

Solder Research Kits





INDIUM CORPORATION

Indium Corporation is a world leader in the manufacture of standard and specialty solders; Pb-Free alloys; solder pastes; solder wire, ribbon, foil, and preforms; solder spheres for BGA packaging; indium chemicals; and much more.

What attracts customers to Indium Corporation is our reputation for quality, service, flexibility, and technical knowledge. These customers have come to rely on our award-winning company, offering award-winning products, supported by award-winning people around the world.

Our goal is to continue as the quality leader. We strive to exceed every customer expectation as it applies to the products we make, the services we provide, and the way we administer each business transaction.

Research Kits

At Indium Corporation, we have created a strong research and development team that has made us one of the top solder manufacturers in the world. We understand the challenges of developing viable products for today's marketplace.

One of the key hurdles in your product development is being able to test a variety of options at a reasonable cost. With our Research Kits, you can experiment with various solders, then choose the best one for your application.

If you need assistance in the selection process, our engineers are available to discuss your applications and help you choose which alloys to consider.

After you have selected the best alloy, contact us for assistance in getting production quantities in the form you require.

Solder selection depends on many factors, including:

- Maximum soldering temperature
- Maximum and minimum operating temperature
- Lead content/Pb-Free composition
- Base metal compatibility
- Tensile strength
- Corrosion resistance
- Electrical/thermal conductivity
- Thermal coefficient of expansion
- Physical appearance
- Available solder forms





Paste Selector Kit

Our solder paste selector kit allows you to test alloys based on metallurgical compatibility and physical performance for step soldering and other applications. These alloys range in temperature from 96°C to 296°C and include Pb-Free options.

Several of the alloys are indium-based. Compared to tin-lead solders, indium-lead and indium-lead-silver alloys show reduction in scavenging and leaching of gold and silver, and improved resistance to thermal fatigue.

All pastes are made with Type 3 powder (25-45 microns). Paste can be packaged either in syringes with thumb plungers (50g per alloy), or jars (100g per alloy), depending on your application.

Research kit flux vehicles are all rated R0 per J-STD-004A.

The shelf life of the solder paste is 6 months at storage temperatures of -20° to 5°C. Room temperature storage below 25°C is acceptable for short periods.

Indalloy® Number	Alloy	Melting Temperature (°C)
1E	52In 48Sn	118 E
2	80In 15Pb 5Ag	154 - 149
4	100In	157 MP
7	50In 50Pb	210 - 184
42	46Bi 34Sn 20Pb	96 E
97	43Sn 43Pb 14Bi	163 - 144
Sn62	62Sn 36Pb 2Ag	179 E
Sn63	63Sn 37Pb	183 E
121	96.5Sn 3.5Ag	221 E
133	95Sn 5Sb	240 - 235
151	92.5Pb 5Sn 2.5Ag	296 - 287
204	70In 30Pb	175 - 165
205	60In 40Pb	181 - 173
206	60Pb 40In	231 - 197
241	95.5Sn 3.8Ag 0.7Cu	220 - 217
256	96.5Sn 3.0Ag .05Cu	220 - 217
281	58i 42Sn	138 E
282	57Bi 42Sn 1Ag	140 - 139
290	97In 3Ag	143 E



Wire Selector Kit

You can select from the following alloys to determine the ideal solder for your application. Whether your application calls for Pb-Free, low temperature, or high temperature, the information listed below will help you in your selection process. Personalize your kit with 2, 5, or 10 different alloys. Pricing is based on the number of alloys selected. Kits also come with several fluxes - for a complete list see the *Flux Selector Worksheet* on page 6.

- Wire length is 3ft (914mm)
- Au/Sn wire is 6" (152.4mm)
- Wire diameter is 0.030" (0.76mm)

Liquidus temperatures range from 96°C to 300°C and include numerous Pb-Free alloys. These solders are popular for microelectronics and aerospace applications. In applications that require soldering to gold, use indium-based alloys for service temperatures below 125°C. For service temperatures above 125°C, Indalloy® 182 (80Au/20Sn) is recommended.



Bonding to Non-Metallics

Bonding to non-metallic surfaces requires a solder with special properties. We recommend Indalloy numbers 1E, 3, 4, and 290. Indalloy 1E and 4 exhibit the best wetting, while Indalloy 3 and 290 exhibit higher strength due to the hardening effect of the silver, although they do result in slightly decreased wettability. For

Indalloy® Number	Alloy	Temperature (°C)	Pb-Free
1E	52In 48Sn	118 E	X
2	80In 15Pb 5Ag	154 - 149	
3	90In 10Ag	237 - 143	X
4	100In	157 MP	X
7	50In 50Pb	210 - 184	
9	70Sn 18Pb 12In	167 - 154	
42	46Bi 34Sn 20Pb	96 E	
Sn62	62Sn 36Pb 2Ag	179 E	
Sn63	63Sn 37Pb	183 E	
121	96.5Sn 3.5Ag	221 E	X
133	95Sn 5Sb	240 - 235	X
136	49Bi 21In 18Pb 12Sn	58 E	
151	92.5Pb 5Sn 2.5Ag	296 - 287	
164	92.5Pb 5In 2.5Ag	310 - 300	
182	80Au 20Sn	280 E	X
201	91Sn 9Zn	199 E	X
204	70In 30Pb	175 - 165	
205	60In 40Pb	181 - 173	
241 SAC387	95.5Sn 3.8Ag 0.7Cu	220 - 217	X
244	99.3Sn 0.7Cu	227 E	X
246 SAC405	95.5Sn 4Ag 0.5Cu	225 - 217	X
256 SAC305	96.5Sn 3Ag 0.5Cu	220 - 217	X
281	58i 42Sn	138 E	X
282	57Bi 42Sn 1Ag	140 - 139	X
290	97In 3Ag	143 E	X

* For non-metal bonding evaluations, a special indium applicator is available. See *How To Order* on back page.

non-metallic bonding, an indium applicator is recommended. An information booklet, included with the kit, describes how to use this applicator to create the indium sub-oxide layer required for bonding, as well as recommending when to use flux and when to avoid it.



Ribbon Selector Kit

When creating your Ribbon Selector Kit, you can choose 6 or 12 different alloys of 1.00" (25.4mm) x 0.002" (0.05mm) x 3 ft. (914mm) ribbon. Cut your ribbon into experimental preforms (with included knife) to determine the proper configuration. Solder volume can be increased by stacking cut preforms. Kits also come with several fluxes which can be reviewed in the *Flux Selector Worksheet*, on page 6.

Choose from the following alloys which range in temperature from 118°C to 287°C; included are Pb-Free, tin-lead, and indium-based solders. If your application involves non-metallic bonding, refer to recommendations under *Wire Kit: Non-Metallic Bonding Selections* (see page 4). Spools are individually packed in argon-filled bags. See section on *Tools & Fluxes* for other included items.

Indalloy® Number	Alloy	Melting Temperature (°C)
1E	52In 48Sn	118 E
2	80In 15Pb 5Ag	154 - 149
4	100In	157 MP
Sn62	62Sn 36Pb 2Ag	179 E
Sn63	63Sn 37Pb	183 E
121	96.5Sn 3.5Ag	221 E
150	81Pb 19In	275 - 260
151	92.5Pb 5Sn 2.5Ag	296 - 287
205	60In 40Pb	181 - 173
241 SAC387	95.5Sn 3.8Ag 0.7Cu	220 - 217
246 SAC405	95.5Sn 4Ag 0.5Cu	225 - 217
256 SAC305	96.5Sn 3Ag 0.5Cu	220 - 217
281	58Bi 42Sn	138 E
282	57Bi 42Sn 1Ag	140 - 139
290	97In 3Ag	143 E



Tools & Fluxes

Tools

Tweezers, flux applicator brush, X-ACTO® knife, and information booklet are included with Wire and Ribbon Kits.

Fluxes

Wire and Ribbon Kits include up to 5 fluxes, which cover a wide variety of applications.

See *Flux Selector Worksheet* on page 6.



Kit Builder Worksheet

Wire Select <input type="checkbox"/> 2, 5 or 10	Ribbon Select <input type="checkbox"/> 6 or 12	Paste Select <input type="checkbox"/> 3 or 5	Indalloy® Number	Composition (%)	Liquidus (°C)	Solidus (°C)	Electrical Conductivity (% of IACS)	Thermal Conductivity (W/cm²C@85°C)
<input type="checkbox"/>			136	49Bi 21In 18Pb 12Sn	58E	58	2.43	0.1
<input type="checkbox"/>		<input type="checkbox"/>	42	46Bi 34Sn 20Pb	96E	96	-	-
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1E	52In 48Sn *	118E	118	11.7	0.34
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	281	58Bi 42Sn *	138E	138	4.5	0.19
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	282	57Bi 42Sn 1Ag *	140	139	-	-
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	290	97In 3Ag *	143	143	23	0.73
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2	80In 15Pb 5Ag	154	149	13	0.43
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4	100In *	157	MP	24	0.86
<input type="checkbox"/>		<input type="checkbox"/>	97	43Pb 42Sn 14Bi	163	144	-	-
<input type="checkbox"/>			9	70Sn 18Pb 12In	167	154	12.2	0.45
<input type="checkbox"/>		<input type="checkbox"/>	204	70In 30Pb	175	165	8.8	0.38
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sn62	62Sn 37Pb 2Ag	179E	179	11.9	0.5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	205	60In 40Pb	181	173	7	0.29
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sn63	63Sn 37Pb	183	183	11.5	0.5
<input type="checkbox"/>			201	91Sn 9Zn *	199	199	15	0.61
<input type="checkbox"/>		<input type="checkbox"/>	7	50In 50Pb	210	184	6	0.22
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	241	95.5Sn 3.8Ag 0.7Cu *	220	217	13.2	-
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	121	96.5Sn 3.5Ag *	221E	221	16	0.33
<input type="checkbox"/>		<input type="checkbox"/>	206	60Pb 40In	231	197	5.2	0.19
<input type="checkbox"/>			3	90In 10Ag *	237	143	22.1	0.67
<input type="checkbox"/>		<input type="checkbox"/>	133	95Sn 5Sb *	240	235	11.9	0.28
<input type="checkbox"/>	<input type="checkbox"/>		150	81Pb 19In	275	260	4.5	0.17
<input type="checkbox"/>			182	80Au 20Sn *	280	280	-	0.57
<input type="checkbox"/>		<input type="checkbox"/>	151	92.5Pb 5Sn 2.5Ag	296	287	8.6	-
<input type="checkbox"/>		<input type="checkbox"/>	164	92.5Pb 5In 2.5Ag	310	300	5.5	0.25
<input type="checkbox"/>			244	99.3Sn 0.7Cu *	227	227	-	-
<input type="checkbox"/>	<input type="checkbox"/>		246	95.5Sn 4Ag 0.5Cu *	225	217	-	-
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	256	95.5Sn 4Ag 0.5Cu *	220	217	-	-

Flux Selector Worksheet Select up to 5 Fluxes

Flux No.	(Clean residue in)	Metal to be soldered	Temp. Range
<input type="checkbox"/> #1†	Water	Inconel™, Monel™, zinc, mild steel	102°C-338°C
<input type="checkbox"/> #2†	Water	Stainless & chrome-based steel	100°C-371°C
<input type="checkbox"/> #3†	Water	Aluminum	96°C-343°C
<input type="checkbox"/> #40A	Water	SnNi Electrodeposit & Kovar™, Pb, oxidized Cu, brass, bronze, BeCu, Rh, Cd, Ni	100°C-250°C
<input type="checkbox"/> #5RA	IPA	Pb, oxidized Cu, brass, bronze, BeCu, Rh, Cd, Ni, solder plate, Sn	125°C-350°C
<input type="checkbox"/> #5RMA	IPA	Solder plate, Sn, clean Cu, Pt, Pd, Ag, Au	125°C-350°C
<input type="checkbox"/> #5R	IPA	Clean Cu, Pt, Pd, Ag, Au	125°C-350°C

†Not recommended for electronics applications.



These alloys are the most popular of our over 200 choices.
These selections have been proven in many applications.

* Entries indicate lead-free alloys

Thermal Coefficient of Expansion (PPM/C @ 20°C)	Tensile Strength (PSI)	APPLICATION NOTES
23	6300	Poor wettability but adequate for mechanical joining of metallic substrates if corrosive type flux is used.
-	-	Can be used on the same metallizations as SnPb-based solder.
20	1720	Fair wettability on glass, quartz, and many ceramics. Good low-temperature malleability. Compensates for some difference in CTE.
15	8000	Good low melting point solder for electronics assembly or for applications where Cd and Pb are to be avoided. Also good for thermo-electric applications.
-	-	Similar to Indalloy® #281 but not as brittle. Used in low-temperature, Pb-Free applications.
22	800	Silver added to improve strength. Has nearly the wettability and low-temperature malleability of Indium.
28	2550	Especially useful for soldering against gold because it minimizes leaching. Good thermal fatigue.
29	273	Pure Indium. Soft, ductile metal. Good wettability on many surfaces including glazed ceramics, certain metallic oxides, glass, and quartz. Deforms indefinitely under load. Has no tendency to become brittle, making it valuable for cryogenic application. Bonds to non-metallic.
24	6400	Good general purpose step soldering alloy.
24	5320	General purpose solder with good physical properties.
28	3450	Minimizes gold leaching characteristics. Good thermal fatigue properties.
27	7000	Good general purpose solder. Can be used on silver-metallized surfaces to reduce scavenging.
27	4150	Minimizes gold leaching characteristics. Good thermal fatigue properties.
25	7500	Standard eutectic tin-lead solder with wide application. Not recommended for use against silver or gold.
-	7940	Recommended for soldering to aluminum using Flux #3.
27	4670	Minimizes gold leaching characteristics. Good thermal fatigue properties. Very good resistance to alkaline corrosion.
-	6962	Pb-free alloy slated to replace SnPb in consumer electronic applications.
30	5800	Use when lead-based solders do not meet temperature, strength or safety requirements. Not recommended against gold-plated surfaces.
-26	5000	Minimizes gold leaching. Good thermal fatigue properties.
15	1650	Silver added to improve strength. Has nearly the wettability and low-temperature malleability of Indium.
31	5900	Used to join copper tubing for refrigeration and potable water systems. Good wettability with good creep resistance at elevated temperatures.
27	5550	Minimizes gold leaching. Good thermal fatigue properties.
16	40000	Strong solder with excellent thermal fatigue resistance. Can be soldered to gold surfaces without flux in inert atmosphere.
29	4210	Wide application in semiconductor assembly. Often used in reducing atmospheres such as 88% nitrogen 12% hydrogen.
25	4560	Particularly good thermal fatigue. Minimal gold leaching properties of Indium-lead alloys. Often used in reducing atmospheres such as hydrogen.
-	-	Candidate for certain Pb-Free applications. Better than SAC Alloys for CTE Mismatch.
-	7476	Candidate for certain Pb-Free applications.
-	7200	Candidate for certain Pb-Free applications.

This brochure is provided for general information only. It is not intended, and shall not be construed, to warrant or guarantee the performance of the products described which are sold subject exclusively to written warranties and limitations thereon included in product packaging and invoices.

How To Order

1 Select kit type, Indalloy® numbers, and fluxes desired.

WIRE KIT Select 2, 5 or 10 alloys	RIBBON KIT Select 6 or 12 alloys	PASTE KIT Select 3 or 5 alloys	FLUXES Select up to 5 Fluxes	APPLICATOR
<input type="checkbox"/> 1E <input type="checkbox"/> 121 <input type="checkbox"/> 204 <input type="checkbox"/> 282 <input type="checkbox"/> 2 <input type="checkbox"/> 133 <input type="checkbox"/> 205 <input type="checkbox"/> 290 <input type="checkbox"/> 3 <input type="checkbox"/> 136 <input type="checkbox"/> 241 <input type="checkbox"/> Sn62 <input type="checkbox"/> 4 <input type="checkbox"/> 151 <input type="checkbox"/> 244 <input type="checkbox"/> Sn63 <input type="checkbox"/> 7 <input type="checkbox"/> 164 <input type="checkbox"/> 246 <input type="checkbox"/> 9 <input type="checkbox"/> 182* <input type="checkbox"/> 256 <input type="checkbox"/> 42 <input type="checkbox"/> 201 <input type="checkbox"/> 281 <small>*Available at additional cost.</small>	<input type="checkbox"/> 1E <input type="checkbox"/> 246 <input type="checkbox"/> 2 <input type="checkbox"/> 256 <input type="checkbox"/> 4 <input type="checkbox"/> 281 <input type="checkbox"/> 121 <input type="checkbox"/> 282 <input type="checkbox"/> 150 <input type="checkbox"/> 290 <input type="checkbox"/> 151 <input type="checkbox"/> Sn62 <input type="checkbox"/> 205 <input type="checkbox"/> Sn63 <input type="checkbox"/> 241	<input type="checkbox"/> 1E <input type="checkbox"/> 97 <input type="checkbox"/> 205 <input type="checkbox"/> 282 <input type="checkbox"/> 2 <input type="checkbox"/> 121 <input type="checkbox"/> 206 <input type="checkbox"/> 290 <input type="checkbox"/> 4 <input type="checkbox"/> 133 <input type="checkbox"/> 241 <input type="checkbox"/> Sn62 <input type="checkbox"/> 7 <input type="checkbox"/> 151 <input type="checkbox"/> 256 <input type="checkbox"/> Sn63 <input type="checkbox"/> 42 <input type="checkbox"/> 204 <input type="checkbox"/> 281 <small>Check method of application:</small> <input type="checkbox"/> Dispensing syringes with thumb plungers. <input type="checkbox"/> Stenciling jars	<input type="checkbox"/> #1† <input type="checkbox"/> #5RA <input type="checkbox"/> #2† <input type="checkbox"/> #5RMA <input type="checkbox"/> #3† <input type="checkbox"/> #5R <input type="checkbox"/> #40A <small>†Not recommended for electronics applications.</small>	<input type="checkbox"/> Check here for indium applicator, available at an additional cost, for non-metal bonding with Wire and Ribbon Kits. (Paste can not be used for non-metal bonding because the flux removes the essential sub-oxide.)

Prices are based on the number of alloys required and whether gold alloy #182 or indium applicator is selected. You may select up to 5 fluxes when purchasing our Wire and Ribbon Kits.

2 Contact us for pricing on the kit you have created. We require the following information to complete your quote:

Name _____ Title _____ Company _____

Mailing Address _____

Billing Address _____

Phone _____ Purchase Order # _____

Fax _____ VISA MASTERCARD AMERICAN EXPRESS

E-mail _____ CARD # _____

Application _____ Signature _____ Expiration Date _____

3 Place your order by phone, fax, mail or e-mail. Please provide a VISA, MasterCard or American Express number and expiration date, a purchase order number, or make arrangements to prepay. Wire and Ribbon Kits are generally shipped within 2-3 days and Paste Kits within 2 weeks. If Material Safety Data Sheets are required, please specify.

 **For your convenience, a copy of this page may be faxed to any of the locations below.**

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