

# INDIUM AND ITS ALLOYS

Indium is a soft metal with strange characteristics used in different fields. Due to its excellent ductility, indium is used as sealer on high vacuum machinery; it is also a very good sealer on cryogenic pumps, in fact it does not become brittle even at the lowest temperatures, and withstands physical and thermal stresses.

Thanks to its high wettability, with a simple cold pressure Indium can be welded on metallic and non metallic surfaces such as glass, quartz and ceramics.

Indium is an excellent electroplating material, and used as a tin oxide tile creates a transparent electrically conductive coating on glass, plastic, or metals.

As a high purity metal, it is used for doping germanium, in the electronic industry.

Indium can be alloyed to other metals, to improve and modify their physical and mechanical characteristics.

**Indium-Lead** alloys: replacing tin with indium in alloy with Pb can prevent the leaching phenomenon and prevent embrittlement of joints on gold conductors.

Indium unusual plasticity makes these type of alloys suitable for use in cryogenic applications.

**Indium-Tin** alloys: the low melting point of the eutectic tin/indium allows to make welding at different temperatures if compared with traditional tin/lead solders. Due to their excellent wettability, they can be used on non-metallic materials.

**Indium-Silver** alloys: silver when alloyed with indium improves the alloy's mechanical characteristics, but reduces its wettability.

**Indium-Bismuth-Tin** alloys: a) have very low melting points, b) can be substituted for the conventional fusible alloys containing toxic elements such as cadmium and lead.

## INDIUM chemical and physical characteristics:

Indium crystallizes in a face-centred tetragonal structure. Soluble in chloridric, sulphuric and nitric acid, it forms the soluble trivalent salts.

Exposed to air, indium remains unchanged thanks to a thin coat of oxide which quickly forms itself at ambient temperature.

Symbol	In		
Atomic number	49		
Atomic weight	114,82		
Density (g cm <sup>3</sup> )	7.310 g cm <sup>3</sup>	at 20° C	
Melting Temperature	156,6 °C	Melting latent heat	6.807 cal/g
Boiling temperature	2.080 °C	Boiling latent heat	468 cal/g
Shrinking solidification	2,5 %		
Electrical Resistivity (ohm cm)	superconductive	at 3,38 °K	
Linear coefficient of thermal expansion	9 x 10 <sup>-6</sup>	at 20 °C	
	29,1 x 10 <sup>-6</sup>	at 156 °C	
	24,8 x 10 <sup>-6</sup>	for 1 °C/cm	
Resistance to tensile strenght	from 380	up to 515 psi	
Compressive strength	310 psi		
Extension	from 22 %	up to 41 %	
Brinell hardness	0,9 ÷ 1,0		
Modulus of Elasticity	1.570.000 psi		
Steam pressure(mm.Hg)	1	at 1.249 °C	
	10	at 1.406 °C	
	100	at 1.756 °C	
	400	at 1.982 °C	

## OMODEO A. & S. Metalleghe S.p.A.

Office: 20128 - Milano, Via Pontenuovo, 51 Tel. ++39-02-27200522 r.a. fax ++39-02-2592549 www.omodeo.it  
Warehouse: 20128 - Milano Via Cesalpino, 2 Tel. ++39-02-27200522  
84015 - Nocera Superiore Via S.ta Croce, 1 Tel. ++39-081-5176213  
Plant: 20041 - Agrate Brianza Via Talete, 6 Tel/fax ++39-039-654415  
Laboratory: 20134 - Milano Via dei Canzi, 14 Tel ++39-02-21591127 fax. ++39-02-21592336