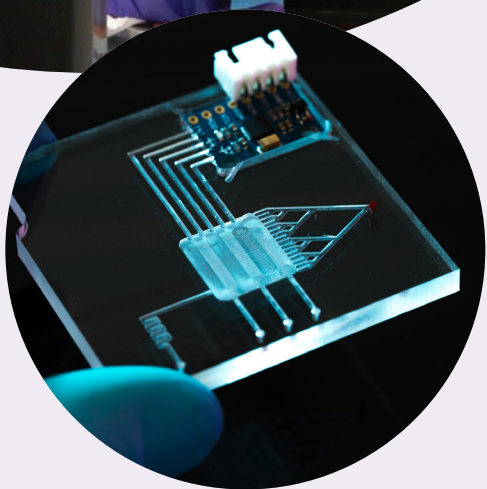


MD[®] MULTI-PURPOSE ADHESIVES
FOR MEDICAL DEVICE ASSEMBLY

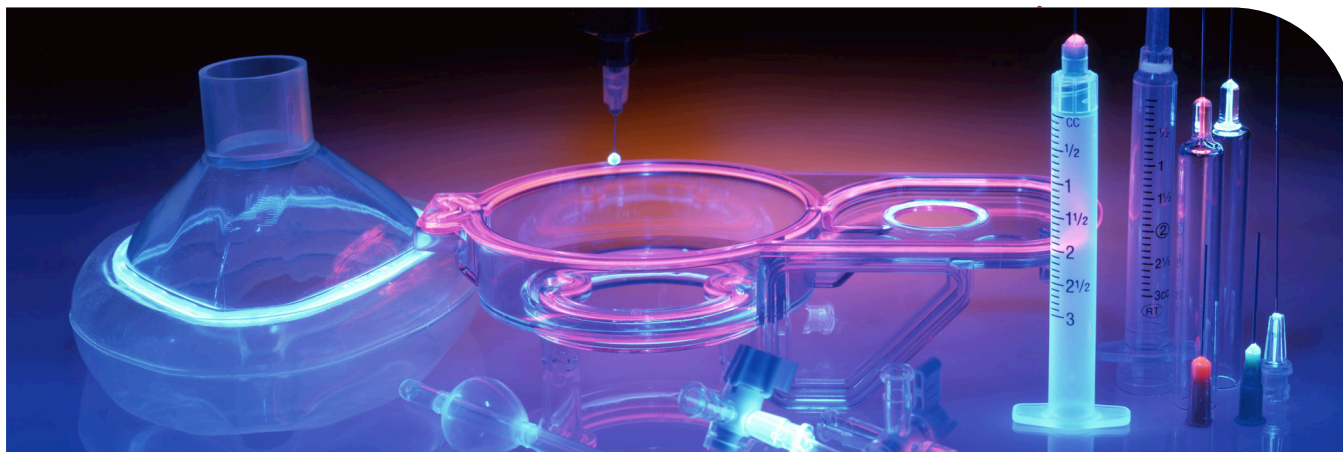


Only Dymax offers expert knowledge of light-cure technology, along with a full array of light-cure products. Dymax is committed to developing a true collaborative partnership — applying our extensive process knowledge to your specific application challenges.

We create custom solutions to ensure that chemistry and equipment work seamlessly together with maximum efficiency. Our application engineering team works side-by-side with our customers, providing assistance with formulation, testing, evaluation, and pre-production trials. We also offer an extensive inventory of curing equipment, manual and automated dispensing systems to help you achieve a more efficient, cost-effective manufacturing process.

About Our Products

Since pioneering light-cure technology over 40 years ago, Dymax has continued to develop innovative ways to optimize medical device assembly. We understand the demands of the medical device market and are ready to assist you with every step of the product development process including adhesive selection, dispensing options, curing recommendations, biocompatibility testing, component design, and process validation. We are continually developing new technologies to help you build safer, higher quality products that increase your manufacturing efficiency, and deliver the best possible outcomes.



MD® Adhesives

Dymax MD® adhesives are specially formulated for disposable medical device assembly and used in a variety of applications.*

- Optimize assembly speeds enabling faster processing, greater output, and in-line inspection of bond lines
- No added solvents
- RoHS compliant
- Many meet ISO 10993 biocompatibility and/or USP Class VI 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.

1000-Series Adhesives

Dymax 1000-series adhesives 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.

- Adhesives cure within seconds upon exposure to UV and visible light, permitting bonding of UV-inhibited and tinted plastics.
- LED-curable adhesives available
- Fluorescing materials available for easy inspection on high-speed, high-volume production lines

Recommended Products

Product	Unique Product Feature	Recommended Substrates	Viscosity, cP	Rheology	Durometer Hardness	Tensile Break, MPa [psi]	Elongation at Break, %	Modulus of Elasticity, MPa [psi]	Fluorescing*
1040-M	Autoclave Resistant Material for Bonding, Potting, & Encapsulating	ABS, PCTG, PMMA, SS	750	Newtonian	D60	18.6 [2,700]	8	668.8 [97,000]	No
1072-M-Z	Flexible, Moisture-Resistant Plastic Bonder; TPO Free	COC, COP, ABS, PC, PMMA, PVC	1,100	Newtonian	A70	3 [440]	540	10.3 [1,500]	No
1128A-M	Impact-Resistant Adhesive with Secondary Heat Cure	SS, AL, NiTi, ABS, PC, PMMA, GL	600	Newtonian	D80	30 [4,300]	13	640 [93,000]	Blue
1162-M-Z	Blue Fluorescing Plastic & Metal Bonder; TPO Free	ABS, PC, PVC, SS	200	Newtonian	D75	11 [1,600]	110	958.4 [139,000]	Blue
1172-M-UR-Z	Flexible Plastic Bonder with Ultra-Red Technology; TPO Free	COC, COP, PS, PU, PVC	1,050	Newtonian	D25	3 [430]	525	6.6 [960]	Ultra-Red®
1181-M	Blue Fluorescing Adhesive for Plastics and Metals	ABS, PC, PCTG, PS, SS	5,750	Newtonian	D80	56 [8,100]	17	900 [130,000]	Blue
1202-M-SC	Flexible Adhesive; See-Cure Technology	ABS, PC, PCTG, PETG, PVC	200	Newtonian	D55	11 [1,600]	230	100 [15,000]	No
1209-M-UR-SC-Z	Self-Leveling Adhesive; TPO Free; Encompass® Technology	SEBS, PVC, PC, ABS	1,750	Newtonian	D73	12.4 [1,800]	145	490 [71,200]	Ultra-Red®
1405M-T-UR-SC-Z	Adhesive for Plastics & Metal; Encompass Technology; TPO Free	ABS, PC, PCTG, PETG, PMMA, SAN	8,500	Thixotropic	D75	20 [2,900]	160	855 [124,000]	Ultra-Red
1120-M-UR	LED UV Curable Plastic Bonder with Ultra-Red® Fluorescing	ABS, PC, PVC, SAN	250	Newtonian	D70	12 [1,800]	22	151 [22,000]	Ultra-Red®
1121-M	LED UV Curable, Blue Fluorescing Plastic Bonder	ABS, PC, PU, PVC, BPA-Free Copolyester	450	Newtonian	D65	15.8 [2,300]	225	175.8 [25,500]	Blue
1128A-M-VT	Adhesive for Plastics & Metal with Secondary Heat Cure	SS, AL, NiTi, PC, PMMA, GL	11,000	Thixotropic	D75	33 [4,800]	3.4	621 [90,100]	Blue
1161-M	Multi-Purpose Plastic & Metal Bonder	ABS, PC, PCTG, SAN, TPU, SS	300	Newtonian	D70	17 [2,500]	120	300 [44,000]	Blue
1180-M-T	Flexible, General Purpose Adhesive	SS, PC, PS, PU, PVC, ABS	6,000	Thixotropic	D70	19 [28,000]	70	413 [60,000]	Blue
1187-M-GEL	Flexible, Moisture-Resistant Plastic Bonder	PC, PU, PVC, TPU	24,000	Thixotropic	D50	16 [2,400]	200	64 [9,400]	Blue
1187-M-SV01	Flexible, Moisture-Resistant Plastic Bonder	ABS, PC, PU, PVC	6,500	Thixotropic	D55	17 [2,400]	170	170 [25,000]	Blue
1204-M-SC	Flexible, Low Shrinkage Bonder; See-Cure Technology	PCTG, PETG, PVC	12,000	Newtonian	A65	4 [600]	270	3 [370]	No

■ Featured Product

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

SC See-Cure (Patented Color-Change Technology)

UR Ultra-Red® (Patented Fluorescing Technology)

VT Very Thick

SV Special Viscosity

T Thick

Z TPO Free

Substrate Bonding Guide

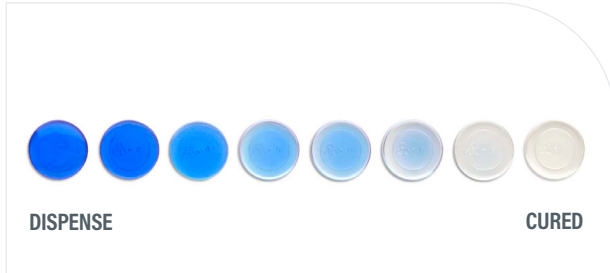
PRODUCT	ABS acrylonitrile-butadiene-styrene	CAP cellulose acetate propionate	COP/COC cyclo olefin polymer/copolymer: Tritan	GL glass: borosilicate, quartz, mica	NTT nickel titanium	PA polyamide	PC polycarbonate	PEBA polyether block amide	PEEK polyetherether-ketone	PEI polyetherimide	PET poly(ethylene 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
1040-M	●	○		●			●						○	●		●				●	○	
1072-M-Z	●		●	○		●	●	●		●	●	●	○	●		●	●	○	●	●	●	●
1128A-M	●			●	●	○	●	○		●				●		●	○	●		●		●
1162-M-Z	●			●			●				●				○	●			●			●
1172-M-UR-Z	●		●	●		●	●	●		○	●	●	●	●		●	●	●	●	●	●	●
1181-M	●						●			●						●		○	●	●		●
1202-M-SC	●					○	●	○	●	○	○	●		●		●		○	●		○	●
1209-M-UR-SC-Z	●						●			●		●				●			●	●	●	
1405M-T-UR-SC-Z	●					○	●			●	●	●	○	●		●		●	○	●	○	●
1120-M-UR	●	●					●												●	●		
1121-M	●						●		○	○	○	●		●		○		●	●	●	●	
1128A-M-VT	●			●	●	○	●	○		●				●		●	○	●		●		●
1161-M	●	●				○	●				●	●	○	●	○	●		○	○	●	●	●
1180-M-T	●			●		●	●			●		●				●		●	●	●		○
1187-M-GEL	●						●				○	○				●		●	●	●	●	
1187-M-SV01	●						●				●			○		●		●	●			
1204-M-SC	●						●			○	●	●	●	○		○	●	○	●	●	○	

- Recommended adhesive
- Limited applications
- ST** Requires surface treatment (e.g., plasma, corona treatment, etc.)

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

Adhesive Technologies

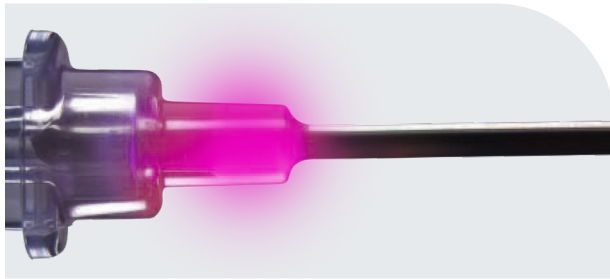
As an innovator in the adhesive and coating industries, Dymax strives to create new technologies that help manufacturers increase process efficiency, productivity, and throughput while decreasing costs and inventory. Through the years, our dedication to innovation has resulted in over 30 patents and numerous awards for our innovative technologies and service.



See-Cure Technology

Confirm Adhesive Placement & Cure

- Material transitions color when cure is complete
- Provides critical safety feature for manufacturing processes
- Simple visual confirmation of cure, no special equipment needed



Ultra-Red® Technology

Enhance Bond-Line Inspection

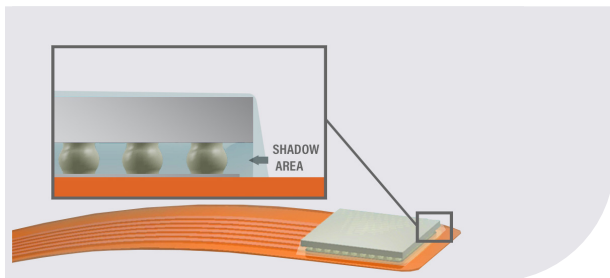
- Fluoresces bright red when exposed to low-intensity black light so bond lines can be easily inspected
- Produces a unique energy peak exclusive to Dymax so products can be marked and positively identified



Encompass® Technology

Enhance Bond-Line Inspection & Confirm Cure

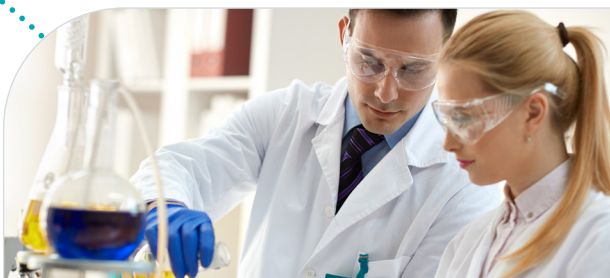
- Ultra-Red® and See-Cure technologies incorporated into one product
- Manufacturers gain efficiencies from rapid curing with easy cure confirmation and post-cure bond-line inspection



Multi-Cure® Technology

Eliminate Uncured Material in Shadow Areas

- Cures with light but features secondary heat cure for material that flows into shadow areas.



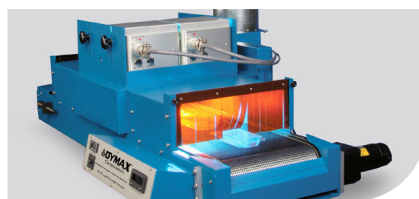
TPO-Free Adhesives

Trusted Quality, Future-Ready Formulations

- Formulated without Trimethylbenzoyl Diphenylphosphine Oxide (TPO)
- Same trusted performance and reliability while supporting long-term product planning and compliance

Dispensing & Light-Curing Equipment

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 also 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. Visit the dymax.com website for a complete listing of our equipment.



Dymax Dispensing Systems

- Pneumatic dispense and spray systems
- Available with suck back control for crisp shutoff even with stringy/tacky materials
- Valves with disposable fluid paths available for contaminate-free dispensing

BlueWave® MX-150 LED Spot-Curing System

- Emitter design for set up flexibility and consistent intensity
- LED curing emitters in 365, 385, and 405 nm
- PLC interface for easy integration into fully automated lines

BlueWave® AX-550 LED Flood-Curing System

- Compact, all-in-one design
- 5" x 5" curing area with up to 800 mW/cm² initial intensity
- Available in 365, 385, and 405 nm

UVCS Conveyor Systems

- Left, right, and top curing capability with 6"- or 12"-width cure area
- Available in a wide range of configurations with UV broad-spectrum or LED flood lamps

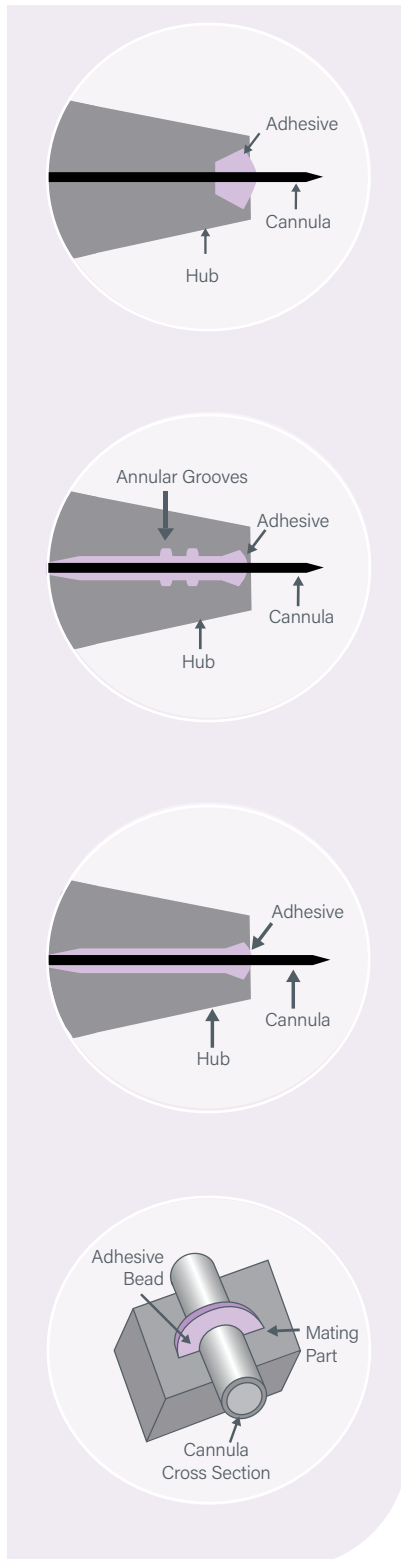
Radiometers

- Provides accurate measurement of system lamp intensity and dosage
- UV broad-spectrum and LED compatible radiometers
- Wand and puck style radiometers available for spot, flood, and conveyor systems

Reference Tables

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.

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.

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

Standard viscosity products do not have a suffix.

Typical Centipoise (cP/MPas)	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



LV Low Viscosity
Newtonian



T Viscosity
Slightly Thixotropic














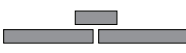


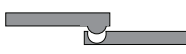
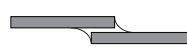
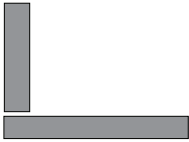
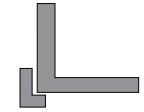
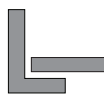
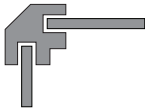



VT Viscosity
Thixotropic



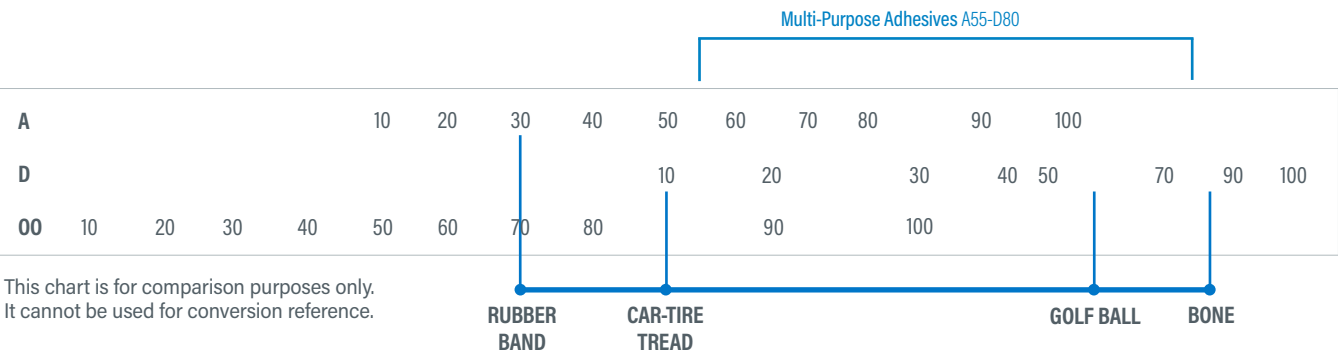
GEL Viscosity
Highly Thixotropic

Dots

Volume of a dot is 1/2 the volume of a sphere $V=.2618D^3$						
						
Volume (ul)	0.10	0.51	0.05	0.01	00.0	25.0
Volume (mL)	0.0001	0.00050	0.0010	0.0050	0.0100	0.025
Diameter (mm)	0.73	1.241	0.56	2.673	0.37	4.57
Diameter (in)	0.0290	0.0490	0.0610	0.1030	0.1330	0.180

Avoid butt joints: cleavage or asymmetric-type forces can result in part failure	Suggested alternatives: (Recommended bond gaps: 0.002" - 0.006" [0.05 -0.15 mm])
	<div>    </div> <div>    </div> <div>    </div> <div> Tongue in Groove Fillet Smoothing </div>
Avoid corner butt joints: Cleavage-type forces can result in part failure	Suggested alternatives: (Recommended bond gaps: 0.002" - 0.006" [0.05 -0.15 mm])
	<div>    </div> <div>    </div>

Hardness



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)



Visit our website to learn more about our
medical device assembly adhesives



www.dymax.com

Americas

USA | +1.860.482.1010 | info@dymax.com
Mexico | +1.915.315.9381 | info-LATAM@dymax.com

Europe

Germany | +49 611.962.7900 | info_de@dymax.com
Ireland | +353 21.237.3016 | info_ie@dymax.com

Asia

Singapore | +65.67522887 | info_ap@dymax.com
Shenzhen | +86.755.83485759 | info@hanarey.com
Hong Kong | +852.2460.7038 | dymaxasia@dymax.com
Korea | +82.31.608.3434 | info_kr@dymax.com

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