



## ESL ELECTRO-SCIENCE

CERAMIC TAPES &  
THICK-FILM MATERIALS

416 EAST CHURCH ROAD  
KING OF PRUSSIA, PA 19406-2625 USA

T: 610.272.8000  
F: 610.272.6759

[www.electroscience.com](http://www.electroscience.com)

# SOLAR CELL BACK-SURFACE TABBING SILVER

# 9924

## Cd-Free, Low-Lead Photovoltaic Conductor

### APPLICATION

ESL 9924 is a **pure silver** paste intended for the back-surface solderable metallization of monocrystalline and polycrystalline silicon solar cells. The 9924 paste contains a Cd-free, low-lead glass developed to provide excellent ohmic contact, high adhesion, and excellent solderability with both leaded and lead-free solder compositions. This paste is specially formulated for applications requiring a pure silver composition.

This material is designed to provide the highest coverage and excellent electrical performance over a wide range of processing conditions.

### PRODUCT FEATURES

- Pure silver paste
- Low-lead and cadmium-free
- Highest efficiency
- Highest coverage
- High adhesion
- Good solder wetting

### PASTE PROPERTIES

<b>Rheology:</b>	Thixotropic, screen-printable paste
<b>Viscosity</b> <sup>1</sup> (Brookfield RVT/ABZ, 10 rpm, 25.0°C – 26.0°C):	110 ± 30 Pa·s
<b>Solids:</b>	68.5 ± 1.5 %
<b>Shelf life:</b>	6 months
<b>FOG:</b>	< 10 µm

#### 9924 1105-New

#### ESL Affiliates

ESL China • Rm#1707, Tower A • City Center of Shanghai • 100 Zunyi Road • Shanghai, China 20005 • Tel: (011-86)-21-62370336 • Fax: (011-86)-21-62370338 • [esichina@esishanghai.net](mailto:esichina@esishanghai.net)

ESL Europe • 8 Commercial Road • Reading, Berkshire, England RG2 0QZ • Tel: (011-44)-118-918-2400 • Fax: (011-44)-118-986-7331 • [Sales@ESLEurope.co.uk](mailto:Sales@ESLEurope.co.uk)

ESL Nippon • Sukegawa Bldg • 6<sup>th</sup> floor • 3-4 Yanagibashi 1-chome • Taito-ku • Tokyo 111, Japan • Tel: (011-81)-3-3864-8521 • Fax: (011-81)-3-3864-9270 • [Sales@ESL-Nippon.co.jp](mailto:Sales@ESL-Nippon.co.jp)

See Caution and Disclaimer on other side.

## PROCESSING GUIDE

<b>Screen mesh/emulsion:</b>	180 - 325 mesh, 5 - 25 $\mu\text{m}$ emulsion
<b>Leveling time:</b>	5 - 10 minutes
<b>Drying time @ 125-150°C (box oven):</b>	10 - 15 minutes
<b>Drying time @ 220-300°C (IR furnace):</b>	< 60 seconds
<b>Dried thickness:</b>	10 - 15 $\mu\text{m}$
<b>Firing temperature (IR furnace set point):</b>	840 - 910°C
<b>Time above 600°C (IR furnace actual temperature):</b>	typically 5-8 seconds
<b>Fired thickness:</b>	7 - 11 $\mu\text{m}$
<b>Resistivity:</b>	< 3 m $\Omega$ /square
<b>Recommended thinner</b>	ESL 401, ESL 413

<sup>1</sup> The 9924 paste is manufactured within a viscosity range compatible with most solar cell printing processes. If a different viscosity is desired, please contact ESL Technical Services for assistance.

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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.

**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 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. Electro-Science assumes no liability for any injury, loss, or damage consequential arising out of its use by others. This information is furnished upon the condition that the person receiving it shall make their own tests to determine the suitability thereof for their particular use, but User assumes all risk and liability whatsoever in connection with their intended use. Electro-Science's only obligation shall be to replace such quantity of the product proved defective.

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