Technical Data Sheet

LOCTITE® EA 9461

Known as Hysol 9461
September 2014

PRODUCT DESCRIPTION

LOCTITE® EA 9461 provides the following product characteristics:

Technology	Epoxy
Chemical Type (Resin)	Epoxy
Chemical Type (Hardener)	Amine
Appearance (Resin)	White opaque paste
Appearance (Hardener)	Black opaque paste
Appearance (Mixture)	Gray paste
Components	Two part - Resin & Hardener
Viscosity	Thixotropic
Mix Ratio, by volume - Resin : Hardener	1 : 1
Mix Ratio, by weight - Resin : Hardener	100 : 100
Cure	Room temperature cure after mixing
Application	Bonding
Maximum Gap	3.0 mm
Specific Benefit	• Excellent peel strength • Excellent tensile shear strength • Impact and fatigue resistant • Non-sag slump resistance • Easy to mix and dispense

LOCTITE® EA 9461 is a thixotropic, two component epoxy adhesive formulated for ease of use as well for a good balance of properties. This adhesive couples high peel strength and excellent shear strength in a smooth, non-sag paste that is easily dispensed. The product has a medium working life with a quick heat cure response if required. The tough nature of this structural adhesive makes it useful for bonding dissimilar substrates including metals, engineering thermoplastics and thermoset laminates such as sheet moulding compound (SMC).

TYPICAL PROPERTIES OF UNCURED MATERIAL

Resin Properties

Specific Gravity @ 25 °C	0.0001
Viscosity, DIN 54453, mPa·s (cP):	
Shear rate 10 s^{-1}	85,980
Shear rate 50 s^{-1}	38,570
Thixotropic Index	2.8

Flash Point - See SDS

Hardener Properties

Specific Gravity @ 25 °C	1.31
Viscosity, DIN 54453, mPa·s (cP):	
Shear rate 10 s^{-1}	59,530
Shear rate 50 s^{-1}	42,860
Thixotropic Index	2

Flash Point - See SDS

Mixed Properties

Pot Life @ 22 °C, minutes:	
100 g mass	40

TYPICAL CURING PERFORMANCE

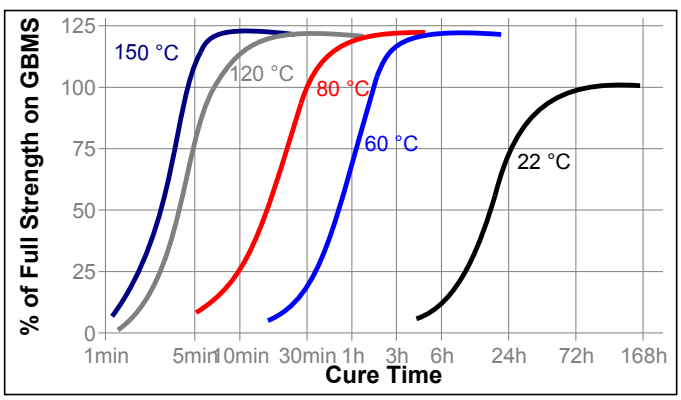
Fixture Time

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

Fixture Time, mixed, @ 22 °C, minutes	240

Cure Speed vs. Time/Temperature

LOCTITE® EA 9461 will achieve handling strength in 4 to 5 hours at room temperature (note: this can vary with different bond configurations and ambient temperatures). Elevated temperatures may be used to accelerate the cure. 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

Cured for 7 days @ 22 °C, 1.2 mm thick samples

Physical Properties :

Shore Hardness, ISO 868, Durometer D		80
Elongation , ISO 527-2,%		3.5
Tensile Strength, ISO 527-2	N/mm²	30
	(psi)	(4,400)
Tensile Modulus , ISO 527-2	N/mm²	2,757
	(psi)	(400,000)

Electrical Properties:

Dielectric Strength, kV/mm	36.6
Dielectric Constant / Dissipation Factor:	
@ 1 KHz	4.1/0.023
@ 1MHz	3.8/0.04
@ 10MHz	3.6/0.057
Surface Resistivity, IEC 60093, ohms	$\geq 1.9\times10^{17}$
Volume Resistivity, IEC 60093, ohm-cm	1.8×10^{14}

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 7 days @ 22 °C

Lap Shear Strength , ISO 4587:

Mild steel (grit blasted)	N/mm²	25
	(psi)	(3,600)
Aluminum (abraded) (Silicon Carbide Paper, A166 grit, P400A grade)	N/mm²	21
	(psi)	(3,100)
Aluminum (etched in acidic ferric sulphate)	N/mm²	21
	(psi)	(3,100)
Stainless steel	N/mm²	19
	(psi)	(2,800)
Galvanized Steel (Hot Dipped)	N/mm²	16
	(psi)	(2,300)
Brass	N/mm²	11
	(psi)	(1,600)
Zinc dichromate	N/mm²	16
	(psi)	(2,300)
Polycarbonate	N/mm²	6.5
	(psi)	(940)
ABS	N/mm²	6.2
	(psi)	(900)
GRP (Polyester resin matrix)	N/mm²	5
	(psi)	(720)
Glass Fiber Reinforced Epoxy	N/mm²	13
	(psi)	(1,900)

180° Peel Strength, ISO 8510-2:

Mild Steel (grit blasted)	N/mm	10
	(lb/in)	(57.1)

IZOD Impact Resistance , ISO 9653 J/m² :

Mild Steel (grit blasted)	8.3

TYPICAL ENVIRONMENTAL RESISTANCE

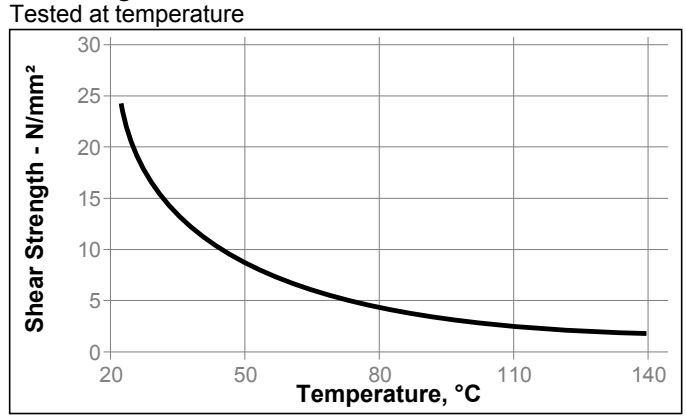
Cured for 7 days @ 22 °C

Lap Shear Strength , ISO 4587:

Mild Steel (grit blasted)

Hot Strength

Tested at temperature



Heat Aging

Aged under conditions indicated and tested at 22 °C.

Temperature	% Initial strength retained after		
	500 h	1,000 h	3,000 h
50 °C	110	105	105
80 °C	115	125	120
100 °C	110	100	100
120 °C	125	125	125
150 °C	135	125	120

Chemical/Solvent Resistance

Immersed in conditions indicated and tested at 22 °C.

		% of initial strength		
Environment	°C	500 h	1000 h	3000 h
Motor oil	22	100	95	100
Unleaded gasoline	22	75	70	60
Water/glycol 50/50	87	75	75	95
Sodium hydroxide, 4%	22	85	80	80
98% RH	40	85	70	70
Water	60	85	75	75
Water	90	85	80	55
Acetone	22	65	35	35
Acetic Acid, 10%	22	75	65	50
Salt water solution, 7.5%	22	80	80	80

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).

Where aqueous washing systems are used to clean the surfaces before bonding, it is important to check for compatibility of the washing solution with the adhesive. In some cases these aqueous washes can affect the cure and performance of the adhesive.

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.

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.

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
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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Reference 1.2