



## **ECO SOLDER**

## **M-SERIE**

POLYMER BASE, SOLDER REPLACEMENT PASTE

- \* **EXCELLENT ELECTRICALLY CONDUCTIVE PROPERTIES**
  - \* **HARMLESS & SAFE TO USE (NO LEAD; NO CFC; NO VOC)**
  - \* **USES REGULAR ON LINE EQUIPMENT**
  - \* **STABLE TECHNOLOGICAL PROPERTIES.**
- 

### **GENERAL DESCRIPTIONS:**

AMEPOX MC product, trade name ECO-SOLDER™ represents new generation of single component, electrically conductive formulation designed for replacement of traditionally tin-lead solder pastes. Technology with our new ECO-SOLDER™ materials eliminates all type of solvents used for pre- or post-cleaning, like it is in conventional tin-lead solder technology.

One of the biggest advantages of ECO-SOLDER™ is, that it contains no lead or any other dangerous ingredients. It may be used with standard SMD stenciling (10/20 mil pitches with excellent resolution) or screen printing application. ECO-SOLDER™ doesn't dry out on open screens or stencils for up to 2 weeks and refrigeration during storage of this material is not necessary.

ECO-SOLDER™ has extremely short curing time (especially with IR heating tunnel) and quite pleasant odor. This is 100% solids formulation without any volatile thinners so, is no fear about safety conditions for work. CFC solvent's attack ozone layer in the stratosphere is widely known. Aqueous cleaning solvents usually contain alcohol such a methanol, ethanol or isopropyl which are VOC (volatile organic compounds). VOC's are photochemically active and cause smog and ozone in the lower atmosphere. The use of ECO-SOLDER™ requires no fluxes and therefore no solvent cleaning of the PCB is needed.

ECO-SOLDER™ contains very pure (electronic grade) silver, so their material cost is higher than ordinary tin-lead pastes. However, when will be account total manufacturing costs – many savings can be realized:

- REDUCED WASTE due to very long working life (pot life), even on open screens or stencils,
- LESS EQUIPMENT is required for manufacturing due to reduced process steps,
- LESS FLOORSPACE is required due to reduction of process steps & equipment,
- LESS WORKING CAPITAL is required,
- LESS MATERIAL CONSUMPTION due to ECO-SOLDER™ lower specific gravity,
- FEWER ENVIRONMENTAL COMPLIANCE FINES due to elimination of CFC's,
- SHORTER MANUFACTURING TIME,
- REDUCED LIABILITY, etc.

## SPECIFICATIONS:

The values listed below are averages and they are not intended for exact specification purpose. Pls, contact AMEPX MC when establishing specifications.

<b>SPECIFICATION</b>	<b>E-S AX20</b>	<b>E-S AX65MN</b>	<b>E-S AX70MN</b>
Number of Components	<b>one</b> epoxy base	<b>one</b> epoxy-phenolic hybrid resin base	<b>one</b> epoxy-phenolic hybrid resin base
Consistency	<b>medium/high viscosity</b>	<b>medium visc.</b>	<b>medium viscosity</b>
Viscosity* [mPas]	<b>650 – 750 k</b>	<b>245 – 265 k</b>	<b>530 – 560 k</b>
Thixotrophy index**	<b>3.8 – 4.5</b>	-	-
Curing Schedule***	<b>150°C – 10 min.</b>	<b>180°C - 10min. 200°C - 4min.</b>	<b>180°C - 10min. 200°C - 4min.</b>
Curing Schedule****	<b>150°C – 5 min.</b>	<b>200°C – 4 min.</b>	<b>200°C – 4 min.</b>
Working Life *****	<b>1 working day</b>	<b>2 weeks</b>	<b>2 weeks</b>
Percentage of Silver	<b>75%</b>	<b>65%</b>	<b>70%</b>
Method of Applications	<b>screen, stencil</b>	<b>screen</b>	<b>screen, stencil</b>

Attn: \* - BROOKFIELD STD. DVII; SSA#14; 1rpm;25C.

\*\* - Ti= 1rpm/10rpm

\*\*\* - Curing conditions inside air circulated oven.

\*\*\*\* - Heating Tunnel (IR+hot plate); Temp. is max. in peak, and total time inside tunnel.

\*\*\*\*\* - On open surface of screen, stencil or inside open jar (at 25C temp.).

## PHYSICAL PROPERTIES (\*):

<b>PROPERTIES</b>	<b>E-S AX20</b>	<b>E-S AX65MN</b>	<b>E-S AX70MN</b>
<b>Specific gravity</b> (1)	<b>3.5 – 3.7 g/cm<sup>3</sup></b>	<b>2.1 – 2.4 g/cm<sup>3</sup></b>	<b>2.1 – 2.4 g/cm<sup>3</sup></b>
<b>Tensile Shear Strength</b> (2)	<b>1500 psi (77.3 kG/cm<sup>2</sup>)</b>	<b>1600 psi (82.5 kG/cm<sup>2</sup>)</b>	<b>1400 psi (72.1 kG/cm<sup>2</sup>)</b>
<b>Stud Pull Test</b> (3)	<b>35 lb. (16 kg)</b>	<b>32 LB. (15 kg)</b>	<b>28 LB. (12.8 kg)</b>
<b>Weight Loss</b> (300°C)	<b>1.6%</b>	<b>1.7%</b>	<b>1.6%</b>
<b>Thermal Conductivit.</b> (4)	<b>2.5 W/mK</b>	<b>2.2 W/mK</b>	<b>2.3 W/mK</b>
<b>Glass Trans. Temp.</b>	<b>90°C</b>	<b>93°C</b>	<b>93°C</b>
<b>Electrical Resistivity</b> (5)	<b>0.0003 Ωcm</b>	<b>0.0045 Ωcm</b>	<b>0.0002 Ωcm</b>

(\*) - Typical value for number of tests.

Attention:

- (1) – ERF 3-82
- (2) – ERF 15-82 (ASTM D 1002)
- (3) – ERF 28-82 (ASTM D 570)
- (4) – ERF 22-69
- (5) – ASTM D 257

*In most cases, STM (Standard Test Methods) and ERF (Epoxy Resin Formulators Division of the Society of Plastics Industries) are the same tests.*

*Shelf life for all these formulations is ab. 12 months at room temperature in closed containers. Refrigeration is not necessary.*

For better knowledge these new products, please look on showed the next graphs and analyze it.

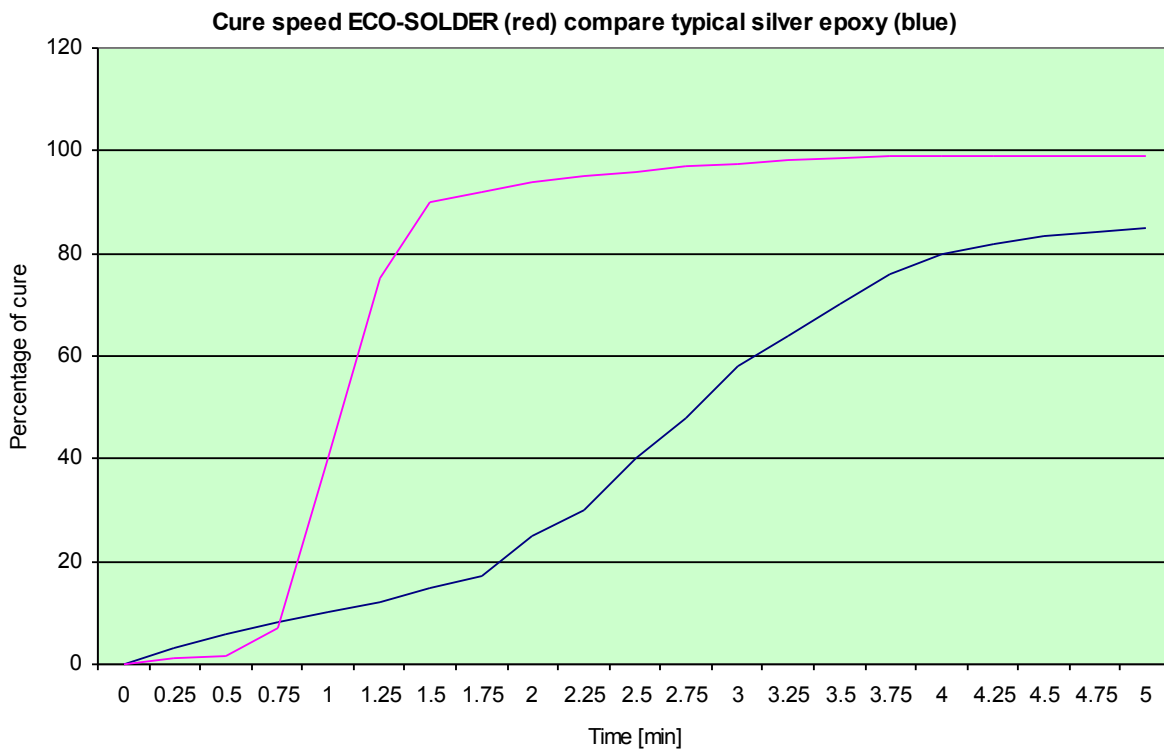


Fig.1.

As you can see from graph (Fig.1), is very big difference between curing mechanism both types of formulations – normal, silver – epoxy type (like E-S AX20), and special prepared for ECO-SOLDER's™ purpose, epoxy-phenolic “hybrid” type resin. This resin special feature is rapidly curing process after passing some critical temperature. This critical temperature activate “hybrid” resin molecules in present of catalyzes and crosslinking is very quick – during next several seconds.

From that reason, is very important to adjust curing ramp of tunnel oven in proper way. This mean that for start increasing of temperature should cover speed of heating accumulation by PCB, and after this during next minutes temperature should activate curing process very quick.

Please, treat this graph (Fig.2) like advice only. You should adjust your own curing ramp, depend on your PCB dimensions

Typical temperature profile for IR&Hot Plate Tunnel oven

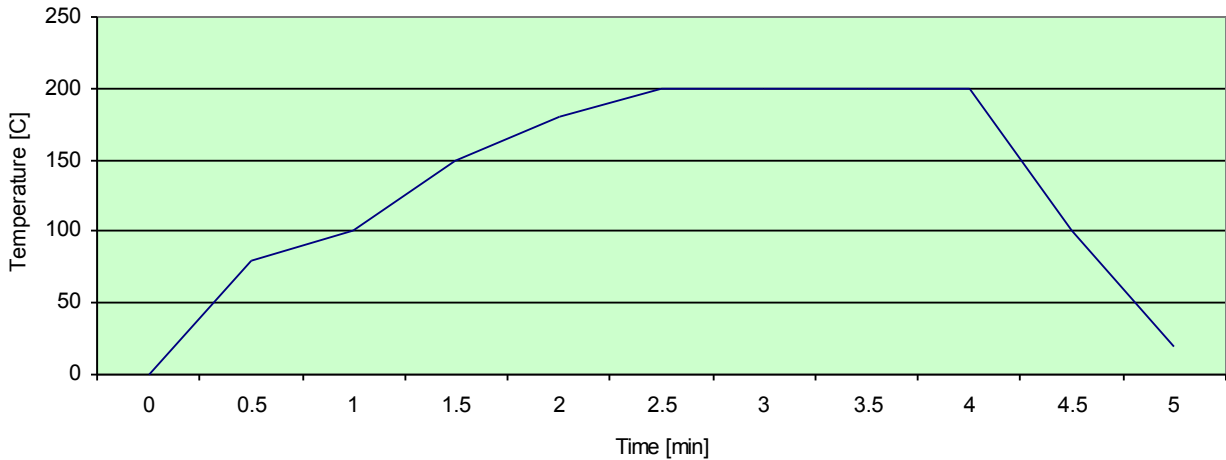


Fig.2.

For better illustrating problem of heating accumulation by ECO-SOLDER's™, and influence of this process on curing mechanism and final electrical and mechanical connection properties, please look and analyze next graphs (see Fig.3.). Those graphs will show how is temperature difference inside of ECO-SOLDER™ and outside of this material when air circulating oven and tunnel oven were applied.

**Temp.=f(time):**

(a) inside material (blue), (b) outside (red) -curing w ith circulation oven;  
(c) inside material (yellow ), outside material (green) - curing w ith heating tunnel.

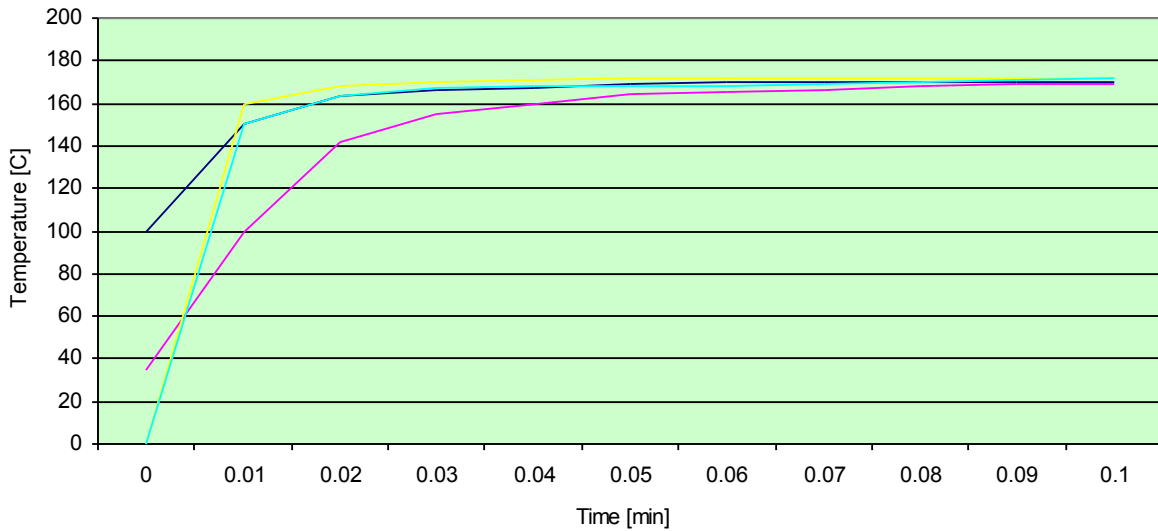


Fig.3.

For more information please contact Amepox MICROelectronics asap. We will be happy cooperate with you for solving all your technical problems.

**ATTENTION:**

1. Product is ready for use, but should be mixed very thoroughly before use using wood or plastic spatula only. Mix smoothly from the bottom of the container. Mix carefully - not to whip air into the

product. ***INSURE ECO-SOLDER's IS AT ROOM TEMPERATURE WHEN YOU WILL START WORKING WITH.***

2. Prepare consistency before use according your SPECIFICATION.
3. If you need, use AXMC **TH E-S** thinner. Thinner will change paste resistivity. Pls, do not exceed 1% of weight. After first tests pls let us know about your viscosity requirements – we will be able to change it for you.
4. Low conductivity and poor adhesion performance are symptomatic that paste is under curing conditions.
5. Refrigeration during shelf time is useful. Keep container with lacquer in temp. no less 10 C. Before use, increase paste temperature very slowly.
6. Use paste with adequate ventilation.
7. Avoid skin and eye contact. If ingested, consult a physician immediately.
8. Clean by MEK or other suitable solvents. Allow screen to completely dry before using again.

This information is based on data and tests believed to be accurate. **AMEPOX MC** makes no warranties ( expressed or implied ) as to its accuracy and assumes no liability in connection with the use or inability to use this product.

( el-ecosolder-MCS )