Solder

	Indium foil	High temperature solder	Ostalloy®
Melting point	430 K	Solidus 548 K Liquidus 575 K	343.16 K
Electrical thermal conductivity	84 W/(m·K) at 293 K	35 W/(m·K) at 293 K	18.6 W/(m·K) at 293 K
Resistivity	9×10^{-4} Ω·m at 293 K	204×10^{-9} Ω·m at 293 K	—
Tensile strength	2.61 MPa to 3.55 MPa	30 MPa	—
Density	7.3 g/cm^3	10.75 g/cm^3	9.67 g/cm^3
Composition	99.99% pure Indium	90% Pb 10% Sn	49.5% Bi, 27.3% Pb, 13.1% Sn, 10.1% Cd

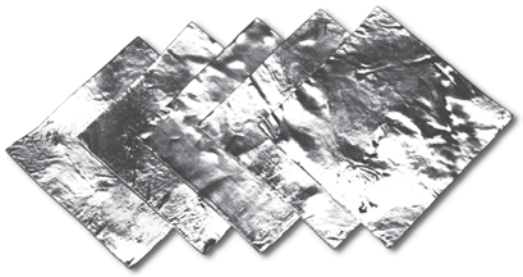
Indium foil/solder

- Foil form
- Exceptional pressure seal
- Extremely malleable
- 99.99% pure
- Acts as a metallic seal against corrosion
- Flexible sensor mounting material for low stress at cryogenic temperatures

Indium can be used to create solder "bumps" for microelectronic chip attachments and also as gaskets for pressure and vacuum sealing purposes. When used as a washer between a silicon diode or other temperature sensors and refrigerator cold stages, indium foil increases the thermal contact area and prevents the sensor from detaching due to vibration. It also may be used as a sealing gasket for covers, flanges and windows in cryogenic applications.

Indium, a semiprecious, nonferrous metal, is softer than lead, and extremely malleable and ductile. It stays soft and workable down to cryogenic temperatures. It is an excellent choice for cryogenic pumps, high vacuum systems and other unique joining and sealing applications. Indium lends itself to this application due to its characteristic "stickiness" or "tackiness" and ability to conform to many irregular surfaces.

Note: Indium foil becomes a superconductor at 3.38 K (-270 °C), below which the thermal conductivity decreases.



Specifications

Melting point: 430 K (157 °C)
Thermal conductivity at 293 K (20 °C): 84 W/(m · K)
Superconducting transition: 3.38 K (-270 °C)
Volume resistivity (Ω-m): 8.27×10^{-4} at 273 K (0 °C); 9.00×10^{-4} at 293 K (20 °C); 30.11×10^{-4} at 455 K (182 °C)
Thermal expansion coefficient: 24.8×10^{-6} at 300 K (27 °C)
Magnetism: Diamagnetic
Dimensions: 0.127 mm × 50.8 mm × 50.8 mm (0.005 in × 2 in × 2 in)
Tensile strength: 2.61 MPa to 3.55 MPa (380 psi to 515 psi)
Specific heat: 290 J/(kg · K) at 293 K

Ordering information

Part number	Description
IF-5	5 indium foil sheets, 0.127 mm × 50.8 mm × 50.8 mm (0.005 in × 2 in × 2 in)
ID-10-31	10 indium disks, 7.925 mm diameter × 0.127 mm) (0.312 in diameter × 0.005 in)
ID-10-56	10 indium disks, 14.27 mm diameter × 0.127 mm (0.562 in diameter × 0.005 in)

High temperature solder

- 90% Pb, 10% Sn
- Good for connecting hardware
- Solidifies quickly

This solder has a higher lead content than normal electronics solder, and can be used for connecting hardware for use at cryogenic temperatures. Its higher melting point also makes it perfect for soldering leads to silicon diode, platinum, or rhodium-iron temperature sensors for operation up to 500 K (227 °C).

Specifications

Solidus: 548 K (275 °C)
Liquidus: 575 K (302 °C)
Density: 10.75 g · cm^{-3}
Diameter: 0.787 mm (0.031 in)

Ordering information

Part number	Description
SLT-10	90% Pb, 10% Sn solder, 3 m (10 ft)

Ostalloy® 158 solder

- Does not shrink, but exhibits expansion upon solidification
- Low melting temperature 343 K (70 °C), requiring only a simple melting pot and a gas or electric heat source
- Reusable many times
- Oxide separated easily in hot water
- Solidifies quickly
- Creates almost no dross because of its low melting temperature

This is a low melting point solder, nearly identical to what is commonly called Wood's Metal. An alloy of bismuth, tin, lead, and cadmium, it is an eutectic alloy with a sharply defined melting point of 343.16 K (70 °C). Ostalloy® 158 has proven itself in production processes—there is no equal to be found to its special advantages.

Mainly used as sealing for demountable vacuum cans and electric feedthroughs in cryogenic testing facilities. Good for soldering any items which cannot be subjected to high temperatures. Ostalloy® 158 solder is used for tool fixturing, holding small parts to be machined, tube shaping and bending, nesting fixturing dies, and internal and external support of thin walled tools and parts. This solder is not recommended for general temperature sensor lead attachment due to its low joint strength.



Specifications

Composition of Ostalloy® 158 solder:
49.5% Bi, 27.3% Pb, 13.1% Sn, 10.1% Cd

Ordering information

Part number	Description
SOSY-16	Ostalloy® 158 solder, 454 g (16 oz)