



TECHNICAL DATA SHEET

*ELECTRA-D'OR*TM

ED5000 SERIES

CARBON CONDUCTOR PASTES FOR RIGID
CIRCUIT BOARDS

PRODUCT DESCRIPTION

The ***ELECTRA-D'OR* ED5000** range of screenprintable conductive carbon filled polymer pastes are designed for the protection of copper contacts or for printing conductive tracks. They are intended to eliminate the problems and costs associated with selective nickel/gold electroplating whilst maintaining a corrosion free conductive surface. They can also be used for printing crossover linkages on circuit boards as an alternative to jumper wires or through hole plating.

The ***ELECTRA-D'OR* ED5000** range provides a corrosion resistance comparable to gold, a hard durable surface to withstand many insertions and contacts, as well as the commonly used soldering operations such as wave soldering, IR reflow and hot air solder levelling.

FEATURES & ADVANTAGES:

- **Economical.** **ED5000** carbon pastes are an economical alternative to expensive processes such as Gold or through hole plating and materials such as silver filled polymer pastes.
- **Highly Conductive.** **ED5000** carbon pastes have a typical sheet resistance of 10-25Ω□⁻¹. When printed as a key contact typical resistance value is less than 5Ω per contact
- **Wear Resistance.** **ED5000** carbon pastes will withstand more than 1 million hits with 200g force.
- **Crossovers.** **ED5000** carbon pastes are suitable for printing crossover connections on circuit boards, eliminating the need for jumper wires or through hole plating.
- **Corrosion Resistant.** **ED5000** carbon pastes withstand fluxes associated with wave- soldering or hot air solder levelling without softening or loss of adhesion and does not require protection before soldering.

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Page 1 of 5

CARAPACE

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PRODUCT RANGE

ED5000: Maximum carbon loading for maximum conductivity. Can be cured at temperatures down to 120°C.

ED5020: Improved screen stability and surface hardness. Minimum resistance change on soldering or overprinting with peelable mask. Cure temp 150°C

PROCESSING

Viscosity adjustment:

Viscosity may be adjusted using **Electra-reducer ER7**. No more than 5% reducer should be added or deterioration of printing and curing properties may occur.

Important: Before making additions of reducer, the paste should be thoroughly stirred to ensure it's structure is fully broken down.

Board surface preparation:

Copper surfaces should be brushed or chemically cleaned to give a waterbreak-free surface. Failure to observe this precaution may lead to loss of adhesion or increased electrical resistance.

All surfaces should be completely dry before printing.

Printing:

The following factors all influence the quality of the print obtained:

- **Screen mesh: % opening, mesh type (S.T.HD) and material (stainless steel or polyester)**
- **Stencil type and thickness.**
- **Squeegee: hardness, sharpness, blade shape, angle and speed of print stroke.**
- **Snap off distance.**

For printing on conventional boards, a 77T polyester mesh with an 18 - 25 micron capillary type stencil and a squeegee hardness of 70 to 80° Shore has been found to give good results. If a thicker deposit is required for PTH boards, then coarser meshes down to 55T may be used. In this case it may also be necessary to use a thicker stencil.

Owing to the thixotropic nature of these materials it may be necessary to increase the squeegee and flood coat speeds to ensure consistent printing results. It may also be advantageous to use a:

FLOOD → PRINT → CHANGE cycle, rather than a **PRINT → FLOOD → CHANGE** cycle.



When printing **ELECTRA²D'OR 5000** carbon pastes as protective coatings for keyboard contacts it is preferable to make the screen image slightly wider than the tracks it is being printed over. This ensures that the copper track is completely encapsulated by the carbon paste, and so provides complete protection against solder pick-up and/or corrosion.

Care should be taken when overprinting keyboard contacts where 1:1 registration has been achieved by the use of photoimageable soldermask that the carbon paste does not “bridge” and form a skin between the copper and the edge of the soldermask leaving a void of entrapped air under the carbon. Failure to observe this precaution may result in loss of adhesion during subsequent soldering operations due to expansion of the entrapped air.

Curing:

ED5000 carbon pastes may be cured in a convection oven or by using IR radiation. The curing temperature required depends on the product used. Typical convection oven cure schedules are given below.

ED5000, 30 to 60 mins at 120°C
15 to 30 mins at 150°C

Note: DO NOT LET BOARD TEMPERATURE EXCEED 180°C with ED5000

ED5020: 30 - 60 mins at 150°C.

The conductivity achieved will depend on the cure time and temperature used.

Higher cure temperatures and longer times will generally result in higher conductivity/lower resistivity..

Important: IR curing is the most efficient method of curing carbon inks, however resistance values and cure speeds will be dependent on IR wavelength and intensity, please contact Electra technical service department for recommendations.

EFFECT OF PEELABLE

Overprinting with **Electramask EM55 PEELABLE RESISTS** will normally result in little or no change in the resistance value of the carbon conductor when fully cured .

Other peelable resists may have adverse effects on the conductivity.

STORAGE: Store at between 10°C - 25°C in a dry store. Avoid subjecting containers to temperatures below 5°C because of risk of splitting.

SHELF LIFE:

Minimum 6 months from date of manufacture when stored in cool dry conditions.

Important: Shelf life of product will be increased by storing ED5000 under refrigeration. Material from the screen should not be mixed with fresh ED5000. Instead it should be put in to a separate container, have it's viscosity reduced with ER7 (if necessary) ready for re-use.



CLEANING:

Screens and equipment should be cleaned using Universal Screenwash SW100.

FINAL PROPERTIES:

- Adhesion:** Passes IPC SM 840 Cross Hatch Test.
- Wear Resistance:** Withstands more than 1 million contacts with 200g force.
- Temp. Cycling:** No loss of conductivity or adhesion.
- Thermal shock:** No loss of conductivity or adhesion.
- Solder Resistance:** Will withstand wave soldering and hot air solder levelling without protection with no loss of adhesion and minimal resistance change.

Electrical properties:

	<u>Cure temp.</u>	<u>Surface resistivity</u>
ED5000:	120°C	15Ω□ ⁻¹
	150°C	12Ω□ ⁻¹
ED5020:	150°C	20Ω□ ⁻¹

Contact resistance depends on geometry of pad design but is typically less than 5 Ohms per contact. Voltage drop at 100mA would be somewhat less than 500mV.

Humidity Resistance

	Change in resistance after 7 days @ 40°C, 95% RH		
	30' @ 120°C	30' @ 150°C	IR cure
ED5000	-6%	+5%	+7%
ED5020	+4%	+2%	+6%



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Page 5 of 5

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