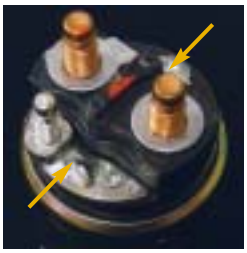
SolderPlus®

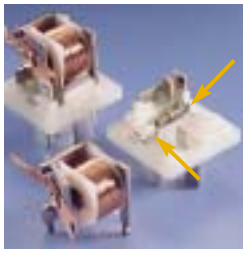
EFD® A NORDSON COMPANY

We listen and respond.

Dispensed Solder Paste Systems

For Automotive Solenoids and Switches





Large Engine Starter Solenoids

Goal: Improve joint consistency and part quality. Automate a slow, manual wire soldering process.

Solution: SolderPlus® is dispensed from two fixtured EFD Model 790 auger valves operating in pulsed air pressure mode. SolderPlus is quickly and reliably applied in large, consistent solder paste deposits, filling the eyelet hole through which the coil wire passes. The deposits are heated with an induction coil. SolderPlus No clean flux wets to the eyelet and wire creating a bright, conductive solder joint.

Benefits:

- *A controlled soldering assembly process – improved part reliability*
- *Full automation, eliminates human variables*
- *No part cleaning required*
- *Significant reduction in scrap and rework costs*

Solenoid Relays

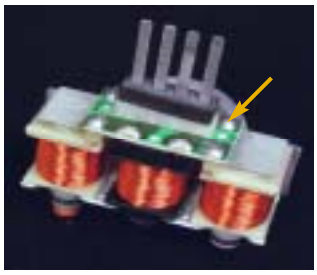
Goal: Improve solder joint conductivity and strength. Reduce assembly steps.

Solution: An EFD air powered dispenser mounted on an automated positioning system dispenses SolderPlus to leads on a resistor located in the base of the relay. A coil is set in place on top of the base with mounting tabs contacting the solder deposits. The unique capillary flow of SolderPlus wets to the coil tabs and resistor leads in a single heating pass through a conveyorized oven.

Benefits:

- *Consistent, quality solder joints eliminate field failures*
- *Single automated assembly process replaces three-step manual process*

Finger Switches



Goal: Automate to increase solder assembly productivity.

Solution: SolderPlus is air dispensed from two fixtured syringes applying paste to three pairs of through-hole terminals. The part is rotated under the SolderPlus dispensing station, then indexed to position and heated using a fixed thermal induction coil. SolderPlus with no clean flux produces bright, quality joints without costly cleaning.

Benefits:

- *Dispensed SolderPlus facilitates automation of this assembly process*
- *Manual assembly variables are eliminated*
- *No residue removal is required, further reducing process time*

Key: ← denotes location of solder joint

Proven Lead Free Formulations

EFD, Inc., telephone: 401-333-3800 toll free: 800-338-4353 fax: 401-333-4954 e-mail: solder@efd-inc.com

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Selecting Solder Paste

The Best Materials
+ The Best Tools
= The Best Results

Alloy	Solidus (°C)	Liquidus (°C)	Tensile Strength (psi)	Shear Strength (psi)
Sn42 Bi58	-E-	138	8000	NA
Sn43 Pb43 Bi14	144	163	6120	NA
Sn62 Pb36 Ag2	179	189	6700	6250
Sn63 Pb37	-E-	183	6700	6060
Sn60 Pb40	183	191	6200	5680
Sn96.5 Ag3.0 Cu0.5	217	219	NA	NA
Sn96.3 Ag3.7	-E-	221	8900	4600
Sn100	MP	232	1800	2560
Sn95 Sb5	232	240	5900	6200
Sn95 Ag5	221	245	10100	8400
Sn10 Pb88 Ag2	268	290	4900	4300
Sn5 Pb92.5 Ag2.5	287	296	4210	2240
Sn10 Pb90	275	302	4600	3900
Sn5 Pb95	308	312	4190	3000

-E-: Eutectic MP: Melting Point □: Lead free

Alloy Selection

When choosing an alloy, the three most important factors are composition, solidus, and liquidus temperatures. Alloy **composition** affects joint strength, visual fillet quality, wetting, leaching, and suitability as a lead-free alternative.

The **solidus** is the temperature at which 100% of the alloy is in a solid crystalline form. Soldering begins upon reaching the solidus. The **liquidus** is the temperature at which 100% of the alloy is in a fluid, non-crystalline form. In the "**plastic range**", between the solidus and liquidus, some portion of the alloy is solid but the majority is liquid. Alloys are eutectic when the solidus and liquidus are equal.

Step soldering, multiple soldering processes at different temperatures, requires careful alloy selection. The peak reflow temperature for the lower temperature alloy must not reach the solidus of the higher temperature alloy.

Solder Powder Sizes

It is important to choose a solder alloy powder size that will meet your processing needs. To ensure the most consistent and robust process possible, pick the size recommended for the smallest solder feature in your application.

Powder Type	Size (microns)	Mesh Count	Dispense Dot Diameter (mm)	(inches)
II	75-45µ	-200+325	0.8	0.030
III	45-25µ	-325+500	0.5	0.020
IV	38-25µ	-400+500	0.3	0.012
V	25-20µ	-500+635	0.25	0.010
VI	15-5µ	NA	0.1	0.004

Flux Options

No-Clean (NC) flux consists of rosin, solvent, and a small amount of activator. NC flux has low activity and is suited to easily solderable surfaces. NC residue is clear, hard, non-corrosive, non-conductive, and designed to be left on your assembly. Residue may be removed with an appropriate solvent if so desired.

Rosin mildly activated (RMA) flux consists of rosin, solvent, and a small amount of activator. Most RMA flux is fairly low in activity and best suited to easily solderable surfaces. RMA flux residue is clear, soft, non-corrosive, and non-conductive. Cleaning is optional. Residue may be removed with an appropriate solvent if so desired.

Rosin activated (RA) flux consists of rosin, solvent, and aggressive activators. RA flux has higher activity than RMA for moderately oxidized surfaces. RA flux residue is corrosive and should be removed as soon as possible after reflow to prevent damage to your assembly. Maximum safe time before cleaning is product dependent. Residue may be removed with an appropriate solvent.

Water soluble (WS) flux consists of organic acids, thixotrope, and solvent. WS flux comes in a wide range of activity levels for soldering to even the most difficult surfaces. WS flux residue is corrosive and should be removed as soon as possible after reflow to avoid damage to your assembly. Maximum safe time before cleaning is product dependent. Residue may be removed with 60°C (140°F) water and 40 psi pressure.

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