Technical Data Sheet

LOCTITE® EA 3981

September 2020

PRODUCT DESCRIPTION

LOCTITE® EA 3981 provides the following product characteristics:

Technology	Epoxy
Chemical Type	Epoxy
Appearance (uncured)	Translucent, slight amber liquid[LMS]
Appearance (cured)	Translucent, slight amber solid[LMS]
Fluorescence	Positive under UV light
Components	One component – requires no mixing
Cure	Heat cure
Cure benefit	Production - high speed curing
Application	Assembly of disposable medical devices
Key substrates	Stainless steel and plastics

LOCTITE® EA 3981 is suitable for a wide range of applications that require fast cure, excellent environmental resistance and high adhesion. The product cures rapidly when exposed to temperatures as low as 100°C and achieves excellent adhesion to plastics, metals and glass. LOCTITE® EA 3981 was specifically designed for bonding stainless steel cannulae into hubs, syringes and lancets for needle assemblies. Suitable for use in the assembly of **disposable medical devices**.

ISO-10993

LOCTITE® EA 3981 has been tested to Henkel's test protocols based on ISO 10993 biocompatibility standards, as a means to assist in the selection of products for use in the medical device industry.

TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific gravity @ 25 °C	1.14
Flash point - see SDS	
Viscosity , Brookfield SSA - RVT,25°C,mPa·s (cP)	
Spindle 14, speed 50 rpm	4,000 to 6,000[LMS]

TYPICAL CURING PERFORMANCE

Cure schedule

Typical cure times were estimated as >99% conversion using differential scanning calorimetry:
@100°C, 35 minutes
@125°C, 23 minutes
@150°C, 16 minutes

TYPICAL PROPERTIES OF CURED MATERIAL

Cured for 30 minutes @120°C

Physical properties

Shore hardness, ISO 868, Durometer D	≥70[LMS]

Cured for 30 minutes @125°C

Physical properties

Coefficient of thermal expansion, ISO 11359-2, K^{-1}		
Pre Tg (Alpha 1)		$62x10^{-6}$
Post Tg (Alpha 2)		$193x10^{-6}$
Glass transition temperature, ASTM E 228, °C		56
Linear shrinkage, ASTM D 792, in/in		1.4
Water absorption, ISO 62, %		
2 hours in boiling water		1.8
7 days in water @ 22 °C		0.63
Elongation at break, ISO 527-3, %		2.98
Tensile strength, ISO 527-3	N/mm^2 (psi)	62 (8,970)
Tensile modulus, ISO 527-3	N/mm^2 (psi)	2,383 (345,500)

TYPICAL PERFORMANCE OF CURED MATERIAL

Cured for 30 minutes @ 120°C

Adhesive properties

Lap shear strength:		
Aluminum (etched) 0.125 mm gap	N/mm^2 (psi)	≥13.8[LMS] (≥2,000)

Cured for 30 minutes @100°C

Needle Pullout Strength:

Material	22 Gauge Cannula		27 Gauge Cannula	
ABS	N (lb)	302 (68)	N (lb)	147 (33)
Acrylic	N (lb)	276 (62)	N (lb)	142 (32)
Polycarbonate	N (lb)	89 (20)	N (lb)	76 (17)
Polyethylene	N (lb)	13 (3)	N (lb)	13 (3)
Polyethylene (plasma treated)	N (lb)	214 (48)	N (lb)	138 (31)
Polypropylene	N (lb)	53 (12)	N (lb)	13 (3)
Polypropylene (plasma treated)	N (lb)	160 (36)	N (lb)	98 (22)
Polystyrene	N (lb)	191 (43)	N (lb)	125 (28)
Polyurethane	N (lb)	280 (63)	N (lb)	151 (34)

Cured for 30 minutes @125°C

Block Shear Strength, ISO 13445:

Acrylic	N/mm^2 (psi)	4 (580)
G-10 Epoxy	N/mm^2 (psi)	15 (2,240)
Nylon	N/mm^2 (psi)	4 (620)
Polybutylene Terephthalate	N/mm^2 (psi)	12 (1,670)
Polycarbonate	N/mm^2 (psi)	3 (370)
Aluminum (grit blasted)	N/mm^2 (psi)	29 (4,160)
Steel (grit blasted)	N/mm^2 (psi)	34 (4,930)

TYPICAL ENVIRONMENTAL RESISTANCE

Thermal Stability of Needle Assemblies

Aged @ 60°C and tested @ 22 °C

Needle Pullout Strength, % of initial strength:	4 weeks	8 weeks
Polycarbonate:		
22 Gauge Cannula	255	290
27 Gauge Cannula	175	205
Polypropylene (plasma treated):		
22 Gauge Cannula	170	180
27 Gauge Cannula	170	160
Polystyrene:		
22 Gauge Cannula	125	110
27 Gauge Cannula	120	125

Sterilization Resistance of Needle Assemblies

Sterilized as indicated and tested @ 22 °C

Needle Pullout Strength, % of initial strength:

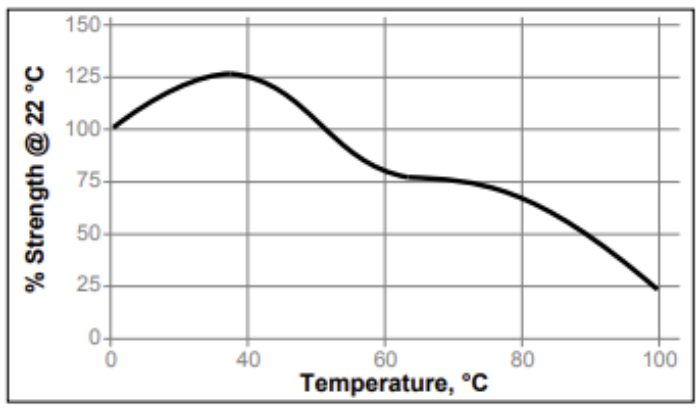
	Gamma	ETO	Autoclave	
	30 kGy	1 Cycle	1 Cycle	5 Cycles
Polycarbonate				
22 Gauge Cannula	110	110	90	90
27 Gauge Cannula	100	100	60	75
Polypropylene (plasma treated)				
22 Gauge Cannula	145	140	75	85
27 Gauge Cannula	140	110	65	100
Polystyrene				
22 Gauge Cannula	100	100	N/A	N/A
27 Gauge Cannula	95	90	N/A	N/A

N/A - Not applicable. The polystyrene was not compatible with the autoclave sterilization process.

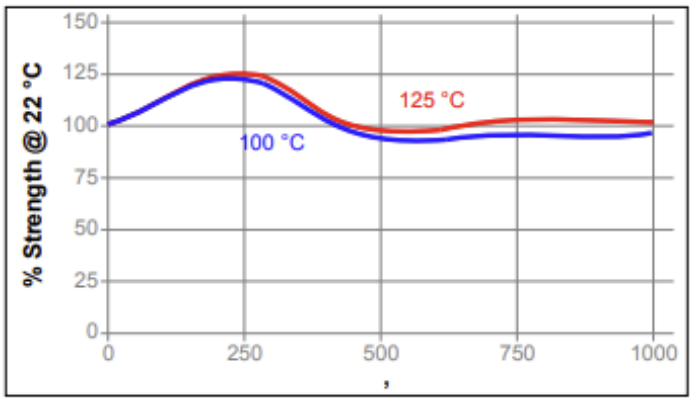
Hot strength

Cured for 30 minutes @ 125 °C The bonded specimens were tested at the indicated temperature:

Block shear strength, ISO 13445, Polycarbonate



Heat aging
Cured for 30 minutes @ 125 °C The bonded specimens were conditioned as indicated and tested at 22°C.
Block shear strength, ISO 13445, Polycarbonate



Chemical/solvent resistance
Cured for 30 minutes @ 125 °C The bonded specimens were conditioned as indicated and tested at 22°C.
Black shear strength, ISO 13445, Polycarbonate:

		% of initial strength			
Environment	**°C**	**24 h**	**100 h**	**600 h**	**1000 h**
95% RH	40	---	140	170	170
Ambient water submersion	22	---	160	160	115
Isopropanol	22	150	---	---	---
Heptane	22	140	---	---	---

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
1. Adhesive must be room temperature just prior to use.
2. Clean and dry surfaces to be bonded.
3. Apply adhesive evenly to both surfaces.
4. Assemble parts and allow to cure at 100°C for 35 minutes or until completely firm.
5. Refer to cure schedule for alternate cure information.

Loctite material specification[LMS]
LMS dated August 08, 2002. 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: 2°C to 8°C. Storage below 2°C or greater than 8°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
(°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

Product specification
The technical data contained herein are intended as reference only and are not considered specifications for the product. Product specifications are located on the Certificate of Analysis or please contact Henkel representative.

Approval and certificate
Please contact Henkel representative for related approval or certificate of this product

Data ranges
The data contained herein may be reported as a typical value. Values are based on actual test data and are verified on a periodic basis.

Temperature/Humidity Ranges: 23°C / 50% RH = 23±2°C / 50±5% RH

Disclaimer
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Reference 1

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