

ALPHA[®] ECOSOL SOLDER ALLOY

Low Melt Point, Pb-Free Solder Alloy for PV Ribbon

DESCRIPTION

From the world's leading manufacturer of electronic grade solder materials comes ALPHA EcoSol, the industry's first Low Melt Point, Pb-free Solder Alloy designed specifically for PV Ribbon Tinning and cSi Module Assembly. ALPHA EcoSol is also low cost, priced well below conventional Pb-free solders, closer to the price of standard Sn60Pb40 solder. The low melt point means it has a liquidus temperature near Sn60Pb40 and above conventional lamination temperatures. It can generally be "dropped in" to most current assembly processes. ALPHA EcoSol has mechanical, electrical and thermal conductivity properties considered acceptable to PV Module Assemblers and passes IEC-61215 and 61730 reliability requirements.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

Features:

- Low Cost – Over 30% below the price of most other Pb-Free alloys
- Low Melt Point relative to other popular Pb-free alloys
- Exhibits Mechanical Reliability, Soldering and Electrical Conductivity performance deemed acceptable to PV Module Assemblers and Industry Standards (IEC-61215 and 61730)

Benefits:

- Low price supports transitioning to Pb-free without incurring substantially higher solder costs
- Has a liquidus temperature near Sn60Pb40 solder and above conventional lamination temperatures. This, combined with excellent wetting characteristics, means ALPHA EcoSol can generally be "dropped in" to most current cSi module assembly processes with no change in throughput.
- High mechanical strength ensures long module service life
- High conductivity means no module power loss after transitioning to ALPHA EcoSol

APPLICATION GUIDELINES

ALPHA EcoSol is designed to be used as a solder coating over a copper core to make the PV Ribbon that is used in cSi solar module assembly. With a liquidus temperature of ~179 °C and excellent soldering characteristics, ALPHA EcoSol can be used as a “drop-in” replacement for many of the popular Pb bearing alloys used today (i.e., Sn60Pb40, Sn62Pb38Ag2, etc...). A solder pot temperature of ≥ 235 °C is recommended for tinning of the copper. In its molten state, ALPHA EcoSol has been found to wet to a clean copper ribbon at the same rate as other popular alloys in high speed dipping / tinning processes. It forms a strong intermetallic bond to copper and ultimately to the Ag busbar of the solar cell ensuring a highly reliable and electrically conductive connection. ALPHA EcoSol can be plated at different thicknesses depending on the requirement and forms a clean and uniform surface finish that resists corrosion and oxidation after exposure to common fluxes and during the normal service life of the solar module.

TECHNICAL DATA

Complies with all requirements of RoHS Directive (Article 4.1 of the European Directive 2011/65/EU). Alloy specification for Maximum Lead (Pb) Content = **0.05%**

Material Property	Units	EcoSol
Liquidus	Celsius	179.7
Hardness	HV	23
Density	g/cm ³	8.14
Specific Heat Capacity	J/gK	0.174
Thermal Diffusivity	mm ² /s	20.2
Tensile Strength	MPa	240.5
Tensile Strain	%	6.5
Yield Strength	MPa	69.3
Elongation	%	29
Wetting Speed	t ₀ (sec)	1.15
Wetting Force	F _{max} (m)	4.3
JIS Spread Testing	S _R %	73.5
Copper Erosion Rate	Time (min)	16.5*
Silver Erosion Rate	Time (sec)	28**

* This is an indication of how fast the molten solder may erode copper during the PV ribbon tinning process. 2x better than silver (Ag) bearing Pb-free alloys

**This is an indication of how fast PV ribbon coated with ALPHA EcoSol may consume the silver plated busbar during the tabbing and stringing process.

AVAILABILITY

ALPHA EcoSol is available worldwide in Bars, Ingots, and Chunks.

RECYCLING SERVICES

We provide safe and efficient recycling services to help companies meet their environmental and legislative requirements and at the same time, maximize the value of their waste streams. Our service collects solder dross, solder scrap, and various forms of solder paste waste. Please contact your local sales representative for recycling capabilities in your area or [link here](#).



SAFETY & WARNING

It is recommended that the company/operator read and review the Safety Data Sheets for the appropriate health and safety warnings before use. **Safety Data Sheets are available at MacdermidAlpha.com/assembly-solutions/knowledge-base.**

STORAGE

Store the solder bar in a cool, dry, and non-corrosive environment. Wrap up the solder bar when not in use to reduce exposure to environment.

CONTACT INFORMATION

To confirm this document is the most recent version, please contact Assembly@MacDermidAlpha.com

www.macdermidalpha.com

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Also read carefully warning and safety information on the Safety Data Sheet. This data sheet contains technical information required for safe and economical operation of this product. READ IT THOROUGHLY PRIOR TO PRODUCT USE. Emergency safety directory assistance: US 1 202 464 2554, Europe + 44 1235 239 670, Asia + 65 3158 1074, Brazil 0800 707 7022 and 0800 172 020, Mexico 01800 002 1400 and (55) 5559 1588

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