SPECIALTY ALLOYS

AIM specialty alloys consist of, but are not limited to, Indium, Bismuth, Cadmium, Gold and Gallium. The term "specialty" is used to describe solders that do not meet the standard tin-lead temperature range. AIM has developed solder products that meet customer needs on either side of 183°C.

Indium alloys are a good choice to solder gold surfaces when the gold has to remain intact. These alloys show excellent fatigue resistance when thermal mismatches are encountered. Indium alloys have a range of melting points, the lowest being the indium/tin alloy 118ºC eutectic. These alloys perform very well when operating temperatures do not exceed 120ºC. Indium is a unique, low-melting, ductile metal that will weld to itself under relatively low pressure and will wet metallic and non-metallic surfaces.

Indium Alloys	Ag	In	Pb	Sn	Melting Point C°	Density lb/in³
In 99		99.9			156	.2639
In 80	5	80	15		142-149	.2834
In 70		70	30		165-175	.2956
In 60		60	40		173-181	.3072
In 52		52		48	118	.2635
In 50		50	50		178-210	.3198
In 40		40	60		195-225	.3355
In 30		30	70		245-260	.3590
In 26		26	36.5	37.5	134-181	.3040
In 25		25	75		226-228	.3599
In 20		20	26	54	130-154	.2950
In 19		19	81		270-280	.3707

Bismuth alloys are the least expensive of the low temperature alloys, and bismuth is considered to be a less toxic metal. Bismuth/tin alloys are considered to be safe for potable water systems. These alloys do not wet as well and have lower peel strength as compared to tin/lead alloys.

Bismuth Alloys	Bi	Pb	Sn	Melting Point C°	Density lb/in³
Bi 58	58		42	138	.3090
Bi 52	52	32	16	100	.3465
Bi 46	46	20	34	100-105	.3500
Bi 14	14	43	43	144-163	.3245
Bi 8	8	46	46	120-167	.3166

Cadmium alloys are typically used for EMF shielding when cadmium content is in the 70% range. Cadmium alloys are an excellent choice for low temperature soldering when a mechanical joint is needed on aluminum or other difficult-to-solder materials.

Cadmium Alloys	Ag	Cd	Pb	Sn	Melting Point C°	Density lb/in³
Cd 70		70		30	140-160	.2770
Cd 18		18	32	50	145	.3051
Cd 1	3.5	1	32	65	216-219	.2657

Gold alloys are the best choice when soldering to gold-based materials. They are considered to be high reliability alloys, with excellent thermal and mechanical characteristics. Gold alloys are excellent for corrosion resistance when hermetic seals need to be formed.

Gold Alloys	Au	Ge	In	Si	Sn	Melting Point C°	Density lb/in³
Au 99	98			2		370-800	.6113
Au 97	96.8			3.2		370	.5564
Au 88	87.5	12.5				356	.5301
Au 82	82		18			451-485	.5383
Au 80	80				20	280	.5242

Fusible alloys containing Bismuth/Indium/Tin have a wide range of fusible applications. Due to the low temperature and expansion characteristics of these alloys, they can be used in lens fixturing, radiation shielding, sprinkler head assembly, proof casting, turbine blade machining, and tube bending.

Fusible Alloys	Bi	Cd	In	Pb	Sn	Melting Point C°	Density lb/in³
AIM 47	45	5	19	23	8	47	.3307
AIM 70	50	10		27	13	70	.3458
AIM 124	55			45		124	.3769
AIM 138/170	40				60	138-170	.2930
AIM 70/88	42	9		38	11	70-88	.3541

Gallium alloys are low temperature alloys that can be liquid at room temperature. These alloys can be used to replace Hg in applications such as motion switches and thermostats. Gallium/Indium alloys are also used for thermal management applications.

Gallium Alloys	Ga	In	Sn	Melting Point C°	Density lb/in³
Ga 75	75.5	24.5		15.7	.2294
Ga 62	62.5	21.5	16	10.7	.2348