



# Electro-Science Laboratories, Inc.

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## 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, ABZ Spindle, 10 rpm, 25.5°C±0.5°C)

<b>4113</b>	250±25 Pa·s
<b>4113-H</b>	250±25 Pa·s
<b>4114</b>	250±25 Pa·s
<b>4115</b>	250±25 Pa·s
<b>4117</b>	350±50 Pa·s

##### COLOR:

Yellow-Green

##### SHELF LIFE: (25°C)

6 months

#### PROCESSING

##### SCREEN MESH/EMULSION:

200-325/37.5  $\mu$ m

##### LEVELING TIME:

5-10 minutes

4100 Series 0304-A

#### ESL Affiliates

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<b>DRYING AT 125°C:</b>	10-15 minutes
<b>FIRING TEMPERATURE RANGE:</b>	930°C-980°C
<b>OPTIMUM:</b>	980°C
<b>TIME AT PEAK:</b>	10-15 minutes
<b>SUBSTRATE FOR CALIBRATION:</b>	96% alumina
<b>THINNER:</b>	ESL 401

## TYPICAL PROPERTIES

	<u>4113</u>	<u>4113-H</u>	<u>4114</u>	<u>4115</u>	<u>4117</u>
<b>FIRED THICKNESS:</b> (□m)	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), □	≥ 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 □m	≥ 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

### 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 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 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. Electro-Science 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 their own tests to determine the suitability thereof for their particular use, before using it. 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.