INDIUM CORPORATION OF AMERICA, EUROPE and ASIA

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INDALLOY SPECIALTY ALLOYS

Typical in-house specifications for alloy percent unless otherwise specified by customer:
Elements <1% (as dopants not as impurities) ±50% of nominal value
Elements 1% to <2%: ±0.25% of nominal value
Elements 2% to <10%: ±0.5% of nominal value
Elements >10%: ±1.0% of nominal value (Bismuth containing alloys, major constituent ±1.5%)

MECHANICAL PROPERTIES

Indalloy Number	TEMP Liquidus	TEMP Solidus	Elemental Composition (% by Mass)	TEMP Liquidus	TEMP Solidus	Density	Electrical Conductivity (1.72μohms-cm)	Thermal Conductivity @ 85°C	Thermal Coefficient Expansion @ 20°C	Tensile Strength	Shear Strength	Young's Modulus	Elongation	Brinell Hardness	Latent Heat of Fusion	Specific Heat SOLID	Specific Heat LIQUID	Application Notes
	°C	°C		°F	°F	lb/in³	% of IACS	W/m-°C	PPM/°C	PSI	PSI	PSI x 10⁶	%		J/g	J/g-°C	J/g-°C	
46L	8	7	61.0 Ga 25.0 In 13.0 Sn 1.0 Zn	46	44	0.2348	6.50											Liquid metal used as a replacement for mercury
51E	11 E	11	66.5 Ga 20.5 In 13.0 Sn	52	52	0.2263	6.32											
60	16 E	16	75.5 Ga 24.5 In	60	60	0.2294	6.35											
51	17	11	62.5 Ga 21.5 In 16.0 Sn	63	51	0.2348	6.50											
77	29	16	93.0 Ga 8.0 In	77	60	0.2222	6.15											
14	30 MP		100.0 Ga	86		0.2133	5.90											
19	43	38	42.9 Bi 21.7 Pb 18.3 In 8.0 Sn 5.1 Cd 4.0 Hg	109	100	0.3353	9.28											
117	47 E	47	44.7 Bi 22.6 Pb 19.1 In 8.3 Sn 5.3 Cd	117	117	0.3310	9.16	4.5	.15	25	5400		37.5 note 4	16.5 note1	36.8	0.163	0.197	See Table 1
16	52	47	44.7 Bi 22.6 Pb 16.1 In 11.3 Sn 5.3 Cd	126	117	0.3310	9.16											
17	56	54	49.1 Bi 20.9 In 17.9 Pb 11.6 Sn 0.5 Cd	133	129	0.3255	9.01											
139	58 E	58	49.0 Bi 21.0 In 18.0 Pb 12.0 Sn	136	136	0.3256	9.01	2.43	.10	23	6300		20 note 4	16.5 note1	28.9	0.167	0.201	Poor wettability but adequate for mechanical joining of metallic substrates when highly active flux is used. See Table 1
19	60 E	60	51.0 In 32.5 Bi 16.5 Sn	140	140	0.2847	7.88	3.3	.19 @ 40.1°C	22	4850			11				
18	62 E	62	61.9 In 19.8 Bi 7.6 Cd	143	143	0.2898	8.02											
140	65	57	47.5 Bi 25.4 Pb 12.6 Sn 9.5 Cd 5.0 In	149	135	0.3422	9.47	3.5	.15		3725		77.5 note 4	14 note 1	36	0.159	0.188	
147	65	61	48.0 Bi 25.6 Pb 12.8 Sn 9.6 Cd 4.0 In	149	142	0.3432	9.50											See Table 1
21	69	58	49.0 Bi 18.0 Pb 18.0 In 15.0 Sn	156	136	0.3252	9.00											
158	70 E	70	50.0 Bi 26.7 Pb 13.3 Sn 10.0 Cd	158	158	0.3461	9.58	4	.18	22	5990	300	120 note 4	14.5 note 1	39.8	0.146	0.184	Good fusible alloy used for lens blocking. See Table 1
162	72 E	72	66.3 In 33.7 Bi	162	162	0.2887	7.99											
22	73	70	50.5 Bi 27.8 Pb 12.4 Sn 9.3 Cd	163	158	0.3494	9.67											
23	73	70	50.0 Bi 25.0 Pb 12.5 Sn 12.5 Cd	163	158	0.3488	9.60	3.1			4550		30	25				Non-electrical solder for low-ambient temperature
24	73	70	50.0 Bi 25.0 Pb 12.5 Sn 12.5 Cd .15 Ag	163	158	0.3465	9.59											
25	78 E	78	48.5 Bi 41.5 In 10.0 Cd	172	172	0.3067	8.49											
26	78	70	50.5 Bi 34.5 Pb 9.3 Sn 6.2 Cd	172	158	0.3573	9.89											
174	79 E	79	57.0 Bi 26.0 In 17.0 Sn	174	174	0.3086	8.54											
27	81 E	81	54.0 Bi 29.7 In 16.3 Sn	178	178	0.3080	8.47											
28	82	77	50.0 Bi 39.0 Pb 8.0 Cd 3.0 Sn	180	171	0.3660	10.13											
29	85	81	50.3 Bi 39.2 Pb 8.0 Cd 1.5 In 1.0 Sn	185	178	0.3687	10.15											
160-190	88	71	42.5 Bi 37.7 Pb 11.3 Sn 8.5 Cd	190	160	0.3544	9.81	4.3			5400	300	135 note 4	15 note 1	34.3	0.146		See Table 1
31	89	80	50.0 Bi 32.2 Pb 8.0 Cd 1.8 Sn 1.0 In	192	176	0.3687	10.15											
32	89	80	50.9 Bi 31.1 Pb 15.0 Sn 2.0 In 1.0 Cd	192	176	0.3479	9.63											
33	91	87	51.1 Bi 30.6 Pb 8.1 Cd 5.8 In	196	189	0.3689	10.21											
34	92	83	52.0 Bi 31.7 Pb 16.3 Sn 1.0 Cd	198	181	0.3505	9.70											
197	92 E	92	51.6 Bi 40.2 Pb 8.2 Cd	198	198	0.3703	10.25											
35	93	73	50.0 Bi 39.0 Pb 7.5 Cd 4.0 Sn	199	163	0.3653	10.11											
36	93	87	51.4 Bi 31.4 Pb 15.2 Sn 2.0 In	199	189	0.3483	9.64											
8	93 E	93	44.0 In 42.0 Sn 14.0 Cd	199	199	0.2695	7.46		.36	.24	2632			4.8 note 2				
37	94	90	52.0 Bi 31.7 Pb 16.3 Sn 1.0 In	201	194	0.3505	9.70											
38	95 E	95	52.5 Bi 32.0 Pb 15.5 Sn	203	203	0.3508	9.71											
257	96	95	52.0 Bi 32.0 Pb 16.0 Sn	204	203	0.3501	9.69			.24	5060	3800	2.08	148.6				
39	96 E	96	52.0 Bi 30.0 Pb 18.0 Sn	205	205	0.3488	9.60	2.3	.13		5200		100	15.5 note 1	34.7	0.151	0.167	
42	96 E	96	46.0 Bi 34.0 Sn 20.0 Pb	205	205	0.3248	8.99											Low temperature eutectic solder. Can be used on the same metallization as SnPb based solders. Lowest temperature solder paste
40	99	93	50.0 Bi 31.0 Pb 19.0 Sn	210	199	0.3461	9.58											
41	100 E	100	50.0 Bi 25.0 Pb 22.0 Sn	212	212	0.3411	9.44											
43	102	70	40.5 Bi 27.8 Pb 22.4 Sn 9.3 Cd	216	158	0.3367	9.32											
45	103	102	54.0 Bi 26.0 Sn 20.0 Cd	217	216	0.3172	8.78											
46	104	95	56.0 Bi 22.0 Pb 22.0 Sn	219	203	0.3385	9.37											
97	104	95	50.0 Bi 30.0 Pb 20.0 Sn	219	203	0.3443	9.53											
47	105	70	35.3 Bi 35.1 Pb 20.1 Sn 9.5 Cd	221	158	0.3425	9.48											
48	105	98	52.2 Bi 37.8 Pb 10.0 Sn	221	208	0.3602	9.97											
49	107	96	45.0 Bi 35.0 Pb 20.0 Sn	225	205	0.3468	9.60											
50	108	95	46.0 Bi 34.0 Pb 20.0 Sn	226	203	0.3465	9.59											
52	108	102	54.5 Bi 39.5 Pb 6.0 Sn	226	216	0.3664	10.14											
224	108 E	108	52.0 In 48.0 Sn 1.0 Zn	226	226	0.2627	7.27											
53	109 E	109	67.0 Bi 33.0 In	228	228	0.3183	8.81											
54	112	98	51.0 Bi 41.4 Pb 7.6 Sn	234	208	0.3660	10.13											
55	113	72	40.0 Bi 33.4 Pb 13.3 Sn 13.3 Cd	235	162	0.3479	9.63											
56	113	104	54.4 Bi 45.6 Pb 1.0 Sn 1.0 Cd	235	219	0.3750	10.38											
44	115	95	50.0 Bi 25.0 Pb 25.0 Sn	239	203	0.3387	9.32											
58	117	103	53.0 Bi 42.5 Pb 4.5 Sn	243	217	0.3700	10.24											
59	118	75	38.0 Bi 31.7 Sn 26.4 Pb 2.6 Cd 1.1 Sb .16 Cu	244	167	0.3273	9.06											
1E	118 E	118	52.0 In 48.0 Sn	244	244	0.2637	7.30	11.7	.34	20	1720	1630	83	4.5 note 2				Fair wettability on glass, quartz, and many ceramics. Good low temperature malleability. Compensates for some CTE mismatch. Low vapor pressure
61	119	108	53.7 Bi 43.1 Pb 3.2 Sn	246	226	0.3721	10.30											
62	120	117	55.0 Bi 44.0 Pb 1.0 Sn	248	243	0.3754	10.39											
63	121	92	56.8 Bi 41.2 Pb 2.0 Cd	250	198	0.3743	10.36											
64	121	120	55.0 Bi 44.0 Pb 1.0 In	250	248	0.3754	10.39											
65	123	70	46.0 Pb 30.7 Bi 18.2 Sn 5.1 Cd	253	158	0.3519	9.74						46					
283	123 E	123	74.0 In 26.0 Cd	253	253	0.2703	7.62											
255	124 E	124	55.5 Bi 44.5 Pb	255	255	0.3772	10.44	4	.04		6400		37.5	15	20.9	0.126	0.155	Good fusible alloy. Poor solderability. See table 1
1	125	118	58.0 In 42.0 Sn	257	244	0.2637	7.30	11.7	.34	20	1720	1630	83	4.5 note 2				Fair wettability on glass, quartz, and many ceramics. Good low temperature malleability. Compensates for some CTE mismatch. Low vapor pressure
13	125 MP		70.0 In 15.0 Sn 9.6 Pb 5.4 Cd	257		0.2757	7.63		.39	.27	1478	2000		4				
67	126	124	58.0 Bi 42.0 Pb	259	255	0.3758	10.40											
68	127	93	38.0 Pb 37.0 Bi 25.0 Sn	261	199	0.3425	9.48											
69	129	95	51.6 Bi 37.4 Sn 6.0 In 5.0 Pb	264	203	0.3160	8.58											
70	130	121	40.0 In 40.0 Sn 20.0 Pb	266	250	0.2840	7.86											
71	131	118	52.0 Sn 48.0 In	268	244	0.2637	7.30											
72	133	96	34.0 Pb 34.0 Sn 32.0 Bi	271	205	0.3306	9.15											
73	133	128	58.0 Bi 41.2 Sn 2.0 Pb	271	262	0.3167	8.60											
74	135	96	38.4 Bi 30.8 Pb 30.8 Sn Dopant: 0.05 Ag	275	205	0.3328	9.21											
75	135 E	135	57.4 Bi 41.6 Sn 1.0 Pb	275	275	0.3100	8.58											
76	136	95	36.0 Bi 32.0 Pb 31.0 Sn 1.0 Ag	277	203	0.3331	9.22											
78	136	95	36.7 Bi 31.8 Pb 31.5 Sn .05 Ag	277	203	0.3324	9.20											
79	136	121	55.1 Bi 39.9 Sn 5.0 Pb	277	250	0.3132	8.67											
80	137	95	36.4 Bi 31.8 Pb 31.8 Sn	279	203	0.3320	9.19											
81	137	96	43.0 Pb 28.5 Bi 28.5 Sn	279	205	0.3407	9.43											
281	138 E	138	58.0 Bi 42.0 Sn	281	281	0.3493	8.53	4.5	.19	15	8000	500	55 note 4	23 note 1	44.8	0.167	0.201	Good low temperature solder for electronics assembly or where Cd and Pb are to be avoided. Also good for thermo-electric applications. See Table 1
83	139	96	38.4 Pb 30.8 Bi 30.8 Sn	282	205	0.3360	9.30											
84	139	132	45.0 Sn 32.0 Pb 18.0 Cd 5.0 Bi	282	270	0.3118	8.63											
282	140	139	57.0 Bi 42.0 Sn 1.0 Ag	284	282	0.3098	8.57											More malleable and ductile than #281
85	143	96	33.4 Bi 33.3 Pb 33.3 Sn	289	205	0.3310	9.16											
290	143 E	143	97.0 In 3.0 Ag	290	290	0.2698	7.38	23	.73	22	800			2				Has nearly the wettability, thermal conductivity, and low temp. malleability of indium. Solders silver, fired glass, and ceramics. Good for thermal interfaces requiring more creep resistance than pure indium
88	144 E	144	60.0 Bi 40.0 Cd	291	291	0.3394	9.31											
87	145	118	58.0 Sn 42.0 In	293	244	0.2637	7.30											
181	145 E	145	51.2 Sn 30.6 Pb 18.2 Cd	293	293	0.3053	8.45	5	.35	24	6283							
203	150	125	95.0 In 5.0 Bi	302	257	0.2675	7.40											
88	150 MP		90.5 In 9.7 Sn	302		0.2641	7.31											
225	151	143	90.0 In 10.0 Sn	304	289	0.2641	7.31											
89	152	120	42.0 Pb 37.0 Sn 21.0 Bi	306	248	0.3310	9.16											
239	152	140	54.0 Sn 26.0 Pb 20.0 In .16 Cu	306	284	0.2912	8.06											Also known as 532
90	152 MP		99.4 In 0.6 Ga	306		0.2641	7.31											
91	153 MP		99.9 In 0.4 Ga	307		0.2641	7.31											
2	154	149	80.0 In 15.0 Pb 5.0 Ag	309	300	0.2836	7.85	13	.43	28	2550	2150	58	5.2 note 2				Especially useful for soldering to gold because it minimizes leaching. Good thermal fatigue properties
92	154 MP		99.9 In 0.1 Ga	309		0.2641	7.31											
4	157 MP		100.0 In	314		0.2641	7.31	24	.86	29	273	890	1.57	22 to 41	0.9	28.47	0.243	Soft, ductile metal has good wettability on many surfaces including glazed ceramics, certain metallic oxides, glass, and quartz. Deforms indefinitely under load and has no tendency to become brittle, making it valuable for cryogenic applications. Bonds to non-metallic. Volume change on freezing -2.5%
93	160	122	54.5 Pb 45.5 Bi	320	252	0.3826	10.59											
94	160	145	50.0 Sn 25.0 Cd 25.0 Pb	320	293	0.3030	8.38											
95	162	140	48.0 Sn 36.0 Pb 16.0 Bi	324	284	0.3172	8.78											
97	163	144	43.0 Sn 43.0 Pb 14.0 Bi	325	291	0.3239	9.02			24	6400		3.56	41				Good general purpose step soldering alloy
98	167	120	50.0 Sn 40.0 Pb 10.0 Bi	333	248	0.3169	8.77											
9	167	154	70.0 Sn 18.0 Pb 12.0 In	333	309	0.2815	7.79	12.2	.45	24	5320	4190		135.5	12 note 2			General purpose solder with good physical properties
99	170	131	51.5 Pb 27.0 Sn 21.5 Bi	338	268	0.3461	9.58											
281-338	170	138	60.0 Sn 40.0 Bi	338	280	0.2934	8.12	5	.30		7500		35	23.5 note 1	44.4	0.18	0.213	See table 1
234	172	166	49.7 Sn 41.8 Pb 8.0 Bi 0.5 Ag	342	331	0.3187	8.82											
181	173	130	50.0 Pb 30.0 Sn 20.0 Bi	343	266	0.3422	9.47											
240	173	160	46.0 Sn 46.0 Pb 8.0 Bi	343	320	0.3241	8.97			22	6000	5.28	48					
284	175	165	70.0 In 30.0 Pb	347	329	0.2959	8.19	8.8	.38	28	3450							Minimizes gold leaching characteristics. Good thermal fatigue properties
102	176	146	47.5 Pb 39.9 Sn 12.6 Bi	349	295	0.3299	9.13											
103	177 E	177	67.8 Sn 32.2 Cd	351	351	0.2776	7.68											
104	179 E	179	62.5 Sn 36.1 Pb 1.4 Ag	354	354	0.3039	8.41	11.9	.50	27	7000	7540					0.167	Widely used electronic solder. Good for silver metallization. Has improved strength and fatigue properties
105	180	96	60.0 Sn 25.5 Bi 14.5 Pb	356	205	0.2981	8.25											
5	181	134	37.5 Pb 37.5 Sn 25.0 In	358	273	0.3042	8.42	7.8	.23	23	5260	4300	101	10.2 note 2				Very good resistance to alkaline corrosion
205	181	173	60.0 In 40.0 Pb	358	343	0.3078	8.52	7	.29	27	4150							Minimizes gold leaching characteristics. Good thermal fatigue properties
100	182	178	62.6 Sn 37.0 Pb 0.4 Ag	361	352	0.3035	8.40											
106	183 E	183	63.0 Sn 37.0 Pb	361	361	0.3035	8.40	11.5	.50	25	7500	6200	4.35	37	17		0.167	Most widely used SnPb electronic solder. Not recommended for soldering to gold thicker than 0.5 microns (20 micro inches)
213	183	183	62.0 Sn 38.0 Pb	362	361	0.3046	8.43						4.35					
107	184	183	65.0 Sn 35.0 Pb	363	361	0.3010	8.33											
231	186	174	86.5 Sn 5.5 Zn 4.5 In 3.5 Bi	367	345	0.2659	7.36											Zinc causes high dross
108	186	183	70.0 Sn 30.0 Pb	367	361	0.2948	8.16	12.5		22	7800	5200	5.08	30	17			Good pre-tinning alloy
227	187	175	77.2 Sn 20.0 In 2.8 Ag	369	347	0.2619	7.25	9.8	.54	28	6800	4800	5.6	47	17			Can be used as a lead-free replacement for Sn63, Sn62, Sn60. Has similar melting point and equal or superior physical and mechanical properties. Not for use over 100°C due to Sn/In eutectic. U.S. Patent #5,256,370; covers 70-92%Sn 1-6%Ag 4-35%In; temp. range Liq., 179-213°C, Sol. 167-212°C
226	187	181	91.8 Sn 8.2 In 1.0 Zn	369	358	0.2627	7.27				6600		4	85.6				Zinc causes high dross U.S. Patent #5,342,698; covers 72.8-89.4Sn 8.7-19.2Zn 2.7-16.4In; temp. range Liq., 176-193; Sol. 166-191.4
137	189	179	61.5 Sn 35.5 Pb 3.0 Ag	372	354	0.3046	8.43											
109	191	183	60.0 Sn 40.0 Pb	376	361	0.3071	8.50	11.5	.49	25	7600	5800	4.35	40	16			Good electrical grade solder
110	192	183	75.0 Sn 25.0 Pb	378	361	0.2890	8.00											
239	195	165	90.0 In 10.0 Sn 3.0 Ag	383	329	0.3104	8.59											
111	197	170	55.5 Pb 40.5 Sn 4.0 Bi	387	338	0.3328	9.21											
112	199	183	90.0 Sn 20.0 Pb	390	361	0.2836	7.85											
201	199 E	199	91.0 Sn 9.0 Zn	390	390	0.2627	7.27	15	.61		7940		32.5	21.5 note 1	71.2	0.239	0.272	Recommended for soldering to aluminum using flux #3
113	200	183	95.0 Sn 45.0 Pb	392	361	0.3136	8.68											
114	205	183	85.0 Sn 15.0 Pb	401	361	0.2782	7.70											
254	205	204	86.9 Sn 10.0 In 3.1 Ag	401	399	0.2663	7.37											Lead-free U.S. Patent #5,256,370; covers 70-92%4Sn 1-6%Ag 4-35%In; temp. range Liq. 179-213°C, Sol. 167-212°C
115	210	177	95.0 Pb 44.0 Sn 1.0 Ag	410	351	0.3291	9.11											
7	210	184	50.0 In 50.0 Pb	410	363	0.3201	8.86	6	.22	27	4670	2680	55	9.6 note 2				Minimizes gold leaching characteristics. Good thermal fatigue properties. Very good resistance to alkaline corrosion
116	212	183	50.0 Sn 50.0 Pb	414	361	0.3205	8.87	10.9	.48	23	6000	5200	35	14				General purpose solder
118	213	183	90.0 Sn 10.0 Pb	415	361	0.2728	7.55											
249	213	211	91.8 Sn 4.8 Bi 3.4 Ag	415	412	0.2688	7.44											
119	216	183	50.0 Sn 49.5 Pb 0.5 Sb	421	361	0.3198	8.85											
236	217 E	217	90.0 Sn 10.0 Au	423	423	0.2811	7.78				7280		1.1					
120	218	183	52.0 Pb 48.0 Sn	424	361	0.3234	8.95											
241	220	217	95.5 Sn 3.8 Ag 0.7 Cu	428	423	0.2674	7.40	13.2			6962	3916	36.5	15				Lead-free alloy, no Patent
252	220	217	95.8 Sn 3.3 Ag 0.9 Cu	428	423	0.2674	7.40											Lead-free alloy, no Patent. Alloy of choice for general SMT assembly. See Indalloy 256
256	220	217	96.5 Sn 3.0 Ag 0.5 Cu	428	423	0.2674	7.40				7200		2.41	19.3				Lead-free alloy, no Patent. Preferred alloy to recommend
121	221 E	221	96.5 Sn 3.5 Ag	430	430	0.2710	7.50	16	.33	30	5800	2700		73	40			Lead-free high temperature solder. Excellent thermal fatigue properties. Not recommended for soldering to gold thicker than 0.5microns (20 micro inches)
122	222	183	95.0 Sn 5.0 Pb	432	361	0.2681	7.42											
246	225	217	95.5 Sn 4.0 Ag 0.5 Cu	437	423	0.2674	7.40				7470		2.6	17.3				Lead-free alloy, no Patent. See Indalloy 256
251	225	217	96.2 Sn 2.5 Ag 0.8 Cu 0.5 Sb	437	423	0.2663	7.37											Castin Patented alloy
123	236	221	97.5 Sn 2.5 Ag	456	430	0.2652	7.34											
217-440	227	103	48.0 Bi 29.5 Pb 14.5 Sn 9.0 Sb	441	217	0.3360	9.30	3			13000			19		0.167		See Table 1
125	227	183	55.0 Pb 45.0 Sn	441	361	0.3277	9.07											
256	227	215	98.5 Sn 1.0 Ag 0.5 Cu	441	419	0.2645	7.32				5640		2.15	13.4				
243	227 E	227	99.0 Sn 1.0 Cu	441	441	0.2641	7.31											Lead-free alloy, no Patent

Indalloy Number	TEMP (Temperature critical alloy: ±2°C of solidus. Non-temperature critical alloy ±3°C) Liquidus °C	Solidus °C	Elemental Composition (% by Mass)	TEMP Liquidus °F	Solidus °F	Density lb/in³	Density g/cm³	Electrical Conductivity (1.72ωohms-cm) % of IACS	Thermal Conductivity @ 85°C W/(m·°C)	Coefficient Expansion @ 20°C PPM/°C	Tensile Strength psi	Shear Strength psi	Young's Modulus psi x 10⁶	Elongation %	Brinell Hardness	Latent Heat of Fusion J/g	Soecific Heat SOLID cal/°C	Soecific Heat LIQUID cal/°C	Application Notes
244	227 E	227	99.3 Sn 0.7 Cu	441	441	0.2641	7.31												Lead-free alloy, no Patent
126	231	185	58.0 Bi 40.0 Sn 2.0 Sb	448	365	0.3313	9.17												
206	231	197	60.0 Pb 40.0 In	448	387	0.3360	9.30	5.2	.19	26	5000								Minimizes gold leaching characteristics. Good thermal fatigue properties
127	232	179	60.0 Pb 37.5 Sn 3.0 Ag	450	354	0.3393	9.39												
128	232 MP		100.0 Sn	450		0.2630	7.28	15.6	.73	24	1900		6.1				0.222		
209	233 MP		65.0 Sn 25.0 Ag 10.0 Sb	451		0.2818	7.80			36	17000								
129	235 MP		99.0 Sn 1.0 Sb	455		0.2627	7.27												
3	237	143	90.0 In 10.0 Ag	459	289	0.2734	7.54	22.1	.67	15	1650	1600		61	2.7 note 2				Has nearly the wettability and low temperature malleability of Indium. Solders silver, fired glass, and ceramics. Large plastic range
130	238	183	60.0 Pb 40.0 Sn	460	361	0.3353	9.28	10.1	.44	25	5400	4600	3.34	25	12				Inexpensive utility solder
131	238	232	97.0 Sn 3.0 Sb	460	450	0.2628	7.26				1400								
132	240	221	95.5 Sn 5.0 Ag	464	430	0.2670	7.39	12.6		23	8000	3540		30	13.7		0.23		High temperature electrical solder
133	240	235	95.0 Sn 5.0 Sb	464	455	0.2819	7.25	11.9	.28	31	5900	6000		38	13.3				Lead-free, used in food equipment, potable water systems, and refrigeration tubing. Good wettability and creep resistance
134	243	185	63.2 Pb 35.0 Sn 1.8 Sb	469	365	0.3393	9.39												
135	247	183	65.0 Pb 35.0 Sn	477	361	0.3452	9.50												
239	247	237	83.0 Pb 10.0 Sb 5.0 Sn 2.0 Ag	477	459	0.3739	10.35												
138	250	185	68.4 Pb 30.0 Sn 1.6 Sb	482	365	0.3479	9.63												
139	251	134	95.0 Bi 5.0 Sn	484	273	0.3483	9.64												
210	253	179	70.0 Pb 27.0 Sn 3.0 Ag	487	354	0.3555	9.84												
233	255	245	85.0 Pb 10.0 Sb 5.0 Sn	491	473	0.3743	10.36	6		27	5570			3.5		0.9	0.15		
141	257	183	70.0 Pb 30.0 Sn	495	361	0.3512	9.72	9.3	.41	26	5000	4000	3.05	18	12				Minimizes gold leaching characteristics. Good thermal fatigue properties. Very good resistance to alkaline corrosion
142	260	179	50.0 Sn 47.0 Pb 3.0 Ag	500	354	0.3201	8.86												
19	260	240	75.0 Pb 25.0 In	500	464	0.3602	9.97	4.6	.18	26	5450	3520		47.5	10.2 note 2				
143	260	252	90.0 Pb 10.0 Sb	500	486	0.3830	10.60												
144	263	184	73.7 Pb 25.0 Sn 1.3 Sb	505	363	0.3370	9.88												
202	268 E	268	82.6 Cd 17.4 Zn	511	511	0.3017	8.35												Limited production
145	268	183	75.0 Pb 25.0 Sn	514	361	0.3590	9.96				3426			53					
146	270	184	79.0 Pb 20.0 In 1.0 Sb	518	363	0.3671	10.16												
148	271 MP		100.0 Bi	520		0.3541	9.80												
209	272	250	90.0 Sn 10.0 Sb	522	482	0.2816	7.24												
150	275	260	81.0 Pb 19.0 In	527	500	0.3711	10.27	4.5	.17	27	5550								Minimizes gold leaching characteristics. Good thermal fatigue properties. Very good resistance to alkaline corrosion
149	280	183	80.0 Pb 20.0 Sn	536	361	0.3680	10.21	8.7	.37	27	4800	3000	2.9	20	11				
182	280 E	280	80.0 Au 20.0 Sn	536	536	0.5242	14.51		.57	16	40000	40000	8.57	2			0.15		Very strong solder with excellent thermal fatigue resistance. Excellent solder to use when soldering to gold. High thermal conductivity
152	285	239	92.0 Pb 5.0 Sn 3.0 Sb	545	462	0.3909	10.82												
153	288	183	85.0 Pb 15.0 Sn	550	361	0.3898	10.70				4700	4470							
154	289	179	57.0 Pb 40.0 Sn 3.0 Ag	552	354	0.3346	9.26												
228	290	267	88.0 Pb 10.0 Sn 2.0 Ag	554	513	0.3884	10.75	8.5	.27	29	3260			42			0.143		(Sn10) Not recommended for applications above 120°C, due to formation of eutectic
155	292 MP		90.0 Pb 5.0 Ag 5.0 Sn	558		0.3974	11.00		.25	27									
156	295	221	90.0 Sn 10.0 Ag	563	430	0.2713	7.51												
157	295	252	95.0 Pb 5.0 Sb	563	486	0.3960	10.96												
151	296	287	92.5 Pb 5.0 Sn 2.5 Ag	565	549	0.3982	11.02	8.6		29	4210	2240	2				0.13		
160	300	227	97.0 Sn 3.0 Cu	572	441	0.2645	7.32												
159	302	275	90.0 Pb 10.0 Sn	576	527	0.3894	10.75	8.9	.25	29	4400	2400	2.76	30	10				
242	302	275	89.5 Pb 10.5 Sn	576	527	0.3894	10.75	8.9	.25	29	4400	2400	2.76	30	10				
161	303 E	303	97.5 Pb 2.5 Ag	577	577	0.4094	11.33	8.6			4420	2900		42					Torch solder, poor corrosion resistance
163	304	299	95.5 Pb 2.5 Ag 2.0 Sn	579	570	0.4047	11.20												
237	304 MP		93.5 Pb 3.5 Sn 2.0 In 2.0 Ag	579		0.4000	11.07												
165	309 E	309	97.5 Pb 1.5 Ag 1.0 Sn	588	588	0.4075	11.28	6	.23	30	4420			23	9.5				High temperature solder, frequently used in semiconductor assembly. Often used in reducing atmospheres such as 12% hydrogen. Slightly better corrosion resistance than #101
12	310	290	90.0 Pb 5.0 In 5.0 Ag	590	554	0.3974	11.00	5.6	.25	27	5730	3180		23	9 note 2				Tin-free indium solder
164	310	300	92.5 Pb 5.0 In 2.5 Ag	590	572	0.3982	11.02	5.5	.25	25	4560	2830							Good thermal fatigue. Minimal gold leaching properties of indium-lead alloys. Often used in reducing atmospheres such as 12% hydrogen
171	312	308	96.0 Pb 5.0 Sn	594	586	0.3996	11.06	6.8	.23	30	4000	2100		45	8 note 2				High temperature SnPb alloy
11	313	300	95.0 Pb 5.0 In	595	572	0.3996	11.06	5.1	.21	29	4350	3220		52	6 note 2				
239	313 E	313	91.0 Pb 4.0 Sn 4.0 Ag 1.0 In	595	595	0.3992	11.05												
167	315 MP		98.0 Pb 1.2 Sb 0.8 Ga	599		0.4047	11.20												
168	320	300	98.0 Pb 2.0 Sb	608	572	0.4043	11.19												
169	322	310	98.5 Pb 1.5 Sb	612	590	0.4057	11.23												
170	327 MP		100.0 Pb	621		0.4101	11.35	7.9	.35	29	1800	1800	2.61	55	4				
172	330	231	98.0 Sn 2.0 As	626	448	0.2816	7.24												
173	345	232	99.0 Sn 1.0 Ge	653	450	0.2623	7.26												
183	356 E	356	88.0 Au 12.0 Ge	673	673	0.5300	14.67			44	13	28835	26825	10.55					
184	383 E	383	96.9 Au 3.2 Si	685	685	0.5584	15.40			27	12	36975	31900	12.04					
175	364	305	95.0 Pb 5.0 Ag	687	581	0.4083	11.30												
229	365	304	94.5 Pb 5.5 Ag	689	579	0.4101	11.35	6	.23	30	4420								
176	382 E	382	95.0 Zn 5.0 Al	720	720	0.2385	6.60												
185	395	340	95.0 Cd 5.0 Ag	743	644	0.3154	8.73												
186	424 E	424	55.0 Ge 45.0 Al	795	795	0.1340	3.71												
177	465	451	76.0 Au 25.0 In	869	844	0.4950	13.70												Extremely hard, high temperature alloy. Limited production
178	485	451	82.0 Au 18.0 In	905	844	0.5383	14.90												Extremely hard, high temperature alloy. Limited production
187	525 E	525	45.0 Ag 38.0 Au 17.0 Ge	977	977	0.3823	10.58												
188	577 E	577	88.3 Al 11.7 Si	1,071	1,071	0.0961	2.66												
189	595	521	90.0 Al 10.0 Si 4.0 Cu	1,083	970	0.0994	2.75												
190	610	577	92.5 Al 7.5 Si	1,130	1,071	0.0968	2.68												
216	620	605	48.0 Ag 24.0 Cd 16.0 Zn 15.0 Cu	1,148	1,121	0.3291	9.11												
191	630	577	95.0 Al 5.0 Si	1,166	1,071	0.0972	2.69												
216	635	625	50.0 Ag 18.0 Cd 16.5 Zn 15.5 Cu	1,175	1,157	0.3320	9.19												
217	650	620	56.0 Ag 22.0 Cu 17.0 Zn 5.0 Sn	1,202	1,148	0.3328	9.21												
192	660 MP		100.0 Al	1,220		0.0976	2.70												
218	690	630	50.0 Ag 16.0 Cd 15.5 Cu 15.5 Zn 3.0 Ni	1,274	1,166	0.3328	9.21												
219	700	605	35.0 Ag 26.0 Cu 21.0 Zn 18.0 Cd	1,292	1,121	0.3298	8.88												
179	705	603	61.0 Ag 24.0 Cu 15.0 In	1,301	1,117	0.3425	9.48												
211	705	640	80.0 Cu 15.0 Ag 5.0 P	1,301	1,184	0.2753	7.62												
212	710	605	30.0 Ag 27.0 Cu 23.0 Zn 20.0 Cd	1,310	1,121	0.3169	8.77												
214	720	600	60.0 Ag 30.0 Cu 10.0 Sn	1,328	1,112	0.3481	9.58												
193	780 E	780	72.0 Ag 28.0 Cu	1,436	1,436	0.3617	10.01												
220	785	775	71.5 Ag 28.0 Cu 0.5 Ni	1,445	1,427	0.3617	10.01												
194	800	370	98.0 Au 2.0 Si	1,472	698	0.6113	16.92												
221	800	690	63.0 Ag 29.5 Cu 6.0 Sn 2.5 Ni	1,472	1,274	0.3508	9.71												
195	890 E	890	80.0 Au 20.0 Cu	1,634	1,634	0.5662	15.67												
196	950 E	950	82.0 Au 18.0 Ni	1,742	1,742	0.5752	15.92												
207	961 MP		100.0 Ag	1,762		0.3794	10.50												
208	985	665	85.0 Cu 8.0 Sn 7.0 Ag	1,805	1,229	0.3206	8.87												
198	1020	1000	50.0 Au 50.0 Ag	1,868	1,832	0.4914	13.60												
199	1030	380	99.4 Au 0.6 Sb	1,886	680	0.6894	19.08												
222	1030	1025	99.0 Au 1.0 Ge	1,886	1,877	0.6818	18.87												
223	1063 MP		99.9 Au 0.2 P	1,945		0.6843	18.94												
200	1064 MP		100.0 Au	1,948		0.6973	19.30	73.4	3.18	14	20000		11.2	39 to 45(2in)			0.13		
532	see Indalloy #230																		

NOTES

note 1: Brinell Hardness, 2mm ball, 4kg load
note 2:Modified Brinell hardness, using 100Jin load, 1/2 min
note 3:Depends on specimen preparation.
note 4:% elongation on 5.65 (sq. root Area) gauge length

Conversions:

Resistivity of IACS / Elec. conductivity %IACS = Resistivity of alloy
ex: 1.72 x 100 / %IACS = micro ohm - cm