LOCTITE®

Solutions That Cure®

Adhesives for Medical Device Assembly

SOLUTIONS

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

Our adhesives have been specified by medical device manufacturers all over the world 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, speed assembly time, 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, Henkel 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 Henkel 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 Henkel to revalidate its medical device adhesives to ISO 10993 on a regular basis?
There is no specific regulatory requirement regarding revalidation of our medical device adhesives. Henkel, as the industry leader, believes the revalidation is an important service to our customers in assuring continuity of compliance.

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

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

- Each batch of LOCTITE® medical device adhesive is validated by Henkel's Quality Control Department to include all raw material inputs, intermediates and raw material manufacturers, as well as compliance to 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

Henkel 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

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.

CUSTOMER WORKSHOP

These unique, fully integrated programs are taught by Henkel engineering and technical representatives. Presenters review a range of issues 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. Whether you need a quick product recommendation or a full-blown turn-key process, Henkel Engineering Services can provide the right solution. Our skilled engineers have years of combined experience developing hundreds of solutions for medical device manufacturers. Consult with Henkel 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

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				
	CYANOACRYLATES	EPOXIES	LIGHT CURE ADHESIVES	SILICONES	URETHANES
BENEFITS	Wide range of bonding applications	Wide range of formulations	Rapid cure/ adhesion to plastics	Excellent temperature resistance	Excellent toughness/ flexibility
LIMITATIONS	Low solvent resistance	Mixing required	Light cure system required	Low cohesive strength	Sensitive to moisture
TEMPERATURE RESISTANCE					
TYPICAL FOR THE CATEGORY	-65°F to 180°F	-65°F to 300°F	-65°F to 300°F	-65°F to 350°F	-65°F to 250°F
HIGHEST RATED PRODUCT	250°F	300°F	300°F	350°F	250°F
ENVIRONMENTAL RESISTANCE					
POLAR SOLVENTS (e.g., H_2O, ETHYLENE GLYCOL, IPA, ACETONE)	Poor[1]	Very Good	Good	Good	Good
NON-POLAR SOLVENTS (e.g., MOTOR OIL, TOLUENE, GASOLINE, ATF)	Good	Excellent	Very Good	Poor to Fair	Good
ADHESION TO SUBSTRATES					
METALS	Very Good	Excellent	Good	Good	Good
PLASTICS[2]	Excellent	Fair	Excellent	Good	Very Good
GLASS	Not Recommended	Excellent	Excellent	Good	Good
RUBBER	Very Good	Fair	Fair	Fair	Good
OVERLAPPING SHEAR STRENGTH	High	High	High	Low	Medium
PEEL STRENGTH	Low[3]	Medium	Medium	Medium	Medium
TENSILE STRENGTH	High	High	High	Low	Medium
ELONGATION / FLEXIBILITY	Low-Medium	Low	Medium	Very High	High
HARDNESS	Rigid	Rigid	Semi-Rigid	Soft	Soft
PROCESS CONSIDERATIONS	**ADHESIVE CATEGORY**				
	CYANOACRYLATES	**EPOXIES**	**LIGHT CURE ADHESIVES**	**SILICONES**	**URETHANES**
NUMBER OF COMPONENTS	1	1 and 2	1	1	2
CURE TEMPERATURES	Room Temperature	Heat or Room Temperature	UV/Visible	UV/Visible	Room Temperature
FIXTURE TIME					
AVERAGE	60 seconds	5 hours	15 seconds	10 minutes	5 hours
FASTEST	5 seconds	15 to 20 minutes	5 seconds	60 seconds	5 hours
FULL CURE TIME	24 hours	1/2 to 24 hours	2 to 30 seconds	24 hours	24 hours
GAP FILL					
IDEAL (IN INCHES)	0.001 to 0.003	0.004 to 0.006	0.002 to 0.010	0.004 to 0.006	0.004 to 0.006
MAXIMUM (IN INCHES)	0.010	0.5	0.25	0.25	0.5
DISPENSING / MIXING EQUIPMENT REQUIRED	No	Yes (2 parts)	No	No	Yes
LIGHT CURE VERSIONS AVAILABLE?	Yes	No	Yes	Yes	No

[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 CURING 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 CURING 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 CURING CYANOACRYLATES

LOCTITE® FlashCure® light curing cyanoacrylates are well suited for applications where a secondary moisture cure is required. 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 and filters, as well as a number of other devices.

LIGHT CURING SILICONES

LOCTITE® Nuva-Sil® 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 offering 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 prior to 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® Hysol® 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. Hysol® 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, artherectomy devices, blood heat exchangers and syringes, as well as dental, surgical and orthopedic instruments.

POLYURETHANE ADHESIVES

LOCTITE® Hysol® 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	Appearance	Fluorescent	Cure Method	Viscosity (cP)	Temp. Range (°F)	Shore Hardness	Modulus (psi)	Elongation (%)	Tensile (psi)
LIGHT CURING										
UV/Visible Acrylics	★3311™	Clear/Pale Straw	N	UV, V	300	-65 to 300	64 (D)	97,000	265	3,300
	★3341™	Clear/Straw	Y	UV, V	450	-65 to 300	27 (D)	3,600	220	2,200
	3921™	Transparent/Hazy	Y	UV, V	150	-65 to 300	67 (D)	122,750	32	2,830
	★3922™	Transparent/Hazy	Y	UV, V	300	-65 to 300	66 (D)	91,500	135	2,600
	3924™	Transparent/Hazy	Y	UV, V	1,100	-65 to 300	60 (D)	41,100	280	2,600
	3926™	Transparent/Hazy	Y	UV, V	5,500	-65 to 300	57 (D)	20,700	331	2,740
	3933™	Transparent/Hazy	Y	UV, V	3,250	-65 to 300	57 (D)	47,000	79	1,600
	★3936™	Transparent/Hazy	Y	UV, V	10,000	-65 to 300	55 (D)	24,500	300	2,780
	★3942™	Transparent/Hazy	Y	UV, V	1,100	-65 to 300	76 (D)	142,900	15	4,200
	3943™	Transparent/Hazy	Y	UV, V	6,000	-65 to 300	69 (D)	64,000	271	3,480
	3944™	Pale Yellow	Y	UV, V	5,000	-65 to 300	50 (D)*	57,000	86	3,000
	★3971™	Transparent/Hazy	Y	UV, V	300	-65 to 300	66 (D)	95,000	93	3,700
	3972™	Transparent/Hazy	Y	UV, V	4,500	-65 to 300	68 (D)	66,750	88	3,370
	★3974™	Translucent/Colorless	Y	UV, V	5,000	-65 to 300	77 (A)	4,800	100	2,280
	★3979™	Transparent/Hazy	Y	UV, V	58,000	-65 to 300	56 (D)	54,780	227	2,620
Flashcure® Cyanoacrylates	4306™	Clear/Pale Green	Y	UV, V, M	20	-65 to 180	82 (D)	250,700	2.2	4,720
	4307™	Clear/Pale Green	Y	UV, V, M	900	-65 to 180	82 (D)	262,900	2.2	4,840
	★4310™	Transparent/Light Yellow-Green	Y	UV, V, M	175	-65 to 200	84 (D)	283,000	7.3	7,250
	★4311™	Transparent/Light Yellow-Green	Y	UV, V, M	1,050	-65 to 200	84 (D)	270,000	5.2	7,250
Nuva-Sil® Silicones	5240™	Translucent/White	N	UV, V, M	25,000	-65 to 200	45 (A)	145	350	435
	5055™	Transparent/Light Yellow	N	UV, V	525	-65 to 300	55 (A)	650*	80	870
	★5056™	Transparent/Light Yellow	N	UV, V	2,200	-65 to 300	43 (A)	195*	170	765
CYANOACRYLATES										
Surface Insensitive	431™	Clear	N	M	900	-65 to 180	80 (D)*	200,000*	2*	4,000*
	★4011™	Clear	N	M	100	-65 to 180	80 (D)*	200,000*	2*	4,000*
	4061™	Clear	N	M	20	-65 to 180	80 (D)*	200,000*	2*	4,000*
	★4541™	Clear	N	M	Gel	-65 to 180	80 (D)*	200,000*	2*	4,000*
Low Odor/ Low Bloom	4031™	Clear	N	M	1,300	-65 to 160	80 (D)*	200,000*	2*	4,000*
	4081™	Clear	N	M	5	-65 to 160	80 (D)*	200,000*	2*	4,000*
	4601™	Clear	N	M	50	-65 to 160	80 (D)*	200,000*	2*	4,000*
Toughened/ Flexible	435™	Clear	N	M	175	-65 to 250	80 (D)*	120,000*	15*	3,600
	4861™	Clear	N	M	4,000	-65 to 125	80 (A)*	63,250	4*	1,800*
	4902™	Clear	N	M	200	-65 to 220	65 (D)	57,900	>30	2,085
	★4902 FL™	Clear	Y	M	200	-65 to 220	65 (D)	57,900	>30	2,085
General Purpose	4013™	Clear	N	M	500	-65 to 180	65 (Barcol)	200,000*	2	4,000*
	4014™	Clear	N	M	3	-65 to 220	65 (Barcol)	200,000*	2	4,000*
Primers/ Accelerators	713™	Clear	N	N/A	1	N/A	N/A	N/A	N/A	N/A
	★7701™	Clear	N	N/A	3	N/A	N/A	N/A	N/A	N/A
EPOXIES & URETHANES										
Hysol® One-Part Heat Cure Epoxies	3981™	Transparent/Yellow	Y	H	5,300	-65 to 300	84 (D)	345,000	3.0	8,970
	★3984™	Light Grey	Y	H	25,500	-65 to 300	75 (D)	566,000	1.1	5,540
Hysol® 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
	★M-31 CL™	Ultra-Clear	N	RT	6,000 (mixed)	-65 to 300	85 (D)	362,000*	8	8,000
	M-121 HP™	Amber	N	RT	11,000 (mixed)	-65 to 300	85 (D)	216,000*	10	5,910
	M-06 FL™	Off-White	N	RT	38,000 (mixed)	-65 to 250	45 (D)	15,000*	74	1,300
	M-11 FL™	Clear	N	RT	3,800 (mixed)	-65 to 250	45 (D)	1,860*	170	490

KEY:

*Estimated
† Made to order items

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

★ **Best in Class**

			PRODUCT ORDERING				
Cure Depth (in.)	Substrates (TP, G, ME, E, C)	Features	Item #	Pkg. Size	Item #	Pkg. Size	Product
0.09	TP, G, ME	Flexible, excellent on PVC and most thermoplastics	19736	25 ml	19737	1 liter	**3311™**
0.12	TP	Excellent on highly flexible PVC and other difficult-to-bond substrates	23792	25 ml	23440	1 liter	**3341™**
0.08	TP, G, ME	Highly fluorescent, superior sterilization resistance	36484	25 ml	36485	1 liter	**3921™**
0.12	TP, G, ME	Superior sterilization resistance, excellent adhesion to PC	32083	25 ml	32047†	1 liter	**3922™**
0.10	TP, G, ME	Superior sterilization resistance, excellent adhesion to various thermoplastics	36488	25 ml	36489	1 liter	**3924™**
0.10	TP, G, ME	Highly fluorescent, superior sterilization resistance	36492	25 ml	36493	1 liter	**3926™**
0.04	TP, G, ME	Excellent on PC and other thermoplastics, minimal stress cracking	N/A	N/A	32040	1 liter	**3933™**
0.08	TP, G, ME	Highly flexible, excellent on PC and other thermoplastics, minimal stress cracking	32304	25 ml	32037†	1 liter	**3936™**
0.11	TP, G, ME	High performance, rapid tack-free curing	36483	25 ml	36481	1 liter	**3942™**
0.12	TP, G, ME	Tough, superior tack-free curing	36480	25 ml	36478	1 liter	**3943™**
0.15	TP, G, ME	Superior tack-free curing, very flexible	38210	25 ml	38212	1 liter	**3944™**
0.16	TP, ME	Superior tack-free curing, low viscosity	36792	25 ml	36805	1 liter	**3971™**
0.25	TP, ME	Superior tack-free curing, moderate viscosity	36294	25 ml	36295	1 liter	**3972™**
0.11	TP, G, ME, C	Highly flexible, ideal for joining different substrates that undergo thermocycling	1135733	25 ml	1135732	1 liter	**3974™**
0.08	TP, G, ME	Gel viscosity, fluoresces red, tack-free curing	1402562	25 ml	1402563	300 ml	**3979™**
0.15	TP, ME, E	Rapid tack-free surface and shadow curing, low viscosity	37439	1 oz.	37442†	1 lb.	**4306™**
0.17	TP, ME, E	Rapid tack-free surface and shadow curing, high viscosity	37441	1 oz.	37443	1 lb.	**4307™**
0.08	TP, ME, E	Toughened, rapid tack-free surface and shadow curing	1401792	1 oz.	1401790	1 lb.	**4310™**
0.16	TP, ME, E	Toughened, rapid tack-free surface and shadow curing	1401791	1 oz.	1401789	1 lb.	**4311™**
0.35	TP, G, ME, E	High viscosity, high tear strength, cures in shadowed areas	1010341	30 ml	1010320	300 ml	**5240™**
0.22	TP, G, ME, E	Low viscosity, high adhesion to silicone and polycarbonate	1212167	30 ml	1214246	1 liter	**5055™**
0.25	TP, G, ME, E	Medium viscosity, superior heat and humidity resistance	1214249	30 ml	1214250	1 liter	**5056™**
0.008	TP, ME, E	Medium viscosity, ideal for acidic substrates and in dry environments	41255	20 g	41256	1 lb.	**431™**
0.005	TP, ME, E	Low viscosity, ideal for acidic substrates and in dry environments	18680	20 g	18681	1 lb.	**4011™**
0.004	TP, ME, E	Wicking viscosity, ideal for acidic substrates and in dry environments	18686	20 g	18687	1 lb.	**4061™**
0.010	TP, ME, E, C	High viscosity, ideal for acidic substrates and in dry environments	18690	20 g	18690	200 g	**4541™**
0.008	TP, ME	Medium viscosity, minimizes need for ventilation, reduces frosted residue	18682	20 g	18683	1 lb.	**4031™**
0.002	TP, ME	Wicking viscosity, minimizes need for ventilation, reduces frosted residue	18688	20 g	18689	1 lb.	**4081™**
0.004	TP, ME	Low viscosity, minimizes need for ventilation, reduces frosted residue	18692	20 g	18693	1 lb.	**4601™**
0.005	TP, ME, E	Low viscosity, toughened and surface insensitive	40994	20 g	40995	1 lb.	**435™**
0.008	TP, ME, E	High viscosity, flexible	37708	20 g	37711	1 lb.	**4861™**
0.004	TP, ME, E	Very high flexibility, low modulus	1875841	20 g	1875842	1 lb.	**4902™**
0.004	TP, ME, E	Very high flexibility, low modulus, fluorescent	2103947	20 g	2104199	1 lb.	**4902 FL™**
0.010	TP, ME, E	General-purpose, gap filling	20268	20 g	18013	1 lb.	**4013™**
0.003	TP, ME, E	General-purpose for metal and plastic bonding	20269	20 g	18014	1 lb.	**4014™**
N/A	N/A	Speeds fixture time for cyanoacrylates, 10-minute worklife	19889	1.75 fl. oz.	N/A	N/A	**713™**
N/A	TP, E	Adhesion promoter for cyanoacrylates, for use on low-energy plastics	19886	1.75 fl. oz.	19887	16 fl. oz.	**7701™**
>0.50	TP, G, ME, C	Superior thermal, chemical and sterilization resistance; moderate viscosity	36766	30 ml	37297	1 liter	**3981™**
>0.50	TP, G, ME, C	Superior thermal, chemical and sterilization resistance; highest modulus	36768	30 ml	N/A	N/A	**3984™**
>0.50	TP, G, ME, E, C	Epoxy offering high peel and shear strength, 20-minute worklife	30671	50 ml dual	N/A	N/A	**M-21 HP™**
>0.50	TP, G, ME, C	Epoxy offering excellent impact resistance, 30-minute worklife	30673	50 ml dual	30674†	200 ml	**M-31 CL™**
>0.50	TP, G, ME, C	Ultra-strength epoxy, excellent thermal shock resistance, 120-minute worklife	30680	50 ml dual	N/A	N/A	**M-121 HP™**
>0.50	TP, G, ME, E, C	Highly flexible; excellent peel and shear strength, 5 minute worklife	30676	50 ml dual	N/A	N/A	**M-06 FL™**
>0.50	TP, G, ME, E, C	Urethane offering highly flexible bondlines, 10-minute worklife	30678	50 ml dual	N/A	N/A	**M-11 FL™**

The data provided represents typical properties.
Please consult Henkel's 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 an 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.

By 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. Benefits of this light source are that it is inexpensive, small in size, portable, and generates minimal heat and minimal ultraviolet energy, making it safer to work with than traditional UV light sources.

LOCTITE® 3922™ bonds thermoplastic inlet valve assembly.

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 be 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 device that was safe, convenient, dependable and inexpensive.

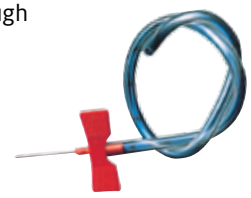
LOCTITE® 3311™ offers adhesion to various swab substrates, resulting in a safer and more reliable device.

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 pass the burst and pull tests with ease. 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.

For more details on these and additional case histories please visit our website:
www.na.henkel-adhesives.com/medicaladhesives

Dispensing, Curing and Process Monitoring

EQUIPMENT

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

A variety of light curing systems is available, ranging from portable curing wands to modular flood chambers and benchtop conveyors. All of our light cure equipment is engineered to match the spectral output of our range of light curing adhesives. As a manufacturer of both the 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.

Henkel's state-of-the-art detection systems allow for real-time process monitoring of dispense cycles. If you are trying to determine the amount of adhesive dispensed from an individual dispense nozzle, Henkel has the system that will get the job done with high degrees of precision and reliability.

Henkel 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.

New innovations in adhesive dispensing for medical device assembly include jetting valves, micro valves and positive displacement options.

CURING SYSTEMS

Henkel has introduced new LED light curing devices 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 line arrays and variable output spot systems, there is an LED or traditional curing system to suit most medical device adhesive curing needs.

For more information on LOCTITE® equipment visit:
www.equipment.loctite.com

LOCTITE®

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