sup>	<b>OTHER EXPOSURE LIMITS:</b> N/A
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**Appropriate Engineering Controls:**

Local/Mechanical Exhaust required for melting or grinding operations where dust may be generated.

**Personal Protective Measures:**

- Use NIOSH/MSHA approved respiratory protection if possibility of dust/fume exposure exists.
- Safety glasses
- Canvas or leather protective gloves.
- Safety shoes.

**IX. PHYSICAL AND CHEMICAL PROPERTIES**

**Appearance:**

Silver metallic solid

<b>Odor:</b> None	<b>Odor Threshold:</b> None	<b>Ph:</b> N/A
<b>Melting/Freezing Point:</b> 117° F (47.2° C)	<b>Boiling Point:</b> 1409° F (765° C)	<b>Boiling Range:</b> N/A

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<b>Flash Point:</b> N/A	<b>Evaporation Rate:</b> N/A	<b>Flammability (Solid, Gas):</b> N/A
<b>Upper/Lower Flammability/Explosive Limit:</b> N/A	<b>Vapor Pressure:</b> Cadmium (mm Hg): @ 689o F	<b>Vapor Density:</b> N/A
<b>Relative Density:</b> 9.16 g/cm <sup>3</sup>	<b>Solubility (ies):</b> Insoluble in water	<b>Partition Coefficient: NOctanol/Water:</b> N/A
<b>Auto Ignition Temperature:</b> N/A	<b>Decomposition Temperature:</b> N/A	<b>Viscosity:</b> N/A

## X.STABILITY AND REACTIVITY

### Reactivity:

Will react violently with strong oxidizing agents

### Chemical Stability:

Stable under normal temperature conditions and recommended use.

**Possibility of Hazardous Reactions:** N/A

**Conditions to Avoid:** Static Discharge, Shock, Vibrations, Etc.

Do not heat past melting point without local exhaust ventilation. Massive metal is stable under normal temperatures and pressures. Fresh cut or cast lead surfaces tarnish rapidly due to the formation of an insoluble protective layer of basic lead carbonate. Heated cadmium in contact with air forms highly toxic cadmium oxides.

### Incompatible Materials:

Bismuth is incompatible with aluminum, BrF<sub>3</sub>, Acids, NOF, Ammonium Nitrate, HClO<sub>x</sub>, Chlorine, IF<sub>3</sub>, Nitric Acid, HClO<sub>4</sub>. Tin is incompatible with Bromine and Chlorine plus heat,

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sodium, and potassium peroxides, and with perchloric acid which may react with incandescence, heat, or explosion. Lead reacts vigorously with strong oxidizers, such as ammonium nitrate, sodium azide, sodium carbide, zirconium, hydrogen peroxide and chlorine trifluoride, and active metals, such as sodium and potassium. Powdered lead metal in contact with disodium acetylide, chlorine trifluoride, sodium carbide or fused ammonium nitrate poses a risk of explosion. Solutions of sodium azide in contact with lead metal can form lead azide, which is a detonating compound. Cadmium dust can react vigorously with oxidizing materials and is incompatible with strong oxidizers, sulfur, selenium and tellurium. For your protection, the specific chemical used in your manufacturing process should be evaluated for possible incompatibility with this product.

**Hazardous Decomposition Products:**

When highly heated, when in contact with Acid or Acid Fumes, or when in use in high temperature operations such as oxy-acetylene cutting, electric arc welding or overheating a molten bath, this alloy may generate highly toxic lead oxide fume. Lead oxide is highly soluble in body fluids and the particle size of the metal fumes is largely within the respirable size range, which increases the likelihood of inhalation and deposition of the fume within the body.

**XI. TOXICOLOGICAL INFORMATION**

**Possible Exposure Routes (Inhalation Etc.):**

Inhalation, ingestion, eye contact, and skin contact

**Symptoms Related To Toxicological Characteristics:**

**ACUTE TOXICITY LEAD**

Skin/Eyes: Contact with lead dust or fumes may cause local irritation but would not cause tissue damage.

Inhalation: Inhalation of lead dust or fumes may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in legs, arms, and joints. An acute short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposure of this magnitude is rare.

Kidney damage, as well as anemia, can occur from acute exposure.

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Ingestion: Symptoms due to ingestion of lead dust or fume would be similar to those from inhalation. Other health effects such as metallic taste in the mouth and constipation or bloody diarrhea might also be expected to occur.

Other: Certain cadmium compounds are confirmed carcinogens in animals. There is limited evidence for carcinogenicity in humans. Occupational exposure to cadmium has been associated with increased incidence of respiratory cancers. Individuals with pre-existing lung, liver, kidney, and blood ailments should be precluded from exposure until approved by a physician. Initial and periodic medical examinations are recommended for persons exposed to levels above the exposure limits of cadmium.

#### ACUTE TOXICITY CADMIUM

Skin/Eyes: Dermatitis and irritation of the eyes may develop after repeated contact.

Inhalation: Prolonged exposure of cadmium dust and/or fume may cause loss of sense of smell, occasional ulcerations of the nasal passages, rhino laryngitis, cough, shortness of breath, mild anemia, sleeplessness, irritability, loss of appetite, and cadmium-yellow fringe on teeth. Damage to the lungs may be irreversible (of the emphysematous type) and there may be injury to the kidney, liver, and blood. Smoking appears to increase the risk of cumulative toxic effects. Clinical evidence of the cumulative effects of cadmium may appear after exposure has ceased. Disease may then be progressive.

#### **Delayed, Immediate, and Chronic Effects:**

CHRONIC TOXICITY LEAD: Prolonged exposure to lead dust and fume may produce many of the symptoms of short-term exposure and may also cause central nervous system damage, gastrointestinal disturbances, anemia, and rarely, wrist drop. Reduced hemoglobin production has been associated with low lead exposures. Symptoms of central nervous system damage due to moderate lead exposure include fatigue, headaches, tremors and hypertension. Very high lead exposure can result in lead encephalopathy with symptoms of hallucinations, convulsions, and delirium. Kidney dysfunction and possible injury has also been associated with chronic lead poisoning. Chronic over-exposure to lead has been implicated as a causative agency for the impairment of male and female reproductive capacity, but there is, at present, no substantiation of the implication. Pregnant women should be protected from excessive exposure. Lead can cross the placental barrier and unborn children may suffer neurological damage or developmental problems due to excessive lead exposure in pregnant women. Teratogenic and mutagenic effects from exposure to lead have been

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reported in some studies but not in others. The literature is inconsistent and no firm conclusions can be drawn at this time. Lead and lead compounds are listed as an A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans) by the ACGIH and as a Group 2B Carcinogen (possibly carcinogenic to humans) by IARC. The NTP, OSHA and the EU do not currently list lead as a human carcinogen. Excessive ingestion of bismuth salts may produce damage to kidneys and liver, foul breath, salivation, and gingivitis. Possible lung damage and chronic respiratory distress upon exposure to Indium Oxide.

**Numerical Toxicity Measurements:** N/A

**NTP/LARC/OSHA Known Carcinogen:**

Lead and lead compounds are listed as an A3 Carcinogen (Confirmed Animal Carcinogen with Unknown Relevance to Humans) by the ACGIH and as a Group 2B Carcinogen (possibly carcinogenic to humans) by IARC. The NTP, OSHA and the EU do not currently list lead as a human carcinogen.

## XII. ECOLOGICAL INFORMATION

**Ecotoxicity:**

Do not allow material to be released to the environment without proper governmental permits. Lead compounds can pose a severe threat to the environment. Contamination of water, soil, and air should be prevented.

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**Persistence and Degradability:**

In

**Bioaccumulative Potential:**

Lead (when in the dissolved phase) is bioaccumulated by plants and animals, both aquatic and terrestrial.

Cadmium does not form volatile compounds in the aquatic environment and sorption by clays and iron oxides is important in reducing the aquatic load of cadmium. Cadmium may occur in soil as free cadmium compounds or in solution dissolved in soil water. High soil acidity favors the release of cadmium ions and the uptake of cadmium by plants.

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Cadmium is not reduced or methylated by microorganisms and, therefore, microorganisms do not produce more soluble and volatile forms of cadmium. However, biological production of sulfide results in the precipitation of insoluble cadmium sulfide. Cadmium is strongly accumulated by all organisms through both food and water. Bioaccumulation in aquatic organisms is greatest in invertebrates, followed by fish and aquatic plants. Bioaccumulation in terrestrial plants results in higher levels of cadmium in land mammals that feed on the plants.

**Soil Mobility:**

In most surface water and groundwater, lead forms compounds with anions such as hydroxides, carbonates, sulfates, and phosphates and has a low solubility. Most lead is strongly retained in soil, resulting in little mobility. Compared to other heavy metals, cadmium is relatively mobile in an aqueous environment.

**Other Adverse Effects:**

None known.

**XIII. DISPOSAL CONSIDERATIONS**

**Waste Residue and Disposal:**

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local, state, and national authority requirements. Do not introduce back into environment or wastewater system. When handling waste, consideration should be made to the safety precautions applying to handling of the product.

**XIV. TRANSPORT INFORMATION**

<p><b>UN Number:</b> N/A</p>	<p><b>UN Proper Shipping Name:</b> N/A</p>	<p><b>Transport Hazard Class (es):</b> N/A</p>
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<b>Packing Group:</b> N/A	<b>Environmental Hazards:</b>	<b>Transport in Bulk (Annex LI MARPOL 73/78 and IBC Code)</b>
	N/A	N/A

**Special Precautions:**

N/A

**XV.REGULATORY INFORMATION**

**Environmental/ Health/ Safety:**

**U.S. FEDERAL REGULATIONS**

TSCA (TOXIC SUBSTANCE CONTROL ACT): All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory.

**Regulations for Lead:**

CERCLA (COMPREHENSIVE RESPONSE COMPENSATION, AND LIABILITY ACT): Section 103 Hazardous Substance

EPCRA 302 Extremely Hazardous Substance: No

EPCRA 311/312 HAZARD CATEGORIES: Delayed (chronic) health hazard – carcinogen  
Delayed (chronic) health hazard – reproductive toxin

EPCRA 313 REPORTABLE INGREDIENTS: Lead CAS No. 7439-93-1

**CANADIAN**

All components of this product are listed on the Domestic Substances list.

WHMIS Classification: D2A, Materials Causing Other Toxic Effects – Very Toxic

**INTERNATIONAL REGULATIONS**

All components of this product are listed on the European Inventory of Existing Commercial Chemical Substances (EINECS) EU classification Category 1 and3 Reproductive Toxin.

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### **Regulations for Cadmium:**

U.S. FEDERAL REGULATIONS:

HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD: Yes.

INGREDIENT LISTED ON TSCA INVENTORY: Yes.

CERCLA SECTION 103 HAZARDOUS SUBSTANCES: Yes.

RQ: N/A\*

\* reporting not required when diameter of the pieces of solid metal released is equal to or exceeds 100 micrometers.

EPCRA SECTION 302: Extremely hazardous substance.

EPCRA SECTION 311/312 HAZARD CATEGORIES: Immediate (Acute) Health Hazard – Toxic Delayed (Chronic) Health Hazard – Carcinogen

CALIFORNIA PROPOSITION 65: Cadmium is a chemical known to the State of California to cause cancer and other reproductive harm.

### **CANADIAN REGULATIONS**

WHMIS CLASSIFICATION: Controlled product, classification D1B. This product has been classified in accordance with the hazard criteria of the CPR and the SDS contains all the information required by the CPR.

## **XVI. OTHER INFORMATION**

This information is furnished without warranty, express or implied, except that it is accurate to the best knowledge of Salem Fabrication Supplies. It relates only to the specific material designated herein, and does not relate to use in combination with any other material or in any process. Salem Fabrication Supplies assumes no legal responsibility for use of or reliance upon this information.

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