

# Hysol®

# Hysol® 9450™

April 2006

## PRODUCT DESCRIPTION

Hysol® 9450™ provides the following product characteristics:

<b>Technology</b>	Epoxy
Chemical Type (Resin)	Epoxy
Chemical Type (Hardener)	Mercaptan
Appearance (Resin)	Translucent white paste <sup>LMS</sup>
Appearance (Hardener)	Translucent light yellow paste <sup>LMS</sup>
Appearance (Mixed)	Translucent paste
Components	Two part - Resin & Hardener
Mix Ratio, by volume - Resin : Hardener	1 : 1
Mix Ratio, by weight - Resin : Hardener	100 : 92
<b>Cure</b>	Room temperature cure after mixing
Specific Benefit	<ul style="list-style-type: none"> <li>• Fast curing</li> <li>• Non sagging paste when uncured</li> <li>• Ideal for gap filling and vertical applications</li> <li>• Clear bond lines</li> <li>• Slightly flexible</li> </ul>
<b>Application</b>	Bonding
Strength	High
Key Substrates	Metals, Ceramics, Glass and Most plastics
Maximum Gap	3.0 mm

Hysol® 9450™ is a fast curing two component epoxy adhesive suitable for a wide variety of substrates like metals, ceramics, glass and most plastics. Hysol® 9450™ is designed for use in component assembly, domestic appliances, electronics and fiber optics, and general industrial repairs. Its non-sagging formula is especially suited for use on vertical surfaces to avoid run-off.

## TYPICAL PROPERTIES OF UNCURED MATERIAL

### Resin Properties

Specific Gravity @ 25 °C	1.15 to 1.2 <sup>LMS</sup>
Flash Point - See MSDS	
Flow, ISO 7390, mm	<10 <sup>LMS</sup>
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 7, speed 2.5 rpm	150,000 to 750,000
Thixotropic Index	3.2

### Hardener Properties

Specific Gravity @ 25 °C	1.09 to 1.16 <sup>LMS</sup>
Flash Point - See MSDS	
Flow, ISO 7390, mm	<10 <sup>LMS</sup>
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 7, speed 20 rpm	15,000 to 75,000
Thixotropic Index	3.7

## Mixed Properties

Pot Life @ 25 °C, minutes:  
10 g mass

2 to 7<sup>LMS</sup>

## TYPICAL CURING PERFORMANCE

### Fixture Time

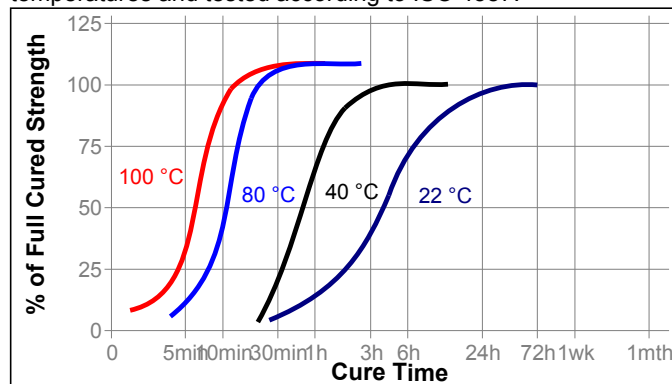
Fixture time is defined as the time to develop a shear strength of 0.1 N/mm<sup>2</sup>.

Fixture Time, @ 22 °C, minutes

13

### Cure Speed vs. Time/Temperature

Hysol® 9450™ develops high strength at room temperature within 3 to 6 hours. The assembled parts will be fixtured for light handling (0.1 N/mm<sup>2</sup>) after 13 to 15 minutes at room temperature. 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

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

### Physical Properties:

Coefficient of Thermal Expansion, ISO 11359-1, K <sup>-1</sup> :	
Temperature Range: -20 °C to 25 °C	53×10 <sup>-6</sup>
Temperature Range: 55 °C to 200 °C	192×10 <sup>-6</sup>

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

### Physical Properties:

Shore Hardness, ISO 868, Durometer D	70
Glass Transition Temperature, ASTM D 1640, °C	50
Elongation, ISO 527-3, %	40
Tensile Strength, ISO 527-3	N/mm <sup>2</sup> 17
	(psi) (2,400)
Tensile Modulus, ISO 527-3	N/mm <sup>2</sup> 1,025
	(psi) (150,000)

**Electrical Properties:**

Volume Resistivity, IEC 60093, $\Omega \cdot \text{cm}$	$1 \times 10^{15}$
Surface Resistivity, IEC 60093, $\Omega$	$2 \times 10^{15}$
Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	4.0 / 0.02
1 MHz	3.4 / 0.04
10 MHz	3.2 / 0.03

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

Cured for 5 days @ 22 °C

Lap Shear Strength, ISO 4587:

Mild steel (grit blasted)	N/mm <sup>2</sup> 23 (psi) (3,300)
Stainless steel	N/mm <sup>2</sup> 14 (psi) (2,000)
Aluminum (abraded) (Silicon Carbide Paper, A166 grit, P400A grade)	N/mm <sup>2</sup> 9 (psi) (1,300)
Aluminum (anodised)	N/mm <sup>2</sup> 8 (psi) (1,200)
Polycarbonate	N/mm <sup>2</sup> 2.5 (psi) (360)
Nylon	N/mm <sup>2</sup> 1.0 (psi) (150)
Wood (Fir)	N/mm <sup>2</sup> 10 (psi) (1,500)

180° Peel Strength ISO 8510-2:

Mild Steel (grit blasted)	N/mm 0.6 (lb/in) (3.4)
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Tensile Strength, ISO 6922:

Mild steel (grit blasted) to Soda glass	N/mm <sup>2</sup> 10 (psi) (1,500)
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**TYPICAL ENVIRONMENTAL RESISTANCE**

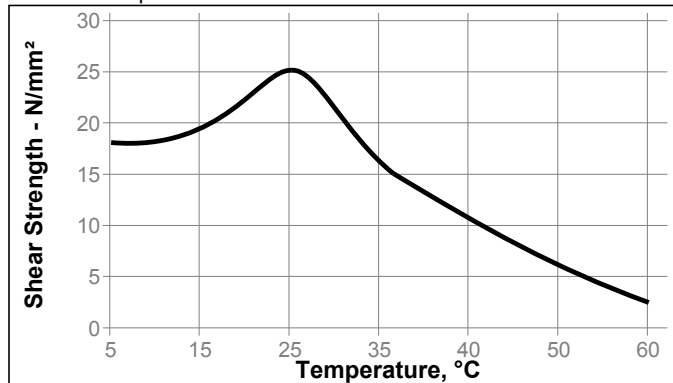
Cured for 7 days @ 22 °C

Lap Shear Strength, ISO 4587:

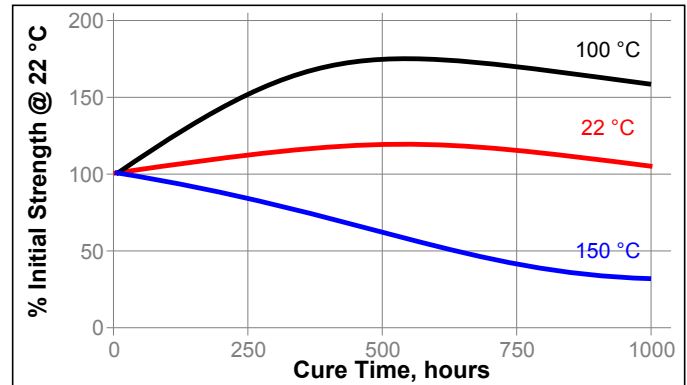
Mild steel (grit blasted)

**Hot Strength**

Tested at temperature

**Heat Aging**

Cured for 5 days @ 22 °C on mild steel (grit blasted) lapshears with no induced gap. Stored in air at temperatures indicated and tested at 22°C.

**Chemical/Solvent Resistance**

Cured for 5 days @ 22 °C on mild steel (grit blasted) lapshears with no induced gap, immersed in conditions indicated and tested @ 22 °C.

Environment	°C	% of initial strength	
		500 h	1000 h
Motor oil (10W-30)	87	90	80
Unleaded gasoline	22	90	90
Water/glycol 50/50	87	90	40
Salt/Fog ASTM B-117	22	20	20
98% RH	40	50	50
Condensing Humidity	49	15	10
Water	22	55	30
Acetone	22	90	90
Isopropanol	22	105	95

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

Environment	°C	% of initial strength	
		500 h	1000 h
98% RH	40	10	0

**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.

**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 20 g 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<sup>LMS</sup>

LMS dated April 14, 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.

#### Conversions

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

#### Note

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Reference 1.0