Hysol® 9481™

April 2008

PRODUCT DESCRIPTION

Hysol® 9481™ provides the following product characteristics:

Technology	Epoxy
Chemical Type (Resin)	Epoxy
Chemical Type (Hardener)	Amine
Appearance (Resin)	White, Translucent liquid[LMS]
Appearance (Hardener)	Translucent white, light yellow liquid[LMS]
Appearance (Mixed)	Clear paste
Components	Two part - Resin & Hardener
Mix Ratio, by volume - Resin : Hardener	2.7 : 1
Mix Ratio, by weight - Resin : Hardener	100 : 33
Cure	Room temperature cure after mixing
Application	Bonding
Specific Benefit	• Extended pot life • Easy to mix • Clear bond lines • Extended working life
Key Substrates	Glass, Metals, Circuit boards, Fiber optics and Most plastics
Maximum Gap	3.0 mm

Hysol® 9481™ is a general purpose, two component epoxy adhesive, suitable for a wide variety of substrates. It is ideal for bonding fiber optics and printed circuit boards. Hysol® 9481™ is designed for use in component assembly, appliances, electronics and fiber optics, and general industrial repairs where clear bond lines and long working life are required.

Note: Dual cartridge dispenses adhesive in a 2 : 1 ratio. Tests show no significant effect on bond performance compared to 2.7 : 1 ratio.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Resin Properties

Specific Gravity @ 25 °C	1.09 to 1.14[LMS]
Flash Point - See MSDS	
Thixotropic Index	5
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 7, speed 20 rpm	75,000 to 105,000
Spindle 7, speed 2.5 rpm	450,000 to 900,000

Hardener Properties

Specific Gravity @ 25 °C	0.96 to 1.01[LMS]
Flash Point - See MSDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 5, speed 5 rpm	30,000 to 80,000

Mixed Properties

Pot Life @ 25 °C, minutes:	
200 g mass	20 to 70[LMS]

TYPICAL CURING PERFORMANCE

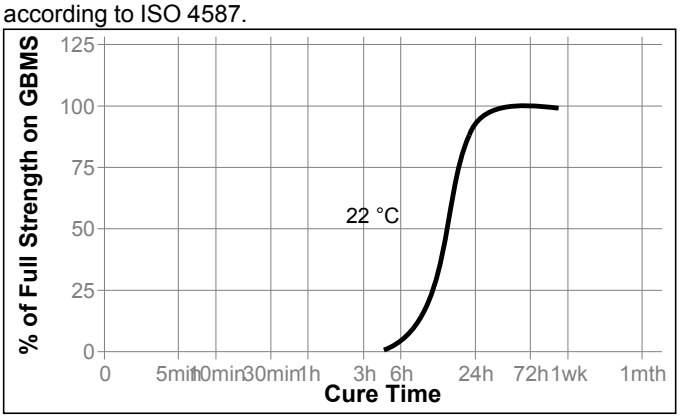
Fixture Time

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

Hysol® 9481™ develops complete cure within 3 days at room temperature. Elevated temperatures may be used to accelerate the cure. The following graph indicates development of shear strength on mild steel (grit blasted) lapshears as a function of time and temperature tested according to ISO 4587.



Alternative Curing Conditions

2 hours @ 60 °C
1 hour @ 82 °C
30 minutes @ 120 °C

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: 45 °C to 55 °C	32×10^{-6}
Temperature Range: 70 °C to 125 °C	124×10^{-6}

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

Physical Properties:

Coefficient of Thermal Conductivity, , ISO 8302, W/(m·K)		0.4
Shore Hardness, ISO 868, Durometer D		85
Glass Transition Temperature, ASTM D 1640, °C		70
Elongation , ISO 527-3,%		2.85
Tensile Strength, ISO 527-3	N/mm² (psi)	34 (4,900)
Tensile Modulus , ISO 527-3	N/mm² (psi)	1,676 (240,000)
Compressive Strength, ISO 604	N/mm² (psi)	76 (11,000)

Electrical Properties:

Volume Resistivity, IEC 60093, Ω·cm	1×10^{15}
Dielectric Breakdown Strength, IEC 60243-1, kV/mm	42
Dielectric Constant / Dissipation Factor, IEC 60250:	
1 kHz	$3.9 / 5.3\times10^{-4}$

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 2 hours @ 60 °C

Lap Shear Strength , ISO 4587:

Mild Steel (grit blasted)	N/mm² (psi)	19 (2,800)
Stainless Steel	N/mm² (psi)	14 (2,000)
Aluminum (abraded) (Silicon Carbide Paper, A166 grit, P400A grade)	N/mm² (psi)	12 (1,700)

Impact Resistance , ISO 9653:

Mild Steel Blocks (grit blasted)	kJ/m² (ft-lbs/in²)	3.9 (1.9)

Cured for 5 days @ 22 °C

Lap Shear Strength , ISO 4587:

Mild steel (grit blasted)	N/mm² (psi)	16 (2,300)
Aluminum (acid etched)	N/mm² (psi)	10 (1,500)
Brass	N/mm² (psi)	10 (1,500)
Zinc dichromate	N/mm² (psi)	10 (1,500)
Galvanized Steel (Hot Dipped)	N/mm² (psi)	6.7 (970)
ABS	N/mm² (psi)	9 (1,300)
GRP	N/mm² (psi)	8 (1,200)
PVC	N/mm² (psi)	6.6 (960)
Glass Fiber Reinforced Epoxy	N/mm² (psi)	13 (1,900)

Tensile Strength , ISO 6922:

Mild steel pin (grit blasted) to Soda glass	N/mm² (psi)	11 (1,600)

180° Peel Strength ISO 8510-2:

Mild steel (grit blasted)	N/mm (lb/in)	<1 (<5.71)

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 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 May 18, 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 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

Note
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Reference 1.2