

LOCTITE® EA E-20NS™

Known as Hysol® E-20NS™
January 2018

PRODUCT DESCRIPTION

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

Technology	Epoxy
Chemical Type (Resin)	Epoxy
Chemical Type (Hardener)	Amine
Appearance (Resin)	Off-white ^{LMS}
Appearance (Hardener)	Tan to Light Green ^{LMS}
Appearance (Mixture)	Off-white ^{LMS}
Components	Two components - 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

LOCTITE® EA E-20NS™ is a non-sagging industrial grade epoxy adhesive. Once mixed, the two component epoxy cures at room temperature to form an off white, 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 SDS	
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 SDS	
Viscosity, Brookfield - RVT,25°C,mPa·s (cP):	
Spindle 7,, speed 50 rpm	30,000 to 90,000 ^{LMS}

Mixed Properties:

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

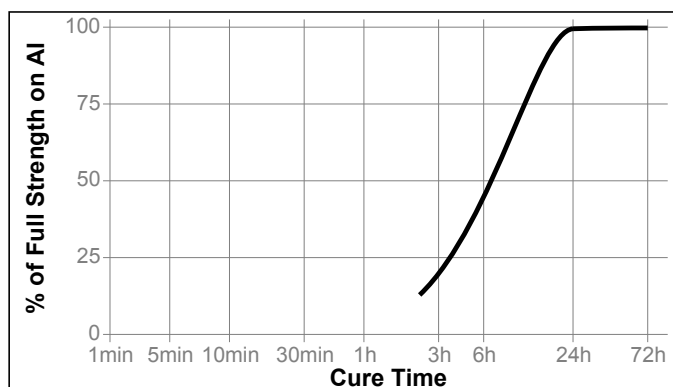
TYPICAL CURING PERFORMANCE

Gel Time

Gel time, 100 °C, minutes	40 to 80 ^{LMS}
---------------------------	-------------------------

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	75
Coefficient of Thermal Expansion, ISO 11359-2, K ⁻¹ :	
Pre Tg	52×10 ⁻⁰⁶
Post Tg	183×10 ⁻⁰⁶
Shore Hardness, ISO 868, Durometer D	84 to 94 ^{LMS}
Elongation, ISO 527-2, %	4
Tensile Strength, ISO 527-2	N/mm ² 23 (psi) (3,335)

Electrical Properties:

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

TYPICAL PERFORMANCE OF CURED MATERIAL**Adhesive Properties**

Cured for 2 hours @ 65 °C

Lap Shear Strength :

Aluminum 0.12 to 0.13 mm gap

N/mm² ≥3.47^{LMS}
(psi) (500)

Cured for 5days @ 22°C

Lap Shear Strength :

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)

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**

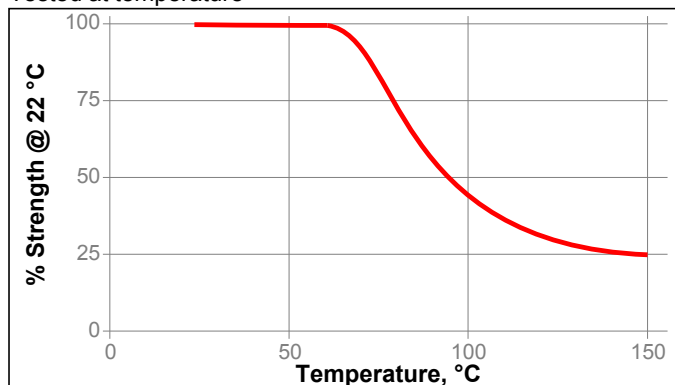
Cured for 12 hours @ 65°C followed by 4 hours @ 22 °C

Lap Shear Strength :

Aluminum (acid etched & abraded), 0.1 to 0.2 mm gap

Hot Strength

Tested at temperature



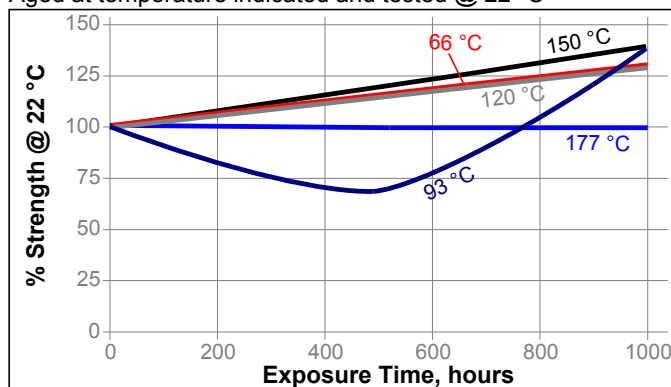
Cured for 5days @ 22°C

Lap Shear Strength :

Steel

Heat Aging

Aged at temperature indicated and tested @ 22 °C

**Chemical/Solvent Resistance**

Aged under conditions indicated and tested @ 22 °C.

Environment	°C	% of initial strength	
		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 Safety Data Sheet (SDS).

Directions for use

- For high strength structural bonds, remove surface contaminants such as paint, oxide films, oils, dust, mold release agents and all other surface contaminants.
- Use gloves to minimize skin contact. DO NOT use solvents for cleaning hands.
- 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.
- 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 necessary. 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 Henkel representative.

Conversions

$(^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$
 $\text{kV/mm} \times 25.4 = \text{V/mil}$
 $\text{mm} / 25.4 = \text{inches}$
 $\mu\text{m} / 25.4 = \text{mil}$
 $\text{N} \times 0.225 = \text{lb}$
 $\text{N/mm} \times 5.71 = \text{lb/in}$
 $\text{N/mm}^2 \times 145 = \text{psi}$
 $\text{MPa} \times 145 = \text{psi}$
 $\text{N}\cdot\text{m} \times 8.851 = \text{lb}\cdot\text{in}$
 $\text{N}\cdot\text{m} \times 0.738 = \text{lb}\cdot\text{ft}$
 $\text{N}\cdot\text{mm} \times 0.142 = \text{oz}\cdot\text{in}$
 $\text{mPa}\cdot\text{s} = \text{cP}$

Disclaimer

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product. Any liability in respect of the information in the Technical Data Sheet or any other written or oral recommendation(s) regarding the concerned product is excluded, except if otherwise explicitly agreed and except in relation to death or personal injury caused by our negligence and any liability under any applicable mandatory product liability law.

In case products are delivered by Henkel Belgium NV, Henkel Electronic Materials NV, Henkel Nederland BV, Henkel Technologies France SAS and Henkel France SA please additionally note the following:

In case Henkel would be nevertheless held liable, on whatever legal ground, Henkel's liability will in no event exceed the amount of the concerned delivery.

In case products are delivered by Henkel Colombiana, S.A.S. the following disclaimer is applicable:

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. Henkel is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product.

Any liability in respect of the information in the Technical Data Sheet or any other written or oral recommendation(s) regarding the concerned product is excluded, except if otherwise explicitly agreed and except in relation to death or personal injury caused by our negligence and any liability under any applicable mandatory product liability law.

In case products are delivered by Henkel Corporation, or Henkel Canada Corporation, the following disclaimer is applicable:

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

Except as otherwise noted, all trademarks in this document are trademarks of Henkel Corporation in the U.S. and elsewhere. ® denotes a trademark registered in the U.S. Patent and Trademark Office.

Reference 0.4

