Needles • Tube Sets • Catheters • Respiratory Masks • Reservoirs • Wearable Devices

MD® ADHESIVES FOR MEDICAL DEVICE ASSEMBLY

RISK MANAGEMENT

SOLVENT FREE

RAPID CURE

SAFETY FACTOR

BIOCOMPATIBLE

DYMAX®

OUR TECHNOLOGY.
YOUR ADVANTAGE.®

Light-Curable Materials.
Dispensing Systems.
Light-Curing Equipment.
Technical Expertise.

At Dymax, we combine our product offering with our expert knowledge of light-cure technology. Where others only supply products, we are committed to developing a true collaborative partnership, bringing our unsurpassed expertise in light-cure technology and total process knowledge to our customers' specific application challenges.

Because we understand the process as a whole, we can offer our customers a solution where chemistry and equipment work seamlessly together with maximum efficiency. Our application engineering team works side-by-side with our customers, providing assistance with product and process design, equipment selection and integration, testing, evaluation, and pre-production trials throughout the life of the assembly process. Our laboratory is fully equipped to perform mechanical testing under a variety of enviromental conditions including shear strength, adhesion strength between substrates, compression set, and humidity aging per ASTM standards. The lab also has a variety of curing equipment and manual and automated dispensing systems for evaluation.

Our assembly solutions and expertise give manufacturers the knowledge and tools to increase productivity, lower costs, increase safety, and achieve a more efficient manufacturing process. That's a competitive advantage they can't get anywhere else.

ABOUT DYMAX

> MEDICAL DEVICE ADHESIVES

Since pioneering light-cure technology over 35 years ago, Dymax has continued to set new standards with innovative ways to co-optimize the disposable medical device assembly process with customer-centric solutions that meet today's application challenges. Our global team of technical experts understands the demands of the medical device market and is readily available to assist you with adhesive selection, dispensing options, curing recommendations, biocompatibility testing, component design, and process validation. We care about your business, your assembly process, and the people who ultimately use your products. We want your customers to be able to deliver the best care possible, which drives us to continually improve our materials, creating new technologies that allow you to build safer, higher quality products while still increasing your manufacturing efficiency.

MD® Adhesives

Dymax MD® Adhesives, specially formulated for disposable medical device assembly, are used in a wide range of applications including catheter, syringe, anesthesia mask, reservoir, tube set, and medical electronics assembly. They help optimize assembly speeds to enable faster processing, greater output, and lower processing costs while allowing for 100% in-line inspection of bond lines. All of our adhesives are solvent-free, RoHS-compliant, and meet both USP Class VI and ISO 10993 biocompatibility standards.

MD® adhesives are intended for use in short-term (<29 days) or single-use disposable-device applications only. Dymax does not authorize their use in long-term implant applications. In all cases, it's the user's responsibility to determine and validate the suitability of these adhesives in the intended medical device.

Compatible sterilization methods include gamma irradiation and ethylene oxide. Sterilization by autoclaving may be limited to certain applications. It remains the user's obligation to ascertain the effect of sterilization on the cured adhesive.

Typical ISO 10993 Biocompatibility Tests performed on Dymax MD® Medical Device Adhesives:

- Acute Systemic Toxicity
- Cytotoxicity
- Hemocompatibility
- Irritation / Intracutaneous
- Implantation (14 day)

MULTIPURPOSE ADHESIVES FOR MEDICAL DEVICE ASSE

Product	1072-M	1120-M-UR	1121-M	1128A-M	1161-M
Unique Product Features	Flexible, Moisture-Resistant Plastic Bonder	LED-Curable, Ultra-Red® Fluorescing Plastic Bonder	LED-Curable, Blue Fluorescing Plastic Bonder	Impact-Resistant Adhesive with Secondary Heat Cure	Multi-Purpose Plas & Metal Bonder
Properties					
Recommended Substrates	COC, COP, SS, PS, PU, PVC	ABS, PA, PC, PS, PU, PVC	ABS, PC, PU, PVC	SS, AL, NiTi, PA, PU, ABS, GL	PC, ABS, PVC, PMM
Nominal Viscosity, cP	1,000	300	450	600	300
Additional Viscosities	-	-	-	11,000	-
Rheology	Newtonian	Newtonian	Newtonian	Newtonian	Newtonian
Durometer Hardness	A58	D70	D65	D80	D70
Tensile Break, MPa [psi]	4.8 [700]	19 [2,800]	15.8 [2,300]	30 [4,300]	17 [2,500]
Elongation at Break, %	700	30	225	13	120
Modulus of Elasticity, MPa [psi]	3.4 [500]	158 [23,000]	175.8 [25,500]	640 [93,000]	300 [44,000]
Fluorescing*	No	Ultra-Red®	Blue	Blue	Blue
Substrate Bonding Guide					
ABS acrylonitrile-butadiene-styrene	✓	✓	✓	✓	✓
CAP cellulose acetate propionate		✓			✓
COP/COC cyclo olefin polymer/copolymer: Tritan®	✓				
GL glass: borosillicate, quartz, mica	✓			✓	✓
NiTi nickel titanium					
PA polyamide	✓	✓		✓	●
PC polycarbonate	✓	✓	✓		✓
PEBA polyether block amide	✓			✓	
PEEK polyetheretherketone			●		
PEI polyetherimide	●		●	✓	✓
PET poly(ethylene terephthalate)	✓		●		
PETG poly(ethylene terephthalate)glycol	✓		✓		
PI polyimide	✓				●
PMMA poly(methyl methacrylate)	✓		✓		✓
PP polypropylene					●
PS polystyrene	✓	✓	✓	✓	✓
PSU polysulfone	✓			●	
PU polyurethane	✓	✓	✓	✓	●
PVC poly(vinyl chloride)	✓	✓	✓		●
SAN styrene-acrylonitrile	✓	✓		✓	✓
TPU thermoplastic polyurethane	✓				
SS stainless steel	✓				✓

✓ Recommended adhesive

● Limited applications

ST Requires surface treatment (e.g., plasma, corona treatment, etc.)

* U.S. Patents 6,080,450 & 7,892,386

MBLY

Dymax 1000-series adhesives are solvent free and cure within seconds upon exposure to UV and visible light, permitting bonding of UV-inhibited and tinted plastics. Many 1100-series adhesives are formulated with patented Dymax fluorescing technology, causing them to glow brightly when exposed to a low-intensity “black light”. This enhances the functionality of automated vision equipment for high-speed, high-volume production. These products are ISO 10993 approved and are ideal for bonding a wide variety of substrates found in reservoirs and housings, respiratory devices, needles and syringes, transducers, tube sets and fittings, wearable devices, and other medical disposables.

	1187-M	1201-M-SC	1202-M-SC	1204-M-SC	1209-M-UR-SC	1405-M-UR-SC
stic	Moisture-Resistant, Flexible Plastic Bonder	Flexible Adhesive Formulated with See-Cure Technology	Flexible Adhesive Formulated with See-Cure Technology	Flexible, Low Shrinkage Bonder Formulated with See-Cure Technology	Self-Leveling Adhesive Formulated with Encompass® Technology	Adhesive for Plastics and Metal Formulated with Encompass® Technology
A, SS	PC, PVC, ABS, PET	PC, PVC, PU, ABS, PET, PEBA	PC, PVC, PU, ABS, PET, PEBA	PVC, PU, ABS, PC, EVA	ABS, PC, PS, PVC, SEBS	SS, PC, PMMA, ABS
	450	600	600	12,000	1,200	150
	6,500 I 24,000	8,000 I 38,000	-	-	-	7,000
	Newtonian	Newtonian	Newtonian	Newtonian	Newtonian	Newtonian
	D60	D60	D60	A60	D60	D70
	19.9 [2,900]	14 [2,000]	14 [2,000]	6.9 [1,000]	15.6 [2,275]	18.6 [2,700]
	200	170	170	380	770	150
	158 [23,000]	120 [17,000]	120 [17,000]	5.1 [740]	641 [93,000]	397 [57,600]
	Blue	No	No	No	Ultra-Red®	Ultra-Red®
	✓	✓	✓	✓	✓	✓
	✓					
		✓	✓			
	✓	✓	✓	✓	✓	✓
		✓	●			
				✓		✓
	✓	✓	✓	●		
	✓				✓	✓
		●	✓	●		✓
				●	✓	✓
		✓	✓	✓		
	✓		✓	✓	✓	
					✓	✓
				✓	✓	✓
			●			✓

SV - Special Viscosity **T** - Thick **SC** - See-Cure (Patented Color-Change Technology) **UR** - Ultra-Red® (Patented Fluorescing Technology)

Individual Product Data Sheets (PDS) list complete test data, with copies of test reports available upon request.

200-SERIES CTH ADHESIVES FOR CATHETER ASSEMBLY

Product Series	203A-CTH-F				209-CTH
Unique Product Feature	Catheter and Guidewire Adhesives with Secondary Heat-Cure Capability				Multipurpose Adhesive for Plastics & Metals
Available Grades	**203-CTH-F-VLV**	**203A-CTH-F**	**203A-CTH-F-T**	**203A-CTH-F-VT**	**209-CTH**
Recommended Substrates	ABS, NiTi, PS, PSU	ABS, NiTi, PS	ABS, NiTi, PS	ABS, NiTi, PS, PSU	ABS, PC, PET, PS
Nominal Viscosity, cP	55	600	3,250	11,000	300
Rheology	Newtonian	Newtonian	Thixotropic	Thixotropic	Newtonian
Durometer Hardness	D85	D80	D80	D80	D70
Tensile Break, MPa [psi]	32 [4,600]	30 [4,300]	26 [3,800]	28 [4,100]	17 [2,500]
Elongation at Break, %	7	13	2.6	8	120
Modulus of Elasticity, MPa [psi]	640 [93,000]	640 [93,000]	630 [92,000]	550 [80,000]	300 [44,000]
Fluorescing*	Blue	Blue	Blue	Blue	Blue
Substrate Bonding Guide					
ABS acrylonitrile-butadiene-styrene	✓	✓	✓	✓	✓
CAP cellulose acetate propionate					
NiTi nickel titanium	✓	✓	✓	✓	✓
PA polyamide (nylon 6/6)	✓	✓	✓	●	●
PA polyamide (nylon 12)					
PC polycarbonate					✓
PEBA polyether block amide	✓	✓	✓	✓	●
PEI polyetherimide	✓	✓	●	●	
PET poly(ethylene terephthalate)					✓
PETG poly(ethylene terephthalate)glycol					
PI polyimide					●
PL platinum					
PPO poly(phenylene oxide)					
PS polystyrene	✓	✓	✓	✓	✓
PSU polysulfone	✓	●	●	✓	
PU polyurethane	✓	✓	✓	●	●
PVC poly(vinyl chloride)					●
SAN styrene-acrylonitrile	✓	✓	✓	●	
SIL silicone	Please contact Dymax Application Engineering for assistance.				

✓ Recommended adhesive

● Limited applications

ST Requires surface treatment (e.g., plasma, corona treatment, etc.)

* U.S. Patents 6,080,450 & 7,892,386

Dymax CTH UV/Visible light-curable catheter bonding adhesives provide catheter manufacturers with reliable cost-saving assembly solutions. These light-curable single-component adhesives, formulated to meet the unique assembly challenges associated with the newest catheter materials, provide excellent adhesion, a high degree of flexibility, and fast cure speeds for consistent, low stress catheter assembly. CTH products provide excellent moisture and humidity resistance. In-line inspection is made possible with patented fluorescing technology available in many Dymax catheter products.

	211-CTH-SC	212-CTH-UR-SC	215-CTH-UR-SC			
	LED-Curable Adhesive Formulated with See-Cure Technology	Marker Band Adhesive with Non-Flowing Viscosity	LED-Curable Adhesive with Excellent Adhesion to Nylon 12 and PEBA; Formulated with Encompass® Technology			
	211-CTH-SC	**212-CTH-UR-SC**	**215-CTH-UR-SC**	**215-CTH-LV-UR-SC**	**215-CTH-SV01-UR-SC**	**215-CTH-T-UR-SC**
	ABS, PA, PC, PVC, PU	PC, PL, PS, PVC	ABS, Nylon 12, PC, PEBA, TPU	ABS, Nylon 12, PC, PEBA, TPU	ABS, Nylon 12, PC, PEBA, TPU	ABS, Nylon 12, PC, PEBA, TPU
	450	10,000	18,000	450	1,100	6,000
	Newtonian	Thixotropic	Thixotropic	Newtonian	Thixotropic	Thixotropic
	D70	D62	D53	D55	D55	D50
	16 [2,300]	18 [2,600]	15.1 [2,200]	11.7 [1,700]	11 [1,600]	11.7 [1,700]
	140	185	360	300	300	260
	320 [46,000]	116 [17,000]	165 [24,000]	117 [17,000]	105.4 [15,300]	154 [22,400]
	No	Ultra-Red®	Ultra-Red®	Ultra-Red®	Ultra-Red®	Ultra-Red®
	✓	✓	✓	✓	✓	✓
	✓	✓				
	●					
	✓					
			✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓
			✓	✓	✓	✓
		✓				
		●				
	✓	✓				
	✓					

SV - Special Viscosity **T** - Thick **SC** - See-Cure (Patented Color-Change Technology) **UR** - Ultra-Red® (Patented Fluorescing Technology)

Individual Product Data Sheets (PDS) list complete test data, with copies of test reports available upon request.

1400 SERIES
NEEDLE BONDERS

Dymax MD® UV/Visible light-curable adhesives are ideal for automated high-speed needle assembly lines that incorporate immediate in-line testing and packaging. These single-component adhesives cure rapidly upon exposure to the proper combination of high-intensity visible and long wave UV light. The ability to cure with visible light allows for bonding of UV-blocking or heavily tinted plastics. Their fluorescing properties enhance the performance of automated sensing and vision systems, allow for easy detection of adhesive coverage and volume, and lead to higher production yields and improved quality assurance. All MD® needle-bonding adhesives are ISO 10993. Typical applications include bonding cannulas to hubs in various hypodermic and biopsy needles, syringes, and winged infusion sets made from multiple plastics, metals, and glass.

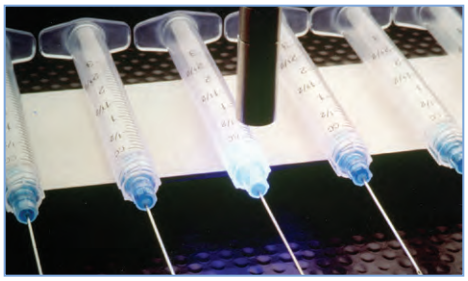
Product Series	**1401-M-UR**	**1402-M**	**1403-M**
Unique Product Feature	LED-Curable Adhesive for High-Speed Needle Bonding	LED-Curable Adhesive with Low Viscosity for Fast Flow	LED-Curable Adhesive with Good Moisture Resistance
Available Grades	**1401-M-UR**	**1402-M**	**1403-M**
Recommended Substrates	PC, PS, SS	PC, PS, SS	PC, PS, SS
Nominal Viscosity, cP	2,800	150	450
Rheology	Thixotropic	Newtonian	Newtonian
Durometer Hardness	D70	D70	D57
Tensile Break, MPa [psi]	22 [3,300]	21 [3,200]	17 [2,500]
Elongation at Break, %	200	160	80
Modulus of Elasticity, MPa [psi]	284 [41,300]	359 [52,170]	367 [56,300]
Fluorescing*	Ultra-Red®	Blue	Blue
Substrate Bonding Guide			
ABS acrylonitrile-butadiene-styrene	✓	✓	✓
GL glass: borosillicate, quartz, mica	✓		
PA polyamide (nylon 6/6)	✓	✓	✓
PC polycarbonate	✓	✓	✓
PMMA poly(methyl methacrylate)	✓	✓	✓
PP polypropylene	ST	ST	ST
SS stainless steel	✓	✓	✓

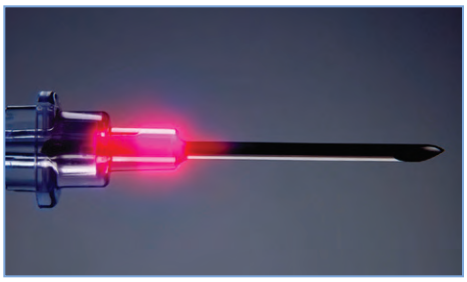
✓ Recommended adhesive

● Limited applications

ST Requires surface treatment (e.g., plasma, corona treatment, etc.)

* U.S. Patents 6,080,450 & 7,892,386





1404-M-UR	1405-M-UR-SC		1406-M
Low Wicking, LED-Curable Plastic and Metal Bonder	LED-Curable Plastic and Metal Bonder with Encompass® Technology		LED-Curable Adhesive for Small Gauge Needles
1404-M-UR	**1405-M-UR-SC**	**1405-M-T-UR-SC**	**1406-M**
PC, PS, SS	SS, PC, PMMA, ABS	ABS, PC, PMMA, PS,SS	SS, PP, PE
6,000	150	7,000	150
Thixotropic	Newtonian	Thixotropic	Newtonian
D65	D70	D70	D70
23 [3,400]	18.6 [2,700]	23 [3,400]	15 [2,200]
150	150	180	120
447 [65,000]	397 [57,600]	379 [55,000]	419 [60,800]
Ultra-Red®	Ultra-Red®	Ultra-Red®	Blue
✓	✓	✓	✓
✓			
✓	✓	✓	✓
✓	✓	✓	✓
ST	ST	ST	ST
✓	✓	✓	✓

SV - Special Viscosity **T** - Thick **SC** - See-Cure (Patented Color-Change Technology) **UR** - Ultra-Red® (Patented Fluorescing Technology)

Individual Product Data Sheets (PDS) list complete test data, with copies of test reports available upon request.

MSK-SERIES RESPIRATORY
DEVICE ADHESIVES

The Dymax "MSK" line of UV/visible light-curable adhesives is formulated for bonding respiratory devices such as anesthesia masks, resuscitator bags, and breathing circuits. These products are solvent free, ISO 10993-5 Cytotoxicity approved, and form strong, flexible bonds to a variety of substrates including highly plasticized plastics. "On-demand" bonding at line speeds greater than 20 feet per minute (6.1 meters per minute) is possible, providing increased through-put without additional labor or line expansion. Some "MSK" products are formulated to fluoresce blue or red upon exposure to low-intensity "black" light, making them ideally suited for in-line inspection. Dymax respiratory-device adhesives are easily dispensed by syringe, dipping well, screen print, or spray and are compatible with gamma, EtO, and E-Beam sterilization.

Product	**104-MSK**		**108-MSK**	**111-MSK**	**112-MSK-UR-SC**
Unique Product Features	General Purpose Fluorescing Adhesive		Fast, Tack-Free Adhesive	Flexible, Moisture-Resistant Adhesive	LED-Curable Adhesive Formulated with Encompass® Technology
Available Grades	**104-MSK**	**104-MSK-GEL**			
Recommended Substrates	PVC, PC, PET, PS, PU	PVC, PC, PET, PS, PU	PVC, PC, PS, PU, ABS	PVC, SEBS, PU, PS	PVC, PC,PS, SEBS, ABS
Nominal Viscosity, cP	550	25,000	600	280	1,200
Rheology	Newtonian	Thixotropic	Newtonian	Newtonian	Newtonian
Durometer Hardness	D55	D55	D70	D50	D60
Tensile Break, MPa [psi]	17 [2,500]	17 [2,500]	21 [3,000]	6 [900]	18 [2,600]
Elongation at Break, %	125	125	40	200	160
Modulus of Elasticity, MPa [psi]	552 [80,000]	552 [80,000]	689 [100,000]	70 [10,000]	262 [38,000]
Fluorescing*	No	No	Blue	Blue	Ultra-Red®
Substrate Bonding Guide					
ABS acrylonitrile-butadiene-styrene			✓	✓	✓
PC polycarbonate	✓	✓	✓		✓
PET poly(ethylene terephthalate)	✓	✓			
PETG poly(ethylene terephthalate)glycol				✓	✓
PI polyimide					
PMMA poly(methyl methacrylate)					
PS polystyrene	✓	✓	✓		✓
PU polyurethane	✓	✓	✓	✓	
PVC poly(vinyl chloride)	✓	✓	✓	✓	✓
SAN styrene-acrylonitrile					✓
SEBS styrene-ethylene/butylene-styrene				✓	
Silicone (platinum cured)					

* U.S. Patents 6,080,450 & 7,892,386

✓ Recommended adhesive

● Limited applications

ST Requires surface treatment (e.g., plasma, corona treatment, etc.)

SC - See-Cure (Patented Color-Change Technology) **UR** - Ultra-Red® (Patented Fluorescing Technology)

Individual Product Data Sheets (PDS) list complete test data, with copies of test reports available upon request.

MATERIALS FOR MEDICAL ELECTRONICS

Dymax light-curable materials for electronic medical devices are ideal for sealing, conformal coating, or encapsulating electronic circuit boards and components. They provide superior protection and are formulated with innovative features like secondary heat-cure for shadowed areas and patented fluorescing technology to meet the unique assembly challenges associated with medical electronics assembly. LED-curable and colored grades are also available.

Product	1181-M	1184-M-B	1184-M-T-R	1901-M
Unique Product Features	Fast, LED-Curable Adhesive for Bonding & Potting	Blue-Black, Low Gloss Conformal Coating with Secondary Heat-Cure	Red Adhesive with Secondary Heat Cure	LED-Curable Electronics Coating with Secondary Heat-Cure
Properties				
Recommended Substrates	PC, ABS, PVC, SAN	FR4, CAP, PU, PS, Steel, SAN	CAP, PU, PS, SS, SAN	FR4, Glass, Metal, Ceramic
Nominal Viscosity, cP	5,000	6,000	4,000	3,000
Rheology	Newtonian	Thixotropic	Thixotropic	Newtonian
Durometer Hardness	D80	D80	D80	A67
Tensile Break, MPa [psi]	56 [8,100]	43 [6,200]	60 [8,600]	2 [290]
Elongation at Break, %	17	5	5	45
Modulus of Elasticity, MPa [psi]	900 [130,000]	830 [120,000]	970 [140,000]	3 [480]
Fluorescing*	Blue	No	No	No
Substrate Bonding Guide				
ABS acrylonitrile-butadiene-styrene	✓		✓	
AL aluminum				●
CAP cellulose acetate propionate	✓	✓		✓
CER ceramic				●
FR4		✓		✓
GL glass: borosillicate, quartz, mica		✓	✓	●
PEI polyetherimide			✓	
PET poly(ethylene terephthalate)			✓	
PI polyimide			✓	
PMMA poly(methyl methacrylate)			✓	
PS polystyrene		✓	✓	✓
PSU polysulfone			✓	
SAN styrene-acrylonitrile	✓		✓	
SS stainless steel	✓		✓	
TPU thermoplastic polyurethane			✓	✓

* U.S. Patents 6,080,450 & 7,892,386

✓ Recommended adhesive

● Limited applications

Individual Product Data Sheets (PDS) list complete test data, with copies of test reports available upon request.

> ADHESIVE TECHNOLOGIES

Revolutionary New Technologies to Increase Process Efficiency and Manage Risk

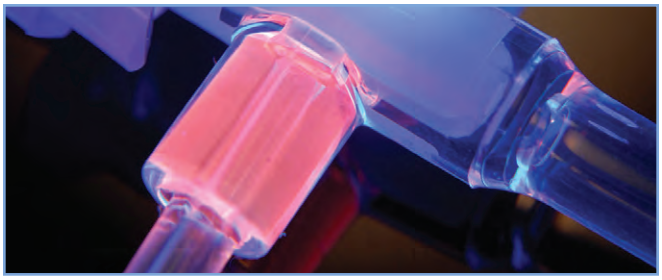
As an innovator in the adhesive and coating industries, Dymax strives to create new technologies that help manufacturers increase process efficiency, productivity, and throughput while decreasing costs and inventory. Through the years, our dedication to innovation has resulted in over 30 oligomer, adhesive, and equipment patents and numerous awards for our innovative technologies and service. Our R&D experts are always striving to create new technologies that will help manufacturers improve their processes and minimize risk. Our current portfolio of technologies provide a variety of benefits including easier bond line inspection and cure confirmation for better quality control, faster cures for quicker processing, and curing in shadowed areas to eliminate concerns about uncured material.

Confirm Placement & Cure - See-Cure Technology

Dymax light-curable adhesives with patented See-Cure color-change technology have built-in cure validation that makes it easy for operators or simple automated inspection equipment to confirm cure without investing in additional specialized equipment. Materials formulated with See-Cure technology start out bright blue in their uncured state, making them highly visible when dispensed onto substrates. Workers can easily confirm the adhesive placement and quantity with just their eyes.

After the adhesive is exposed to light, the color transitions from blue to colorless. This cure indicator ensures the adhesive is completely cured, providing a critical safety feature for manufacturing processes.

UNCURED CURED COLORLESS



Enhance Bond-Line Inspection - Ultra-Red® Technology

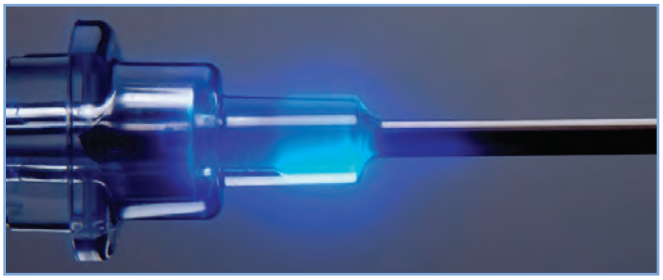
Ultra-Red® fluorescing technology enhances bond-line inspection processes and product authentication. Adhesives formulated with Ultra-Red® remain colorless until exposed to low-intensity UV light (360-380 nm), at which point they fluoresce bright red. This is particularly effective while bonding plastics that naturally fluoresce blue, such as PVC and PET. The Ultra-Red® fluorescence does not absorb the same wavelengths as those used to cure the adhesive, resulting in faster, deeper cures when compared to blue fluorescing products. The patented Ultra-Red® fluorescing compound is exclusive to Dymax for use in light-curable adhesives and coatings. When measured, this compound produces a unique energy peak that cannot be reproduced by other fluorescing compounds. This offers manufacturers the ability to assemble or mark their products so they can be positively identified.

Speed up Production with Faster Cures - LED Light-Curing Technology

Dymax offers specially formulated LED light-curable adhesives that are optimized to work seamlessly with Dymax LED light-curing systems. The adhesives range from fast to ultra-fast cure speeds in order to accommodate specific assembly needs. LED-curing equipment is available in a number of different styles including spot lamps, flood lamps, and conveyors to accommodate various process requirements.

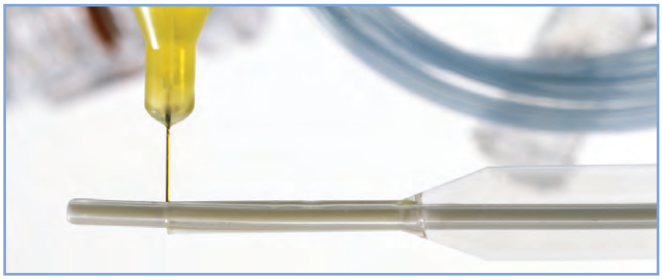
Enhance Bond-Line Inspection and Confirm Cure - Encompass® Technology

Dymax adhesives formulated with Encompass® technology incorporate Dymax exclusive Ultra-Red® fluorescing and See-Cure color change technologies into one light-curable product. As a result, manufacturers gain efficiencies from rapid on-demand curing with easy cure confirmation and post-cure bond-line inspection.



Enhance Bond-Line Inspection - Blue Fluorescing Technology

In addition to Ultra-Red® fluorescing adhesives, Dymax also manufacturers products that fluoresce blue under low-intensity “black” light (365 nm). The fluorescing characteristic of these materials is ideal for in-line inspection, allowing bondlines to be inspected easily.



Cure in Shadows - Multi-Cure® Light/Heat Cure Technology

Multi-Cure adhesives and coatings combine the high-speed cure of UV or UV/Visible light with secondary cure mechanisms that enhance polymerization. Secondary cure mechanisms, which include moisture, thermal, or activator cure, are useful when light can only reach a portion of the bond line, or when tacking a part prior to final cure to allow easier handling and transport during the manufacturing process.

DISPENSING & CURING

Dymax dispensing and light-curing systems are perfectly matched to our adhesives' chemistry. Our field-proven dispense solutions are designed to fit many adhesive dispensing applications and include various automatic and manual dispense systems, spray valves, and related components for seamless integration into your assembly process.

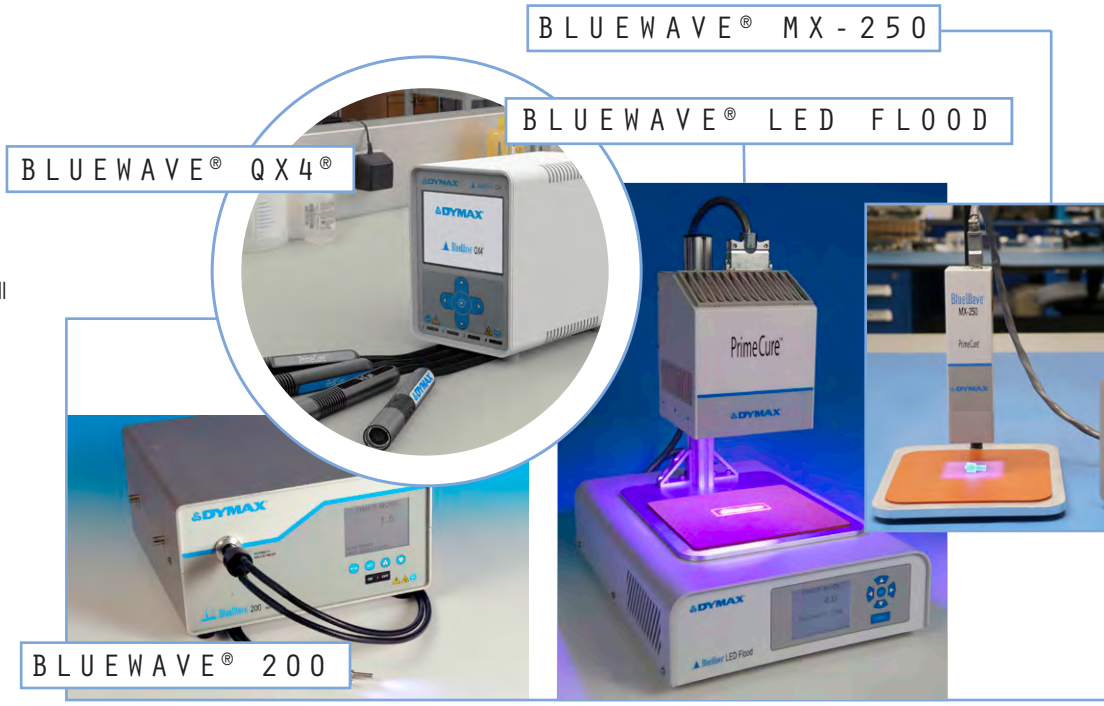
We offer a complete line of conventional and LED light-curing equipment including spot, flood, and conveyor systems, as well as radiometers for measuring light intensity. Our equipment can be configured as stand-alone units or integrated into existing manufacturing assembly lines for fast processing.

BlueWave® 200

The BlueWave® 200 spot-curing lamp delivers UV and visible energy (300-450 nm) for curing adhesives, coatings, and encapsulants. The lamp uses a patented intensity adjustment feature that allows users to deliver the optimized level of energy for their application requirements. The system contains an integral shutter which can be actuated by a foot pedal or PLC making it ideal for both manual and automated processes.

BlueWave® MX-Series Systems

BlueWave® MX-Series curing systems feature all the benefits of LED-curing technology in smaller, more versatile units. These systems are uniquely designed to offer higher, more consistent curing intensity than traditional spot or flood curing systems. They are comprised of a power supply, a controller with an easy-to-use control interface, and an emitter. Emitters are available in two models, the MX-150 for spot curing and MX-250 for flood curing, as well as in three different curing wavelengths, 365, 385, and 405 nm.



BlueWave® LED Flood

The BlueWave® LED Flood Curing System offers greater intensity and uniformity, contributing to faster and more repeatable cure times. The unit features instant on/off capability so there are no mechanical shutter components, no warm-up time requirements, faster exposure cycles, and lower maintenance costs. The system is available with three different wavelength arrays (365, 385, and 405 nm) so users can fully optimize the curing process between their light-curable material and curing equipment. The BlueWave® LED Flood has a 5" x 5" (12.7 cm x 12.7 cm) active area for curing larger parts. It is ideal for manufacturers looking to complement their "green" initiatives because it is CE marked, RoHS compliant, and offers user-friendly operation.

BlueWave® QX4®

The BlueWave® QX4® spot-cure system features all the benefits of LED-curing technology in a smaller, more versatile unit. This system consists of a controller and up to four LED heads. LED heads are available in 365, 385, and 405 nm and can be outfitted with 3-, 5-, or 8-mm diameter focusing lenses. The system offers maximum curing flexibility to users. When variable mode is used, each head can be individually programmed for intensity and cycle times. Individual exposure times and intensity settings can be set in 1% increments for each LED head allowing for a completely customized spot-cure process.

EQUIPMENT

UVC CONVEYOR SYSTEMS

ACCU-CAL™ RADIOMETERS

SD-100 DIGITAL SYRINGE DISPENSER

UVCS Conveyor Systems

Dymax conveyor systems use high-intensity light sources for fast curing of adhesives, coatings, inks, and encapsulants. UVCS bench-top conveyors can be outfitted with up to four UV or LED flood lamps, or for higher energy requirements, can be configured with microwave-driven light sources. All configurations have adjustable belt speeds of 1 to 32 fpm, and adjustable lamp-to-belt distance to address a variety of application requirements. When combined, the UVCS conveyors' consistent intensity, fast curing, and adjustable line speeds create an optimized UV-curing process that enables high throughput.

ACCU-CAL™ Radiometers

ACCU-CAL™ radiometers allow operators to monitor, document, and maintain a reliable light-curing process, while ensuring the system is providing the intensity and dosage levels required for successful curing. A radiometer can signal an operator to replace a curing system's degrading bulb, reflector, or lightguide to help prevent incomplete cures from happening. ACCU-CAL™ radiometers can also measure the intensity of stray or reflected energy and confirm that operators are properly shielded from light exposure. The ACCU-CAL™ 50 measures UV-A (320-390 nm) intensity and dose (energy). The ACCU-CAL™ 50-LED measures energy levels emitted from lightguides and LED flood lamps and has a spectral sensitivity range of 350 to 450 nm. Dymax also offers the ACCU-CAL™ 160 for measuring intensity and dose in flood lamp and conveyor systems. The ACCU-CAL™ 160 is available for both UV and LED systems.

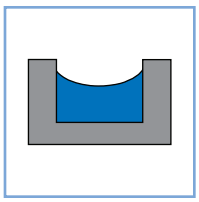
SD-100 Digital Syringe Dispenser

The SD-100 digital syringe dispenser accurately dispenses low-to-high viscosity materials from a syringe. Operators are able to quickly and easily set up the system for the deposit size needed by utilizing the digital timer control and adjustable pressure gauge. The digital timer has a range of 0.01 to 9999 seconds giving the operator precise control over fluid dispense, and the adjustable vacuum suck-back results in clean, drip-free shut-off of materials. This dispensing system replaces manual syringe dispensers and squeeze bottles, reducing operator fatigue. It's ideal for use as an operator work station and can also be integrated into an automated process. The SD-100, a portable light-weight unit with a space-saving footprint, is compatible with a variety of syringe sizes from 3 to 55 cc. The unit is CE certified for global use and is RoHS compliant.

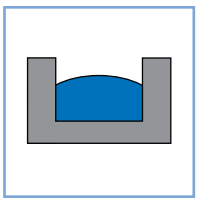
REFERENCE TABLES

The following tables provide additional information about the Dymax adhesives in this guide.

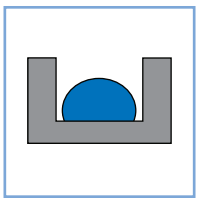
> > >



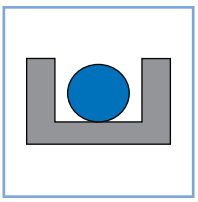
LV Low Viscosity
Newtonian



T Viscosity
Slightly Thixotropic



VT Viscosity
Thixotropic



GEL Viscosity
Highly Thixotropic

VISCOSITY >

When choosing a viscosity, consideration should be given to how the adhesive must flow (or not flow) on the part after the adhesive is applied. Part geometry, process design, and assembly speed and method should all be considered when selecting viscosity. Viscosity is a material's resistance to flow. Low-viscosity adhesives flow more readily than high-viscosity adhesives. Thixotropic gels flow very slowly and are recommended when adhesive flow on a part after dispensing must be minimal.

Dymax adhesives are available in a variety of viscosities. The identifiers appear as suffixes on product names as follows:

VLV = Very Low Viscosity
LV = Low Viscosity
T = Thick
VT = Very Thick
GEL = Gel

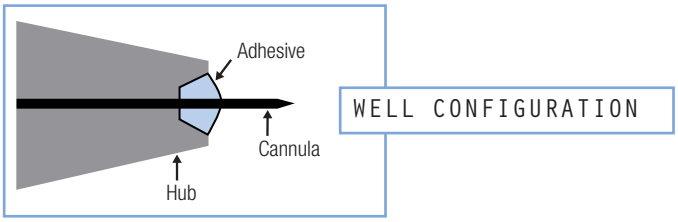
Standard viscosity products do not have a suffix.

Typical Centipose (cP/MPa)	Typical Reference Liquids at 20°C
1	Water
10	Kerosene
110	SAE 10 Oil
200	Maple Syrup
440	SAE 30 Oil
1,100	Castor Oil
3,000	Honey
10,000	Molasses
18,000	Chocolate Syrup
65,000	Vaseline
100,000	Sour Cream
200,000	Peanut Butter
1,500,000	Shortening

DOTS | Volume of a dot is 1/2 the volume of a sphere V=.2618D³						
	·	•	•	●	●	●
Volume (ul)	.10	.51	.05	.01	0.0	25.0
Volume (mL)	.0001	0.00050	.0010	.0050	.0100	.025
Diameter (mm)	.73	1.241	.56	2.673	.37	4.57
Diameter (in)	.0290	.0490	.0610	.1030	.1330	.180

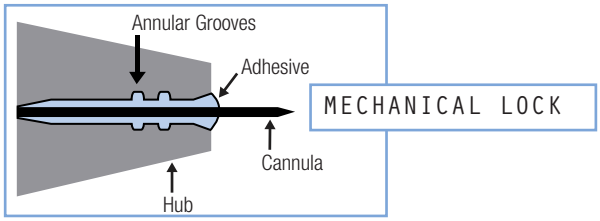
JOINT DESIGN >

An adhesive should be chosen according to the needs of the application and joint design.



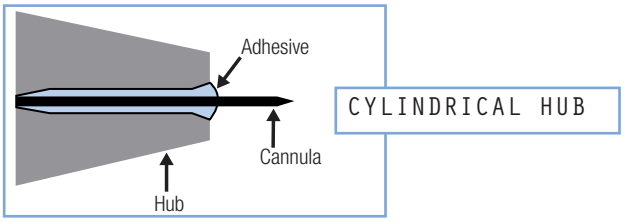
WELL CONFIGURATION

A hub that is flared at the distal end is described as a "well" configuration. Filling the well with adhesive secures the needle in place. In many cases the hubs are opaque but can be cured from above so UV light is not required to pass through the plastic. In the "well" design, adhesion to both the hub substrate and cannula are of critical importance. The well in this configuration is usually large enough to permit using mid-range viscosities. Refer to the Substrate Bonding Guide on pages 6-7 for help in choosing a suitable adhesive.



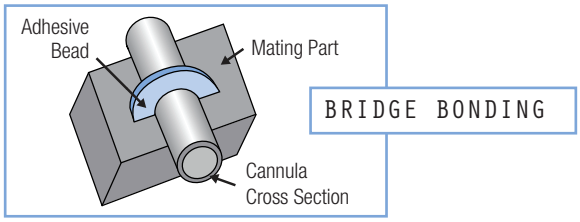
MECHANICAL LOCK

A hub can be molded with annular grooves in its inside diameter. The annular rings are typically 0.005" to 0.008" (0.127-0.2 mm) deep per side subject to molding limitations. This allows the cured adhesive to form a mechanical lock, substantially increasing pullout strength. Adhesives will form a structural bond with the stainless steel cannula and lock in place with the added groove feature. With this design, a low- to medium-viscosity adhesive is used to wick between the stainless steel cannula and hub forming a mechanical lock.



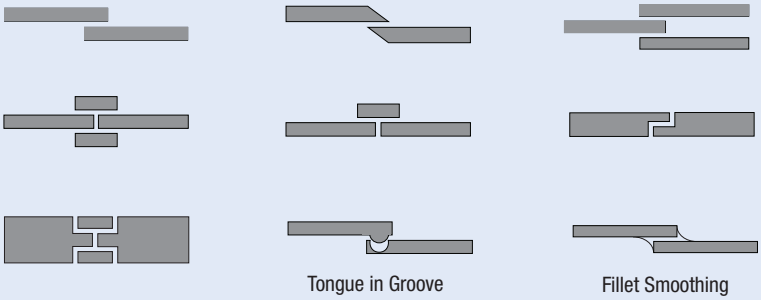
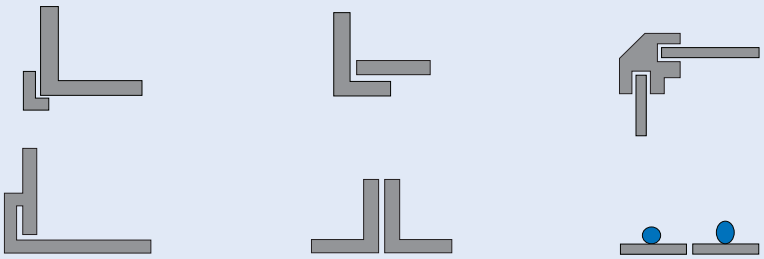
CYLINDRICAL HUB

The close-fitting cannula-to-hub design is commonly encountered in medical disposable syringes. A cylindrical hub that is closely fit to the cannula requires a low-wicking-grade-viscosity adhesive. It is also critical to choose an adhesive that has superior bond strength to both substrates. Recommended gap: 0.002"-0.004" (0.05-0.1 mm) per side.

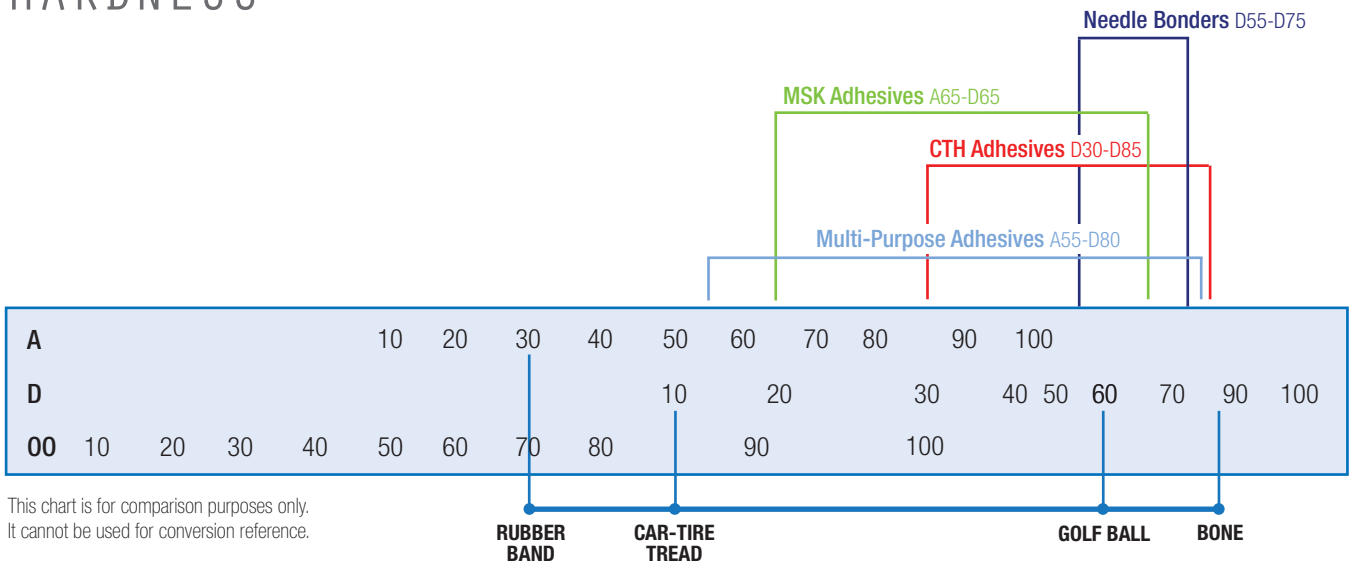


BRIDGE BONDING

The cannula can be attached to the mating part by bridge bonding, which entails placing an adhesive bead over the top of the cannula. This design overcomes the problem of getting light into a shadowed area for the purpose of curing the adhesive.

Avoid butt joints: cleavage or asymmetric-type forces can result in part failure	**Suggested alternatives:** (recommeded bond gaps: 0.002” - 0.006” [0.05 -0.15 mm])
	
Avoid corner butt joints: cleavage-type forces can result in part failure	**Suggested alternatives:** (recommeded bond gaps: 0.002” - 0.006” [0.05 -0.15 mm])
	

HARDNESS



This chart is for comparison purposes only.
It cannot be used for conversion reference.

PRODUCTION THROUGHPUT PLANNER

1 Piece Every...	Minute	Hour	*Day (8 hours)	*Week (40 hours)	*Month (21 days)	*Year (50 weeks)
0.5 second	120	7,200	57,600	288,000	1,209,600	14,400,000
1 second	60	3,600	28,800	144,000	604,800	7,200,000
5 seconds	12	720	5,760	28,800	120,960	1,440,000
10 seconds	6	360	2,880	14,400	60,480	720,000
30 seconds	2	120	960	4,800	20,160	240,000
1 minute	1	60	480	2,400	10,080	120,000
5 minutes	-	12	96	480	2,016	24,000
10 minutes	-	6	48	240	1,008	12,000
30 minutes	-	2	16	80	336	4,000
1 hour	-	1	8	40	168	2,000

*Based on 8-hour shifts.

ESTIMATING USAGE

Bond-Line Gap or Coating Thickness	Theoretical Area Covered by 1 Liter of Adhesive or Coating
0.002" (51 µm)	30,500 in^2 (212 ft^2) (19.7 m^2)
0.005" (127 µm)	12,200 in^2 (84.7 ft^2) (7.88 m^2)
0.010" (254 µm)	6,100 in^2 (42.4 ft^2) (3.94 m^2)
0.015" (381 µm)	4,070 in^2 (28.3 ft^2) (2.63 m^2)

Bead Size	Theoretical Usage (Length per Liter)
1/32" (.79 mm)	66,300 in (1,684 m)
1/16" (1.6 mm)	16,600 in (422 m)
3/32" (2.4 mm)	7,400 in (188 m)
1/8" (3.2 mm)	4,100 in (104 m)
3/16" (4.8 mm)	1,900 in (48 m)
1/4" (6.4 mm)	1,000 in (25.4 m)

Dymax Worldwide Locations

North America

Dymax Corporation
Global Headquarters
+1.860.482.1010
info@dymax.com
www.dymax.com

Dymax Oligomers & Coatings
+1.860.626.7006
info_oc@dymax.com
www.dymax-oc.com

Europe

Dymax Europe GmbH
+49 611.962.7900
info_de@dymax.com
www.dymax.de

Dymax Engineering Adhesives Ireland Ltd.
+353 21.237.3016
info_ie@dymax.com
www.dymax.ie

Asia

Dymax UV Adhesives & Equipment (Shenzhen) Co. Ltd.
+86.755.83485759
dymaxasia@dymax.com
www.dymax.com.cn

Dymax UV Adhesives & Equipment (Shanghai) Co. Ltd.
+86.21.37285759
dymaxasia@dymax.com
www.dymax.com.cn

Dymax Asia (H.K.) Limited
+852.2460.7038
dymaxasia@dymax.com
www.dymax.com.cn

Dymax Asia Pacific Pte. Ltd. (Singapore)
+65.6752.2887
info_ap@dymax.com
www.dymax-ap.com

Dymax Korea LLC
+82.2.784.3434
info_kr@dymax.com
www.dymax.com/kr

SG015 3/2018