Optimizing Solder Paste Parameters for Syringe Dispensing

APPLICATION NOTE

Powder Size Selection

The solder powder size (Type 3, Type 4, etc.) must be selected based upon the size of the needle that will be used to dispense the solder paste from the syringe. Using a powder size that is too large for the needle will result in clogs and inconsistent dispensing. This chart can serve as a guideline for selecting solder powder size based upon the needle size.

Dispensing Needle				Powder Size
		Inner Diameter (Needle Bore)		
Gauge	Color	Inches	Microns	Type
14	Olive	0.060	1520	2
15	Amber	0.053	1350	2
16	Grey	0.047	1190	2
18	Green	0.033	840	2
20	Pink	0.023	580	3
21	Purple	0.020	510	3
22	Blue	0.016	410	3
23	Orange	0.013	330	3
25	Red	0.010	250	4
27	Clear	0.008	200	5
30	Lavender	0.006	150	6

Effect of Cold Welding on Particle Size Selection

Certain conditions will cause the solder particles to cold weld together. The obvious issue with cold welding for paste dispensing is that the solder particles that have cold welded together may become large enough to affect dispensing performance, including a rise in viscosity and clogging. Indium, as a metal, is naturally prone to cold welding. Two bars of indium metal pressed together will cause them to cold weld. Indium metal and indium-containing solder powder are also subject to cold welding. The propensity for solder particles to cold weld is based on the powder particle size. Smaller particles have more surface area for a given mass of powder than larger particles. Increasing the surface area (reducing the solder powder particle size) increases the likelihood for cold welding. Indium metal and high indium-containing alloys are generally not recommended for particle sizes smaller than Type 4. Requests for particle sizes smaller than Type 4 with indium and indium-containing alloys should be addressed on a case-by-case basis.

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Form No. 98585 R0

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APPLICATION NOTE

Metal Load Determination

The metal load (percentage-by-weight of solder in the paste) directly affects the viscosity of the paste. The viscosity and the metal load must be optimized to insure consistent, smooth dispensing. Viscosity that is too low will result is a runny paste. Viscosity that is too high will result in clogs. The optimum metal load is a function of the flux chemistry, solder alloy (density), and solder alloy particle size. Generally speaking, if all other paste parameters are equal, the optimum dispensing metal load should be ~5% less than the optimum stencil printing metal load. For example, a paste that has a recommended metal load of 90% for stencil printing will likely have a recommended metal load of 85% for syringe dispensing.

Contact Indium Corporation's Technical Support Engineers to discuss the alloy, particle size, and metal load that best suits your application.

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