

SEALING WITH INDIUM

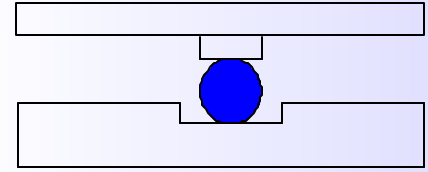


AIM supplies indium preforms in various shapes including flat washers, "O" rings, square windows, discs and rectangles. Foil and wire are available for custom seal fabrications.

The Quality of an Indium Seal Depends On

- **The purity and cleanliness of the indium.**
 - A minimum of 4Ns purity indium is preferred; some very critical applications may call for 5Ns purity.
 - Heavy contamination with organic compounds should be removed by degreasing. Surface oxide can be removed by using 50% hydrochloric acid (a 2-4 second dip) or acetone, followed by rinsing in deionized water.
- **The proper preparation of the surfaces to be sealed.**
 - Both seal surfaces and the indium should be kept as clean and dry as possible.
 - Glass and ceramic surfaces to be joined must be cleaned with an appropriate cleaner. Drying can be performed by passing the parts through a gas flame or in an oven. For applications where extreme cleanliness is required, cleaning may be performed with electrical plasma or by exposure to ultra-violet light.
 - Metal surfaces to be sealed can be bare, pre-tinned with indium, or plated with indium or silver. Bare surfaces can be polished using abrasive powders or can be machine finished. Machine finished surfaces should not be "improved" by using abrasive powders, cloths, etc.
- **The thickness and shape of the indium.**
 - The thickness of the indium may range from less than 0.2mm to 1-2 mm, depending upon the area of the surfaces to be joined and the compressive force on the seal.
 - If the seal is positioned in an "O" ring groove, the seal should be sized so that it overfills the groove by five to fifteen % when compressed.
 - In some applications, the use of overlapping segments of indium can perform as well as a continuous washer.
 - When making a seal out of indium wire, cut the wire to length, beveling the edges to make the joint. The freshly cut edges will readily stick together.
 - Correctly formed seals have leak rates of less than 2×10^{-7} torr liter/sec -1.

Please contact AIM for additional information and references on sealing with indium.



Example of Indium Seal Configuration

Indium, a malleable, semi-precious silvery metal, can be utilized to seal unsolderable surfaces in cryogenic applications, vacuum pumps, and in heat-sensitive areas.

As opposed to gaskets made from other materials, which only form a barrier to the medium being contained, when indium is used as the sealant, a mechanical and chemical bond is formed between this and the surfaces to be joined. Furthermore, seals produced with indium are far less sensitive to the effect of low temperature, mechanical shock, and vibration than seals produced with other materials.

Because indium quickly forms an oxide at its surface, it is necessary to break this oxide film in order to obtain a chemical bond between indium and another surface without soldering. Plastic deformation may be utilized to break this film in order to present clean indium metal to a substrate. However, this process is easily accomplished, since indium readily flows under pressure, even at cryogenic temperatures.

Whatever your application, AIM has the indium products and technical support to fulfill your most stringent requirements.

For additional information please contact AIM at
1 800 CALL-AIM (225-5246)
1 401 463-5605
1 401 463-0203 Fax
or visit us on the web at
www.aimsolder.com