ESL ELECTROSCIENCE
CERAMIC TAPES & THICK-FILM MATERIALS
416 EAST CHURCH ROAD
KING OF PRUSSIA, PA 19406-2625, U.S.A
T: 610-272-8000
F: 610-272-6759
www.electroscience.com

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 aluminium metallizations.

PASTE DATA

Rheology:	Thixotropic screen-printable paste
Viscosity: (Brookfield HBT, Shear rate 9.6 sec^{-1}, CP-51 Spindle, 25.0 ± 0.2 °C)	120 ± 30 Pa.s
Shelf Life (20 - 25 °C):	6 months

PROCESSING

Screen Mesh, Emulsion:	280 - 325 S/S, 15 - 30 µm
Levelling Time (at 20 °C):	5 - 10 min
Drying Set Point:	200 - 300 °C
Drying Time:	≤ 3 - 4 sec
Furnace Set Point:	840 - 910 °C
Time above 600 °C:	typically 5 - 8 sec
Thinner:	ESL 401

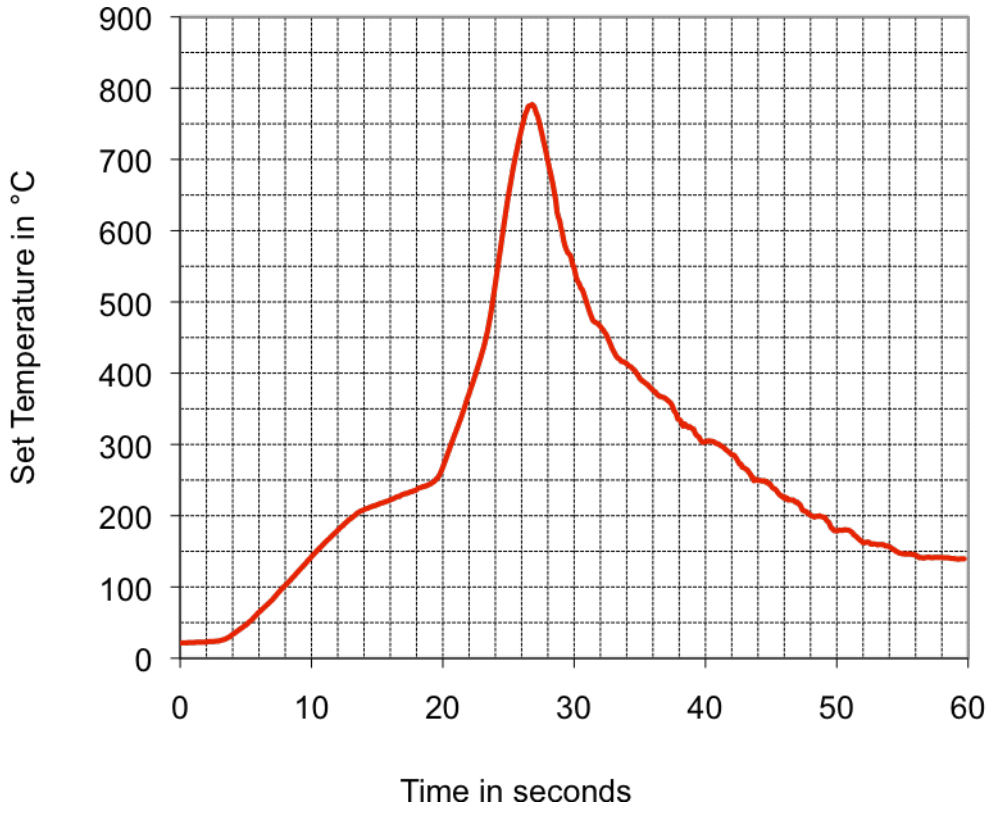
ESL Affiliates
ESL Europe (Agmet Ltd) • 8 Commercial Road • Reading • Berkshire • England • RG2 0QZ • Tel: +44 (0) 118 918 2400 • Fax: +44 (0) 118 986 7331 • Sales@ESLEurope.co.uk
ESL Nippon • Sukegawa Bldg. • 6th floor • 3-4 Yanagibashi 1-chome • Taito-ku • Tokyo 111, Japan • Tel: +81-3-3864-8521 • Fax: +81-3-3864-9270 • Sales@ESL-Nippon.co.jp
ESL China • Room #1707, Tower A, City Center of Shanghai • 100 Zunyi Road • Shanghai, China 200051 • Tel: +86-21-6237-0336 and 0337 • Fax: +86-21-6237-0338 ESLChina@eslshanghai.net

See Caution and Disclaimer on page 2.

TYPICAL PROPERTIES

Fired Thickness:	12 - 18 µm
Resistivity: (at 25 µm fired thickness)	≤2 mΩ/sq.
Printing Resolution: (line/space)	0.100 mm / 0.125 mm
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

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 vapours 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.

DISCLAIMER: The product information and recommendations contained herein are based on data obtained by tests we believe to be accurate, but the accuracy and completeness thereof is not guaranteed. No warranty is expressed or implied regarding the accuracy of these data, the results obtained from the use hereof, or that any such use will not infringe any patent. ElectroScience assumes no liability for any injury, loss, or damage, direct or consequential, arising out of its use by others. This information is furnished upon the condition that the person receiving it shall make his own tests to determine the suitability thereof for his particular use, before using it. User assumes all risk and liability whatsoever in connection with his intended use. ElectroScience's only obligation shall be to replace such quantity of the product proved defective.