



Technical Data Sheet  
**HYSOL® FP4323**  
**(ES4323)**

February 2003

**PRODUCT DESCRIPTION**

Hysol® FP4323 is a high purity liquid epoxy encapsulant for chip-on-board (plastic substrate) and plastic PGA applications. FP4323 is designed as a glob top. It is the thixotropic version of Hysol® FP4322. When properly used, this product exhibits the following characteristics:

- Low thermal expansion for improved thermal cycling
- Purity equivalent to the latest die bonding adhesives
- Excellent moisture resistance
- Superior chemical resistance than silicones

Hysol FP4323 has been carefully mixed, degassed and frozen and requires storage at -40°C to maximize shelf life. Hysol® ES4323 is supplied as a two component system, which requires thorough mixing before use.

**TYPICAL APPLICATIONS**

Glob top applications for chip-on-board (plastic substrate) and plastic PGA applications.

**PROPERTIES OF UNCURED MATERIAL**

	FP4323	ES4323 Part A	ES4323 Part B
Color	Black	Black	Cream
Filler Content, % (ASTM D2584)	65	65	65
Specific Gravity @ 25°C, (77°F), ASTM D1475	1.67	1.70	1.70
Shelf Life @ 25°C, (77°F), months		12	12
@ -40°C, (-40°F), months	9		

**Typical Value**

Viscosity @ 25°C, (77°F), (ASTM D2393)	Typical Value		
Brookfield RVF			
Spindle 7, Speed 2, cP	220,000	172,500	250,000
Spindle 7, Speed 20, cP	100,000	115,000	72,500

**Working life at Room Temperature**

48 hours (Time to double viscosity)

**PHYSICAL PROPERTIES, CURED MATERIAL**

	FP4323 (ES4323)
Color	Black
Density, gm/cc (ASTM D792)	1.7
Coefficient of Thermal Expansion, in/in/°C (ASTM D3386), 40-120°C	29 x 10 <sup>-6</sup>
Linear Shrinkage, % (ASTM D2566)	0.43
Thermal Conductivity, cal/sec x cm x °C (ASTM D1674)	15 x 10 <sup>-4</sup>
Moisture Absorption, % (ASTM D570) 8 hours @ 100°C	0.25
Hardness, Shore D, (ASTM D2240)	97
Glass Transition Temperature, °C (ASTM D3386)	160
Extractable Ionic Content (ITM107B)	
Chloride (Cl-), ppm	20
Potassium (K+), ppm	20
Sodium (Na)	20

**Cured Electrical Properties**

	25°C	
	K	D
1kHz	3.70	.004
100MHz	3.59	.085
1GHz	3.44	.075

Volume Resistivity	6.2 x 10 <sup>14</sup>
Surface Resistivity	1.6 x 10 <sup>14</sup>

K = Dielectric constant by ASTM D150  
 D = Dissipation Factor by ASTM D150  
 Vol. Res.= Volume Resistivity in ohm-cm by ASTM D257  
 Surf.Res.= Surface Resistivity in ohm by ASTM D257

**Handling**

(Recommended mix ratio and typical mixed properties)

Mix Ratio, parts by weight* (ES4323) Part A/Part B	100/100
Pot Life @ 25°C, 77°F, days	2
Viscosity @ 25°C, 77°F	
Spindle 5, Speed 20, cP	8,500
Gel Time @ 121°C, (250°F), Minutes	11

\*Mix ratio of these materials is fixed by their chemistry. Any attempt to increase or decrease the cure rate by adding more or less hardener will result in degraded materials.

**GENERAL INFORMATION**

**For safe handling information on this product, consult the Material Safety Data Sheet, (MSDS).**

**This product is not recommended for use in pure oxygen and/or oxygen rich systems and should not be selected as a sealant for chlorine or their strong oxidizing materials**

**Storage Conditions**

Shelf life at room temperature is approximately 2 days. Products may be stored at -40°C for greater than 6 months. Frozen packages must be completely thawed before use. Warm at room temperature until thawed. For best results FP4323 should be dispensed onto a substrate warmed to approximately 90°C. This will help minimize air entrapment under bonding wire.

ES4323 may settle upon storage. Each container must be thoroughly mixed before combining Part A and Part B. About 5-10 minutes on a standard paint shaker will normally ensure complete dispersion of the filler. Stir with a large spatula to check for lumps. Cold storage will minimize filler settling.

Part B may form a crust if exposed to moist air for an extended period of time. Keep in a well-sealed container. For best results, do not use Part B, which contains this crust caused by moisture contamination. Thorough mechanical mixing of Part A and B together is required for best results. Hand mixing alone is not recommended.

NOT FOR PRODUCT SPECIFICATIONS  
 THE TECHNICAL INFORMATION CONTAINED HEREIN IS INTENDED AS REFERENCE ONLY. PLEASE CONTACT LOCTITE CORPORATION QUALITY DEPARTMENT FOR ASSISTANCE AND RECOMMENDATIONS ON SPECIFICATIONS FOR THIS



## Cure Schedule

(Recommended for Optimum properties)

Recommended Cure	4 hours @ 150°C or 1 hour @ 170°C
Alternate Cure	2 hours @ 125°C plus 4 hours @ 150°C

A two-step cure will minimize stress and warpage on large substrates. Use suggested cure schedules as general guidelines; other cure schedules may yield satisfactory results. Above cure conditions are suggested for maximum performance. Curing below 140°C is not recommended.

User should gel the devices immediately after dispensing to prevent moisture degradation of ultimate properties.

### Note

The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Loctite Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Loctite Corporation's products. Loctite Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Loctite Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications



### Loctite Electronics

Henkel Loctite Corporation, 15051 E Don Julian Road, Industry, CA 91746, U.S.A.  
 U.S.A.: 626.968.6511      Canada: 905.814.6511      Brazil: 011.55.11.4143.7000  
 Loctite is a Trademark of Henkel Loctite Corp. U.S.A.      [www.loctite.com](http://www.loctite.com)