

## Dielectrics

### IP 9117 E

#### Multilayer Dielectric/DPIS\*

##### \* Development Product Information Sheet

##### Description:

IP 9117 E is a permanent-blue 850°C firing dielectric composition, displaying the following advantages :

- Expansion coefficient is closely matched with that of alumina, to provide for minimal substrate bowing
- Extremely dense, hermetic fired film allows for excellent electrical performance at a fired thickness of  $\geq 40 \mu\text{m}$
- Excellent solderability and adhesion of Ag, Ag/Pd, Ag/Pt, Au and Au/Pt conductors on top of dielectric
- Excellent wire bondability of gold conductors on top of dielectric
- Resistors can be processed on top of dielectric
- Absence of the „Battery Effect“. A separation of dissimilar conductor metallizations such as gold and silver is possible without blistering. This enables the use of more cost-effective, high-conductivity pure silver conductors underneath the dielectric.

##### Processing:

1. Spatulate well before use.  
Wait until the paste jar is at room temperature before opening.
2. Print individual layers with a 200 – 325 mesh stainless steel screen. For best via resolution, a 325 mesh screen is recommended ; whenever possible, a double wet pass of the squeegee is advised, to minimize pin holes.
3. Level at room temperature for 5 – 10 minutes
4. Dry at 150°C for 10 – 20 minutes
5. All layers of the interconnect structure should be fired separately.  
  
Fire in air, with a 30 – 60 minute cycle to a peak temperature of 850°C. Dwell time should be 9 – 11 minutes.  
  
Properties are unaffected by multiple refirings.
6. General: Conductor and dielectric film thicknesses should be controlled carefully, to ensure high yield in production. Conductor thickness under dielectric film should not exceed 12  $\mu\text{m}$  FFT.

##### Thinner:

HVS 100, HVS 507

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#### Properties (Paste):

Viscosity:	45 – 75 Pas (23°C, D = 33 s <sup>-1</sup> )
Coverage:	c. 70 cm <sup>2</sup> / g (40 µm fired film thickness)
Shelf Life:	6 months with correct storage (5 to 25°C in a cool, dry, dark place, and with the container tightly shut).

#### Properties (fired)<sup>1</sup>:

Dielectric Constant K: (1 kHz)	7.5 – 9.5 at 25°C
Insulation Resistance:	> 10 <sup>12</sup> Ohm x cm at 25°C
Dissipation Factor: (1 kHz)	< 0.5 % at 25°C
Breakdown Voltage:	> 500 V per 40 µm fired film thickness
Fired Thickness <sup>2</sup> :	≥ 40 µm (3 separately fired layers)
Via Resolution:	≥ 300 µm

- 1 Typical properties based on laboratory test methods. For optimum results all materials should be fired in a profiled furnace supplied with dried, hydrocarbon-free and other contaminant-free air (PP-1). Also depends in general on associated conductor materials employed, processing conditions and measurement methods.
- 2 Measured after printing with a 325 mesh steel screen ; screen thickness and emulsion thickness combined was c.75 µm.

The descriptions and engineering data shown here have been compiled by Heraeus using commonly-accepted procedures, in conjunction with modern testing equipment, and have been compiled as according to the latest factual knowledge in our possession. The information was up-to date on the date this document was printed (latest versions can always be supplied upon request). Although the data is considered accurate, we cannot guarantee accuracy, the results obtained from its use, or any patent infringement resulting from its use (unless this is contractually and explicitly agreed in writing, in advance). The data is supplied on the condition that the user shall conduct tests to determine materials suitability for a particular application.

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