USA
For your local LOCTITE® Adhesive and Sealants Specialist, for your nearest authorized LOCTITE® product distributor, to place an order, to arrange an in-plant seminar, or for technical product assistance, call:
1.800.LOCTITE (562.8483)

Henkel Corporation
One Henkel Way
Rocky Hill, CT 06067
TEL: 1.800.LOCTITE (562.8483)
TEL: 860.571.5100
FAX: 860.571.5465
www.henkelna.com/industrial
www.henkelna.com/loctite

Canada
To arrange an in-plant seminar, or for technical product assistance, call:
1.800.263.5043 (within Canada)

Henkel Canada Corporation
2515 Meadowpine Blvd.
Mississauga, Ontario, Canada, L5N 6C3
TEL: 1.800.263.5043 (within Canada)
TEL: 905.814.6511
FAX: 905.814.5391
www.loctite.ca

Mexico
For your local LOCTITE® Adhesive and Sealant Specialist, for your nearest authorized LOCTITE® product distributor, to arrange an in-plant seminar, or for technical product assistance, call:
52.55.3300.3669 (within Mexico)

To place an order,
52.55.3300.3644 (within Mexico)

Henkel Capital, S.A. de C.V.
Boulevard Magnocentro No. 8 Piso 2
Centro Urbano Interlomas
52760 Huixquilucan, Estado de México
FAX: 52.55.3300.3019
www.loctite.com.mx

www.na.henkel-adhesives.com/medicaladhesives

LOCTITE®

SOLUTIONS THAT CURE®

Adhesives for Medical Device Assembly

Henkel Adhesive Technologies

SOLUTIONS

LOCTITE® has the right adhesive for your application – whether your medical device assembly requires a biocompatible, sterilizable adhesive, or one that meets a host of other performance characteristics.

Our adhesives have been specified by medical device manufacturers worldwide for more than four decades. Our experience, products, and engineering services are second to none, with the world's most diversified and comprehensive line of adhesives, dispensing equipment, and curing systems available anywhere. We offer over 65 products for medical device assemblies requiring biocompatibility testing and hundreds of other products for applications not requiring such evaluation.

Adhesives can provide design advantages, improve overall product performance, and increase production efficiency and quality. LOCTITE adhesives combine all of these advantages and more. When the total cost of a finished medical device is considered, adhesives are the most economical assembly choice.

LOCTITE® adhesives offer many benefits, including:

- Structural bonds
- Ability to bond dissimilar and difficult substrates
- Increased throughput
- Rapid fixture and overall cure times
- Excellent gap-filling capability
- Even stress distribution
- Comprehensive biocompatibility testing

BIOCOMPATIBILITY

All LOCTITE® brand Medical Device Adhesives are tested to the industry's most comprehensive ISO 10993 biocompatibility standards. In addition, LOCTITE employs strict manufacturing and quality controls to ensure continuity of compliance.

Tests include:

- Intracutaneous injection
- Systemic injection
- Muscle implantation
- Cytotoxicity (MEM elution)
- Hemolysis

Frequently Asked Questions and Answers:

What is ISO 10993?

ISO 10993 is an international standard created to facilitate international harmonization of test methods for biological evaluation of medical devices.

Why did LOCTITE move from a USP Class VI to ISO 10993 test program?

ISO 10993 standards offer compliance at a global level. Therefore, device manufacturers outside the U.S. have globally accepted standards, as opposed to the USP Program used in the U.S.

Is there a regulation requiring LOCTITE to revalidate its medical device adhesives to ISO 10993 on a regular basis?

There is no specific regulatory requirement regarding the revalidation of our medical device adhesives. As the industry leader, LOCTITE believes that revalidation is an important service to our customers in assuring continuity of compliance.

Are LOCTITE Medical Device Adhesives suited for use on Implanted Medical Devices?

LOCTITE medical device adhesives are not intended for implants nor invasive protheses.

Are LOCTITE Medical Device Adhesives suited for use on Wearable Medical Devices?

Due to unique requirements, please contact LOCTITE for the latest list of adhesives specifically designed for use in Wearable Medical Devices.

What controls does LOCTITE have in place after the product has been tested to ISO 10993?

While LOCTITE has no specific regulatory obligations under ISO 10993, we perform the following:

- LOCTITE Quality Control Department validates each batch of LOCTITE® medical device adhesives to include all raw material inputs, intermediates, and raw material manufacturers, as well as compliance with the product formulation.
- Ensure that no changes will be made to composition materials, nor significant changes to our processes, without notifying customers who have a specification on file requesting such notification.

> Certificates of compliance are available on our website www.na.henkel-adhesives.com/medicaladhesives

RESOURCES & CAPABILITIES

Training Services

LOCTITE® offers training programs to device manufacturers around the globe. Additional support continues after the seminar as participants are linked to a network of information sources, including adhesive design guides, research data, and technical reports.

On-site Technology Seminar (1-3 hrs)

A training program customized to your needs. Select from a menu of medical device adhesive topics or request a customized seminar to meet your specific requirements. The course is presented on-site and includes instruction, hands-on demos, samples, and technical guides.

Technology Workshop (4+ hrs)

These unique, fully integrated programs are taught by LOCTITE engineering and technical representatives. Facilitators review a range of adhesive technologies specifically related to the medical device industry. Attendees benefit from hands-on demonstrations of adhesives and equipment.

Engineering Services

Our goal is to become your adhesive consultant. LOCTITE Engineering Services can provide the right solution if you need a quick product recommendation or a full-blown turn-key process. Our skilled engineers have years of combined experience developing hundreds of solutions for medical device manufacturers. Consult with LOCTITE and gain access to:

- On-site engineering assistance and consultation
- Process improvement tours
- Joint product development programs and custom formulations
- Contract lab services and testing, including environmental conditioning and accelerated aging studies
- Prototype testing and fixture preparation
- Analytical services to determine surface conditions and degree of cure
- Application and cure equipment/process control

> Technical data sheets and material safety data sheets are available on the web at: www.na.henkel-adhesives.com/medicaladhesives

ADHESIVE PROPERTY COMPARISON

PERFORMANCE CONSIDERATIONS	ADHESIVE CATEGORY					
	LIGHT CURE ACRYLICS	LIGHT CURE SILICONES	LIGHT CURE CYANOACRYLATES	CYANOACRYLATES	EPOXIES	URETHANES
BENEFITS	Rapid cure/adhesion to plastics	Excellent temperature resistance	Wide range of bonding applications	Wide range of bonding applications	Wide range of formulations	Excellent toughness/ flexibility
LIMITATIONS	Light cure system required	Low cohesive strength	Low elongation	Low elongation	Mixing required	Sensitive to moisture
TEMPERATURE RESISTANCE						
TYPICAL FOR THE CATEGORY	-65°F to 300°F	-65°F to 350°F	-65°F to 180°F	-65°F to 180°F	-65°F to 300°F	-65°F to 250°F
HIGHEST RATED PRODUCT	300°F	350°F	200°F	275°F	300°F	250°F
ENVIRONMENTAL RESISTANCE						
POLAR SOLVENTS (E.G., H20, ETHYLENE GLYCOL, IPA, ACETONE)	Good	Good	Moderate	Poor[1]	Very Good	Good
NON-POLAR SOLVENTS (E.G. PENTANE, HEXANE, HEPTANE, MINERAL OIL)	Very Good	Poor to Fair	Good	Good	Excellent	Good
ADHESION TO SUBSTRATES						
METALS	Good	Good	Very Good	Very Good	Excellent	Good
PLASTICS[2]	Excellent	Good	Excellent	Excellent	Fair	Very Good
GLASS	Excellent	Good	Not Recommended	Not Recommended	Excellent	Good
RUBBER	Fair	Fair	Very Good	Very Good	Fair	Good
OVERLAPPING SHEAR STRENGTH	High	Low	High	High	High	Medium
PEEL STRENGTH	Medium	Medium	Low[3]	Low[3]	Medium	Medium
TENSILE STRENGTH	High	Low	High	High	High	Medium
ELONGATION / FLEXIBILITY	Medium	Very High	Low-Medium	Low-Medium	Low	High
HARDNESS	Semi-Rigid	Soft	Rigid	Rigid	Rigid	Soft
PROCESS CONSIDERATIONS	**ADHESIVE CATEGORY**					
	LIGHT CURE ACRYLICS	LIGHT CURE SILICONES	LIGHT CURE CYANOACRYLATES	CYANOACRYLATES	EPOXIES	URETHANES
NUMBER OF COMPONENTS	1	1	1	1	1 and 2	2
CURE TEMPERATURES	UV/Visible	UV/Visible	UV/Visible/Room Temperature	Room Temperature	Heat or Room Temperature	Room Temperature
FIXTURE TIME						
AVERAGE	15 seconds	10 minutes	5 seconds	60 seconds	5 hours	5 hours
FASTEST	5 seconds	60 seconds	2 seconds	5 seconds	15 to 20 minutes	5 hours
FULL CURE TIME	2 to 30 seconds	24 hours	2 to 30 seconds	24 hours	12 to 24 hours	24 hours
GAP FILL						
IDEAL (IN INCHES)	0.002 to 0.010	0.004 to 0.006	0.001 to 0.010	0.001 to 0.003	0.004 to 0.006	0.004 to 0.006
MAXIMUM (IN INCHES)	0.25	0.25	0.17	0.010	0.5	0.5
DISPENSING / MIXING EQUIPMENT REQUIRED	No	No	No	No	Yes (2 parts)	Yes

[1] Cyanoacrylates have very good moisture resistance when applied to plastics.
[2] Uncured liquid adhesives may cause stress cracking of certain thermoplastics, e.g., polycarbonate, acrylic and polysulfone. Special products and process techniques are available. Consult the LOCTITE® Design Guide to Bonding Plastics (LT-2197) or contact 1-800-LOCTITE (562-8483) for more information.
[3] Exception: Toughened cyanoacrylates have HIGH peel strength.

PRODUCTS

Our medical device adhesives cover a variety of chemistries, providing you with a wide range of choices and assembly solutions. Products are available in viscosities ranging from water-thin liquids to thixotropic gels and are compatible with common sterilization methods such as ethylene oxide, gamma radiation, electron beam, liquid sterilization, and limited cycles of autoclave and peroxide plasma.

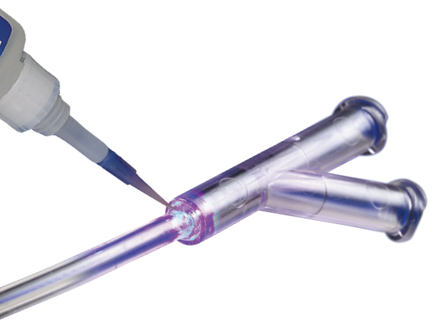
Light Cure Adhesives

Upon exposure to the appropriate light source, these one-part adhesives cure completely in seconds to form thermoset or thermoplastic polymers (depending on the chemistry) with excellent adhesion to a wide variety of substrates. Cure times from 2 to 30 seconds are typical.

Light Cure Acrylics

These products offer the most extensive variety of properties of all light cure chemistries. Upon exposure to suitable UV and/or visible light, acrylics produce tough, durable thermoset polymers. Cured properties range from hard and rigid to soft and flexible. Easily automated, fluorescent versions allow in-line detection of the adhesive.

Light curing acrylics are used to assemble syringes, injectors, infusion sets, pressure transducers, drug delivery devices, IV sets, oxygenators, cardiotomy reservoirs, blood heat exchangers, hearing aids, anesthesia masks, and blood filters.



Light Cure Cyanoacrylates

LOCTITE® FlashCure® light curing cyanoacrylates are well suited for applications requiring a secondary moisture cure. This allows the adhesive to cure completely in shadowed areas where light cannot reach. Exposure to low-intensity UV or visible light provides tack-free surfaces in less than 5 seconds. These adhesives eliminate the need for solvent-borne accelerators and minimize stress cracking and blooming (a whiteness around the bondline) due to their "instant" fixturing.

Light curing cyanoacrylates are ideal for the assembly of catheters, syringes, pressure transducers, orthopedic devices, infusion pumps, oxygen concentrators, blood gas analyzers, filters, and other devices.

Light Cure Silicones

LOCTITE silicones cure to soft, flexible, thermoset elastomers when exposed to high-intensity UV and/or visible light. These adhesives cure in seconds, thus reducing work-in-process, and offer high adhesion to silicone materials as well as plastics and metals. Select products offer a secondary moisture cure, ensuring cure in shadowed areas.

Light curing silicone applications include respiratory devices, tracheal and endotracheal tubes, foley catheters, colostomy devices, and chest drainage tubes.

Cyanoacrylate Adhesives

These one-part adhesives fixture in seconds at room temperature, forming slightly flexible to rigid thermoplastics. They are particularly suited for joining dissimilar substrates in almost any combination, including polyolefins (with a primer), thermoplastics, rubber, and metals. LOCTITE® cyanoacrylates are high-performance, instant adhesives designed for the most challenging applications. The LOCTITE family of cyanoacrylates includes flexible, toughened, low odor/low bloom, surface-insensitive, and thermally resistant formulations.

Cyanoacrylates are widely used to bond components in the assembly of blood pressure transducers, endoscopes, IV sets, infusion pumps, catheters, orthopedic devices, hearing aids, cast boots, and diagnostic imaging equipment.

Cyanoacrylate Accelerators and Primers

Accelerators speed the cure of cyanoacrylates and are used to reduce fixture and cure times or to cure fillets on bondlines and exposed adhesive. They can be applied to a substrate before the application of cyanoacrylate adhesive, or they can be sprayed over a drop or fillet to initiate a rapid cure. Primers enable the cyanoacrylate to form strong bonds with polyolefins and other difficult to bond plastics such as acetal resins. Depending on the plastic, bond strengths up to twenty times the unprimed bond strength may be achieved.

Epoxy Adhesives

LOCTITE epoxies provide high tensile and shear strength on a wide variety of plastics and metals. When cured, these cross-linking thermoset plastics offer superior thermal and chemical resistance, as well as high cohesive strength and minimal shrinkage. Two-part systems are packaged in side-by-side cartridges, allowing them to be dispensed as easily as any one-part system.

Our single-component, heat cure formulas are excellent for bonding metals to a wide variety of plastics, providing superior pull strength when joining cannulae to hubs or syringes.

Epoxies are commonly used on endoscopes, catheters, atherectomy devices, blood heat exchangers, and syringes, as well as dental, surgical, and orthopedic instruments.

Polyurethane Adhesives

LOCTITE urethanes are ideal for bonding metals, plastics, glass, and other substrates. Designed for potting and encapsulating applications, these two-part, room temperature curing products provide excellent peel and shear strength. They are ideal for opaque substrates that require high flexibility.

Urethanes are commonly used in potting applications on filters, kidney dialyzers, blood heat exchangers, and catheters.

	TYPICAL PRODUCT ATTRIBUTES													PRODUCT ORDERING				
	PRODUCT	APPEARANCE	FLUORESCENT	CURE METHOD	VISCOSITY (CP)	TEMP. RANGE (°F)	SHORE HARDNESS	MODULUS (PSI)	ELONGATION (%)	TENSILE (PSI)	CURE DEPTH (IN.)	SUBSTRATES (TP, G, ME, E, C)	FEATURES	IDH #	PKG. SIZE	IDH #	PKG. SIZE	PRODUCT
LIGHT CURING																		
UV/VISIBLE ACRYLICS	3311™	Clear/Pale Straw	N	UV, V	300	-65 to 300	64 (D)	97,000	265	3,300	0.09	TP, G, ME	Flexible, excellent on PVC and most thermoplastics	88189	25 ml	146461	1 liter	3311™
	3341™	Clear/Straw	Y	UV, V	450	-65 to 300	27 (D)	3,600	220	2,200	0.12	TP	Excellent on highly flexible PVC and other difficult-to-bond substrates	237061	25 ml	230199	1 liter	3341™
	3921™	Transparent/Hazy	Y	UV, V	150	-65 to 300	67 (D)	122,750	32	2,830	0.08	TP, G, ME	Highly fluorescent, superior sterilization resistance	434102	25 ml	434103	1 liter	3921™
	3922™	Transparent/Hazy	Y	UV, V	300	-65 to 300	66 (D)	91,500	135	2,600	0.12	TP, G, ME	Superior sterilization resistance, excellent adhesion to PC	312057	25 ml	312054	1 liter	3922™
	3924™	Transparent/Hazy	Y	UV, V	1,100	-65 to 300	60 (D)	41,100	280	2,600	0.10	TP, G, ME	Superior sterilization resistance, excellent adhesion to various thermoplastics	434105	25 ml	434106	1 liter	3924™
	3926™	Transparent/Hazy	Y	UV, V	5,500	-65 to 300	57 (D)	20,700	331	2,740	0.10	TP, G, ME	Highly fluorescent, superior sterilization resistance	434108	25 ml	434109	1 liter	3926™
	3951™	Transparent/Hazy	Y	UV, V	200	-65 to 300	62 (D)	71,000	250	3,300	0.185	TP, G, ME, E	Low viscosity, fast curing, highly flexible adhesive ideal for flexible substrates/bondlines	2298393	25 ml	2298394	1 liter	3951™
	3953™	Transparent/Hazy	Y	UV, V	550	-65 to 300	56 (D)	28,000	230	3,200	0.195	TP, G, ME, E	Fast curing, highly flexible adhesive ideal for flexible substrates/bondlines	2298717	25 ml	2298718	1 liter	3953™
	3961™	Transparent/Hazy	Y	UV, V	80	-65 to 300	75 (D)	180,000	5	3,200	0.315	TP, G, ME	Ultra low viscosity, fast LED curing, ideal for rigid bonding applications	2464890	25 ml	2464891	1 liter	3961™
	3963™	Transparent/Hazy	Y	UV, V	350	-65 to 300	71 (D)	144,000	38	3,300	0.325	TP, G, ME	Low viscosity, fast LED curing, excellent humidity and accelerated aging resistance	2483476	25 ml	2483477	1 liter	3963™
	3971™	Transparent/Hazy	Y	UV, V	300	-65 to 300	66 (D)	95,000	93	3,700	0.16	TP, ME	Superior tack-free curing, low viscosity	444350	25 ml	444375	1 liter	3971™
	3972™	Transparent/Hazy	Y	UV, V	4,500	-65 to 300	68 (D)	66,750	88	3,370	0.25	TP, ME	Superior tack-free curing, moderate viscosity	423298	25 ml	423299	1 liter	3972™
	3974™	Translucent/Colorless	Y	UV, V	5,000	-65 to 300	77 (A)	4,800	100	2,280	0.11	TP, G, ME, C	Highly flexible, ideal for joining different substrates that undergo thermocycling	1135733	25 ml	1135732	1 liter	3974™
	3979™	Transparent/Hazy	Y	UV, V	58,000	-65 to 300	56 (D)	54,780	227	2,620	0.08	TP, G, ME	Gel viscosity, fluoresces red, tack-free curing	1402562	25 ml	1402563	300 ml	3979™
FLASHCURE® CYANOACRYLATES	4306™	Clear/Pale Green	Y	UV, V, M	20	-65 to 180	82 (D)	250,700	2.2	4,720	0.16	TP, ME, E	Rapid tack-free surface and shadow curing, low viscosity	487909	1 oz.	487921	1 lb.	4306™
	4307™	Clear/Pale Green	Y	UV, V, M	900	-65 to 180	82 (D)	262,900	2.2	4,840	0.16	TP, ME, E	Rapid tack-free surface and shadow curing, high viscosity	487920	1 oz.	487922	1 lb.	4307™
	4310™	Transparent/Light Yellow-Green	Y	UV, V, M	175	-65 to 200	84 (D)	283,000	7.3	7,250	0.08	TP, ME, E	Toughened, rapid tack-free surface and shadow curing	1401792	1 oz.	1401790	1 lb.	4310™
	4311™	Transparent/Light Yellow-Green	Y	UV, V, M	1,050	-65 to 200	84 (D)	270,000	5.2	7,250	0.14	TP, ME, E	Toughened, rapid tack-free surface and shadow curing	1401791	1 oz.	1401789	1 lb.	4311™
	4314™	Transparent/Light Yellow Green	Y	UV, V, M	175	-65 to 180	74 (D)	225,000	17	3,600	0.04	TP, ME, E	Rapid tack-free surface and shadow curing, flexible	2610570	1 oz.	2610581	1 lb.	4314™
SILICONES	5240™	Transparent/Light Yellow-Green	N	UV, V, M	25,000	-65 to 200	45 (A)	145	350	435	0.35	TP, G, ME, E	High viscosity, high tear strength, cures in shadowed areas	1010341	30 ml	1010320	300 ml	5240™
	5055™	Transparent/Light Yellow	N	UV, V	525	-65 to 300	55 (A)	650*	80	870	0.22	TP, G, ME, E	Low viscosity, high adhesion to silicone and polycarbonate	1212167	30 ml	1214246	1 liter	5055™
	5056™	Transparent/Light Yellow	N	UV, V	2,200	-65 to 300	43 (A)	195*	170	765	0.25	TP, G, ME, E	Medium viscosity, superior heat and humidity resistance	1214249	30 ml	1214250	1 liter	5056™
CYANOACRYLATES																		
SURFACE INSENSITIVE	431™‡	Clear	N	M	900	-65 to 180	80 (D)*	200,000*	2*	4,000*	0.008	TP, ME, E	Medium viscosity, ideal for acidic substrates and in dry environments	868371	20 g	868372	1 lb.	431™
	4011™	Clear	N	M	100	-65 to 180	80 (D)*	200,000*	2*	4,000*	0.005	TP, ME, E	Low viscosity, ideal for acidic substrates and in dry environments	142059	20 g	146477	1 lb.	4011™
	4061™	Clear	N	M	20	-65 to 180	80 (D)*	200,000*	2*	4,000*	0.004	TP, ME, E	Wicking viscosity, ideal for acidic substrates and in dry environments	229806	20 g	229807	1 lb.	4061™
	4541™	Clear	N	M	Gel	-65 to 180	80 (D)*	200,000*	2*	4,000*	0.010	TP, ME, E, C	High viscosity, ideal for acidic substrates and in dry environments	223088	20 g	92335	200 g	4541™
LOW ODOR/ LOW BLOOM	4031™	Clear	N	M	1,300	-65 to 160	80 (D)*	200,000*	2*	4,000*	0.008	TP, ME	Medium viscosity, minimizes need for ventilation, reduces frosted residue	229804	20 g	229805	1 lb.	4031™
	4081™	Clear	N	M	5	-65 to 160	80 (D)*	200,000*	2*	4,000*	0.002	TP, ME	Wicking viscosity, minimizes need for ventilation, reduces frosted residue	229808	20 g	229809	1 lb.	4081™
	4601™	Clear	N	M	50	-65 to 160	80 (D)*	200,000*	2*	4,000*	0.004	TP, ME	Low viscosity, minimizes need for ventilation, reduces frosted residue	229810	20 g	229811	1 lb.	4601™
TEMPERATURE/ TOUGHENED/ FLEXIBLE	402™‡	Clear	N	M	110	-65 to 275	80 (D)*	200,000*	2*	4,000*	0.005	TP, ME, E	Good heat aging and hot strength performance	2714628	20 g	2712746	500 g	402™
	435™	Clear	N	M	175	-65 to 250	80 (D)*	120,000*	15*	3,600	0.005	TP, ME, E	Improved heat aging and strength performance	840057	20 g	840071	1 lb.	435™
	4861™	Clear	N	M	4,000	-65 to 125	80 (A)*	63,250	4*	1,800*	0.008	TP, ME, E	High viscosity, flexible	518485	20 g	518547	1 lb.	4861™
	4902 FL™	Clear	Y	M	200	-65 to 220	65 (D)	57,900	>30	2,085	0.004	TP, ME, E	Very high flexibility, low modulus, fluorescent	2103947	20 g	2104199	1 lb.	4902 FL™
GENERAL PURPOSE	4013™	Clear	N	M	500	-65 to 180	80 (D)*	200,000*	2	4,000*	0.010	TP, ME, E	General-purpose, gap filling	237041	20 g	88129	1 lb.	4013™
	4014™	Clear	N	M	3	-65 to 220	80 (D)*	200,000*	2	4,000*	0.003	TP, ME, E	General-purpose for metal and plastic bonding	202152	20 g	229650	1 lb.	4014™
PRIMERS/ ACCELERATORS	713™	Clear	N	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Speeds fixture time for cyanoacrylates	135305	1.75 fl. oz.	N/A	N/A	713™
	7701™	Clear	Y	N/A	3	N/A	N/A	N/A	N/A	N/A	N/A	TP, E	Adhesion promoter for cyanoacrylates, for use on low-energy plastics	88195	1.75 fl. oz.	88196	16 fl. oz.	7701™
EPOXIES & URETHANES																		
ONE-PART HEAT CURE EPOXIES	3981™	Transparent/Yellow	Y	H	5,300	-65 to 300	84 (D)	345,000	3	8,970	>0.50	TP, G, ME, C	Superior thermal, chemical and sterilization resistance; moderate viscosity	443946	30 ml	473344	1 liter	3981™
	3984™	Light Grey	Y	H	25,500	-65 to 300	75 (D)	566,000	1	5,540	>0.50	TP, G, ME, C	Superior thermal, chemical and sterilization resistance; highest modulus	443949	30 ml	N/A	N/A	3984™
TWO-PART RT CURE EPOXIES & URETHANES	M-21 HP™	Off-White	N	RT	37,000 (mixed)	-65 to 300	80 (D)	226,000*	8	5,700	>0.50	TP, G, ME, E, C	Epoxy offering high peel and shear strength, 20-minute worklife	235017	50 ml dual	N/A	N/A	M-21 HP™
	M-31 CL™	Ultra-Clear	N	RT	6,000 (mixed)	-65 to 300	85 (D)	362,000*	8	8,000	>0.50	TP, G, ME, C	Epoxy offering excellent impact resistance, 30-minute worklife	235021	50 ml dual	235023	200 ml	M-31 CL™
	M-121 HP™	Amber	N	RT	11,000 (mixed)	-65 to 300	85 (D)	216,000*	10	5,910	>0.50	TP, G, ME, C	Ultra-strength epoxy, excellent thermal shock resistance, 120-minute worklife	235033	50 ml dual	N/A	N/A	M-121 HP™
	M-11 FL™	Clear	N	RT	3,800 (mixed)	-65 to 250	45 (D)	1,860*	170	490	>0.50	TP, G, ME, E, C	Urethane offering highly flexible bondlines, 10-minute worklife	235029	50 ml dual	N/A	N/A	M-11 FL™

KEY:

* Estimated

‡ Upgraded to improve occupational safety through a reduction in hazardous chemicals

Cure Method:
H = Heat Cure
M = Moisture
RT = Room Temperature
UV = Ultraviolet (~254, 365, 380 nm)
V = Visible (~405 nm)

Cure Depth Conditions:
UV/V Acrylics:100 mW/cm², 10 secs. "D" bulb
Nuva-Sil®: 70 mW/cm², 30 secs. Medium Pressure Hg Arc

Substrates:
TP = Thermoplastic
G = Glass
ME = Metal
E = Elastomers
C = Ceramics

The data provided represents typical properties.

Please consult LOCTITE® Technical Data Sheets for more detailed data and test methods.

APPLICATION CASE HISTORIES

LED Light Source Consistently Cures Light Cure Adhesive

US Endoscopy is a manufacturer of accessories for rigid and flexible endoscopes – medical devices used for the exploration and/or biopsy of organs and tissue. Their biopsy inlet valves allow the operator to irrigate without performing an instrument exchange.

Their blue thermoplastic valve needed to be assembled using clear PVC tubing with adequate pull strength. US Endoscopy wanted the equipment and the adhesive to come from one supplier, thus ensuring a well designed process and post sales support.

LOCTITE® 3922™ bonds thermoplastic inlet valve assembly.

Using the LOCTITE® 7700™* Hand-Held LED Light Source with LOCTITE™ 3922™ Medical Device Light Cure Adhesive, US Endoscopy was able to consistently cure the assembly in 10 seconds while nearly doubling the pull strength. The benefits of this light source are that it is inexpensive, small in size, portable, and generates minimal heat and ultraviolet energy, making it safer to work with than traditional UV light sources.

Innovative Device Packaging Solves Safety Hazard

For years, Medical Packaging Corporation produced a swab device in combination with a reagent-filled glass ampule used for various diagnostic tests. The development of an innovative package allowed for increased safety and a patented product, offering the manufacturer a competitive advantage in a very large market.

The new product was designated the SnapSwab™ and consisted of a Dacron® swab tip on a polystyrene shaft encased in a polyethylene tube. It was necessary to reliably attach the swab to the inside of the tube and ensure the entire assembly was leakproof. LOCTITE® 3311™, a single-component light cure acrylic adhesive, was the adhesive of choice for the new swab device. Rapid, semi-automated processing and high adhesion to the various swab substrates resulted in a safe, convenient, dependable, and inexpensive device.

LOCTITE® 3311™ offers adhesion to various swab substrates, resulting in a safer and more reliable device.

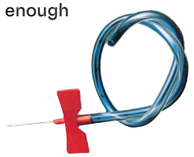
Toxic Solvents Eliminated

A manufacturer of a device used in dialysis machines to withdraw and return blood had a production line shutdown.

The Problem: One vendor had supplied out-of-tolerance parts, and the solvent used for bonding could not fill the excessive gap. The company's PVC tubing supplier also made a substitution, creating additional assembly problems.

The assembly process used solvent welding, a mixture of 90% methylene chloride and 10% cyclohexanone, to join a flexible PVC tube to a copolymer elastomer (TPE).

LOCTITE® 4011™, a surface-insensitive cyanoacrylate, was specified. It filled the gap and had enough strength to easily pass the burst and pull tests. Since the manufacturer already used LOCTITE® 4011™ in another area of the plant, making the switch was easy. Production goals were met, inventory was used, product quality was assured, and a potentially troublesome toxic solvent was eliminated.



LOCTITE® 4011™ replaced solvent bonding in this PVC tube to copolymer fistula assembly.

* LOCTITE® 7700™ Hand-Held LED Light Source has been replaced with the LOCTITE® CL32™ LED Spot System. There are additional LOCTITE® LED Spot Systems available on our website.

Dispensing, Curing, and Process Monitoring

EQUIPMENT

LOCTITE® offers a complete line of dispensing, curing, and process monitoring equipment designed specifically for use with our medical device adhesives.

Various light curing systems are available, ranging from portable curing wands to modular flood chambers and benchtop conveyors. Our light cure equipment is engineered to match the spectral output of our range of light curing adhesives. As a manufacturer of both adhesive and curing equipment, we understand the chemistry and the process needed to cure our products properly, so you can be assured of obtaining the maximum bond strength and cure speeds. Matching the adhesive to the correct curing system will optimize your assembly process and help you attain the fastest, most consistent cures. We offer a full line of accessories, including radiometers, replacement bulbs, and UV safety glasses.

LOCTITE also provides engineering resources to assist customers in developing manufacturing and assembly processes that effectively integrate on-line dispensing and curing equipment. Rental and repair services are also offered, affording customers the opportunity to fully evaluate a process and equipment before making a capital investment.

Dispensing Systems

Our dispensing equipment options range from manual and semiautomatic to fully automatic systems, along with a complete line of accessories, such as needles, nozzles, and syringes. Our dispensing technology enables customers to apply drops or beads of adhesives, making precise application of LOCTITE products economical, fast, and clean.

For dispensing applications requiring a high level of precision, LOCTITE® offers a variety of volumetric solutions.

Curing Systems

LOCTITE has introduced new LED light curing device systems for a wide range of applications. These systems offer long LED life, minimal maintenance, high power, continuous duty cycle, and portability.

From flood systems to variable output spot systems, there is an LED or traditional curing system to suit most medical device adhesive curing needs.