LOCTITE®

BEYOND THE BOND

GLOBAL SOLUTIONS FOR MEDICAL DEVICE ASSEMBLY

Adhesives, Equipment & Services



Henkel

Henkel Adhesive Technologies



INDUSTRY OVERVIEW

04 Solutions

04 Sustainability

05 Biocompatibility

05 Sterilisation

DEVICES & SOLUTIONS

06 Disposables

08 Non-Disposables

10 Patient Equipment

12 Durable & Imaging Equipment

RESOURCES & SERVICES

14 Adhesive Property Comparison

15 Medical Device Adhesives

16 Equipment Solutions

18 Training & Engineering Services



INDUSTRY OVERVIEW

SOLUTIONS

LOCTITE® medical device assembly solutions have been specified by medical device designers and manufacturers for decades.

As device designs have advanced, so have our innovative adhesive solutions to support the growing need for smaller, higher performing, smarter, and safer medical devices. Together, we can bring your medical devices to life.

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 40 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.

SUSTAINABILITY

At Henkel, we are committed to providing sustainable solutions to support our medical device partners and are constantly working on new innovations that drive impact for the environment and its safety.

Innovative adhesives formulated without materials of concern:

- New LOCTITE® solutions that have reduced or removed known chemicals of concern and those that are coming under greater regulatory scrutiny including, but not limited to, CMRs, SVHCs, and skin irritants.

LOCTITE® assembly automation equipment includes solutions that increase productivity, reduce waste and improve safety:

- LED-curing systems for the extensive line of LOCTITE® light-cure acrylics offer lower energy, faster cures, less heat, longer life, and safer disposable parts.
- Dispensing equipment for a range of adhesive types and packages enable waste reduction, use of larger adhesive packs for reduced plastic waste, and improved safety for operators.

BIOCOMPATIBILITY

LOCTITE® brand medical device adhesives are tested to Henkel's test protocols based on 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

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

STERILISATION

Sterilisation is defined as the validated process used to render a product free from viable microorganisms. Material compatibility, cost, and process flow concerns will affect the device manufacturer's choice of a sterilisation method.

Also, the device type - disposable or reusable - will have bearing on the number of cycles as well as type of sterilisation used. Both disposable and reusable devices will typically see initial sterilisation at the OEM manufacturer via ETO, gamma or electron beam sterilisation. Reusable devices may be sterilised multiple times at the point of use (e.g., hospital or clinic) and common methods include autoclaving, chemical immersion, and hydrogen peroxide gas plasma.

The majority of fully cured LOCTITE® medical device adhesives maintain bond performance following exposure to typical sterilisation methods and durations. It is always recommended that designers and users fully evaluate adhesives on actual parts and under actual end-use application to ensure that they meet or exceed requirements.



The product images shown in this brochure are for illustration purposes only. While we strive to maintain accurate proportions, the sizes depicted may not fully reflect real-life dimensions.

SOLUTIONS FOR DISPOSABLE MEDICAL DEVICES

Disposable or single-use devices are manufactured for the purpose of one-time use and can be constructed of a wide range and combination of materials. Biocompatibility, high-speed production, precision assembly, and sterilisation resistance are key requirements that LOCTITE® medical device adhesives support.

DEVICES & ADHESIVE APPLICATIONS

NEEDLES

Technology: Light-Cure Adhesives



CATHETERS

Technology: Light-Cure & Cyanoacrylate Adhesives



FLUID COLLECTION, STORAGE & MANAGEMENT

Technology: Light-Cure Adhesives



DEVICE CHALLENGES

- Quick and effective quality checks in process
- High-speed manufacturing
- Small parts that require precision and accuracy
- Biocompatibility
- Durability for sterilisation
- Dissimilar materials, including hard-to-bond and flexible substrates

LOCTITE® SOLUTIONS & BENEFITS

LIGHT-CURE ACRYLICS	▪ Fast, on-demand, light-cure ▪ Broad range of viscosities ▪ Gap fill ▪ Fluorescent	
LIGHT-CURE CYANOACRYLATES	▪ Fastest, on-demand, light-cure ▪ Dual-cure: light and moisture ▪ Fluorescent	
CYANOACRYLATES	▪ Adhesion to a broad range of substrates, including hard-to-bond ▪ Fast fixturing	
LIGHT-CURE SILICONES	▪ High-silicone substrate adhesion ▪ High flexibility ▪ High-temperature resistance	
EPOXIES (1- & 2-PART FORMULAS)	▪ Superior environmental, chemical, and temperature resistance ▪ Large gap fill	

CASE STUDY

QUALITY & RELIABILITY IMPROVED FOR FISTULA NEEDLE WITH LED LIGHT-CURING ADHESIVE & EQUIPMENT

CHALLENGE:

A global medical device manufacturer of fistula needles was experiencing repeatability and reliability issues in their assembly process. In addition to current adhesive supply and support issues, the manufacturer was not achieving the pull strength requirements nor consistency in performance.

SOLUTIONS BENEFITS:

LOCTITE® AA 3922, a rapid LED-curing medical device acrylic adhesive, was the solution and provided:

- Improved performance with higher bond strength
- Reduced rejection rate and improved precision with the use of LOCTITE® dispensing and LED-curing equipment
- Improved quality control with adhesive fluorescence
- Consistent supply and technical support
- Enhanced end-use device safety with medical device grade adhesive



SOLUTIONS FOR NON-DISPOSABLE MEDICAL DEVICES

Non-disposable or reusable devices are used more than one time in a healthcare environment. Biocompatibility, high durability, and repeated sterilisation resistance are requirements that LOCTITE® medical device adhesives support.

DEVICES & ADHESIVE APPLICATIONS

ENDOSCOPES

Technology: Epoxies



KNEE BRACES

Technology: Cyanoacrylates



SURGICAL TOOLS

Technology: Cyanoacrylates & Epoxies



DEVICE CHALLENGES

- Resistance to repeated cleaners and/or sterilisation
- Biocompatibility
- Small parts that require precision and accuracy
- High durability and strength due to rigorous and repeated use
- Hermetic seals
- Dissimilar materials, including hard-to-bond and flexible substrates

LOCTITE® SOLUTIONS & BENEFITS

LIGHT-CURE ACRYLICS	▪ Fast, on-demand, light-cure ▪ Broad range of viscosities ▪ Gap fill ▪ Fluorescent	
LIGHT-CURE CYANOACRYLATES	▪ Fastest, on-demand, light-cure ▪ Dual-cure: light and moisture ▪ Fluorescent	
CYANOACRYLATES	▪ Adhesion to a broad range of substrates, including hard-to-bond ▪ Fast fixturing	
LIGHT-CURE SILICONES	▪ High-silicone substrate adhesion ▪ High flexibility ▪ High-temperature resistance	
EPOXIES (1- & 2-PART FORMULAS)	▪ Superior environmental, chemical, and temperature resistance ▪ Large gap fill	

CASE STUDY

RELIABILITY & PRODUCTIVITY OF SURGICAL INSTRUMENTS IMPROVED WITH ULTRA-PERFORMANCE INSTANT ADHESIVE

CHALLENGE:

A global medical device manufacturer was experiencing challenges with their current epoxy process of attaching RFID (Radio Frequency Identification) tags to their surgical instruments. The process involved a messy mixing process, long fixture/cure times, the inability to apply with accuracy and efficiency, and poor bond performance following repeated autoclave exposure.

SOLUTIONS BENEFITS:

LOCTITE® 402, an ultra-performance medical device instant adhesive, was the solution and provided:

- Enhanced reliability with higher temperature resistance for limited repeat autoclave exposure
- Increased productivity with rapid fixture speed and semi-automation equipment
- Minimised waste with one-part adhesive formula
- Enhanced end-use device safety with medical device grade adhesive



SOLUTIONS FOR MEDICAL PATIENT EQUIPMENT

Medical patient equipment is used to support critical human functions in healthcare and sometimes home settings. There are typically equipment elements as well as disposable components, with LOCTITE® medical device assembly solutions to support both.

DEVICES & ADHESIVE APPLICATIONS

Epoxies and cyanoacrylate adhesives are the top choices for the equipment components of various medical patient equipment, while light-cure adhesives and silicones are typically used for the disposable components of these systems.

CPAP MACHINES



VENTILATORS



IV PUMPS



DEVICE CHALLENGES

- Dissimilar materials, including hard-to-bond and flexible substrates
- Resistance to surface cleaners
- Quick and effective quality checks in process
- High durability and structural strength for expected long-term use
- Biocompatibility for disposable components
- Small parts that require precision and accuracy

LOCTITE® SOLUTIONS & BENEFITS

LIGHT-CURE ACRYLICS	▪ Fast, on-demand, light-cure ▪ Broad range of viscosities ▪ Gap fill ▪ Fluorescent	
LIGHT-CURE CYANOACRYLATES	▪ Fastest, on-demand, light-cure ▪ Dual-cure: light and moisture ▪ Fluorescent	
CYANOACRYLATES	▪ Adhesion to a broad range of substrates, including hard-to-bond ▪ Fast fixturing	
LIGHT-CURE SILICONES	▪ High-silicone substrate adhesion ▪ High flexibility ▪ High-temperature resistance	
EPOXIES (1- & 2-PART FORMULAS)	▪ Superior environmental, chemical, and temperature resistance ▪ Large gap fill	

CASE STUDY

DUAL-CURE MEDICAL DEVICE ADHESIVE SELECTED FOR NEW MEDICAL FLUID PUMP ASSEMBLY

CHALLENGE:

A global medical device manufacturer designing a new medical fluid pump required an assembly solution that would provide high bond strength and a hermetic seal for the disposable components, as well as strain relief on the pump itself.

SOLUTIONS BENEFITS:

LOCTITE® 4310, a dual-light and moisture-curing medical device adhesive, was the solution and provided:

- Superior bond strength and sealing to the disposable and pump components
- Reliable and repeatable application process via LOCTITE® dispensing and curing equipment
- Rapid LED light-curing to meet productivity requirements
- Enhanced end-use device safety with medical device grade adhesive



SOLUTIONS FOR DURABLE & IMAGING MEDICAL EQUIPMENT

Durable medical equipment is designed for the safe and comfortable support and transport of patients, while imaging (or diagnostic) medical equipment is used in healthcare facilities to detect potential health concerns. Long-term use and high durability are requirements that LOCTITE® assembly solutions support.

DEVICES & ADHESIVE APPLICATIONS

DURABLE EQUIPMENT

Technology: Epoxies & Threadlockers

WHEELCHAIRS



HOSPITAL BEDS



IMAGING EQUIPMENT

Technology: Epoxies & MS Polymers

X-RAYS



DEVICE CHALLENGES

- Dissimilar materials, including hard-to-bond and flexible substrates
- High durability and structural strength for expected long-term use
- Resistance to surface cleaners

LOCTITE® SOLUTIONS & BENEFITS

EPOXIES (1- & 2-PART FORMULAS)	▪ Superior environmental, chemical, and temperature resistance ▪ High structural bond strengths and minimal shrinkage ▪ Large gap fill	
MS POLYMERS (1- & 2-PART FORMULAS)	▪ Superior toughness and flexibility ▪ Large gap fill ▪ Adaptable for small and large surfaces	
ANAEROBIC THREADLOCKERS & SEALANTS	▪ Low strength to permanent locking of metal threaded fasteners ▪ Hermetic seals	
SILICONES (1- & 2-PART FORMULAS)	▪ High-silicone substrate adhesion ▪ High flexibility ▪ High-temperature resistance ▪ Light-curable options	
CYANOACRYLATES	▪ Adhesion to a broad range of substrates, including hard-to-bond plastics ▪ Fast fixturing	

CASE STUDY

QUALITY & MANUFACTURING OF MEDICAL CT SCANNER IMPROVED WITH EPOXY ADHESIVE

CHALLENGE:

A global manufacturer of imaging equipment was having challenges in the assembly of their CT Scanner. The current 2-part epoxy had slow process times and insufficient bond strength, which was causing misalignment between the scanning unit and patient table, resulting in significant rework prior to units being released to the market.

SOLUTIONS BENEFITS:

LOCTITE® EA 3430, a 2-part clear, industrial epoxy was the solution:

- Eliminated misalignment issues with fast fixture speed and high strength
- Reduced reworks, saving time and resources
- Improved process time with enhanced fixture and speed of cure
- Realised an overall cost savings of approximately 15%



ADHESIVE PROPERTY COMPARISON

LOCTITE® medical device adhesives cover a variety of chemistries, providing you with a wide range of choices and assembly solutions.

PERFORMANCE CONSIDERATIONS	ADHESIVE CATEGORY				
	LIGHT-CURE ACRYLICS	**LIGHT-CURE SILICONES**	**LIGHT-CURE CYANOACRYLATES**	**CYANOACRYLATES**	**EPOXIES**
BENEFITS	Rapid cure/adhesion to plastics	Excellent temperature resistance	Wide range of bonding applications	Wide range of bonding applications	Wide range of formulations
LIMITATIONS	Light-cure system required	Low cohesive strength	Low elongation	Low elongation	Mixing required
TEMPERATURE RANGE					
TYPICAL FOR THE CATEGORY	-40°C to 100°C	-40°C to 149°C	-40°C to 100°C	-40°C to 120°C	-40°C to 149°C
HIGHEST-RATED PRODUCT	130°C	149°C	100°C	135°C	149°C
ENVIRONMENTAL RESISTANCE					
POLAR SOLVENTS (E.G., H_2O, ETHYLENE GLYCOL, IPA, ACETONE)	Good	Good	Moderate	Poor[1]	Very Good
NON-POLAR SOLVENTS (E.G. PENTANE, HEXANE, HEPTANE, MINERAL OIL)	Very Good	Poor to Fair	Good	Good	Excellent
ADHESION TO SUBSTRATES					
METALS	Good	Good	Very Good	Very Good	Excellent
PLASTICS[2]	Excellent	Good	Excellent	Excellent	Fair
GLASS	Excellent	Good	Not Recommended	Not Recommended	Excellent
RUBBER	Fair	Fair	Very Good	Very Good	Fair
OVERLAPPING SHEAR STRENGTH	High	Low	High	High	High
PEEL STRENGTH	Medium	Medium	Low	Low	Medium
TENSILE STRENGTH	High	Low	High	High	High
ELONGATION / FLEXIBILITY	Medium	Very High	Low-Medium	Low-Medium	Low
HARDNESS	Semi-Rigid	Soft	Rigid	Rigid	Rigid
PROCESS CONSIDERATIONS	ADHESIVE CATEGORY				
	LIGHT-CURE ACRYLICS	**LIGHT-CURE SILICONES**	**LIGHT-CURE CYANOACRYLATES**	**CYANOACRYLATES**	**EPOXIES**
NUMBER OF COMPONENTS	1	1	1	1	1 and 2
CURE TYPE	UV/Visible	UV/Visible	UV/Visible & Room Temperature	Room Temperature	Heat or Room Temperature
FIXTURE TIME					
AVERAGE	15 seconds	60 seconds	5 seconds	60 seconds	5 hours
FASTEST	5 seconds	60 seconds	2 seconds	5 seconds	3 hours
FULL CURE TIME	2 to 30 seconds	72 hours	24 hours	24 hours	24 hours
GAP FILL					
IDEAL (IN MM)	0,051 to 0,254	0,102 to 0,152	0,025 to 0,254	0,025 to 0,076	0,102 to 0,152
MAXIMUM (IN MM)	6,35	6,35	4,32	0,25	12,7
MIXING REQUIRED	No	No	No	No	Yes (2 parts)

[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. Please contact Henkel Technical Support Group for assistance and more information.

MEDICAL DEVICE ADHESIVES

Featured here are the latest innovations of LOCTITE® medical device adhesives. With more than 40 adhesives designed for medical device assembly, please contact us for additional options.

	PRODUCT	CURE METHOD	VISCOSITY (mPa·s)	FLUORESCENT	KEY FEATURES
CYANOACRYLATES	**402**	Moisture	110	No	Low-viscosity, good heat aging and hot strength performance
	4031	Moisture	1,300	No	Medium viscosity, minimises need for ventilation, reduces frosted residue
	4011 S	Moisture	100	No	Low viscosity, ideal for acidic substrates and in dry environments, good thermal performance
	4061 S	Moisture	20	No	Wicking viscosity, rapid bonding of plastic & rubber, good thermal performance
	4601	Moisture	50	No	Low-viscosity, minimises need for ventilation, reduces frosted residue
	4902	Moisture	200	No	Very-high flexibility, low modulus
	SF 7701	N/A	1	Yes	Adhesion promoter for cyanoacrylates, for use on low-energy plastics
LIGHT-CURES	**4310**	UV/Visible, Moisture	175	Yes	Low-viscosity, toughened*, rapid tack-free surface and shadow curing
	4311	UV/Visible, Moisture	1,050	Yes	Medium-viscosity, toughened*, rapid tack-free surface and shadow curing
	4314	UV/Visible, Moisture	200	Yes	Low viscosity, flexible, raid tack free and shadow curing
	AA 3921	UV/Visible	150	Yes	Low-viscosity, highly fluorescent, superior sterilisation resistance
	AA 3922	UV/Visible	300	Yes	Superior sterilisation resistance, excellent adhesion to PC
	AA 3926	UV/Visible	5,500	Yes	High-viscosity, highly fluorescent, superior sterilisation resistance
	AA 3951	UV/Visible	200	Yes	Low-viscosity, fast curing, highly flexible adhesive ideal for flexible bondlines
	AA 3953	UV/Visible	550	Yes	Fast-curing, highly flexible adhesive ideal for flexible bondlines
	AA 3961	UV/Visible	80	Yes	Ultra-low viscosity, fast LED-curing, ideal for rigid bonding applications
	AA 3963	UV/Visible	350	Yes	Low-viscosity, fast LED-curing, ideal for rigid bonding applications
	AA 3936	UV/Visible	11,000	Yes	High viscosity, good for stress sensitive plastic, superior depth of cure
	AA 3979	UV/Visible	56,500	Yes	Gel viscosity, fluoresces red, good tack-free curing
	AA 3381	UV	5,000	No	Highly flexible adhesive ideal for flexible bonding
	SI 5056	UV/Visible	2,200	No	Medium-viscosity, silicone adhesive, heat and humidity resistant
EPOXIES	**EA M-121HP**	2-Part Mix	11,000 (mixed)	No	Epoxy offering high strength and thermal shock resistance, 120-minute worklife
	EA M-31CL	2-Part Mix	6,000 (mixed)	No	Clear epoxy offering excellent impact resistance, 30-minute worklife

The data provided represents typical properties. Please consult Henkel's Technical Data Sheets for more detailed data and test methods.
*When cured by UV/Visible light

EQUIPMENT SOLUTIONS

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



DISPENSING

LOCTITE® equipment offers high-quality dispensing systems to the marketplace. Henkel's experience and partnerships between customers, application engineering, and equipment engineering means when you purchase LOCTITE® equipment, you get the highest level of expertise, backed by technical service and support unmatched in the industry. The broad range of LOCTITE® dispensing systems offers you solutions for an array of adhesive package sizes for various market applications.

AUTOMATED ROBOTIC DISPENSING

LOCTITE® automated robotic dispensing systems are cost-effective solutions designed to simplify the dispensing of adhesives and sealants onto various surface configurations, ranging from simple to complex. Dispensing robots allow manufacturers to repeatedly and reliably dispense patterns of liquid materials on a programmed basis, resulting in improved process efficiencies, minimal material waste, and reduced manufacturing costs. Automated dispensing systems are offered in multiple configurations to meet all your process needs.





CURING

Henkel offers innovative LOCTITE® LED light-curing systems that provide high-power, portability, continuous duty, and a long life. A wide range of systems are available - handheld point, spot wand, and flood systems - offering maximum flexibility for any application. These light sources are optimised for curing our extensive line of UV/Visible light-curing adhesive products, to provide optimal solutions for nearly every process need.

KEY BENEFITS OF LED-CURING SYSTEMS VERSUS TRADITIONAL BULB TECHNOLOGY

- Long life – Up to 20,000 hours of operation (10x longer than typical UV bulbs) with minimal decay over time.
- Instant on/off – No warm-up like traditional UV systems.
- Zero infrared emissions, reducing part heating (warping) to an absolute minimum.
- 100% of LED light output is within the usable curing spectrum.
- Environmental benefit (no mercury).
- Low maintenance cost (no replacement bulbs).
- Low energy consumption.
- Low cost of ownership.

TRAINING & ENGINEERING SERVICES

SEMINARS & WORKSHOPS

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

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

Technology Workshop

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.





CONSULTATION & TESTING

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 turnkey 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 programmes 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

CONTACT

Henkel Hellas S.A.

23, Kyprou str.
Moschato, 183 46
Athens - Greece
Tel.: +30 210 48 97 200

www.next.henkel-adhesives.com/gr
www.henkel.gr

Except as otherwise noted, all marks used above in this printed material are trademarks and/or registered trademarks of Henkel and/or its affiliates in US, Germany, and elsewhere. © Henkel AG & Co. KGaA, 2025

Henkel

Henkel Adhesive Technologies