

Catheter Assembly Needle Bonding Tube Set Assembly Anesthesia Mask Bonding Respiratory Device Assembly

# *MD<sup>®</sup> Medical Device Adhesives*



ISO 10993 Biocompatible Class VI Certified Solvent-Free Formulations Cures in Seconds with UV/Visible Light



# ABOUT DYMAX

**D**YMAX understands the demands of the medical device market. With over 30 years of direct participation, DYMAX continues to provide medical device manufacturers with innovative adhesive products and assembly solutions which result in improved productivity and reduced processing costs.

A global team of technical professionals dedicated to medical device assembly readily assists manufacturers with adhesive selection, dispensing options, curing recommendations, biocompatibility testing, component design, and process validation.

DYMAX pioneered the development of light-curable adhesives for medical device assembly. This selector guide identifies our standard product offerings for typical device assembly applications involving catheters, guidewires, reservoirs, syringes, breathing circuits, and IV tube sets. Hundreds of formulations are available. If a truly customized solution is more desirable, our R&D team can assist manufacturers in developing an adhesive for their application.



## TYPICAL ISO 10993 BIOCOMPATIBILITY TESTS PERFORMED ON DYMAX MD<sup>®</sup> MEDICAL DEVICE ADHESIVES

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

# ADHESIVE BIOCOMPATIBILITY & STERILIZATION

**P**olymerized DYMAX MD<sup>®</sup> Medical Device adhesives are biocompatibility tested in accordance with ISO 10993 and/or USP Class VI. Each Product Data Sheet (PDS) lists completed test results. Copies of the test reports are available upon request. In all cases, it is the user's responsibility to determine and validate the suitability of these adhesives in the intended medical device.

We have not tested these adhesives for prolonged or permanent implantation, and are they only intended for

use in short-term (<29 days) or single-use disposable device applications. DYMAX does not authorize their use in long-term implant applications.

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.

# CATHETER and GUIDEWIRE-BONDING ADHESIVES

The DYMAX "CTH" line of UV and visible light-curable catheter bonding adhesives provides reliable cost-saving assembly solutions for catheter manufacturers. These products are ISO 10993 approved and formulated to meet the unique assembly challenges associated with the newest catheter materials.

DYMAX light-curable adhesives are solvent free, have excellent adhesion, a high degree of flexibility, and fast cure speeds for consistent, low-stress catheter assembly. In-line inspection is possible with patented fluorescing technology included in all featured catheter adhesives. These products are compatible with gamma, EtO, and E-Beam sterilization.

PROPERTIES	203A-CTH-F	204-CTH-F	208-CTH-F	209-CTH	211-CTH-SC
Bondable Substrates Include:	SS, aluminum, NiTi, PA, PMMA	PC, PVC, PU, ABS, PET, PEBA	PC, PA, PMMA, PU, PVC, SS, ABS, PEBA, PET, PI, PS	PC, PVC, ABS, PMMA, PA, SS	ABS, CAP, PA, PC, PVC, SAN, TPU, EP, SS, PU, PS
Features	Secondary thermal cure capability	Flexible; moisture resistant; use with BlueWave® LED Prime UVA Spot Curing System	Flexible; moisture resistant	Multipurpose; use with BlueWave® LED Prime UVA Spot Curing System	Blue-to-clear color change; Use with BlueWave® LED Prime UVA Spot Curing System
Applications	Guidewire assembly, lumen sealing, sensor attachment	Balloon/lumen, plastics bonder	Balloon/lumen, hub/lumen, tube sets & fittings	Manifold/lumen, plastic and metal bonder	Needle bonding, catheter assembly, balloon bonding, connectors to tubing
Fluorescing (U.S. Patent 6,080,450)	Yes	Yes	Yes	Yes	No
ISO 10993 Biocompatibility	Yes	Yes	Yes	Yes	Yes
USP Class VI Biocompatibility	Yes	Yes	Yes	Yes	Yes
Nominal Viscosity, cP (20 rpm)	600*	500*	300	300	450
Durometer Hardness	D77	D55	D55	D70	D70
Tensile at Break, MPa [psi]	29 [4,200]	17 [2,500]	10 [1,400]	17 [2,400]	14 [2,000]
Elongation at Break, %	10	180	230	70	470
Modulus of Elasticity, MPa [psi]	610 [88,000]	140 [20,000]	66 [9,600]	260 [38,000]	230 [34,000]
Linear Shrinkage, %	1.3	2.1	0.4	0.6	0.59
<b>CURE DATA:</b>					
<b>Fixture Time: (0.05 mm) 0.002 Inch Depth (in seconds) Between Glass</b>					
DYMAX BlueWave® 200 Spot Lamp (10,000 mW/cm <sup>2</sup> )**	1.6	0.2	0.2	<0.2	1.0
<b>SUBSTRATE BONDING GUIDE</b>					
<b>ABS</b> acrylonitrile-butadiene-styrene	o	✓	✓	✓	✓
<b>CAP</b> Cellulose acetate propionate					✓
<b>EP</b> epoxy, FR-4 circuit board					✓
<b>NiTi</b> nickel titanium	✓	o		o	
<b>PA</b> polyamide	✓	o	✓	✓	✓
<b>PC</b> polycarbonate		✓	✓	✓	✓
<b>PE</b> polyethylene		st		st	
<b>PEBA</b> polyether-block-amide	o	✓	✓	o	
<b>PET</b> poly(ethylene terephthalate)	st	✓	✓	✓	
<b>PETG</b> poly(ethylene terephthalate)glycol		o		✓	
<b>PI</b> polyimide	o	✓	✓	o	
<b>PMMA</b> poly(methyl methacrylate)	✓	o	✓	✓	
<b>PS</b> polystyrene	✓	✓	✓	✓	✓
<b>PU</b> polyurethane	o	✓	✓	✓	✓
<b>PVC</b> poly(vinyl chloride)		✓	✓	✓	✓
<b>SAN</b> styrene-acrylonitrile					✓
<b>SS</b> stainless steel	✓	o	✓	✓	✓
<b>TPU</b> Thermoplastic polyurethane					✓

✓ Recommended adhesive o Limited applications st Requires surface treatment (e.g., plasma, corona treatment, etc.)

\*Other viscosity variations may be available upon request.

\*\*10,000 mW/cm<sup>2</sup> measured at work surface over the UVA range (320-395 nm) using the DYMAX ACCU-CAL™ 50 radiometer.

# NEEDLE-BONDING and SYRINGE-ASSEMBLY ADHESIVES

High-speed, high-volume needle bonding and syringe needle assembly is possible with DYMAX UV/visible light-curable adhesives. They are ISO 10993 approved and bond on demand at room temperature when exposed to UV or visible light. DYMAX MD<sup>®</sup> needle bonding adhesives are solvent free, single component, and fluoresce for in-line testing and inspection.

They are ideal for automated assembly lines. Applications include bonding cannulas to hubs in various hypodermic and biopsy needles, syringes, and winged-infusion sets made from multiple plastics, metals, and glass. DYMAX MD<sup>®</sup> needle-bonding adhesives are compatible with gamma, EtO, and E-Beam sterilization.

PROPERTIES	1161-M	1162-M*	1180-M*
Bondable Substrates Include:	PC, ABS, PVC, PMMA, SS, PA	PC, SS, glass, PVC, ABS	PC, PVC, PU, ABS, SS
Features	Multipurpose plastic and metal bonder	Strong bonds to a variety of substrates; low shrinkage	Multipurpose; plastic and metal bonder
Applications	Tube sets and fittings, reservoirs, needle bonding	Needle bonding	Needle bonding, reservoirs, transducer assembly
Fluorescing (U.S. Patent 6,080,450)	Yes	Yes*	Yes*
ISO 10993 Biocompatibility	Yes	Yes	Yes
USP Class VI Biocompatibility	Yes	Yes	Yes
Nominal Viscosity, cP (20 rpm)	300	200	150*
Durometer Hardness	D70	D75	D70
Tensile at Break, MPa [psi]	16 [2,300]	15 [2,100]	17 [2,500]
Elongation at Break, %	68	140	66
Modulus of Elasticity, MPa [psi]	280 [40,000]	390 [57,000]	330 [48,000]
Linear Shrinkage, %	0.6	0.4	0.8

## CURE DATA

### Fixture Time: (0.05 mm) 0.002 Inch Depth (in seconds) Between Glass

DYMAX BlueWave <sup>®</sup> 200 Spot Lamp (10,000 mW/cm <sup>2</sup> )**	<0.2 s	<0.2 s	0.2 s
DYMAX 5000-EC Flood Lamp (200 mW/cm <sup>2</sup> )***	<1 s	<1 s	<1 s
DYMAX UVC-6 Conveyor w/Fusion "D" Bulb (2,500 mW/cm <sup>2</sup> )****	>8.2 m/min [>27 ft/min]	>8.2 m/min [>27 ft/min]	>8.2 m/min [>27 ft/min]

## SUBSTRATE BONDING GUIDE

<b>ABS</b>	acrylonitrile-butadiene-styrene	✓	✓	✓
<b>CAP</b>	cellulose acetate propionate	o		✓
<b>GL</b>	glass	✓	✓	
<b>PA</b>	polyamide	✓		
<b>PC</b>	polycarbonate	✓	✓	✓
<b>PE</b>	polyethylene	st	st	st
<b>PMMA</b>	poly(methyl methacrylate)	✓		✓
<b>PP</b>	polypropylene	st	st	st
<b>PS</b>	polystyrene	✓	✓	✓
<b>PU</b>	polyurethane	✓		✓
<b>PVC</b>	poly(vinyl chloride)	✓	✓	✓
<b>SS</b>	stainless steel	✓	✓	✓

✓ Recommended adhesive   o Limited applications   st Requires surface treatment (such as corona, etc., or a mechanical lock hub design)

\*Other viscosity variations may be available upon request.

\*\*10,000 mW/cm<sup>2</sup> measured at work surface over the UVA range (320-395 nm) using the DYMAX ACCU-CAL<sup>™</sup> 50 radiometer.

\*\*\*200 mW/cm<sup>2</sup> measured 2.5" below bottom of lamp housing. Measured by the ACCU-CAL<sup>™</sup> 50 radiometer.

\*\*\*\*2,500 mW/cm<sup>2</sup> measured by EIT Power Puck radiometer 2.1" below lamp housing.

\*Ultra-Red<sup>™</sup> fluorescing grades available



Fluorescing for in-line inspection



Bond needle to hub

# RESPIRATORY-DEVICE ADHESIVES: ANESTHESIA MASKS, RESUSCITATOR BAGS, and BREATHING CIRCUITS

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 as well as highly plasticized plastics. “On demand” bonding at line speeds greater than 20 feet per minute (6.1 meters per minute) is possible, providing increased throughput without additional labor or line expansion.

The ability of selected “MSK” products to fluoresce upon exposure to low-intensity “black” light makes 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.

PROPERTIES	109-MSK-UR	110-MSK	111-MSK
Bondable Substrates Include:	ABS, PVC, PU, surface-treated silicone	PVC, PC, PU, ABS	PVS, SEBS, PU, PS
Features	Moisture resistant; strong bonds to plasticized PVC; Ultra-Red™ fluorescing	Flexible; bonds to plasticized substrates	Bonds to thermoplastic elastomers; moisture resistant
Applications	Facemasks, breathing circuits	Facemasks, tube sets and fittings, breathing circuits, resuscitator bags	Facemasks, tube sets and fittings, breathing circuits, resuscitator bags
Fluorescing (U.S. Patent 6,080,450)	No	No	Yes
ISO 10993 Biocompatibility	ISO 10993-5	ISO 10993-5	ISO 10993-5
USP Class VI Biocompatibility	Cytotoxicity	Cytotoxicity	Cytotoxicity
Nominal Viscosity, cP (20 rpm)	800	9,500	280
Durometer Hardness	D65	A58	D50
Tensile at Break, MPa [psi]	22 [3,200]	4.1 [590]	6 [900]
Elongation at Break, %	38	230	200
Modulus of Elasticity, MPa [psi]	430 [62,000]	3.6 [520]	70 [10,000]
Linear Shrinkage, %	0.6	1.8	0.5
<b>CURE DATA</b>			
<b>Fixture Time: (0.05 mm) 0.002 Inch Depth (in seconds) Between Glass</b>			
DYMAX 5000-EC Flood Lamp (200 mW/cm <sup>2</sup> )*	1 s	1 s	<1 s
DYMAX UVC-6 Conveyor w/Fusion “D” Bulb (2,500 mW/cm <sup>2</sup> )**	8.2 m/min [27 ft/min]	>8.2 m/min [>27 ft/min]	8.2 m/min [27 ft/min]
<b>SUBSTRATE BONDING GUIDE</b>			
<b>ABS</b>	acrylonitrile-butadiene-styrene	✓	✓
<b>PC</b>	polycarbonate	○	○
<b>PVC</b>	poly(vinyl chloride)	✓	✓
<b>SEBS</b>	styrene-ethylene/butylene-styrene		✓
<b>Silicone</b>	platinum cured	st	

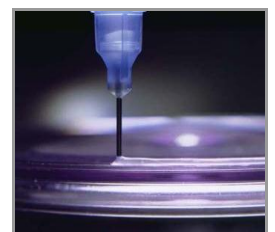
✓ Recommended adhesive ○ Limited applications st Requires surface treatment (e.g., plasma, corona treatment, etc.)

\*200 mW/cm<sup>2</sup> measured 2.5" below bottom of lamp housing. Measured by the ACCU-CAL™ 50 radiometer.

\*\*2,500 mW/cm<sup>2</sup> measured by EIT Power Puck radiometer 2.1" below lamp housing.



Automated facemask curing



MSK adhesives bond to a wide variety of substrates

# MD<sup>®</sup> MULTIPURPOSE BONDING ADHESIVES

DYMAX UV and visible light-curable adhesives for medical devices significantly reduce assembly process costs. The DYMAX MD<sup>®</sup> "1000" series adhesives are solvent free and cure within seconds upon exposure to UV and visible light and permit bonding of UV-inhibited and tinted plastics. In-line inspection of the adhesive bond line is made possible with the patented fluorescing chemistry.

DYMAX medical device adhesives glow brightly when exposed to a low-intensity "black light" and enhance the function

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, and other medical disposables. DYMAX MD<sup>®</sup> adhesives are compatible with gamma, EtO, and E-Beam sterilization.

PROPERTIES	1128A-M	1161-M	1162-M*	1165-M	1180-M*	1187-M
Bondable Substrates Include:	SS, aluminum, glass, PA, PMMA, PS	PC, ABS, PVC, PMMA, SS, PA	PC, SS, glass, PVC, ABS	PVC, PC, PU, ABS, EVA	PC, PVC, PU, ABS, SS	PC, PVC, PU, ABS, PET
Features	High strength; impact resistant; secondary thermal cure capability	Multipurpose plastic and metal bonder; use with BlueWave <sup>®</sup> LED Prime UVA Spot Curing System	Strong bonds to a variety of substrates; low shrinkage; use with BlueWave <sup>®</sup> LED Prime UVA Spot Curing System	Silicone-like softness; cures with dry surface	Multipurpose; plastic and metal bonder	Moisture resistant; clear bond lines; flexible; use with BlueWave <sup>®</sup> LED Prime UVA Spot Curing System
Applications	Metal bonding	Needle bonding, tube sets, reservoirs	Plastic and needle bonding	Tube sets, gaskets	Needle bonding, reservoirs, transducer assembly	Reservoirs, tube sets
Fluorescing (U.S. Patent 6,080,450)	Yes	Yes	Yes*	Yes	Yes*	Yes
ISO 10993 Biocompatibility	Yes	Yes	Yes	Yes	Yes	Yes
USP Class VI Biocompatibility	Yes	Yes	Yes	Yes	Yes	Yes
Nominal Viscosity, cP (20 rpm)	600*	300	200	10,000	150*	450*
Durometer Hardness	D76	D70	D75	A55	D70	D55
Tensile at Break, MPa [psi]	30 [4,300]	16 [2,300]	15 [2,100]	3.8 [550]	17 [2,500]	17 [2,400]
Elongation at Break, %	10	68	140	250	66	170
Modulus of Elasticity, MPa [psi]	620 [90,000]	280 [40,000]	390 [57,000]	3.6 [520]	330 [48,000]	170 [25,000]
Linear Shrinkage, %	1.2	0.6	0.4	1.6	0.8	2.0
<b>CURE DATA</b>						
<b>Fixture Time: (0.05 mm) 0.002 Inch Depth (in seconds) Between Glass</b>						
DYMAX BlueWave <sup>®</sup> 200 Spot Lamp (10,000 mW/cm <sup>2</sup> )**	1.6 s	<0.2 s	<0.2 s	0.4 s	0.2 s	0.2 s
DYMAX 5000-EC Flood Lamp (200 mW/cm <sup>2</sup> )***	1 s	<1 s	<1 s	1 s	<2 s	<1 s
DYMAX UVC-6 Conveyor w/Fusion "D" bulb (2,500 mW/cm <sup>2</sup> )****	8.2 m/min [27 ft/min]	>8.2 m/min [>27 ft/min]	>8.2 m/min [>27 ft/min]	>8.2 m/min [>27 ft/min]	>8.2 m/min [>27 ft/min]	>8.2 m/min [>27 ft/min]

\*Other viscosity variations may be available upon request.

\*\*10,000 mW/cm<sup>2</sup> measured at work surface over the UVA range (320-395 nm) using the DYMAX ACCU-CAL<sup>™</sup> 50 radiometer.

\*\*\*200 mW/cm<sup>2</sup> measured 2.5" below bottom of lamp housing. Measured by the ACCU-CAL<sup>™</sup> 50 radiometer.

\*\*\*\*2,500 mW/cm<sup>2</sup> measured by EIT Power Puck radiometer 2.1" below lamp housing.

\*Ultra-Red<sup>™</sup> fluorescing grades available

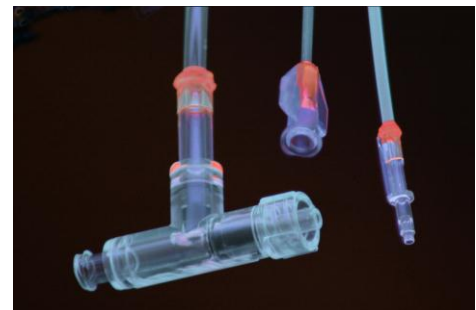
# MD<sup>®</sup> MULTIPURPOSE ADHESIVE / Substrate Bonding Guide - Medical Plastics/Materials

PRODUCTS	1128A-M	1161-M	1162-M*	1165-M	1180-M*	1187-M
<b>PLASTICS</b>						
<b>ABS</b> acrylonitrile-butadiene-styrene	o	✓	✓	✓	✓	✓
<b>CAP</b> cellulose acetate propionate	o	o			✓	
<b>COPE</b> copolyetheresters	o	✓			o	✓
<b>EP</b> epoxy, FR-4 circuit board		✓			✓	
<b>EVA</b> ethylene-vinyl acetate	st			✓		
<b>HDPE</b> high-density polyethylene		st	st	st	st	st
<b>LDPE</b> low-density polyethylene	st	st	st	st	st	st
<b>MBS</b> methacrylate-butadiene-styrene	o	o			✓	o
<b>PA</b> polyamide	✓	✓				o
<b>PC</b> polycarbonate		✓	✓	✓	✓	✓
<b>PC/ABS Blend</b> blend of PC and ABS		✓	✓	✓	✓	✓
<b>PC/PCTG Blend</b> blend of PC and PCTG		✓	✓	✓	✓	o
<b>PCTG</b> poly(cyclohexylene dimethylene terephthalate)glycol		✓	✓	✓	✓	o
<b>PEBA</b> polyether block amide	o	o				✓
<b>PEI</b> polyetherimide		o				
<b>PES</b> polyethersulfone		o				o
<b>PET</b> poly(ethylene terephthalate)	st	✓	✓	o	o	✓
<b>PETG</b> poly(ethylene terephthalate)glycol		✓			o	✓
<b>PI</b> polyimide	o	o		o		✓
<b>PMMA</b> poly(methyl methacrylate)	✓	✓		o	✓	o
<b>POM</b> polyoxymethylene						
<b>PPO</b> poly(phenylene oxide)	o	o			o	o
<b>PS</b> polystyrene	✓	✓	✓	o	✓	✓
<b>PSU</b> polysulfone		o			o	o
<b>PU</b> polyurethane	o	✓		✓	✓	✓
<b>PVC</b> poly(vinyl chloride)		✓	✓	✓	✓	✓
<b>SB</b> styrene-butadiene		o		o	✓	
<b>SAN</b> styrene-acrylonitrile	✓	✓			o	✓
<b>TPU</b> thermoplastic polyurethane	o	o		o	✓	✓
<b>OTHER MATERIALS</b>						
<b>AL</b> aluminum	✓		✓			
<b>CER</b> ceramic	✓	o		o		
<b>GL</b> glass	✓	✓	✓	o		
<b>SS</b> stainless steel	✓	✓	✓	o	✓	

✓ Recommended adhesive    o Limited applications    st Requires surface treatment (such as corona, etc., or a mechanical lock hub design)  
 \*Ultra-Red™ fluorescing grades available

## Ultra-Red™ Fluorescing Technology

DYMAX has introduced a new technology that enhances bond-line inspection processes and product authentication. Ultra-Red™ Fluorescing technology can be incorporated into existing adhesive formulations. The adhesives remain clear until exposed to low-intensity UV light (typical inspection lights), at which point they fluoresce bright red. This is particularly effective when bonding plastics that naturally fluoresce blue, such as PVC and PET. The patented Ultra-Red fluorescence also produces a unique spectral signature that can be used by manufacturers for their product authentication.



Tube sets bonded with DYMAX Ultra-Red adhesives fluoresce bright red

# SEE-CURE TECHNOLOGY

## How do I know that sufficient adhesive has been dispensed? How do I know when it's cured?

DYMAX adhesives containing See-Cure technology provide the ability to answer these questions. Uncured See-Cure adhesives are bright blue in color. This makes them easy to see after dispensing.

During the light-curing process, the blue color transitions to

clear, indicating that sufficient energy was received by the adhesive to complete the curing process. This visual cure-indicator may initially be used to qualify the process and then to ensure that the process remains within the qualified parameters.

PROPERTIES	211-CTH-SC	1201-M-SC	1202-M-SC	1204-M-SC
Bondable Substrates Include:	ABS, CAP, PA, PC, PVC, SAN, TPU, EP, SS, PU, PS	PC, PVC, PU, ABS, PET, PEBA	PMMA, PA, PC, PU, PVC, PET, SS	PVC, PU, ABS, PC, EVA
Features	Blue-to-clear color change; Use with BlueWave® LED Prime UVA Spot Curing System	Blue-to-clear color change; flexible; use with BlueWave® LED Prime UVA Spot Curing System	Blue-to-clear color change; flexible	Blue-to-clear color change; low shrinkage; very flexible
Applications	Needle bonding, catheter assembly, balloon bonding, connectors to tubing	Tube sets, reservoirs, catheters	Tube sets, metal-to-plastic assembly, catheters, reservoirs	Tube sets and fittings, face masks, tracheal tubes
ISO 10993 Biocompatibility	Yes	Yes	Yes	Yes
Nominal Viscosity, cP (20 rpm)	450	450	300	12,000
Durometer Hardness	D70	D60	D55	A60
Tensile at Break, MPa [psi]	14 [2,000]	14 [2,000]	11 [1,600]	6.9 [1,000]
Elongation at Break, %	470	170	230	380
Modulus of Elasticity, MPa [psi]	230 [34,000]	120 [17,000]	100 [15,000]	5.1 [740]
Linear Shrinkage, %	0.59	2.4	2.0	0.1

Note: Please refer to individual Product Data Sheets (PDS) for cure data information

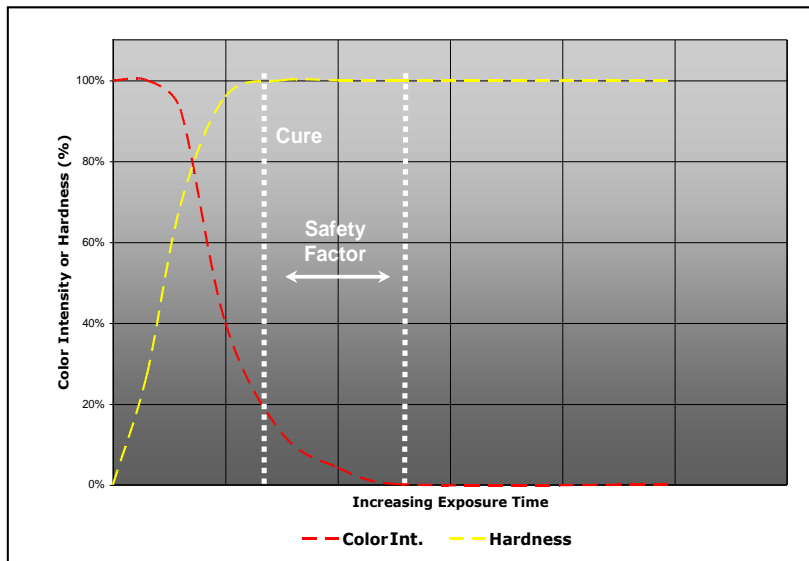
### The Safety Factor Chart

To verify that See-Cure technology consistently serves as a reliable indicator of full cure, DYMAX performed extensive testing with a wide variety of its light-curing adhesive products. The test matrix included standard adhesives with a broad range of adhesive cure speeds and cured properties. Using existing specifications from each standard adhesive as a control, the adhesives adjusted with See-Cure were tested again to the same specifications. All physical cured properties of the sample group remained within the measured values of the original specifications.

In addition, the adhesive products designated for medical device assembly were formulated with the See-Cure technology and tested for biocompatibility. The test results confirm that the addition of See-Cure technology has no affect on the biocompatibility rating of the original product.

To illustrate the concept of See-Cure technology, measurements of product hardness were taken during curing cycles to determine the point of full cure. These were plotted against measurements of adhesive color intensity at the same time intervals.

### The Safety Factor Chart



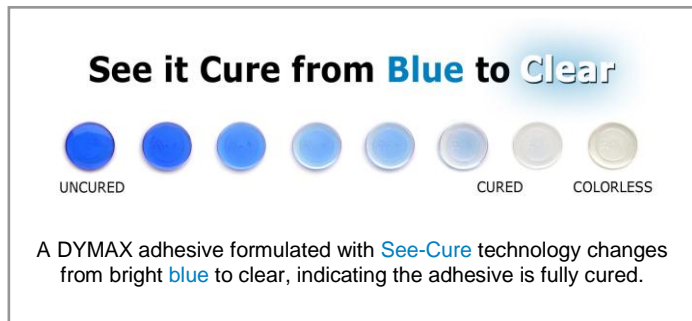
The graph above depicts the typical relationship between the progression of adhesive cure and the diminishing color of See-Cure technology within the adhesive. As verified by the graphed measurements, the final color change from blue occurs after adhesive curing has taken place.



# SEE-CURE ADHESIVES / Substrate Bonding Guide – Medical Plastics/Materials

PRODUCTS	211-CTH-SC	1201-M-SC	1202-M-SC	1204-M-SC
<b>PLASTICS</b>				
<b>ABS</b> acrylonitrile-butadiene-styrene	✓	✓	✓	✓
<b>CAP</b> cellulose acetate propionate	✓			
<b>COPE</b> copolyetheresters		✓		
<b>EP</b> epoxy, FR-4 circuit board	✓			
<b>EVA</b> ethylene-vinyl acetate				✓
<b>HDPE</b> high-density polyethylene		st	st	st
<b>LDPE</b> low-density polyethylene		st	st	st
<b>MBS</b> methacrylate-butadiene-styrene		o	✓	
<b>PA</b> polyamide	✓	o	✓	
<b>PC</b> polycarbonate	✓	✓	✓	✓
<b>PC/ABS Blend</b> blend of PC and ABS		✓	✓	✓
<b>PC/PCTG Blend</b> blend of PC and PCTG		o	✓	✓
<b>PCTG</b> poly(cyclohexylene dimethylene terephthalate)glycol		o	✓	✓
<b>PEBA</b> polyether block amide		✓	o	
<b>PEI</b> polyetherimide				✓
<b>PES</b> polyethersulfone		o		
<b>PET</b> poly(ethylene terephthalate)		✓	✓	o
<b>PETG</b> poly(ethylene terephthalate)glycol		✓	✓	
<b>PI</b> polyimide			✓	
<b>PMMA</b> poly(methyl methacrylate)		o	✓	o
<b>POM</b> polyoxymethylene				
<b>PPO</b> poly(phenylene oxide)				
<b>PS</b> polystyrene	✓	✓	o	o
<b>PSU</b> polysulfone				
<b>PU</b> polyurethane	✓	✓	✓	✓
<b>PVC</b> poly(vinyl chloride)	✓	✓	✓	✓
<b>SB</b> styrene-butadiene			✓	o
<b>SAN</b> styrene-acrylonitrile	✓	✓		
<b>TPU</b> thermoplastic polyurethane	✓	✓	✓	✓
<b>OTHER MATERIALS</b>				
<b>AL</b> aluminum			o	
<b>CER</b> ceramic				
<b>GL</b> glass				
<b>SS</b> stainless steel	✓		o	

✓ Recommended adhesive    o Limited applications    st Requires surface treatment (such as corona, etc., or a mechanical lock hub design)



# MEDI-CURE® 222 SERIES CYANOACRYLATES

Low-odor, low-bloom, medical-grade cyanoacrylate adhesives offer exceptional product stability and faster cure speeds over other cyanoacrylates. The DYMAX MEDI-CURE® 222 Series medical device instant adhesives can replace many different grades of both methyl and ethyl cyanoacrylates due to their ability to adhere to a wide selection of substrates over a broad temperature range.

222 Series medical-grade cyanoacrylates can lower your costs by reducing the number of inventoried products necessary for the manufacturing of medical disposable devices. They are solvent free, ISO 10993 approved, Class VI certified, and are excellent for bonding opaque and difficult-to-bond-to substrates.

PRODUCT	FEATURES	SUBSTRATES BONDED	VISCOSITY
222/3	Solvent free; high strength; instant curing; wide surface compatibility; USP Class VI and ISO 10993 Biocompatibility	Ceramic, Glass, Graphite, Latex, PC, PVC, PEEK, PETG, PSU, SAN, SS	3 cP
222/50			50 cP
222/100			100 cP
222/450			450 cP
222/1700			1700 cP
222/GEL			Thixotropic gel



PROPERTIES			
<b>Uncured</b>			
Solvent Content	None – 100% Reactive Solids		
Chemical Class	Modified Ethyl Cyanoacrylate		
Appearance	Colorless Liquid		
Solubility	Nitromethane, Acetone, Dimethylformamide		
Toxicity	Low		
Flash Point	85°C (185°F)		
Specific Gravity	1.06		
Shelf Life between 50°F and 77°F	One year from date of shipment in unopened containers		
<b>Cured*</b>			
Shear Strength (.05" overlap, 23°C, 25% RH)			
	<b>Steel</b>	2,000 - 4,500 psi	ASTM D-1002
	<b>Stainless Steel</b>	1,000 - 2,500 psi	ASTM D-1002
	<b>Aluminum</b>	400 - 1,400 psi	ASTM D-1002
	<b>Polycarbonate</b>	400 - 1,000 psi	ASTM D-1002
	<b>ABS</b>	1,200 - 2,000 psi	ASTM D-1002
Thermal Limit (brittle/degrades)	-55° to 93°C (-65°/+200°F)		
Softening Point	329°F		
Refractive Index 20°C	1.49		
Dielectric Strength	11.6 kV/mm	ASTM D-1304	
Dielectric Constant (1 kHz)	5.4	ASTM D-1304	
Coefficient of Linear Thermal Expansion	80 x 10 <sup>-6</sup>		
<b>Cure Data</b>	<b>Fixture Speed, Seconds*</b>		
	<b>222/3 through 222/1700</b>	<b>222-GEL</b>	
Plastic to Plastic	5-30	20-40	
Rubber to Rubber	5-10	12-20	
Metal to Metal	2-30	30-90	
With 521 Accelerator**	0-5	0-10	
Without 521 Accelerator	5-40	5-60	

\*Cure speed and strength vary widely with 1) surface properties, 2) absorbed moisture and 3) gap thickness. Dry acidic surfaces cure slower. Basic surfaces accelerate cure speed.

\*\*May bond on contact. Maximum cure thickness 0.004"(0.1 mm). Strength continues to build for up to 24 hours at 68°F.

# UV LIGHT-CURING EQUIPMENT FOR MEDICAL ADHESIVE BONDING

## FLOOD CHAMBERS, SPOT LAMPS, CONVEYOR CURING SYSTEMS, and RADIOMETERS

Successful UV processing demands that the curing equipment be matched to the resin to optimize both performance and cost savings. DYMAX manufactures both light-curable resins and light-curing equipment, and specializes in optimization of light-curing processes.

Our technical specialists are ready to help you optimize your process, and maximize your profit and product performance. For resin and equipment selection assistance, please call the DYMAX Applications Engineering Department.



### BlueWave® 200 Light-Curing Spot Lamp

Patent pending intensity adjustment feature provides high-intensity UV/visible light in a concentrated area. Ideal for integration with automated equipment and multiple output lightguides. **CE Marked.**



### BlueWave® 75 Light-Spot Curing Lamp

Provides the optimal combination of low operating cost with high-intensity output to accommodate a majority of bonding applications. **CE Marked.**



### BlueWave® LED Prime UVA Spot-Curing Lamp

Generates curing energy using high-intensity LEDs (15 W/cm<sup>2</sup>). Provides cool cures and constant intensity with no bulbs to change. No warm-up required.



### 5000 Light-Curing Flood Lamp System

Has shutter and protective enclosure. Ideal for single-component or batch-curing processes requiring moderate intensity and a 5" x 5" (12.7 cm x 12.7 cm) cure area. **CE Marked** PC Series Flood Systems available for European production facilities.



### ACCU-CAL™ 150 Radiometer

Perfect for process monitoring of UV/Visible light-curing conveyor systems. **CE Marked.**



### ACCU-CAL™ 50, ACCU-CAL™ 50V, & ACCU-CAL™ 50-LED Radiometers

Perfect for process monitoring of spot-curing and flood lamp systems. **CE Marked.**



### Light Curing Conveyor Systems

Ideal for providing consistent curing for high-volume and high-speed assembly.



### Light-Curing Conveyor Systems

Specifically designed for compliance with European standards. **For European markets only. CE Marked.**



### Accessories for Light-Curing Lamps

Lightguides, shutters, shields, goggles, bulbs, and rod lenses are available to complement any DYMAX light-curing system. Visit [www.dymax.com](http://www.dymax.com) for more information.

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