

LOCTITE[®] EA 9460[™]

Known as LOCTITE[®] Hysol[®] 9460[™]
December 2013

PRODUCT DESCRIPTION

LOCTITE[®] EA 9460[™] provides the following product characteristics:

Technology	Epoxy
Chemical Type	Epoxy
Appearance (Resin)	white ^{LMS}
Appearance (Hardener)	Black ^{LMS}
Appearance (Mixture)	gray
Components	Two part - Resin & Hardener
Mix Ratio, by weight - Resin : Hardener	1 : 1
Mix Ratio, by volume - Resin : Hardener	1 : 1
Cure	Room temperature cure after mixing
Secondary Cure	Heat
Application	Bonding
Specific Benefit	• Non-sag slump resistance • Smooth paste • Easy to mix • Easy to dispense • Extended working life • Quick heat response • Resistant to automotive fluids • Impact resistant • Fatigue resistant

LOCTITE[®] EA 9460[™] is a thixotropic, modified, two-component epoxy adhesive formulated for ease of use as well for a good balance of properties. This two-part adhesive is formulated to give very high peel strength coupled with excellent shear strength. The flexibility of the cured adhesive makes it useful for bonding dissimilar substrates. Recommended substrates include metals, engineering thermoplastics, and thermoset laminates such as sheet molding compound (SMC) without the use of primers.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Resin:

Specific Gravity @ 25 °C	1.35
Viscosity, Brookfield - HB, 25 °C, mPa·s (cP):	
Spindle 6, speed 20 rpm	150,000 to 300,000 ^{LMS}
Weight Per Gallon, lbs/gal	11.3
Flash Point - See SDS	

Hardener:

Specific Gravity @ 25 °C	1.31
Viscosity @ 25°C, mPa·s (cP)	100,000 to 250,000
Weight Per Gallon, lbs/gal	10.9

Flash Point - See SDS

Mixed:

Specific Gravity @ 25 °C	1.33
Viscosity @ 25°C, mPa·s (cP)	150,000 to 250,000
Peak Exotherm Temperature, °C,	93
Weight Per Gallon, lbs/gal	11.1
Pot life @ 25 °C, minutes	40 to 65 ^{LMS}

TYPICAL PROPERTIES OF CURED MATERIAL

Cured @ 25 °C except where noted

Physical Properties:

Shore Hardness, ISO 868, Durometer D:	
Cured for 2 hours @ 60 °C	≥75 ^{LMS}
Glass Transition Temperature, °C	68
Elongation, ISO 527-2, %	3.5
Tensile Strength, ISO 527-2	N/mm ² 30.3 (psi) (4,400)
Tensile Modulus, ISO 527-2	N/mm ² 2,758 (psi) (400,000)

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 3 days @ 25 °C

Lap Shear Strength, ISO 4587:

Aluminum (etched):

0.125 mm gap, tested @ -53 °C	N/mm ² 20.7 (psi) (3,000)
0.125 mm gap, tested @ 25 °C	N/mm ² 24.1 (psi) (3,500)
0.125 mm gap, tested @ 82 °C	N/mm ² 6.7 (psi) (1,000)
0.125 mm gap, tested @ 121 °C	N/mm ² 2.1 (psi) (300)
0.25 mm gap, tested @ 25 °C	N/mm ² 22.1 (psi) (3,200)
0.75 mm gap, tested @ 25 °C	N/mm ² 15.2 (psi) (2,200)
1.5 mm gap, tested @ 25 °C	N/mm ² 13.8 (psi) (2,000)

Aluminum (degreased):

0.125 mm gap, tested @ 25 °C	N/mm ² 22.1 (psi) (3,200)
------------------------------	---

Aluminum (grit blasted): 0.125 mm gap, tested @ 25 °C	N/mm ² 24.1 (psi) (3,500)	Lytex 9063 Epoxy SMC: 0.75 mm gap, tested @ 25 °C	N/mm ² 8.6 (psi) (1,250)
Steel (cold rolled) (grit blasted): 0.125 mm gap, tested @ 25 °C	N/mm ² 24.1 (psi) (3,500)	Graphite Epoxy Laminate: 0.75 mm gap, tested @ 25 °C	N/mm ² 13.8 (psi) (2,000)
Steel (cold rolled) (degreased): 0.125 mm gap, tested @ 25 °C	N/mm ² 22.1 (psi) (3,200)	Spectrim HF-85 RIM: 0.75 mm gap, tested @ 25 °C	N/mm ² 2.7 (psi) (390)
Primed steel (black e-coated): 0.75 mm gap, tested @ 25 °C	N/mm ² 9.0 (psi) (1,300)	Arimax RTM: 0.75 mm gap, tested @ 25 °C	N/mm ² 6.6 (psi) (950)
Steel (coil coated): 0.75 mm gap, tested @ 25 °C	N/mm ² 13.8 (psi) (2,000)	Peel Strength, ASTM D 3167: Aluminum (etched): Tested @ -55 °C	N 4.4 (lb) (25)
Rynite: 0.75 mm gap, tested @ 25 °C	N/mm ² 1.7 (psi) (250)	Tested @ 25 °C	N 5.3 (lb) (30)
ABS: 0.75 mm gap, tested @ 25 °C	N/mm ² 2.8 (psi) (400)	"T" Peel Strength, ISO 11339: Aluminum (etched): Tested @ -55 °C	N 3.5 (lb) (20)
PVC (clear): 0.75 mm gap, tested @ 25 °C	N/mm ² 4.3 (psi) (620)	Tested @ 25 °C	N 2.6 (lb) (15)
PVC (filled): 0.75 mm gap, tested @ 25 °C	N/mm ² 3.7 (psi) (540)		
Polycarbonate: 0.75 mm gap, tested @ 25 °C	N/mm ² 4.8 (psi) (700)	Cured for 8 hours @ 25 °C followed by 1 hour @ 121 °C Peel Strength, ASTM D 3167: Aluminum (etched): Tested @ -55 °C	N 7.0 (lb) (40)
Eagle Picher 218-2, SMC: 0.75 mm gap, tested @ 25 °C	N/mm ² 3.4 (psi) (500)	Tested @ 25 °C	N 5.3 (lb) (30)
0.75 mm gap, tested @ 82 °C	N/mm ² 2.8 (psi) (400)		
Budd DSM-950, SMC: 0.75 mm gap, tested @ 25 °C	N/mm ² 3.9 (psi) (560)	"T" Peel Strength, ISO 11339: Aluminum (etched): Tested @ -55 °C	N 4.4 (lb) (25)
0.75 mm gap, tested @ 82 °C	N/mm ² 3.1 (psi) (450)	Tested @ 25 °C	N 3.5 (lb) (20)
Diversitech 8002: 0.75 mm gap, tested @ 25 °C	N/mm ² 3.7 (psi) (535)		
0.75 mm gap, tested @ 82 °C	N/mm ² 2.4 (psi) (350)		
Premix EMS 30271, SMC: 0.75 mm gap, tested @ 25 °C	N/mm ² 3.4 (psi) (500)		
0.75 mm gap, tested @ 82 °C	N/mm ² 2.9 (psi) (425)		
Ashland Phase Alpha: 0.75 mm gap, tested @ 25 °C	N/mm ² 3.1 (psi) (445)		
0.75 mm gap, tested @ 82 °C	N/mm ² 2.0 (psi) (290)		
Rockwell 9465: 0.75 mm gap, tested @ 25 °C	N/mm ² 3.8 (psi) (550)		
0.75 mm gap, tested @ 82 °C	N/mm ² 3.8 (psi) (550)		
Derakane 790 HSMC: 0.75 mm gap, tested @ 25 °C	N/mm ² 7.6 (psi) (1,100)		
Fiberite: 0.75 mm gap, tested @ 25 °C	N/mm ² 6.8 (psi) (980)		

TYPICAL ENVIRONMENTAL RESISTANCE

Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C

Environment	°C	% of initial strength
		720 h
Air	25	100
Water	54	75
Salt fog	35	63
Water/glycol 50/50	130	50
ATF	25	100
ATF	82	100
Brake fluid	25	100
Windshield wiper fluid	25	88
Motor oil (10W40)	25	100
Motor oil (10W40)	141	100
Gasoline (unleaded)	25	100
Diesel fuel	25	100
100% RH	38	75

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 Safety Data Sheet (SDS).

Directions for use:**Mixing:**

1. **When mixing by hand**, combine Part A (Resin) and Part B (Hardener) in the correct ratio and mix thoroughly until the color and consistency are uniform. EPOXI-PATCH® Tube Kits have been designed so that squeezing **EQUAL LENGTH BEADS of Part A & Part B** will give the proper ratio.
2. Mixing the adhesive just prior to use is recommended. The temperature of the separate components prior to mixing is not critical, but they should be close to room temperature.
3. Heat buildup during and after mixing is normal. To reduce the likelihood of exothermic reaction or excessive heat buildup, mix less than 4,500 grams at a time. Mixing smaller amounts will minimize heat buildup.
4. **When mixing using a cartridge**, place cartridge in proper dispenser. To begin using a new cartridge, remove the cap and dispense a small amount of adhesive, making sure both parts A & B are extruding. Attach nozzle and dispense approximately 2.5 to 5.0 cm before applying onto the part to be bonded. Partially used cartridges should be stored with the mixing nozzle attached. To reuse, remove and discard the old nozzle, attach the new nozzle, and begin dispensing.

Applying

1. Bonding surfaces should be clean, dry, and free of contamination.
2. Once the adhesive is applied, the bonded parts should be held in contact until the part has developed handling strength. Fixturing can be removed at this point. Since the full bond strength has not yet been attained, load application should be small at this time.

Cure

1. Complete cure is obtained after 72 hours @ 25 °C. LOCTITE® EA 9460™ can also be fully cured with heat such as; 6 to 8 hours at a maximum temperature of 149 °C.
2. After 24 hours, approximately 90% of full cure properties are attained at room temperature.
3. Other times and temperatures (149°C is a suggested maximum) can be used depending on the application.
4. Heat cures can be modified to achieve a desired degree of cure from handling strength to full cure.

Clean up

1. It is important to clean up excess adhesive from the work area and application equipment before it hardens.
2. Denatured alcohol and many common industrial solvents are suitable for removing uncured adhesive.

Loctite Material Specification^{LMS}

LMS dated June 10, 2005 (Resin) and LMS dated October 18, 2004 (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

$(^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$
 $\text{kV/mm} \times 25.4 = \text{V/mil}$
 $\text{mm} / 25.4 = \text{inches}$
 $\mu\text{m} / 25.4 = \text{mil}$
 $\text{N} \times 0.225 = \text{lb}$
 $\text{N/mm} \times 5.71 = \text{lb/in}$
 $\text{N/mm}^2 \times 145 = \text{psi}$
 $\text{MPa} \times 145 = \text{psi}$
 $\text{N}\cdot\text{m} \times 8.851 = \text{lb}\cdot\text{in}$
 $\text{N}\cdot\text{m} \times 0.738 = \text{lb}\cdot\text{ft}$
 $\text{N}\cdot\text{mm} \times 0.142 = \text{oz}\cdot\text{in}$
 $\text{mPa}\cdot\text{s} = \text{cP}$

Note:

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.

Any liability in respect of the information in the Technical Data Sheet or any other written or oral recommendation(s) regarding the concerned product is excluded, except if otherwise explicitly agreed and except in relation to death or personal injury caused by our negligence and any liability under any applicable mandatory product liability law.

In case products are delivered by Henkel Belgium NV, Henkel Electronic Materials NV, Henkel Nederland BV, Henkel Technologies France SAS and Henkel France SA please additionally note the following:

In case Henkel would be nevertheless held liable, on whatever legal ground, Henkel's liability will in no event exceed the amount of the concerned delivery.

In case products are delivered by Henkel Colombiana, S.A.S. the following disclaimer is applicable:

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.

Any liability in respect of the information in the Technical Data Sheet or any other written or oral recommendation(s) regarding the concerned product is excluded, except if otherwise explicitly agreed and except in relation to death or personal injury caused by our negligence and any liability under any applicable mandatory product liability law.

In case products are delivered by Henkel Corporation, Resin Technology Group, Inc., or Henkel Canada Corporation, the following disclaimer is applicable:

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, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel 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 Henkel 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.

Trademark usage

Except as otherwise noted, all trademarks in this document are trademarks of Henkel Corporation in the U.S. and elsewhere. ® denotes a trademark registered in the U.S. Patent and Trademark Office.

Reference 0.1