LOCTITE®

Research, Development & Engineering
Tallaght Business Park,
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Technical Data Sheet
Hysol® 9463

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PRODUCT DESCRIPTION
Loctite Hysol 9463 is a toughened, two component epoxy adhesive, suitable for applications requiring extremely high peel strength. It is ideal for bonding dissimilar substrates like GRP, SMC and composites. The product attains structural properties after room temperature cure.

TYPICAL APPLICATIONS
The tough nature of this adhesive makes it useful for bonding dissimilar substrates and its viscosity characteristics ensure large gap filling.

TYPICAL FEATURES
High peel and high shear strength
Room temperature cure
Bonds variety of substrates
Long pot life
Excellent low temperature properties

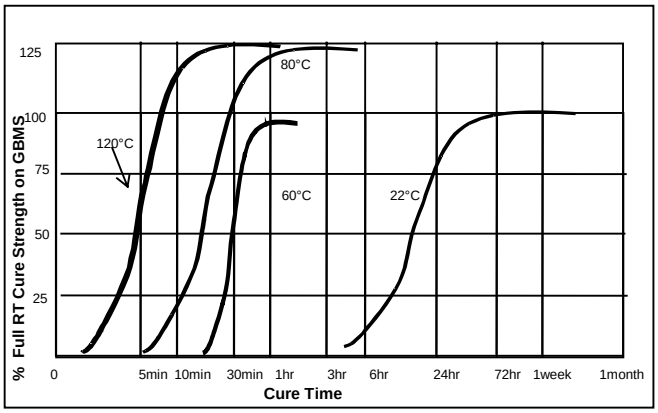
PROPERTIES OF UNCURED MATERIAL

Resin	Typical Value
Chemical Type	Epoxy
Appearance	White-yellow opaque paste
Specific Gravity @25°C	1.15
Brookfield HBT viscosity @25°C Spindle TD @20rpm, mPas	125,000 to 700,000
Flash Point (TCC), °C (°F)	148

Hardener	Typical Value
Chemical Type	Amine
Appearance	Clear liquid
Specific Gravity @25°C	1.00
Brookfield RVT viscosity @25°C Spindle 1 @100rpm, mPas	3 to 50
Flash Point (TCC), °C (°F)	>93 (>200)

Mixed Adhesive	Typical Value
Appearance	Off-White paste
Mix Ratio by Volume (Resin/Hardener)	4:1
Mix Ratio by Weight (Resin/Hardener)	100:23
Maximum gap fill (mm)	2
Working Life of mixed adhesive @22°C (100g mix), minutes	60
Fixture Time (light handling, 0.1N/mm²) @22°C, minutes	300

TYPICAL CURING PERFORMANCE
Hysol 9463 will cure to ultimate properties in 5 days at room temperature. Elevated temperatures may be used to accelerate the cure. For example, 1 hour at 80°C will give complete cure. 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 D1002/EN 1465.



TYPICAL PROPERTIES OF CURED MATERIAL
(1.2mm thick samples cured for 7days@22°C)

Physical Properties	Typical Value
Modulus, ASTM D882, N/mm²	1752
Tensile Strength, ASTM D882, N/mm²	25.6
Elongation, ASTM D 882, %	2.45
Hardness, ASTM D1706, Shore D	75
Coefficient of Thermal Expansion, ASTM E831-93	
(18.5° - 40°), µm/(m·K)	47.4
(55° - 170°), µm/(m·K)	180
Glass Transition Temperature, Tg, °C ASTM E1640-99	58.3

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
Aluminium, Abraded (Silicon Carbide Paper, A166 grit, P400A grade)	16.8
Aluminium, Etched in Acidic Ferric Sulphate	28.6
Stainless Steel	17.1
Brass	17.5
Zinc Dichromate	20.4
Polycarbonate	11.3
ABS	3.4
GRP (Polyester Resin Matrix)	7.8
Epoxy (Glass Fibre Reinforced Epoxy)	19

Tensile Strength, ASTM D2095/EN 26922 GBMS pin to soda glass, N/mm²	30.8

IZOD Impact Resistance, ISO 9653/ASTM D950-98, Steel, GBMS, J/m²	6.5

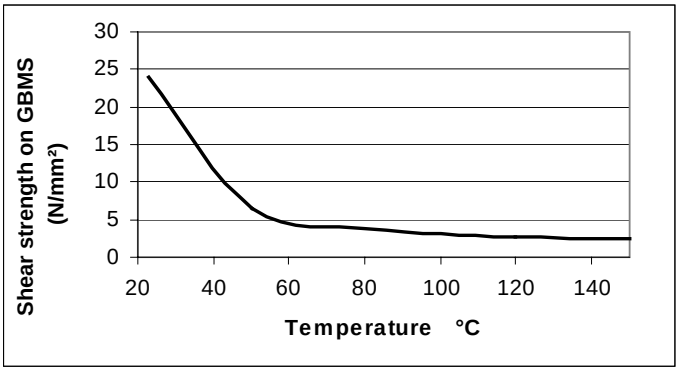
180° Rigid Peel Strength, ASTM D1876	
Steel, GBMS, N/mm	10.5
Aluminium, Acid Etched, N/mm	10.5

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 indicated.



TYPICAL ENVIRONMENTAL RESISTANCE

Temperature Storage

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

Temperature	% Initial Strength retained after		
	500 hr	1000 hr	3000 hr
50ºC	150	133	149
80ºC	149	125	154
100ºC	139	133	174
120ºC	172	147	141
150ºC	131	125	148

Chemical/Solvent Resistance

Immersed in the conditions indicated and tested at 22°C

Solvent	Temp.	% Initial Strength retained after		
		500 hr	1000 hr	3000 hr
Motor Oil	22°C	100	100	99
Unleaded Petrol	22°C	86	82	79
50% Water Glycol	87°C	55	53	53
4% NaOH/water	22°C	78	68	65
98% Relative Humidity	40°C	81	67	58
Water	60°C	86	82	72
Water	90°C	84	66	58
Acetone	22°C	71	60	45
10% Acetic Acid	22°C	62	52	31
7.5% Salt water solution	22°C	79	83	82

Tensile Strength, ASTM D2095/EN 26922, GBMS pin to soda glass				
98% Relative Humidity	40°C	15.6	8	

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. 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. Open time (working time) of the mixed adhesive is 60 minutes at 22°C. Higher temperature and larger quantities will shorten this working time.
6. Excess uncured adhesive can be wiped away with organic solvent (e.g. Acetone).
7. Keep the assembled parts from moving during cure. The joint should be allowed to develop full strength before subjecting to any service loads.
8. After use and before adhesive hardens mixing and dispensing 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: 210036**
Part B: 210037