



ESL ELECTROSCIENCE

CERAMIC TAPES &
THICK-FILM MATERIALS

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SOLAR CELL SILVER PASTE

9987-A

Cadmium-Free, Low-Lead Photovoltaic Material

ESL 9987-A is a cadmium-free, low-lead silver paste developed for use as a front-side metallization in photovoltaic applications. The 9987-A provides high efficiency and high fill factor on single crystal and polycrystalline silicon solar cells. ESL 9987-A can be processed on solar cells, using a fire-through process, with silicon nitride or titanium dioxide anti-reflection coating. The 9987-A is designed for an emitter sheet resistivity of 40-65 ohms/square.

The recommended materials to be used in conjunction with the 9987-A are 9920 Series back-surface silver and 2590 Series back-surface aluminum metallizations.

PASTE DATA

RHEOLOGY:	Thixotropic, screen printable paste
VISCOSITY: (Brookfield HBT, CP-51 Spindle, Shear Rate 9.6 sec^{-1} , $25.0 \pm 0.2^\circ\text{C}$)	120 \pm 30 Pa·s
SHELF LIFE: (25°C)	6 months

PROCESSING

SCREEN MESH/EMULSION:	280-325/15-30 μm
LEVELING TIME: (25°C)	5-10 minutes
DRYING SET POINT:	200-300°C
DRYING TIME:	\leq 3-4 seconds
FURNACE SET POINT:	840-910°C
TIME ABOVE 600°C:	typically 5-8 seconds
THINNER:	ESL 401

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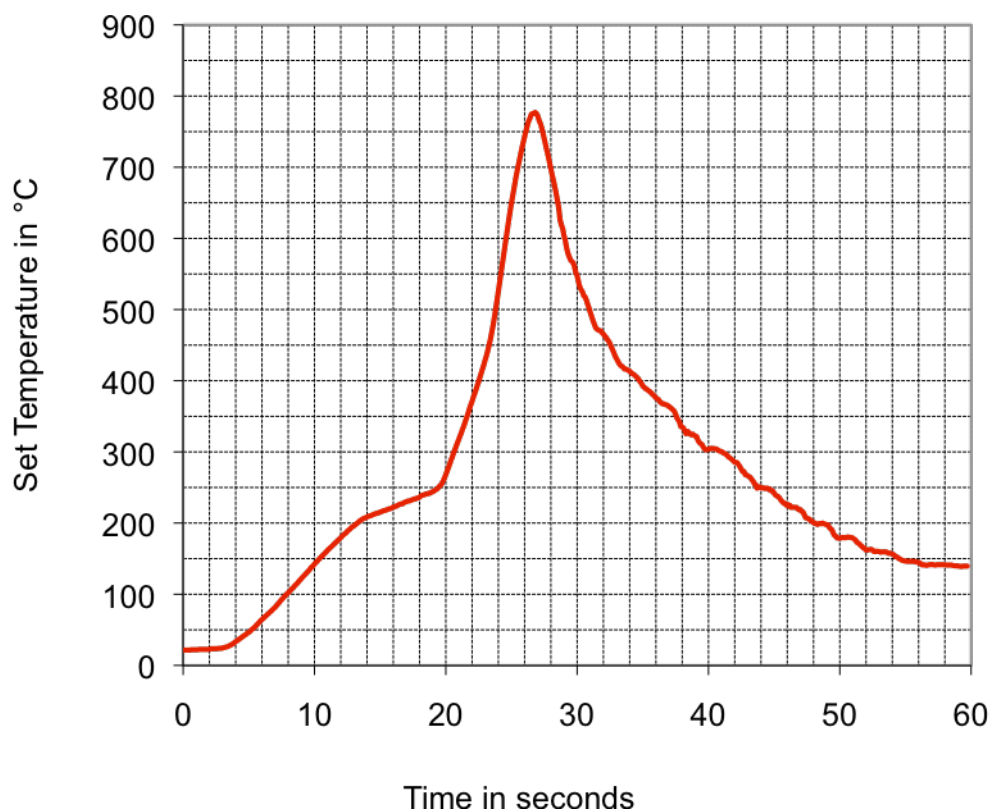
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See Caution and Disclaimer on other side.

TYPICAL PROPERTIES

FIRED THICKNESS:	12-18 μm
RESISTIVITY (at 25 μm thickness):	$\leq 2.0 \text{ m}\Omega/\text{sq.}$
PRINTING RESOLUTION (Line):	100 μm - 125 μm
SOLDERABILITY (tin-silver solder):	excellent

TYPICAL FIRING PROFILE



Furnace: SierraTherm-5 zone IR with 25 cm peak firing zone

Belt speed: 470 cm/min.

Measured using Datapaq Q18 & type K thermocouple, exposed bead, 1mm sheath

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CAUTION: Proper industrial safety precautions should be exercised in using these products. Use with adequate ventilation. Avoid prolonged contact with skin or inhalation of any vapors emitted during use or heating of these compositions. The use of safety eye goggles, gloves or hand protection creams is recommended. Wash hands or skin thoroughly with soap and water after using these products. Do not eat or smoke in areas where these materials are used. Refer to appropriate MSDS sheet.

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