

N109 W13300 ELLSWORTH DRIVE GERMANTOWN, WI 53022  
262-253-5900 FAX 262-253-5919

**DESCRIPTION:**

*Resinlab*® EP1391 Black is a two-part medium viscosity flame retardant epoxy casting resin system. EP1391 Black is recognized under the Component Recognition Program of Underwriters Laboratories Inc., (File# E186034) for UL Standard 94. It qualifies for a vertical burn rating of V-0 at both 3.0 mm and 6.0 mm thickness. It is a REACH compliant version of EP1390 Black and is also compliant to RoHS 2015/863/EU and subsequent amendments, valid as of the date of this document.

EP1391 Black was designed for medium mass potting for printed wire and circuit boards, coils, chargers and power supply applications. It has excellent chemical resistance and cures quickly at room temperature to a tough, semi-rigid polymer. It has good wetting and adhesion to most surfaces and is free flowing to penetrate voids and give good air release.

EP1391 Black was formulated to a 4A:1B by volume mix ratio for ease of use in side by side dispensing cartridges and meter/mix and dispense equipment. Full cure is achieved within 48 hours at room temperature. Cure time can be accelerated by the application of heat after product has gelled. Time to heat substrate must be taken into account. Cooler temperatures will extend work time and increase cure times.

This formula contains soft, low-abrasion fillers which can separate over time, although they have good resistance to hard settling.

**TYPICAL PROPERTIES:**

All properties given are at 25 °C unless otherwise noted.

<b>Property:</b>	<b>Value:</b>	<b>Test Method or Source:</b>
<b>Color</b>	Black	Visual
<b>Mix Ratio</b>	Part A to Part B	Calculated
<b>Mix Ratio by weight</b>	5.72 to 1	
<b>Mix Ratio by volume</b>	4 to 1	
<b>Cure Schedule</b>	48 hrs @ 25 °C 7 hrs @ 41 °C 4 hrs @ 50 °C 2 hrs @ 65 °C 30 min @ 100 °C	
<b>Viscosity - Part A</b>	18,000 cP	TA HR20 Rheometer 25mm parallel plate @
<b>Viscosity - Part B</b>	4,000 cP	1/s DCV6100723
<b>Viscosity - Mixed</b>	10,000 cP	
<b>Specific Gravity - Part A</b>	1.42	Calculated
<b>Specific Gravity - Part B</b>	0.99	
<b>Specific Gravity - Mixed</b>	1.33	
<b>Pot Life defined as the time it takes for initial mixed viscosity to double</b>	70 minutes	TA HR20 Rheometer parallel plate 25mm @ 1/s DCV6100723

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<b>Property:</b>	<b>Value:</b>	<b>Test Method or Source:</b>
<b>Gel Time 100cc Sample</b>	2 hours	455300005339/Gardco Gel Timer
<b>Peak Exotherm</b>	26 °C for 50 mL sample	455300005593 by Type K thermocouple
<b>Hardness</b>	85 Shore D	455300006287/ASTM D2240
<b>Glass Transition Temperature/Tg</b>	54 °C	453560822409 by DSC
<b>Water Absorption</b>	0.08 %	24 hr immersion 457561824543/ASTM D570
<b>Tensile Properties:</b>		4535601224470/ASTM D638
<b>Strength</b>	4,900 psi	
<b>Elongation</b>	1 %	
<b>Modulus</b>	540,000 psi	
<b>Lap Shear Strength</b>		4535601224468/ASTM D1002
<b>0.010" Bond Line, Al to Al</b>	2,100 psi	
<b>Compressive Properties:</b>		4535601224467/ASTM D695
<b>Yield Strength</b>	11,200 psi	
<b>Offset (0.2%) Yield Strength</b>	8,400 psi	
<b>Ultimate Strength</b>	30,000 psi	
<b>Modulus</b>	280,000 psi	
<b>Flame Resistance</b>	Passes with V-0 Rating @ 3.0 mm	45376013225560/UL94V
<b>UL Certified, File #E186034</b>	Passes with V-0 Rating @ 6.0 mm	
<b>Thermal Conductivity by Transient Plane Heat Source (TPS)</b>	0.37 W/m.K	Thermtest TPS Hot Disk ISO 22007-2 45376013225604
<b>Electrical Resistivity:</b>		455300006612/ASTM D257 @ 20.6 °C @ 52.7 %RH
<b>Volume</b>	2.9 x 10 <sup>15</sup> ohm-cm	
<b>Surface</b>	6.6 x 10 <sup>16</sup> ohm/sq	
<b>Dielectric Constant &amp; Dissipation Factor:</b>	$\epsilon'$ $\tan \delta$	455300006513/ASTM D150
<b>@ 100 Hz</b>	3.8                      0.01	
<b>@ 100 kHz</b>	3.6                      0.01	
<b>AC Dielectric Strength</b>	24 kV/mm	DCV6101609; ASTM D149 Method A, immersed in ASTM D3487 Type II Oil Specimen thickness was ~1-3 mm
<b>Coefficient of Thermal Expansion by TMA:</b>		455300005340/ASTM E831 TMA, 5 °C/min
<b>below Tg</b>	55 ppm/°C	
<b>above Tg</b>	162 ppm/°C	
<b>Operating Temperature Range</b>	-55 to 150 °C**	
<b>Relative Thermal Index (RTI)</b>	90 °C	UL746B, Table 7.1 Generic Value Based on Composition

\* Asterisk denotes values considered typical to associated resin systems or extrapolated from other test results.

\*\* Operating Temperature Range is based on average design requirements and is not intended as a guarantee of suitability for all applications operating at that temperature.

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\*\*\* This TDS contains values that have been updated. The values reported in this technical data sheet are typical values of the product, and are highly dependent on test conditions and methodology. We actively seek the most precise and accurate ways to measure and interpret performance of our products, and to update estimated values with measured values. The formula has not been revised or changed in any way. Although the values on paper have changed, you can expect the same performance of the product.

### **INSTRUCTIONS:**

1. Bring to room temperature prior to use.
2. Cartridge format: Mixer should be attached keeping the cartridge vertical and any air pocket purged this way. After the mixer contains material, the mixer tip can be dropped to dispense pre-bleed amount. Attach a new static mixer with each cartridge, then pre-bleed the first 3 inches of dispensed material or until a uniform color is obtained. Maintain adequate velocity during dispensing to ensure complete mixing.
3. Bulk format: stir until homogeneous weigh and mix parts A and B accurately and thoroughly, scraping sides of container often. A power mixer is suggested such as a 500-1000 rpm device with a mix paddle sufficient to turn material and disperse any filler. Do not pour from mixing container, transfer to a new container as residual unmixed material may cause a tacky spot on the surface of the casting. Maintain adequate velocity during dispensing to ensure complete mixing.
4. Allow to cure undisturbed until product is fully gelled or tack-free to the touch.
5. Clean up uncured resin with suitable organic solvent such as MEK or acetone.

### **SHELF LIFE AND STORAGE:**

6 months DOP at 25 °C in cartridges.

Store cartridges horizontally.

12 months at 25 °C in bulk packaging.

Specialty packaging may be less.

This system is prone to settling due to high filler content. Inventory should be rotated on a FIFO (first in, first out) basis.

Bulk containers should be inverted every two to three weeks to reduce the accumulation of the fillers on the bottom of the containers.

Many epoxy resin systems are prone to crystallization as epoxy resin is a super-cooled fluid. This condition may give the product a gritty or grainy appearance (or hazy in clear products). Products in this state will not usually cure to normal and expected properties. In extreme cases it may appear solid and cured. Fluctuating temperatures (within 5 to 50 °C) aggravate this phenomenon. Heating the individual component to 50 to 60 °C while stirring can usually restore products to original state. Storage at 25 +/- 10 °C is optimum for most products.

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