

ALPHA[®] ECOSOL PLUS SOLDER ALLOY

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

DESCRIPTION

ALPHA EcoSol Plus is a Low Melting Point, Pb-free Solder Alloy designed specifically for PV Ribbon Tinning and cSi Module Assembly formulated from the world's leading manufacturer of electronic grade solder materials. **ALPHA EcoSol Plus** is a low cost, priced well below conventional Pb-free solders, closer to the price of standard Sn60Pb40 solder. The low melt point has a liquidus temperature near Sn60Pb40 and above conventional lamination temperatures. It can generally be a "dropped in" to most current assembly processes. **ALPHA EcoSol Plus** has mechanical, electrical and thermal conductivity properties that meet the PV Module Assemblers requirement. **ALPHA EcoSol Plus** also exhibits a supreme creep strength thus resulting to longer fatigue life and more reliable solder joints compared with standard **ALPHA EcoSol**.

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

Benefits:

- No worries on price hike supports transitioning to Pb-free without incurring substantially higher solder costs
- Liquidus temperature near Sn60Pb40 solder and above conventional lamination temperatures.
- Excellent wetting characteristics on CSI module assembly processes with comparable throughput.
- High mechanical strength ensures long module service life
- High conductivity with minimum module power loss

APPLICATION GUIDELINES

ALPHA EcoSol Plus 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. It has a liquidus temperature of ~179°C and excellent soldering characteristics, ALPHA EcoSol Plus 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 ribbon or wire.

In its molten state, ALPHA EcoSol Plus wets onto clean copper ribbon or wire at the similar 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. This will ensure a highly reliable and electrically conductive connection. ALPHA EcoSol Plus 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 Plus |
|------------------------|----------------------|-------------|
| Liquidus | Celsius | 179.3 |
| Hardness | HV | 24.2 |
| Density | g/cm ³ | 8.06 |
| Specific Heat Capacity | J/gK | 0.174 |
| Thermal Diffusivity | mm ² /s | 20.2 |
| Tensile Strength | MPa | 73.9 |
| Tensile Strain | % | 6.0 |
| Yield Strength | MPa | 59.8 |
| Elongation | % | 44.5 |
| Creep Rupture Time | hrs | 23.7 |
| Creep Elongation | % | 71.3 |
| Wetting Speed | t ₀ (sec) | 1.03 |
| Wetting Force | F _{max} (m) | 4.2 |
| JIS Spread Testing | SR% | 76.26 |

| Material Property | Units | EcoSol Plus |
|---------------------|------------|-------------|
| Copper Erosion Rate | Time (min) | 8.3* |
| Silver Erosion Rate | Time (sec) | 35.5** |

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

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

AVAILABILITY

ALPHA EcoSol Plus 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
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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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