Technical Data Sheet

LOCTITE® EA 9489

Known as Hysol 9489
June 2014

PRODUCT DESCRIPTION

LOCTITE® EA 9489 provides the following product characteristics:

Technology	Epoxy
Chemical Type (Resin)	Epoxy
Chemical Type (Hardener)	Polyamide
Appearance (Resin)	Light beige liquid[LMS]
Appearance (Hardener)	Grey, opaque liquid[LMS]
Appearance (Mixture)	Gray liquid
Viscosity	Medium
Components	Two part - Resin & Hardener
Mix Ratio, by volume - Resin : Hardener	1 : 1
Mix Ratio, by weight - Resin : Hardener	100 : 85
Cure	Room temperature cure after mixing
Application	Bonding
Specific Benefit	• Excellent electrical insulator • Extended working life • Excellent resistance to shock and impact • Resistant to a wide range of chemicals and solvents
Key Substrates	Ceramics, Glass, Metals , Plastics, Rubbers, Wood and Masonry materials
Maximum Gap	3.0 mm

LOCTITE® EA 9489 is a toughened, medium-viscosity, industrial grade epoxy adhesive with extended working life. Once mixed, LOCTITE® EA 9489 cures at room temperature to form a flexible grey bondline. It 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 product's extended working life allows more time to adjust parts during assembly.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Resin Properties

Specific Gravity @ 25 °C	1.32 to 1.38[LMS]
Flash Point - See SDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 7, speed 5 rpm	35,000 to 135,000[LMS]
Spindle 7, speed 10 rpm,	60,000 to 175,000
Viscosity, DIN 54453, mPa·s (cP):	
Shear rate 10 s^{-1}	70,000

Hardener Properties

Specific Gravity @ 25 °C	1.06 to 1.12[LMS]
Flash Point - See SDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 6, speed 10 rpm,	20,000 to 45,000[LMS]
Viscosity, DIN 54453, mPa·s (cP):	
Shear rate 10 s^{-1}	16,000

Mixed Properties

Specific Gravity @ 25 °C	1.2
Pot Life @ 25 °C, minutes:	
200 g mass	60 to 110[LMS]

TYPICAL CURING PERFORMANCE

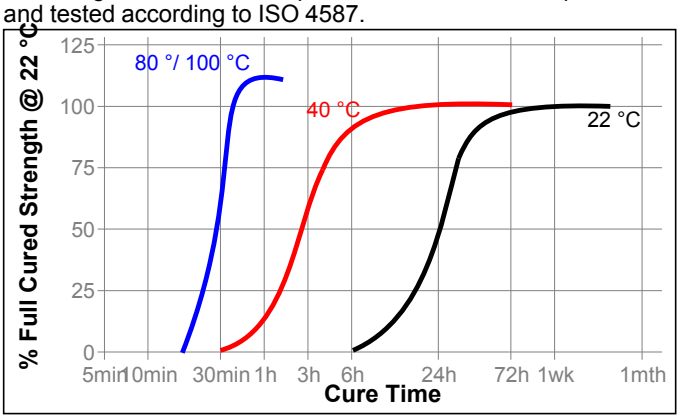
Fixture Time

Fixture time is defined as the time to develop a shear strength of 0.1 N/mm² .

Fixture Time, @ 22 °C, hours	5

Cure Speed vs. Time/Temperature

The graph below shows the shear strength developed with time on grit blasted steel lap shears at different temperatures and tested according to ISO 4587.



TYPICAL PROPERTIES OF CURED MATERIAL

4 mm thick samples cured for 7 days @ 22 °C

Physical Properties :

Coefficient of Thermal Expansion ISO 11359-2, K^{-1}:	
Temperature Range: 25 °C to 30 °C	96×10^{-6}
Temperature Range: 50 °C to 195 °C	171×10^{-6}

1.2 mm thick samples cured for 7 days @ 22 °C

Physical Properties :

Coefficient of Thermal Conductivity, , ISO 8302, W/(m-K)		0.5
Shore Hardness, ISO 868, Durometer D		60
Glass Transition Temperature, ASTM D 1640, °C		54
Elongation , ISO 527-3,%		91
Tensile Strength, ISO 527-3	N/mm²	14
	(psi)	(2,000)
Tensile Modulus , ISO 527-3	N/mm²	35
	(psi)	(5,100)

Electrical Properties:

Dielectric Breakdown Strength IEC 60243-1, kV/mm	15
Volume Resistivity, IEC 60093, Ω·cm	0.2×10^{15}
Surface Resistivity, IEC 60093, Ω	8×10^{15}
Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	5.2 / 0.08
1 MHz	4.6 / 0.05
10 MHz	3.8 / 0.05

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 5 days @ 22 °C

Lap Shear Strength , ISO 4587:

Mild steel (grit blasted)	N/mm²	10
	(psi)	(1,500)
Aluminum (abraded) (Silicon Carbide Paper, A166 grit, P400A grade)	N/mm²	4
	(psi)	(580)
Aluminum (anodised)	N/mm²	11
	(psi)	(1,600)
Stainless Steel	N/mm²	10
	(psi)	(1,500)
Galvanized Steel (Hot Dipped)	N/mm²	12
	(psi)	(1,700)
Polycarbonate	N/mm²	3.8
	(psi)	(550)
Nylon	N/mm²	2.4
	(psi)	(350)
Epoxyglass	N/mm²	6
	(psi)	(870)
Wood (Fir)	N/mm²	8
	(psi)	(1,200)

Tensile Strength , ISO 6922:

Mild steel pin (grit blasted) to Soda glass	N/mm²	13
	(psi)	(1,900)

180° Peel Strength ISO 8510-2:

Mild steel (grit blasted)	N/mm	2.2
	(lb/in)	(12)

TYPICAL ENVIRONMENTAL RESISTANCE

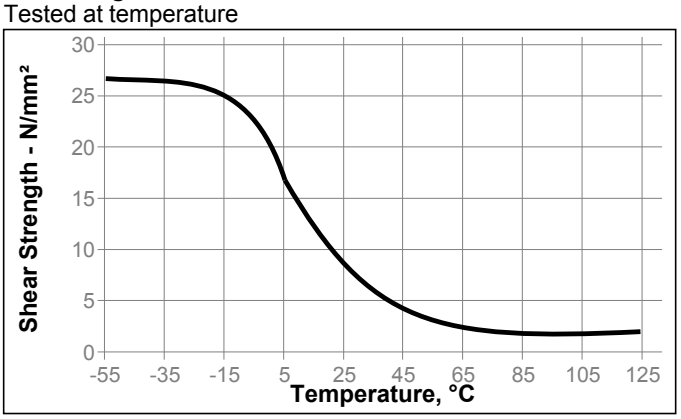
Cured for 5 days @ 22 °C

Lap Shear Strength , ISO 4587:

Mild steel (grit blasted)

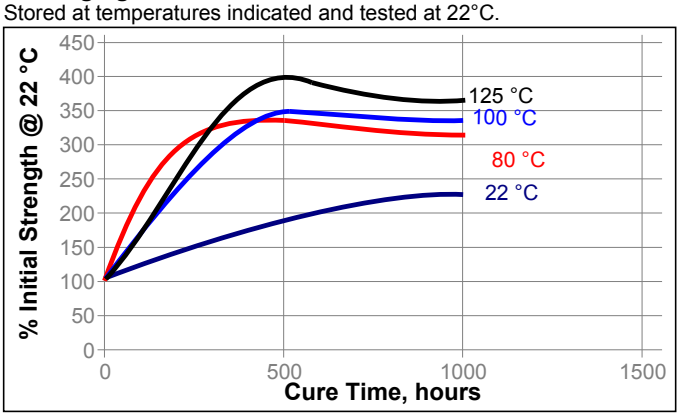
Hot Strength

Tested at temperature



Heat Aging

Stored at temperatures indicated and tested at 22°C.



Chemical/Solvent Resistance

Immersed in conditions indicated and tested at 22 °C.

		% of initial strength	
Environment	**°C**	**500 h**	**1000 h**
Air	87	------	150
Motor oil (10W30)	87	170	210
Unleaded gasoline	87	90	65
Water/glycol 50/50	87	140	110
Salt/Fog ASTM B-117	22	------	60
98% RH	40	180	145
Condensing Humidity	49	------	70
Water	22	------	85
Acetone	22	30	0
Isopropanol	22	80	65

Tensile Strength , ISO 6922, Cured for 5 days @ 22 °C, Mild steel pin (grit blasted) to Soda glass

		% of initial strength	
Environment	**°C**	**500 h**	**1000 h**
Air	22	120	85
98% RH	40	35	20

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 best performance surfaces for bonding should be clean, dry and free of grease. For high strength structural bonds, special surface treatments can increase the bond strength and durability.
2. To use, resin and hardener must be blended. Product can be applied directly from dual cartridges by dispensing through the mixer head supplied. Discard the first 3 to 5 cm of bead dispensed. Using bulk containers, mix thoroughly by weight or volume in the proportions specified in the Product Description Matrix. For hand mixing, weigh or measure out the desired amount of resin and hardener and mix thoroughly. Mix approximately 15 seconds after uniform color is obtained.
3. It is recommended that this product is not mixed and cured in bulk quantities of greater than 4 kg as excessive heat build-up can occur. Mixing smaller quantities will minimize the heat build-up.
4. Apply the adhesive as quickly as possible after mixing to one surface to be joined. For maximum bond strength apply adhesive evenly to both surfaces. Parts should be assembled immediately after mixed adhesive has been applied.
5. For working life please see section 'Typical Properties of Uncured Material'. Higher temperatures and larger quantities will shorten this working time.
6. Keep the assembled parts from moving during cure. The joint should be allowed to develop full strength before subjecting to any service loads.
7. Excess uncured adhesive can be wiped away with organic solvent (e.g. Acetone).
8. After use and before adhesive hardens, mixing and application equipment should be cleaned with hot soapy water.

Loctite Material Specification[LMS]

LMS dated August 03, 2005. 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.

Not for product specifications

The technical data contained herein are intended as reference only. Please contact your local quality department for assistance and recommendations on specifications for this product.

Conversions

(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
N x 0.225 = lb
N/mm x 5.71 = lb/in
N/mm² x 145 = psi
MPa = N/mm²
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

Disclaimer

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.
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