Technical Data Sheet

# LOCTITE® EA 9455

Known as Hysol 9455
June 2014

## PRODUCT DESCRIPTION

LOCTITE® EA 9455 provides the following product characteristics:

| | |
|---|---|
| **Technology** | Epoxy |
| Chemical Type (Resin) | Epoxy |
| Chemical Type (Hardener) | Mercaptan |
| Appearance (Resin) | Colorless liquid[LMS] |
| Appearance (Hardener) | Clear colorless liquid[LMS] |
| Appearance (Mixture) | Ultra clear liquid |
| Viscosity | Low |
| Components | Two part - Resin & Hardener |
| Mix Ratio, by volume - Resin : Hardener | 1 : 1 |
| Mix Ratio, by weight - Resin : Hardener | 100 : 105 |
| **Cure** | Room temperature cure after mixing |
| **Application** | Bonding |
| Strength | High |
| Specific Benefit | • Toughness<br>• Excellent electrical insulator<br>• Low shrinkage properties<br>• Ultra clear adhesive bondline<br>• Good peel resistance |
| Key Substrates | Plastics, Metals , Glass, Wood, Ceramics and Rubbers |

LOCTITE® EA 9455 is a fast-curing, toughened, low viscosity, industrial grade epoxy adhesive. Ideal for bonding and potting of optical components like sensors and lenses.

## TYPICAL PROPERTIES OF UNCURED MATERIAL

**Resin Properties**

Specific Gravity @ 25 °C 1.09 to 1.15[LMS]
Flash Point - See SDS
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):
Spindle 5, speed 50 rpm, 1,200 to 2,750[LMS]

**Hardener Properties**

Specific Gravity @ 25 °C 1.09 to 1.15[LMS]
Flash Point - See SDS
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP):
Spindle 4, speed 20 rpm, 1,500 to 4,500[LMS]

**Mixed Properties**

Pot Life @ 25 °C, minutes:
10 g mass 2 to 7[LMS]

## TYPICAL CURING PERFORMANCE

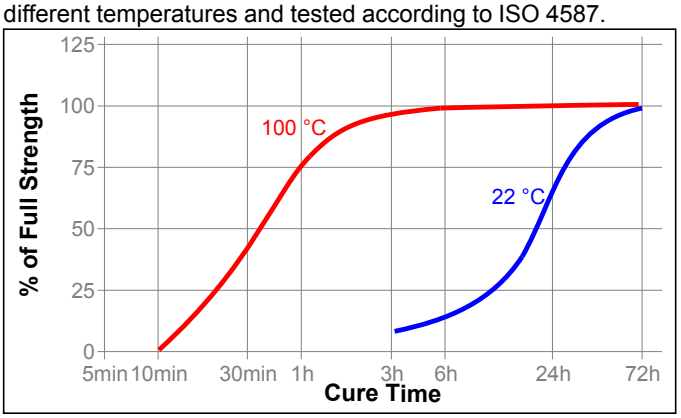
### Fixture Time

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

Fixture Time, @ 22 °C, minutes 15

### Cure Speed vs. Time/Temperature

LOCTITE® EA 9455 develops high strength at room temperature within 3 to 6 hours. The assembled parts will be fixtured for light handling (0.1 N/mm² ) after 15 minutes at room 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 11359-1, $K^{-1}$:
Temperature Range: -15 °C to 25 °C $38\times10^{-6}$
Temperature Range: 45 °C to 200 °C $191\times10^{-6}$

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

**Physical Properties** :

| | | |
|---|---|---|
| Shore Hardness, ISO 868, Durometer D | | 50 |
| Elongation , ISO 527-3,% | | 80 |
| Tensile Strength, ISO 527-3 | N/mm² (psi) | 1.3 (190) |
| Tensile Modulus , ISO 527-3 | N/mm² (psi) | 60 (8,700) |

**Electrical Properties**:

| | |
|---|---|
| Dielectric Breakdown Strength IEC 60243-1, kV/mm | 15.6 |
| Volume Resistivity, IEC 60093, Ω·cm | $900\times10^{15}$ |
| Surface Resistivity, IEC 60093, Ω | $90\times10^{15}$ |
| Dielectric Constant / Dissipation Factor, IEC 60250: | |
| 1 kHz | 8.5 / 0.27 |
| 1 MHz | 4.6 / 0.12 |
| 10 MHz | 3.0 / 0.09 |

## TYPICAL PERFORMANCE OF CURED MATERIAL

**Adhesive Properties**

Cured for 7 days @ 22 °C

Lap Shear Strength , ISO 4587:

| | | |
|---|---|---|
| Mild steel (grit blasted) | N/mm² (psi) | 14 (2,000) |
| Aluminum (abraded) (Silicon Carbide Paper, A166 grit, P400A grade) | N/mm² (psi) | 6 (1,700) |
| Aluminum (acid etched) | N/mm² (psi) | 13 (1,900) |
| Aluminum (anodised) | N/mm² (psi) | 7 (1,000) |
| Stainless steel | N/mm² (psi) | 9 (1,300) |
| Polycarbonate | N/mm² (psi) | 2 (290) |
| Nylon | N/mm² (psi) | 0.3 (40) |
| Softwood (Deal) | N/mm² (psi) | 3 (440) |
| Hardwood (Teak) | N/mm² (psi) | 4 (580) |
| Wood (Fir) | N/mm² (psi) | 3 (440) |
| ABS | N/mm² (psi) | 2 (290) |
| PVC | N/mm² (psi) | 2 (290) |
| GRP (Polyester resin matrix) | N/mm² (psi) | 3 (440) |

180° Peel Strength ISO 8510-2:

| | | |
|---|---|---|
| Mild Steel (grit blasted) | N/mm (lb/in) | 1.8 (10.3) |

Tensile Strength , ISO 6922:

| | | |
|---|---|---|
| Mild steel (grit blasted) to Soda glass | N/mm² (psi) | 12 (1,700) |

Impact Resistance , ISO 9653:

| | | |
|---|---|---|
| Mild Steel Blocks (grit blasted) | kJ/m² (ft-lbs/in² ) | 3.5 (1.7) |

## TYPICAL ENVIRONMENTAL RESISTANCE

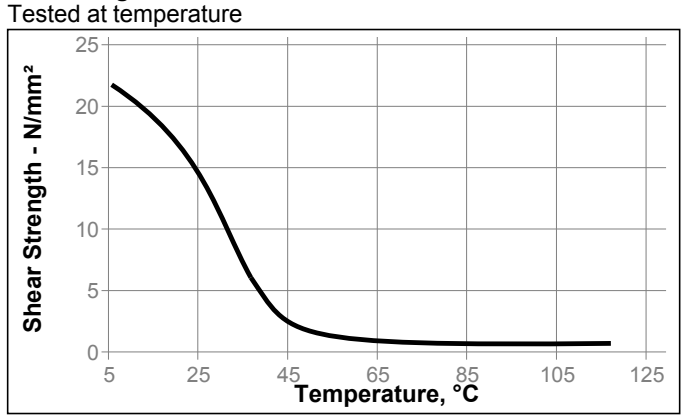
Cured for 7 days @ 22 °C

Lap Shear Strength , ISO 4587:

Mild steel (grit blasted)

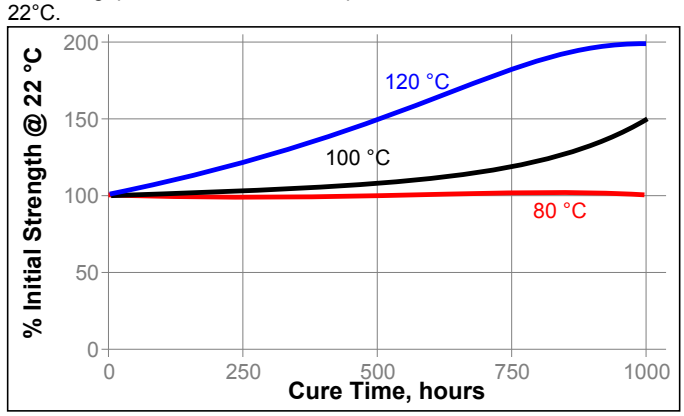
### Hot Strength

Tested at temperature




### Heat Aging

Cured for 5 days @ 22 °C on mild steel (grit blasted) lapshears with no induced gap. Stored in air at temperatures indicated and tested at 22°C.




### Chemical/Solvent Resistance

Cured for 5 days @ 22 °C on mild steel (grit blasted) lapshears with no induced gap, immersed in conditions indicated and tested @ 22 °C.

| | | % of initial strength | |
|---|---|---|---|
| **Environment** | **°C** | **500 h** | **1000 h** |
| Motor oil (10W30) | 87 | 120 | 180 |
| Unleaded gasoline | 22 | 150 | 150 |
| Water/glycol 50/50 | 87 | 0 | 0 |
| Salt/Fog ASTM B-117 | 22 | 5 | 0 |
| 98% RH | 40 | 20 | 10 |
| Water | 22 | 50 | 30 |
| Acetone | 22 | 100 | 100 |
| Isopropanol | 22 | 135 | 100 |

Tensile Strength , ISO 6922, Cured for 7 days @ 22 °C, Mild steel pin (grit blasted) to Soda glass

| | | % of initial strength | |
|---|---|---|---|
| **Environment** | **°C** | **500 h** | **1000 h** |
| 98% RH | 40 | 10 | 0 |

## 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 May 18, 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 = N/mm²
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

## Disclaimer

**Note:**

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.

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Reference 1.3