LOCTITE®

Hysol® E-90FL™

December 2006

PRODUCT DESCRIPTION

Hysol® E-90FL™ provides the following product characteristics:

Technology	Epoxy
Chemical Type (Resin)	Epoxy
Chemical Type (Hardener)	Polyamide
Appearance (Resin)	Off-white to beige liquid[LMS]
Appearance (Hardener)	Dark gray liquid[LMS]
Appearance (Mixed)	Gray, opaque solid[LMS]
Components	Two component - requires mixing
Viscosity	Medium
Mix Ratio, by volume - Resin : Hardener	1 : 1
Mix Ratio, by weight - Resin : Hardener	100 : 85
Cure	Room temperature cure after mixing
Application	Bonding

Hysol® E-90FL™ is a toughened, medium viscosity, industrial grade epoxy adhesive with extended working life. Once mixed, the two component epoxy cures at room temperature to form a flexible, gray bondline with excellent resistance to shock and impact. When fully cured, the epoxy is resistant to a wide range of chemicals and solvents, and acts as an excellent electrical insulator. Typical applications include bonding plastic, metal, glass, wood, ceramic, rubber, and masonry materials where flexibility is required. Suited for low-stress, high-impact bonding applications of dissimilar materials. Hysol® E-90FL™ can also be used for repairing strain gauges, sealing seams on fiberglass components, repairing printed circuit boards, bonding stainless steel inserts, and rubber hose to steel tubing. The products extended working life allows more time to adjust parts during assembly.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Resin:

Specific Gravity @ 25 °C	1.3
Flash Point - See MSDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 7, speed 10 rpm	62,000 to 81,000[LMS]

Hardener:

Specific Gravity @ 25 °C	1.1
Flash Point - See MSDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 6, speed 10 rpm	10,000 to 28,000[LMS]

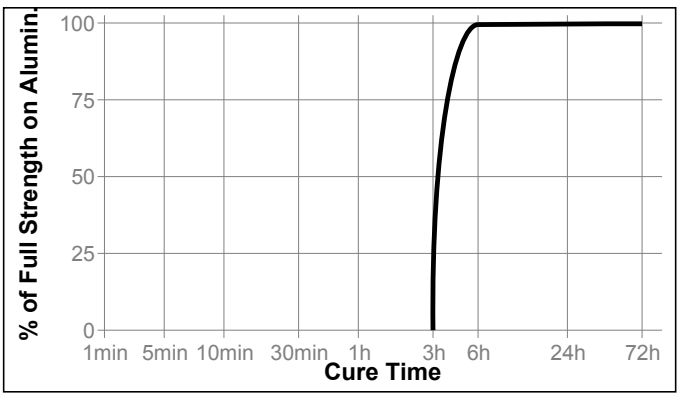
Mixed:

Specific Gravity @ 25 °C	1.2
Working life, minutes	90
Tack Free Time minutes	300

TYPICAL CURING PERFORMANCE

Cure Speed vs. Time

The graph below shows shear strength developed with time on abraded, acid etched aluminum lapshears @ 25 °C with an average bondline gap of 0.1 to 0.2 mm and tested according to ISO 4587.



TYPICAL PROPERTIES OF CURED MATERIAL

Cured @ 25 °C

Physical Properties:

Glass Transition Temperature (Tg), °C		30
Shore Hardness, ISO 868, Durometer D		60
Elongation, ISO 527-2, %		64
Tensile Strength, ISO 527-2	N/mm²	13
	(psi)	(1,900)

Electrical Properties:

Dielectric Breakdown Strength, IEC 60243-1, kV/mm		16

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 5 days @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	5.6
	(psi)	(810)
Aluminum (acid etched & abraded), 0.1 to 0.2 mm gap	N/mm²	21.6
	(psi)	(3,130)
Aluminum (anodised)	N/mm²	10.8
	(psi)	(1,570)
Stainless steel	N/mm²	6.7
	(psi)	(970)
Polycarbonate	N/mm²	5.0
	(psi)	(720)
Nylon	N/mm²	2.4
	(psi)	(350)
Wood (Fir)	N/mm²	7.9
	(psi)	(1,150)

Block Shear Strength, ISO 13445:

PVC	N/mm² (psi)	6.5 (940)
ABS	N/mm² (psi)	5.0 (730)
Epoxy	N/mm² (psi)	12.2 (1,770)
Acrylic	N/mm² (psi)	3.0 (440)
Glass	N/mm² (psi)	14.6 (2,120)

Cured for 2 hours @ 65 °C
Lap Shear Strength, ISO 4587:

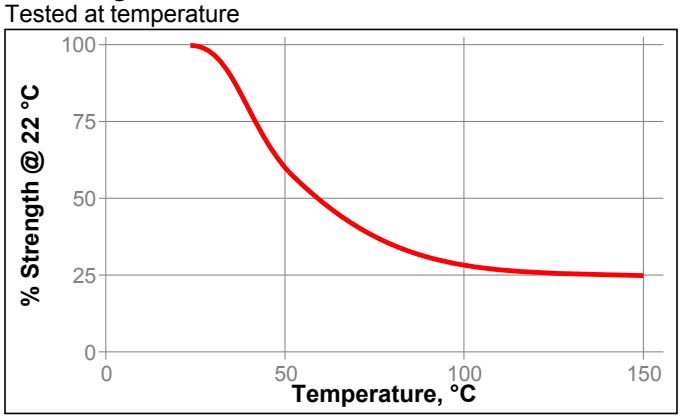
Aluminum (acid etched), 0.13 mm gap	N/mm² (psi)	≥3.4[LMS] (≥493)

TYPICAL ENVIRONMENTAL RESISTANCE

Cured for 12 hours @ 65 °C followed by 4 hours @ 22 °C
Lap Shear Strength, ISO 4587:
Aluminum (acid etched & abraded), 0.1 to 0.2 mm gap

Hot Strength

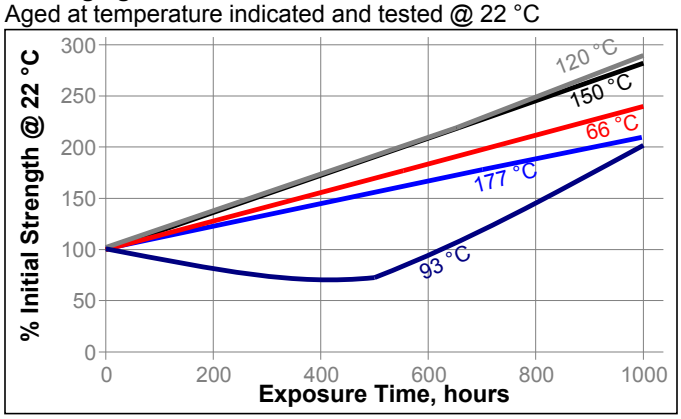
Tested at temperature



Cured for 5 days @ 22 °C
Lap Shear Strength, ISO 4587:
Steel

Heat Aging

Aged at temperature indicated and tested @ 22 °C



Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C.

		% of initial strength	
Environment	**°C**	**500 h**	**1000 h**
Air	87	---	151
Motor oil (10W30)	87	172	212
Unleaded gasoline	87	91	66
Water/glycol 50/50	87	57	83
Salt fog	22	---	60
95% RH	38	---	68
Condensing Humidity	49	---	70
Water	22	---	85
Acetone	22	30	0
Isopropanol	22	83	67

GENERAL INFORMATION

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 other strong oxidizing materials.

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

Directions for use

1. For high strength structural bonds, remove surface contaminants such as paint, oxide films, oils, dust, mold release agents and all other surface contaminants.
2. Use gloves to minimize skin contact. DO NOT use solvents for cleaning hands.
3. **Dual Cartridges:** To use simply insert the cartridge into the application gun and start the plunger into the cylinders using light pressure on the trigger. Next, remove the cartridge cap and expel a small amount of adhesive to be sure both sides are flowing evenly and freely. If automatic mixing of resin and hardener is desired, attach the mixing nozzle to the end of the cartridge and begin dispensing the adhesive. For hand mixing, expel the desired amount of the adhesive and mix thoroughly. Mix for approximately 15 seconds after uniform color is obtained.
   Bulk Containers: Mix thoroughly by weight or volume in the proportions specified in Product Description section. Mix vigorously, approximately 15 seconds after uniform color is obtained.
4. For maximum bond strength apply adhesive evenly to both surfaces to be joined.
5. Application to the substrates should be made within 90 minutes. Larger quantities and/or higher temperatures will reduce this working time.
6. Join the adhesive coated surfaces and allow to cure at 25 °C for 24 hours for high strength. Heat up to 93 °C, will speed curing.
7. Keep parts from moving during cure. Contact pressure is neccesary. Maximum shear strength is obtained with a 0.1 to 0.2 mm bond line.
8. Excessive uncured adhesive can be cleaned up with ketone type solvents.

Loctite Material Specification[LMS]
LMS dated December 21, 1999 (Resin) and LMS dated July 19 , 2001 (Hardener). Test reports for each batch are available for the indicated properties. LMS test reports include selected QC test parameters considered appropriate to specifications for customer use. Additionally, comprehensive controls are in place to assure product quality and consistency. Special customer specification requirements may be coordinated through Henkel Loctite Quality.

Storage
Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.
Optimal Storage: 8 °C to 21 °C. Storage below 8 °C or greater than 28 °C can adversely affect product properties. Material removed from containers may be contaminated during use. Do not return product to the original container. Henkel Corporation cannot assume responsibility for product which has been contaminated or stored under conditions other than those previously indicated. If additional information is required, please contact your local Technical Service Center or Customer Service Representative.

Conversions
(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
µm / 25.4 = mil
N x 0.225 = lb
N/mm x 5.71 = lb/in
N/mm² x 145 = psi
MPa x 145 = psi
N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

Note
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Reference 0.0