

Hysol®

Hysol® 9483™

April 2006

PRODUCT DESCRIPTION

Hysol® 9483™ provides the following product characteristics:

Technology	Epoxy
Chemical Type (Resin)	Epoxy
Chemical Type (Hardener)	Amine
Appearance (Resin)	Colorless liquid ^{LMS}
Appearance (Hardener)	Colorless liquid ^{LMS}
Appearance (Mixed)	Ultra clear paste
Components	Two part - Resin & Hardener
Viscosity	Low
Mix Ratio, by volume - Resin : Hardener	2 : 1
Mix Ratio, by weight - Resin : Hardener	100 : 46
Cure	Room temperature cure after mixing
Application	Bonding
Specific Benefit	<ul style="list-style-type: none"> Minimal shrinkage Ultra clear adhesive bondline Excellent impact resistance Excellent dimensional stability over a wide temperature range Resistant to a wide range of chemicals and solvents
Maximum Gap	0.25 mm

Hysol® 9483™ is a low viscosity, industrial grade epoxy adhesive. Once mixed, the two-part epoxy cures at room temperature. Hysol® 9483™ is suitable for bonding and potting where optical clarity and high strength are required. Ideal for bonding decorative panels and displays.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Resin Properties

Specific Gravity @ 25 °C	1.13 to 1.18 ^{LMS}
Flash Point - See MSDS	
Thixotropic Index	1
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP): Spindle 6, speed 20 rpm	5,000 to 12,000 ^{LMS}

Hardener Properties

Specific Gravity @ 25 °C	1.05 to 1.11 ^{LMS}
Flash Point - See MSDS	
Thixotropic Index	1
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP): Spindle 5, speed 50 rpm	1,000 to 3,000 ^{LMS}

Mixed Properties

Viscosity, Brookfield, 25 °C, mPa·s (cP): Spindle 6, speed 20 rpm	3,000 to 11,000
Pot Life @ 22 °C, minutes: 100 g mass	25 to 60 ^{LMS}

TYPICAL CURING PERFORMANCE

Fixture Time

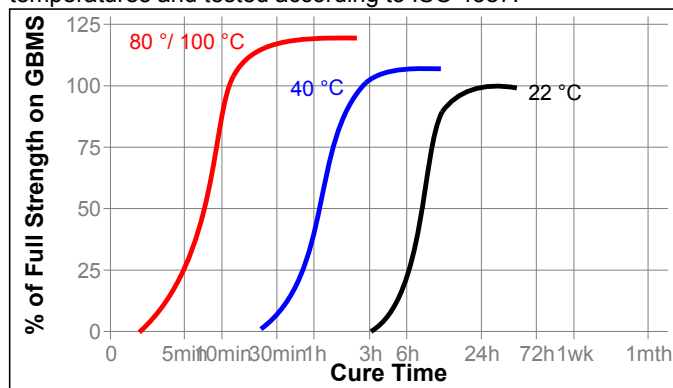
Fixture time is defined as the time to develop a shear strength of 0.1 N/mm².

Fixture Time, @ 22 °C, hours

3.5

Cure Speed vs. Time/Temperature

Hysol® 9483™ develops complete cure within 3 days at room temperature. The rate of cure will depend on the ambient 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 ⁻¹ :	
Temperature Range: 20 °C to 45 °C	50×10 ⁻⁶
Temperature Range: 55 °C to 200 °C	164×10 ⁻⁶

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

Physical Properties:

Coefficient of Thermal Conductivity, ISO 8302, W/(m·K)	0.3
Shore Hardness, ISO 868, Durometer D	65
Glass Transition Temperature, ASTM E 1640, °C	61
Elongation, ISO 527-3, %	3.2
Tensile Strength, ISO 527-3	N/mm ² 47 (psi) (6,800)
Tensile Modulus, ISO 527-3	N/mm ² 2,100 (psi) (300,000)
Compressive Strength, ISO 604	N/mm ² 78 (psi) (11,000)

Electrical Properties:

Dielectric Breakdown Strength, IEC 60243-1, kV/mm	30
Volume Resistivity, IEC 60093, Ω·cm	7×10 ¹⁸
Surface Resistivity, IEC 60093, Ω	4×10 ¹⁵
Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	4.3 / 0.01
1 MHz	3.7 / 0.05
10 MHz	3.5 / 0.05



Technologies

TYPICAL PERFORMANCE OF CURED MATERIAL**Adhesive Properties**

Cured for 5 days @ 22 °C

Lap Shear Strength , ISO 4587:

Mild Steel (grit blasted)	N/mm ²	23
	(psi)	(3,300)
Aluminum (abraded)	N/mm ²	10
(Silicon Carbide Paper, A166 grit, P400A grade)	(psi)	(1,500)
Aluminum (anodised)	N/mm ²	21
	(psi)	(3,100)
Stainless Steel	N/mm ²	10
	(psi)	(1,500)
Polycarbonate	N/mm ²	3.3
	(psi)	(480)
Nylon	N/mm ²	2.4
	(psi)	(350)
Wood (Fir)	N/mm ²	12
	(psi)	(1,800)
ABS	N/mm ²	4
	(psi)	(580)
GRP (Polyester resin matrix)	N/mm ²	2
	(psi)	(290)
Glass Fiber Reinforced Epoxy	N/mm ²	13
	(psi)	(1,900)

Tensile Strength , ISO 6922:

Mild steel pin (grit blasted) to Soda glass	N/mm ²	13
	(psi)	(1,900)

180° Peel Strength, ISO 8510-2:

Mild Steel (grit blasted)	N/mm	1.5
	(lb/in)	(8.6)

TYPICAL ENVIRONMENTAL RESISTANCE

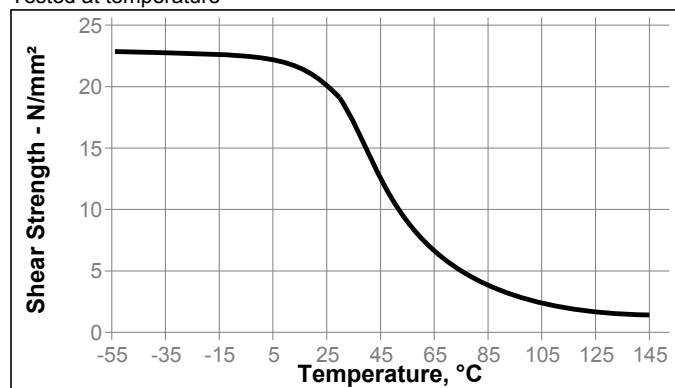
Cured for 5 days @ 22 °C

Lap Shear Strength , ISO 4587:

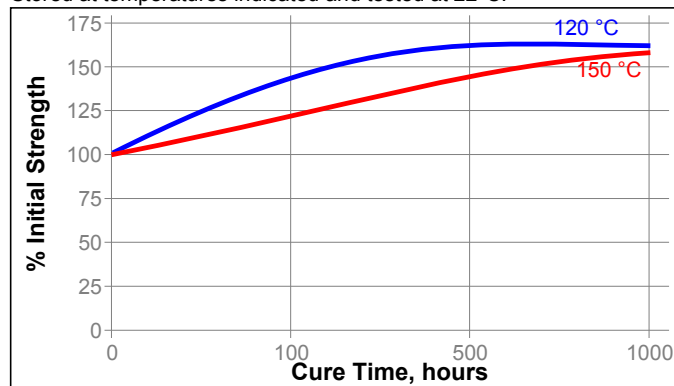
Mild Steel (grit blasted)

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.

Environment	°C	% of initial strength	
		500 h	1000 h
Air	87	155	150
Motor oil (10W-30)	87	160	145
Unleaded gasoline	22	120	110
Water/glycol 50/50	87	115	105
Salt/Fog ASTM B-117	22	70	85
98% RH	40	105	100
Condensing Humidity	49	90	90
Water	22	100	90
Acetone	22	100	105
Isopropanol	22	120	120

Chemical/Solvent Resistance

Immersed in conditions indicated and tested at 22 °C

Tensile Strength , ISO 6922:

Mild steel pin (grit blasted) to Soda glass

Environment	°C	% of initial strength	
		500 h	1000 h
Air	22	180	185
98% RH	40	155	165

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 500 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^{LMS}

LMS dated July 26, 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