Technical Data Sheet

LOCTITE® EA 3471 NA

Known as FIXMASTER STEEL PUTTY
May 2017

PRODUCT DESCRIPTION

LOCTITE® EA 3471 NA provides the following product characteristics:

Technology	Epoxy
Chemical Type	Epoxy
Appearance (Resin)	Grey
Appearance (Hardener)	White
Appearance (Mixed)	Grey putty
Mix Ratio, by weight - Resin : Hardener	6.25 : 1
Mix Ratio, by volume - Resin : Hardener	2.5 : 1
Cure	Room temperature cure after mixing
Application	Metal Repair
Application Temperature	15 to 30°C (59 to 86°F)
Specific Benefit	• Will not sag or shrink • Rebuilds worn parts fast - limits downtime • High steel content - cures to a metal-like finish • Superior adhesion - bonds well to all metal substrates

LOCTITE® EA 3471 NA is a steel reinforced, two-part epoxy repair putty that cures to a metal-like finish and can be machined, drilled, tapped or filed. Typical applications include repairing non-structural defects in castings, making jigs and fixtures, sealing vessels, tanks and valves, resurfacing worn air seals and filling cavitated areas. This product is typically used in applications with an operating range of -30 °C to 105 °C.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Resin:

Density @ 22 °C		2.43

Hardener:

Density @ 22 °C		1.08

Mixed:

Weight per volume	kg/L (lbs/gal)	2.64 to 2.76 (22 to 23)
Flash Point - See SDS		

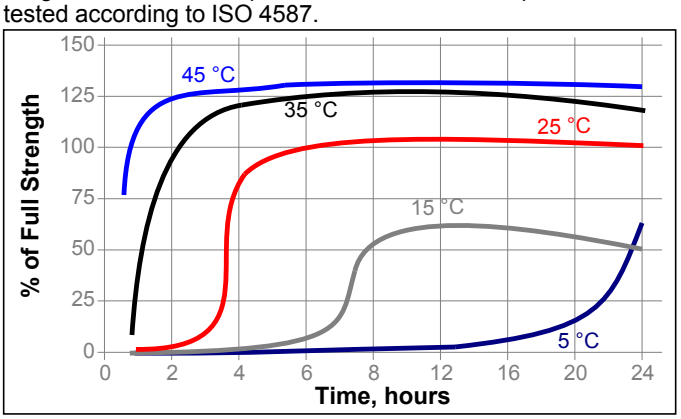
TYPICAL CURING PERFORMANCE

Curing Properties

Gel Time @ 21 °C, minutes	35 to 40
Working life, minutes	30

Cure Speed vs. Temperature

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

Cured @ 25 °C except where noted

Physical Properties:

Tensile Strength, ISO 527-2	N/mm²	27.8
	(psi)	(4,040)
Tensile Modulus, ASTM D638	N/mm²	9,360
	(psi)	(1,357,180)
Compressive Strength, ISO 604	N/mm²	61.7
	(psi)	(8,940)
Compressive Modulus, ISO 604	N/mm²	3,400
	(psi)	(521,740)
Flexural strength , ASTM D790	N/mm²	56.4
	(psi)	(8,190)
Flexural modulus	N/mm²	3,500
	(psi)	(507,540)

Shore Hardness, ISO 868, Shore D	82
Glass Transition Temperature, ASTM E 1640, °C	60
Coefficient of Thermal Expansion, ISO 11359-2 K^{-1}:	
Below Tg	43×10^{-06}
Above Tg	125×10^{-06}
Elongation, ISO 527-2, %	0.49
Volume Shrinkage, %	1.63
Coefficient of Thermal Conductivity ASTM F 433, W/(m·K)	0.523

Abrasion Resistance, ASTM D4060: mg 1 Kg load, CS-10 wheels, Weight of Material Lost	156

Electrical Properties:

Volume Resistivity, IEC 60093, ohm-cm	1.1×10^{15}
Surface Resistivity, IEC 60093, ohms	3.1×10^{15}

TYPICAL PERFORMANCE OF CURED MATERIAL

Shear Strength

Lap Shear Strength, ISO 4587:

Grit Blasted Mild Steel (GBMS)	N/mm²	9.6
	(psi)	(1,395)

TYPICAL ENVIRONMENTAL RESISTANCE

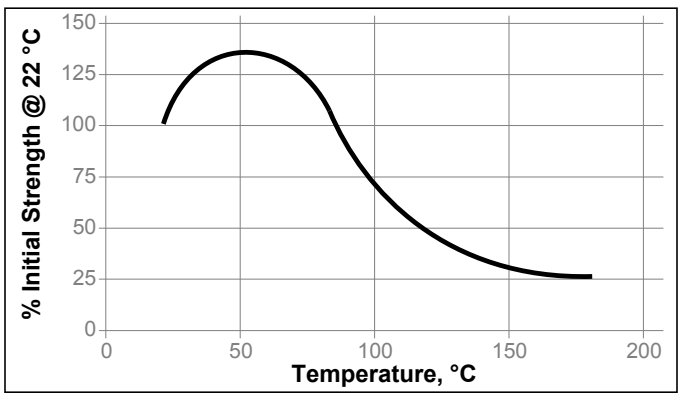
Cured for 72 hours @ 21°C

Lap Shear Strength, ISO 4587:

Grit Blasted Mild Steel (GBMS)

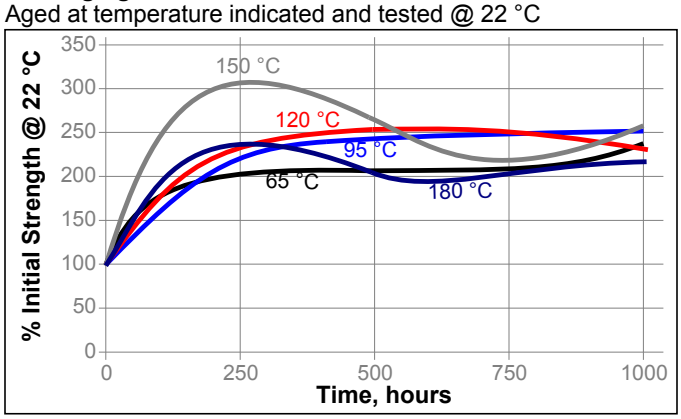
Hot Strength

Tested at temperature



Heat Aging

Aged at temperature indicated and tested @ 22 °C



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).

Surface Preparation

Proper surface preparation is critical to the long-term performance of this product. The exact requirements vary with severity of the application, expected service life, and initial substrate conditions

Directions for use:

1. Remove dirt, oil, grease, etc. with a suitable cleaner, e.g. high pressure water cleaning system using Loctite® SF 7840™ (Loctite® Natural Blue® cleaner/degreaser).

2. Blast all surfaces to be coated with a sharp edged angular grit to a depth of profile of 75 to 100 microns and a degree of cleanliness of Near White Metal (SIS SA 2½ /SSPC-SP 10).

3. After blasting, metal surfaces should be cleaned with waterless cleaner, e.g. with Loctite® SF 7611™ (Loctite® Pro Strength Parts Cleaner), and be coated before any oxidation or contamination takes place.

4. Metal that has been in contact with salt solutions, e.g. seawater, should be grit blasted, high-pressure water blasted, and left for 24 hours to allow any salts in the metal to sweat to the surface. A test for chloride contamination should be performed. The procedure should be repeated until chloride concentration on the surface is below 40 ppm.

Application

1. Mix resin and hardener according to mix ratios listed or transfer entire kit onto a clean and dry mixing surface and mix material vigorously until a uniform color is obtained.
2. Apply material to prepared surface by first forcing a thin layer deep into the texture of the substrate.
3. Then Immediately build up to the desired finished thickness.
4. If using to rebuild shaft, the following applies:
   - Machine the worn area down 3 mm (0.125 in) to produce a square shoulder on part. The material is stronger with a square edge versus a feathered edge.
   - Machine a spiral cut in bottom of area to be repaired to provide mechanical keying into surface.
   - Apply excess product to ensure small shrinkage during cure does not produce depression.
   - Machine the surface to original dimensions prior to full cure, as the product is very wear resistant.

Inspection

- Visually inspect for pinholes and misses just after application.
- Once the coating has cured, repeat visual inspection to confirm it is free from pinholes, misses and mechanical damages.
- Control thickness of the coating, especially in the critical points.
- Perform a test with a holiday detector to confirm coating continuity.

Coverage

To achieve a 6 mm (.25 in) thickness, the coverage rate will be 278cm² (43in²) for 0.45kg (1lb), excluding overthickness, repairs, etc.

Repairs

Any voids, pinholes, or low thickness areas found in the coating should be repaired by lightly abrading, cleaning, and applying further product.

Clean-up

Immediately after use clean tools with suitable cleaner, e.g. Loctite® 7070™ or a solvent such as acetone or isopropyl alcohol. Once cured, the material can only be removed mechanically

Technical Tips for Working With Epoxies

Environmental Conditions

- Relative humidity: <85%
- Ambient temperature: >15°C (60F) and rising
- Substrate temperature must always be 3°C (7F) higher than the dew point to avoid condensing moisture on parts.

Working time and cure depends on temperature and mass:

- The higher the temperature, the faster the cure.
- The larger the mass of material mixed, the faster the cure.

To speed the cure of epoxies at low temperatures:

- Store epoxy at room temperature.
- Pre-heat repair surface until warm to the touch.

To slow the cure of epoxies at high temperatures:

- Mix epoxy in small masses to prevent rapid curing.
- Cool resin/hardener component(s).

Not for product specifications

The technical data contained herein are intended as reference only. Please contact your local quality department for assistance and recommendations on specifications for this product.

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

Reference 0.2