LOCTITE®

Research, Development & Engineering
Tallaght Business Park,
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Technical Data Sheet
Hysol® 9461

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PRODUCT DESCRIPTION

Loctite Hysol 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 sheer strength in a smooth, non-sag paste that is easily dispensed. Hysol 9461 features a 1:1 mix ratio by weight and volume and 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 FEATURES

Excellent Peel Strength
Excellent Tensile Sheer Strength
Impact and Fatigue Resistant
Non-Sag /Slump Resistant
Easily Mixed/Easily Dispensed
Medium Working Life
Heat Accelerated Cure

PROPERTIES OF UNCURED MATERIAL

Resin	Typical Value
Chemical Type	Epoxy
Appearance	White opaque paste
Specific Gravity @25°C	1.35
Viscosity, DIN 54453, mPas D= $10s^{-1}$ D= $50s^{-1}$	 85,980 38,570
Thixotropic Index	2.8
Flash Point (TCC), °C (°F)	>93 (>200)

Hardener	Typical Value
Chemical Type	Amine
Appearance	Black opaque paste
Specific Gravity @25°C	1.31
Viscosity, DIN 54453, mPas D= $10s^{-1}$ D= $50s^{-1}$	 59,530 42,860
Thixotropic Index	2
Flash Point (TCC), °C (°F)	>93 (>200)

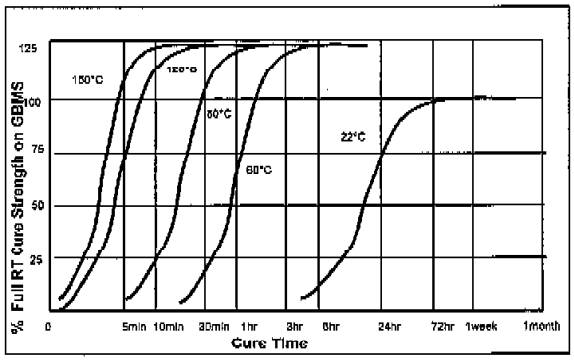
Mixed Adhesive	Typical Value
Appearance	Grey paste
Mix Ratio by Volume (Resin/Hardener)	1:1
Mix Ratio by Weight (Resin/Hardener)	100:100
Maximum gap fill (mm)	3
Working Life of mixed adhesive @22°C (100g mix), minutes	40
Fixture Time (light handling, 0.1N/mm²) @22°C, minutes	240

TYPICAL CURING PERFORMANCE

Cure Speed vs. time/temperature

Hysol 9461 can be cured by a variety of cure schedules to meet processing requirements. Hysol 9461 will achieve handling strength in 4-5 hours at room temperature (note: this can vary with different bond configurations and ambient temperatures).

Full cure time at 22°C is 3 days. After 24 hours, approximately 75% of full cure properties are attained. Heat accelerated cures up to 150°C, such as 6-8 minutes at 120°C can be used to reduce cure time. The following graph indicates development of shear strength on a grit-blasted mild steel lapshears with 0.05mm gap as a function of time and temperature, tested according to ASTM D-1002/EN 1465.



TYPICAL PROPERTIES OF CURED MATERIAL

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

Physical Properties	Typical Value
Young's Modulus, ASTM D638, N/mm²	2,757
Tensile Strength ASTM D638, N/mm²	30
Elongation, ASTM D638, %	3.5
Hardness, ASTM D1706, Shore D	80

PERFORMANCE OF CURED MATERIAL

(cured for 7 days @ 22°C, unless otherwise stated)

Shear Strength, ASTM D1002/ EN 1465 (0.05mm gap unless otherwise stated)	Typical Value (N/mm²)
Steel, Grit Blasted Mild Steel (GBMS)	24.7
Aluminium, Abraded (Silicon Carbide Paper, A166 grit, P400A grade)	21
Aluminium, Etched in Acidic Ferric Sulphate	21.4
Stainless Steel	19.2
Hot Dipped Galvanised Steel	16
Brass	11.3
Zinc Dichromate	16.4
Polycarbonate	6.5
ABS	6.2
GRP (Polyester Resin Matrix)	5
Epoxy (Glass Fibre Reinforced Epoxy)	13

IZOD Impact Resistance. ISO 9653/ASTM D950-98, Steel, GBMS, J/m²	8.3

180° Rigid Peel Strength, ASTM D1876 Steel, GBMS, N/mm	10

NOT FOR PRODUCT SPECIFICATIONS.
THE TECHNICAL DATA CONTAINED HEREIN ARE INTENDED AS REFERENCE ONLY.
PLEASE CONTACT LOCTITE CORPORATION QUALITY DEPARTMENT FOR ASSISTANCE AND RECOMMENDATIONS ON SPECIFICATIONS FOR THIS PRODUCT.
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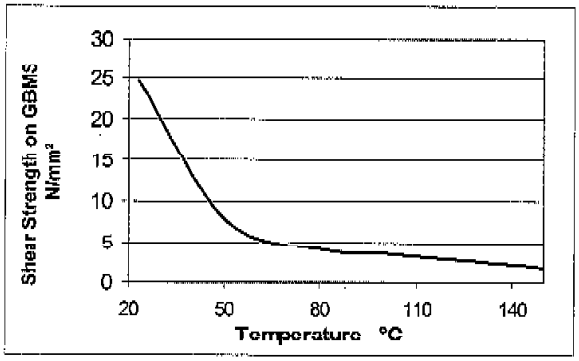
TYPICAL ENVIRONMENTAL RESISTANCE

Test procedure :	ASTM D1002/ EN 1465
Substrate:	Grit blasted mild steel lapshears
Bondline gap:	0.05 mm
Cure procedure:	7 days @22°C

Hot Strength

Tested at temperature.



TYPICAL ENVIRONMENTAL RESISTANCE

Temperature Storage

Stored in air at temperature indicated and tested @22°C.

Temperature	% Initial Strength retained after		
	500 hr	1000 hr	3000 hr
60°C	108	105	106
80°C	117	123	119
100°C	108	102	102
120°C	125	123	123
150°C	136	124	121

Chemical/Solvent Resistance

Immersed in conditions indicated and tested @ 22°C.

Solvent	Temp.	% Initial Strength retained after		
		500 hr	1000 hr	3000 hr
Motor Oil	22°C	100	100	100
Unleaded Petrol	22°C	75	68	62
50% Water Glycol	87°C	77	77	93
4% NaOH/water	22°C	83	79	79
98% Relative Humidity	40°C	83	72	71
Water	60°C	84	74	73
Water	90°C	84	79	56
Acetone	22°C	65	34	34
10% Acetic Acid	22°C	73	66	48
7.5% Salt water solution	22°C	81	81	79

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 oxidising 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 3-5 cm of bead dispensed. Using bulk containers, mix thoroughly by weight or volume in the proportions specified in Properties of Uncured Material section. For hand mixing, weigh or measure out the desired amount of resin and hardener and mix thoroughly. Mix approximately 15 seconds after uniform colour is obtained.
3. Do not mix quantities greater than 4kg, as excessive heat build-up can occur. Mixing smaller quantities will minimise 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. Working Life of the mixed adhesive is 40 minutes at 22°C. Higher temperature 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.

Storage

Product shall be ideally stored in a cool, dry location in unopened containers at a temperature between 8°C to 21°C (46°F to 70°F) unless otherwise labelled. Optimal storage is at the lower half of this temperature range. To prevent contamination of unused product, do not return any material to its original container. For further specific shelf life information, contact your local Technical Service Centre.

Data Ranges

The data contained herein may be reported as a typical value and/or range. Values are based on actual test data and are verified on a periodic basis.

Note

The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Loctite Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Loctite Corporation's products. Loctite Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Loctite Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

Bulk Numbers: Part A – 210038
Part B – 210041

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