Hysol® 3422™

November 2007

PRODUCT DESCRIPTION

Hysol® 3422™ provides the following product characteristics:

Technology	Epoxy
Chemical Type	Epoxy
Appearance (Resin)	White liquid[LMS]
Appearance (Hardener)	Clear yellow liquid[LMS]
Appearance (Mixed)	Pale yellow/white
Components	Two part - Resin & Hardener
Viscosity	Slightly thixotropic
Mix Ratio, by volume - Resin : Hardener	1 : 1
Mix Ratio, by weight - Resin : Hardener	100 : 100
Cure	Room temperature cure after mixing
Application	Bonding
Key Substrates	Metals, Ceramics, Rigid plastics and Wood

Hysol® 3422™ is a two component epoxy adhesive which cures rapidly at room temperature after mixing. It is a general purpose, non sag adhesive which develops high strength on a wide range of substrates. The gap filling properties make this adhesive system suitable for rough and poorly fitting surfaces made from metal, ceramic, rigid plastics or wood.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Resin Properties

Specific Gravity @ 25 °C	1.09 to 1.16[LMS]
Flash Point - See MSDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 6, speed 2.5 rpm	15,000 to 55,000[LMS]
Spindle 6, speed 5 rpm	45,000 to 90,000
Viscosity, DIN 54453, mPa·s (cP):	
Shear rate 10 s^{-1}	38,000
Shear rate 100 s^{-1}	30,000

Hardener Properties

Specific Gravity @ 25 °C	1.05 to 1.12[LMS]
Flash Point - See MSDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 6, speed 5 rpm	25,000 to 50,000
Spindle 6, speed 10 rpm	10,000 to 40,000[LMS]
Viscosity, DIN 54453, mPa·s (cP):	
Shear rate 10 s^{-1}	35,000
Shear rate 100 s^{-1}	35,000

Mixed Properties

Pot Life @ 25 °C, minutes:	
10 g mass	1.5 to 6[LMS]

TYPICAL CURING PERFORMANCE

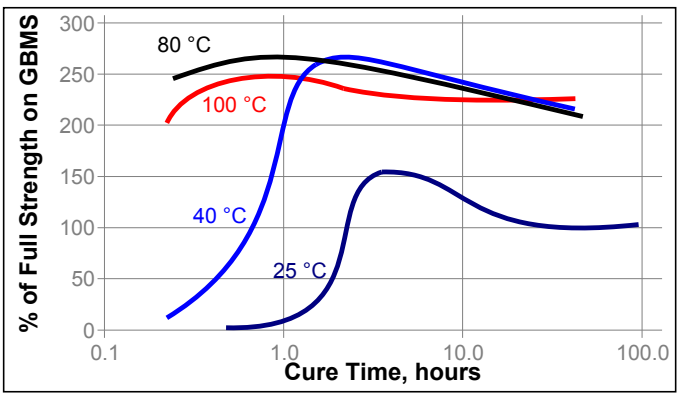
Fixture Time

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

Fixture Time, @ 22 °C, minutes	7

Cure Speed vs. Time/Temperature

Hysol® 3422™ develops high strength at room temperature within 2 hours. 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 11359-2, K^{-1}:	
Temperature Range: 20 °C to 45 °C	67×10^{-6}
Temperature Range: 65 °C to 195 °C	176×10^{-6}

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

Physical Properties:

Coefficient of Thermal Conductivity, ISO 8302, W/(m·K)		0.28
Shore Hardness, ISO 868, Durometer D		70 to 80
Glass Transition Temperature, ASTM E 1640, °C		63
Elongation , ISO 527-3,%		3
Tensile Strength, ISO 527-3	N/mm² (psi)	29 (4,200)
Tensile Modulus , ISO 527-3	N/mm² (psi)	1,300 (190,000)
Compressive Strength, ISO 604	N/mm² (psi)	75 (11,000)

Electrical Properties:

Volume Resistivity, IEC 60093, Ω·cm	0.5×10^{15}
Surface Resistivity, IEC 60093, Ω	2×10^{15}

Dielectric Constant / Dissipation Factor, IEC 60250:

1 kHz	4.0 / 0.02
1 MHz	3.4 / 0.05
10 MHz	3.2 / 0.05

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 7 days @ 22 °C

Lap Shear Strength , ISO 4587:

Steel (grit blasted)	N/mm²	13 to 34
	(psi)	(1,900 to 4,900)
Stainless steel (grit blasted)	N/mm²	3 to 8
	(psi)	(440 to 1,200)
Zinc dichromate	N/mm²	5 to 6.5
	(psi)	(730 to 940)
Aluminum (abraded)	N/mm²	2.5 to 6
	(psi)	(360 to 870)
Aluminum (etched)	N/mm²	6 to 12
	(psi)	(870 to 1,700)
Galvanized Steel (HD)	N/mm²	4 to 7
	(psi)	(580 to 1,000)
Brass	N/mm²	3 to 5
	(psi)	(440 to 730)
Phenolic	N/mm²	0.5 to 1.5
	(psi)	(70 to 220)
Polycarbonate	N/mm²	0.5 to 1.5
	(psi)	(70 to 220)
GRP	N/mm²	0.6 to 0.8
	(psi)	(90 to 120)
ABS	N/mm²	0.5 to 0.8
	(psi)	(70 to 120)
Hardwood (Mahogany)	N/mm²	6 to 9
	(psi)	(870 to 1,300)
Softwood (Red Deal)	N/mm²	6 to 11
	(psi)	(870 to 1,600)

Tensile Strength , ISO 6922:

Mild steel pin (grit blasted) to Soda glass	N/mm²	20
	(psi)	(2,900)

180° Peel Strength, ISO 8510-2:

Mild Steel (grit blasted)	N/mm	0.75 to 1.25
	(lb/in)	(4.3 to 7.1)

TYPICAL ENVIRONMENTAL RESISTANCE

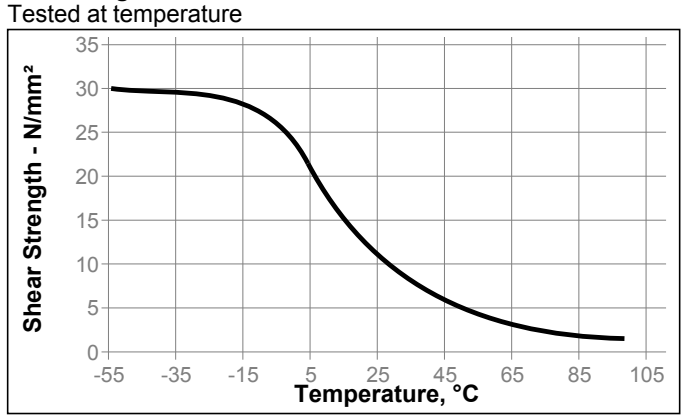
Cured for 7 days @ 22 °C

Lap Shear Strength , ISO 4587:

Mild Steel (grit blasted)

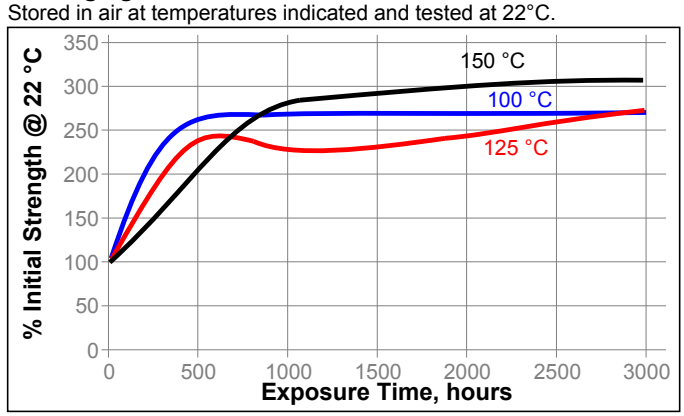
Hot Strength

Tested at temperature



Heat Aging

Stored in air at temperatures indicated and tested at 22°C.



Chemical/Solvent Resistance

Immersed in conditions indicated and tested at 22 °C.

		% of initial strength	
Environment	**°C**	**500 h**	**1000 h**
Acetone	22	175	160
Motor oil	22	190	190
Sodium hydroxide solution, 1 mol	22	180	150
Gasoline	22	145	145
Water/glycol	87	30	20

Chemical/Solvent Resistance

Aged under conditions indicated and tested at 22 °C

Tensile Strength , ISO 6922:

Steel (grit blasted) to Soda glass

		% of initial strength	
Environment	**°C**	**500 h**	**1000 h**
Humidity, 98% RH	40	105	110

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[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

(°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

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, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel 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 Henkel 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.

Trademark usage

Reference 1.1