



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

# CAPACITOR DIELECTRIC

# 4100 Series

## Capacitor Dielectric Pastes with Dielectric Constants Between 20 and 300

ESL 4100 Series is a group of thick film dielectrics developed for firing at 930°C to 980°C and exhibits the excellent properties as shown below. The hermetic nature of this capacitor dielectric series provides excellent performance on moisture testing. Laser trimming of capacitors made with these pastes can be performed for adjustment of value, with subsequent overglazing. Chip capacitors, capacitor arrays, delay lines, RC networks, etc., of superior quality can be made at significant cost saving over discreet monolithic chip capacitors. These materials meet the characteristics of X7R.

### PASTE DATA

#### Rheology:

Thixotropic, screen-printable paste

#### Viscosity:

(Brookfield RVT, 10 rpm,  
ABZ spindle, 25.5 ± 0.5 °C)

4113	250 ± 50 Pa.s
4113-H	250 ± 50 Pa.s
4114	250 ± 50 Pa.s
4115	250 ± 50 Pa.s
4117	350 ± 50 Pa.s

#### Colour:

Yellow - Green

#### Shelf Life (20 - 25 °C):

6 months

### PROCESSING

#### Screen Mesh, Emulsion:

200 - 325, 37.5 µm

#### Levelling Time (at 20°C):

5 - 10 min

#### Drying Time (at 125°C):

10 - 15 min

#### Firing Temperature Range:

930 - 980°C (in air)

#### Optimum:

980°C

#### Time at peak:

10 - 15 min

#### Substrate for Calibration:

96% alumina

#### Thinner:

ESL 401

ESL Europe (KOP) 4100 Series 0304-A

#### 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. • 6<sup>th</sup> 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 other side.

## TYPICAL PROPERTIES

	<u>4113</u>	<u>4113-H</u>	<u>4114</u>	<u>4115</u>	<u>4117</u>
<b>Fired Thickness:</b> (µm)	38 - 50	38 - 50	38 - 50	38 - 50	38 - 50
<b>Dielectric Constant:</b> (1 kHz, 25°C), K	90 -130	120 - 160	40 - 60	15 - 25	270 - 330
<b>Dissipation Factor:</b> (1 kHz, 25°C), %	≤ 0.50	≤ 1.00	≤ 1.00	≤ 1.00	≤ 1.50
<b>Insulation Resistance:</b> (100 V DC), Ω	≥ 10 <sup>10</sup>	≥ 10 <sup>10</sup>	≥ 10 <sup>10</sup>	≥ 10 <sup>10</sup>	≥ 10 <sup>10</sup>
<b>Breakdown Voltage:</b> (25°C in air), V/25 µm	≥ 300	≥ 300	≥ 600	≥ 1000	≥ 500
<b>Finish:</b>	Matte	Matte	Matte	Matte	Matte
<b>ESL Conductor:</b>	9635-B	9638	9635-B	9635-B	9638

ESL Europe (KOP) 4100 Series 0304-A

**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.