

# LOCTITE<sup>®</sup> EA E-05MR<sup>™</sup>

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## PRODUCT DESCRIPTION

LOCTITE<sup>®</sup> EA E-05MR<sup>™</sup> provides the following product characteristics:

<b>Technology</b>	Epoxy
Chemical Type	Epoxy
Appearance (Resin)	Ultra clear
Appearance (Hardener)	Ultra clear
Appearance (Mixture)	Water white clear liquid <sup>LMS</sup>
Components	Two components - requires mixing
Viscosity	Medium
Mix Ratio, (by volume)	1 : 1
Resin : Hardener	
Mix Ratio, by weight - Resin : Hardener	1 : 1
<b>Cure</b>	Room temperature cure after mixing
<b>Application</b>	Bonding

LOCTITE<sup>®</sup> EA E-05MR<sup>™</sup> is a general purpose two-component epoxy adhesive which develops high strength on a wide range of substrates. The gap filling properties make this adhesive system suitable for rough and poorly fitting surfaces made from metal, ceramic, rigid plastics or wood. Once mixed, the two component epoxy cures at room temperature to form an ultra clear adhesive bondline with excellent impact resistance.

## TYPICAL PROPERTIES OF UNCURED MATERIAL

### Resin:

Specific Gravity @ 25 °C	1.17
Viscosity, Cone & Plate, mPa·s (cP):	
Cone CP50-1 @ shear rate 100 s <sup>-1</sup>	18,000 to 25,000
Flash Point - See SDS	

### Hardener:

Specific Gravity @ 25 °C	1.16
Viscosity, Cone & Plate, mPa·s (cP):	
Cone CP50-1 @ shear rate 100 s <sup>-1</sup>	18,000 to 25,000
Flash Point - See SDS	

### Mixed Properties:

Specific Gravity @ 25 °C	1.16
Flash Point - See SDS	
Gel Time @ 22 °C, minutes	7 to 12 <sup>LMS</sup>

## TYPICAL CURING PERFORMANCE

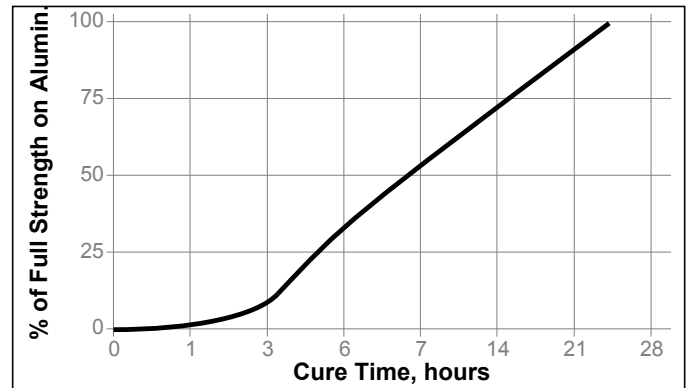
### Fixture Time

Fixture time is defined as the time to develop a shear strength of 0.1 N/mm<sup>2</sup>.

Fixture Time, ISO 4587, minutes:	
Steel (grit blasted), @ 22 °C	10 to 15

## Cure Speed vs. Time

The graph below shows shear strength developed with time on Aluminum (acid etched) 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 @ 22 °C for 5days

### Physical Properties:

Glass Transition Temperature(Tg)	39
ISO 11359-2, °C	
Shore Hardness, ISO 868, Durometer D	78
Coefficient of Thermal Expansion, ISO 11359-2, K <sup>-1</sup> :	
Pre Tg	49×10 <sup>-6</sup>
Post Tg	188×10 <sup>-6</sup>
Linear Shrinkage, in/in	1.3
ASTM D 792,	
Volume Shrinkage, ASTM D 792, %	3.9

### Electrical Properties:

Dielectric Breakdown Strength,	34
IEC 60243-1, kV/mm	

Cured @ 22 °C for 3days

### Physical Properties:

Elongation, at break, ISO 527-3, %	4.5
Tensile Strength, at break, ISO 527-3	N/mm <sup>2</sup> 50
	(psi) (7,240)
Tensile Modulus, ISO 527-3	N/mm <sup>2</sup> 1,500
	(psi) (217,440)

**TYPICAL PERFORMANCE OF CURED MATERIAL****Adhesive Properties**

Cured for 5 days @ 22 °C and 0.13 mm gap

Lap Shear Strength, :

Steel (grit blasted)	N/mm <sup>2</sup>	23
	(psi)	(3,380)
Aluminum (abraded)	N/mm <sup>2</sup>	7
	(psi)	(1,010)
Aluminum (anodised)	N/mm <sup>2</sup>	14
	(psi)	(2,080)
Stainless steel	N/mm <sup>2</sup>	5
	(psi)	(770)
Polycarbonate	N/mm <sup>2</sup>	3
	(psi)	(380)
Nylon to Steel (grit blasted)	N/mm <sup>2</sup>	2
	(psi)	(320)
Wood (Pine) to Steel (grit blasted)	N/mm <sup>2</sup>	7
	(psi)	(1,020)

Block Shear Strength, ISO 13445:

PVC	N/mm <sup>2</sup>	1
	(psi)	(160)
ABS	N/mm <sup>2</sup>	5.7
	(psi)	(820)
Epoxy	N/mm <sup>2</sup>	11
	(psi)	(1,570)
Acrylic	N/mm <sup>2</sup>	1.5
	(psi)	(220)
Glass	N/mm <sup>2</sup>	6.6
	(psi)	(950)

Impact Strength, ISO 9653, J:

Steel (grit blasted)	5
Aluminum (etched)	6

Cured for 2 hours @ 65 °C

Lap Shear Strength, :

Aluminum (acid etched) 0.13 mm gap	N/mm <sup>2</sup>	24.0 <sup>LMS</sup>
	(psi)	(3,480)

**TYPICAL ENVIRONMENTAL RESISTANCE**

Cured for 5 days @ 22 °C

Lap Shear Strength, :

Steel (grit blasted), 0.13 mm gap

**Chemical/Solvent Resistance**

Aged under conditions indicated and tested @ 22 °C.

Environment	°C	% of initial strength	
		500 h	1000 h
Air	87	135	162
Motor oil (10W30)	87	124	133
Unleaded gasoline	87	12	21
Water/glycol 50/50	87	26	20
Water	22	140	126
Acetone	22	99	101
Isopropanol	22	99	88
Salt fog	22	98	90
Condensing Humidity	49	78	46
95% RH	40	110	108

**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:**

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 begin using a new cartridge, remove cartridge cap and dispense a small amount of adhesive, making sure both parts A&B are extruding. Attach nozzle and dispense approximately 25 to 50mm, before applying onto part to be bonded. Partially used cartridges can be stored with the mixing nozzle attached. To reuse, remove and discard old nozzle, attach the new nozzle, dispense approximately 25 to 50mm, before applying onto part to be bonded.

**Hand Mixing:** Combine Part A & Part B in the correct ratio and mix thoroughly. Be sure to scrape both the sides and bottom of mixing container. Mix for approximately 15 seconds after uniform color is obtained. Heat build-up during or after mixing is normal. Do not mix quantities greater than 0.02kg as excessive exotherm or heat build up will develop. Mixing smaller amounts will minimize heat build-up

**Bulk Containers:** Normally material is dispensed through volumetric metered mixing equipment, attached to static mix nozzles. It may also be mixed by weight or volume as described above.

4. For maximum bond strength apply adhesive evenly to both surfaces to be joined.
5. Application to the substrates should be made within 5 minutes. Larger quantities and/or higher temperatures will reduce this working time.
6. Join the adhesive coated surfaces and allow to cure. Higher temperatures will speed up curing.
7. Keep assembled parts from moving during cure. The bond should be allowed to develop full strength before subjecting to any service load.

8. Excessive uncured adhesive can be cleaned up with ketone type solvents.

#### Loctite Material Specification<sup>LMS</sup>

LMS dated June 16, 2009. 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 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.

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#### Reference 0.5