LOCTITE®

Hysol® E-20NS™

March 2009

PRODUCT DESCRIPTION

Hysol® E-20NS™ provides the following product characteristics:

Technology	Epoxy
Chemical Type (Resin)	Epoxy
Chemical Type (Hardener)	Amine
Appearance (Resin)	Off-white paste[LMS]
Appearance (Hardener)	Brown paste[LMS]
Appearance (Mixed)	Tan Solid[LMS]
Components	Two component - requires mixing
Viscosity	Medium
Mix Ratio, by volume - Resin : Hardener	2 : 1
Mix Ratio, by weight - Resin : Hardener	100 : 48
Cure	Room temperature cure after mixing
Application	Bonding

Hysol® E-20NS™ is a non-sagging industrial grade epoxy adhesive. Once mixed, the two component epoxy cures at room temperature to form a light tan, tough bondline, which provides high peel resistance and high shear strengths. When fully cured, the epoxy is resistant to a wide range of chemicals and solvents, and acts as an excellent electrical insulator. Develops strong, tough bonds on aluminum, stainless steel and other metals, as well as glass, ceramics, and plastics. Its non-sagging formula is well suited for use on vertical surfaces to avoid run-off.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Resin:

Specific Gravity @ 25 °C	1.3 to 1.6[LMS]
Flash Point - See MSDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 7, speed 20 rpm	80,000 to 280,000[LMS]

Hardener:

Specific Gravity @ 25 °C	1.4 to 1.6[LMS]
Flash Point - See MSDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):	
Spindle 7, speed 50 rpm	30,000 to 90,000[LMS]

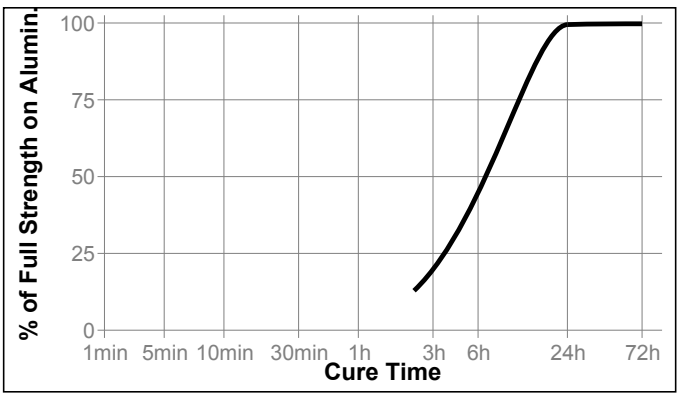
Mixed:

Specific Gravity @ 25 °C	1.43
Working life, minutes	20
Tack Free Time , minutes	20

TYPICAL CURING PERFORMANCE

Cure Speed vs. Time

The graph below shows shear strength developed with time on abraded, acid etched aluminum lapshears @ 25 °C with an average bondline gap of 0.1 to 0.2 mm and tested according to ISO 4587.



TYPICAL PROPERTIES OF CURED MATERIAL

Cured @ 25 °C

Physical Properties:

Glass Transition Temperature (Tg), °C		87
Shore Hardness, ISO 868, Durometer D		84 to 94[LMS]
Elongation, ISO 527-2, %		4
Tensile Strength, ISO 527-2	N/mm²	23
	(psi)	(3,335)

Electrical Properties:

Dielectric Breakdown Strength, IEC 60243-1, kV/mm	24

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

Cured for 5 days @ 22 °C

Lap Shear Strength, ISO 4587:

Steel (grit blasted)	N/mm²	19.2
	(psi)	(2,790)
Aluminum (acid etched & abraded), 0.1 to 0.2 mm gap	N/mm²	17.3
	(psi)	(2,500)
Aluminum (anodised)	N/mm²	9
	(psi)	(1,300)
Stainless steel	N/mm²	8.5
	(psi)	(1,230)
Polycarbonate	N/mm²	13.2
	(psi)	(1,290)
Nylon	N/mm²	1.4
	(psi)	(210)
Wood (Fir)	N/mm²	9.9
	(psi)	(1,440)

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Block Shear Strength, ISO 13445:

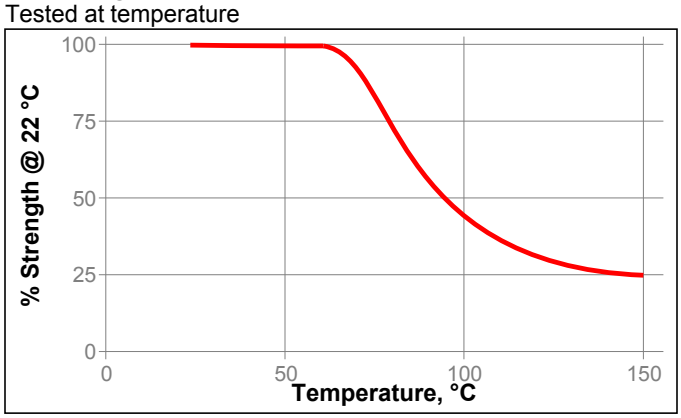
PVC	N/mm²	8.9
	(psi)	(1,290)
ABS	N/mm²	11.2
	(psi)	(1,620)
Epoxy	N/mm²	22.9
	(psi)	(3,320)
Acrylic	N/mm²	2.1
	(psi)	(300)
Glass	N/mm²	9.3
	(psi)	(1,350)

TYPICAL ENVIRONMENTAL RESISTANCE

Cured for 12 hours @ 65 °C followed by 4 hours @ 22 °C
Lap Shear Strength, ISO 4587:
Aluminum (acid etched & abraded), 0.1 to 0.2 mm gap

Hot Strength

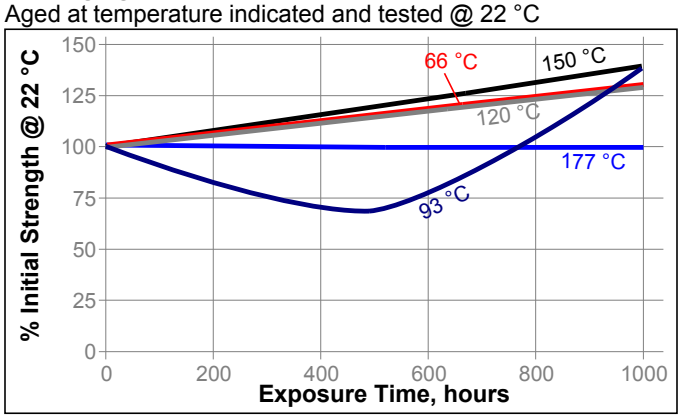
Tested at temperature



Cured for 5 days @ 22 °C
Lap Shear Strength, ISO 4587:
Steel

Heat Aging

Aged at temperature indicated and tested @ 22 °C



Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C.

		% of initial strength	
Environment	**°C**	**500 h**	**1000 h**
Air	87	---	125
Motor oil (10W30)	87	120	135
Unleaded gasoline	87	---	105
Water/glycol 50/50	87	115	115
Salt fog	22	---	60
95% RH	38	---	70
Condensing Humidity	49	---	70
Water	22	---	70
Acetone	22	---	85
Isopropanol	22	---	105

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).

Directions for use:

1. For high strength structural bonds, remove surface contaminants such as paint, oxide films, oils, dust, mold release agents and all other surface contaminants.
2. Use gloves to minimize skin contact. DO NOT use solvents for cleaning hands.
3. **Dual Cartridges:** To use simply insert the cartridge into the application gun and start the plunger into the cylinders using light pressure on the trigger. Next, remove the cartridge cap and expel a small amount of adhesive to be sure both sides are flowing evenly and freely. If automatic mixing of resin and hardener is desired, attach the mixing nozzle to the end of the cartridge and begin dispensing the adhesive. For hand mixing, expel the desired amount of the adhesive and mix thoroughly. Mix for approximately 15 seconds after uniform color is obtained.
   Bulk Containers: Mix thoroughly by weight or volume in the proportions specified in Product Description section. Mix vigorously, approximately 15 seconds after uniform color is obtained.
4. For maximum bond strength apply adhesive evenly to both surfaces to be joined.
5. Application to the substrates should be made within 20 minutes. Larger quantities and/or higher temperatures will reduce this working time.
6. Join the adhesive coated surfaces and allow to cure at 25 °C for 24 hours for high strength. Heat up to 93 °C, will speed curing.
7. Keep parts from moving during cure. Contact pressure is neccesary. Maximum shear strength is obtained with a 0.1 to 0.2 mm bond line.
8. Excessive uncured adhesive can be cleaned up with ketone type solvents.

Loctite Material Specification[LMS]
LMS dated June 16, 2006 (Resin) and LMS dated July 9, 2001 (Hardener). 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 Loctite 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
µm / 25.4 = mil
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.

Reference 0.2