Light Curing
MD® Medical Device Adhesives

DYMAX®

Discover a Better Solution

ABOUT DYMAX

DYMAX understands the demands of the medical device market. With over 20 years of direct involvement, 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, biocompatibility testing, curing recommendations, component design and process validation.

DYMAX pioneered the development of light curing adhesives for medical device assembly. This Selector Guide identifies our standard product offerings for typical device assembly applications involving catheters, guidewires, reservoirs, syringes, optics, breathing circuits, and IV tube sets. Hundreds of other formulations are available, or may be created, if a truly customized solution is more desirable.

ADHESIVE BIOCOMPATIBILITY & STERILIZATION

DYMAX MD® Medical Device adhesives are subjected to various biocompatibility tests in accordance with USP Class VI and/or ISO 10993 recommendations for disposable medical devices. The completed tests are identified on each Product Data Sheet. Certificate copies are provided by DYMAX upon request. Unless otherwise noted on the PDS, these adhesives have not been tested for prolonged or permanent implantation. In all cases, it is the user's responsibility to evaluate and validate the suitability of these adhesives in the intended medical device.

It is recommended that biocompatibility testing of the completed device be done following sterilization. Cured MD® adhesives are not adversely affected by typical sterilization processes for disposable medical devices, which include gamma irradiation, E-Beam, or EtO. Gamma irradiation is known to polymerize unsaturated systems. Sterilization by autoclaving may be limited to specific applications or component geometries.

TYPICAL ISO 10993 BIOCOMPATIBILITY TESTS PERFORMED ON DYMAX MD® MEDICAL DEVICE ADHESIVES

Acute Systemic Toxicity ● Cytotoxicity ● Hemocompatibility ● Irritation / Intracutaneous ● Implantantation (14 day)

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CATHETER and GUIDEWIRE BONDING ADHESIVES

The DYMAX "CTH" line of single-component adhesives was formulated to provide 100% solvent-free, cost saving assembly solutions for catheter manufacturing. "CTH" adhesives are USP Class VI and ISO 10993 approved, and "bond on demand" with worker-friendly longwave UV/visible light. They are formulated to meet the unique assembly challenges associated with typical catheter materials. These products provide good adhesion, high flexibility, fast cure speeds, and moisture and humidity resistance for reliable assembly of catheters and guidewires. Bond line inspection is made possible with the patented fluorescing option offered in the CTH-F product line.

PROPERTIES*		201-CTH	203A-CTH	204-CTH	206-CTH	207-CTH
Bondable Substrates Include:		PC, PET, PETG	PA, SS	PC, PU, PVC	PC, SS	Nitinol®, PA, PU, SS
Features		Very flexible; low stress; moisture resistant	For guidewire assembly; secondary thermal cure capability	Cures through UV blocking plastics; bonds to flexible and rigid substrates	Flexible; tack-free surface	Tough; low shrink; secondary thermal cure capability
Fluorescing (U.S. Patent #6,080,450)		-"F" only	-"F" only	-"F" only	Yes	Yes
ISO 10993 Biocompatibility		----	Yes	----	Yes	Pending
USP Class VI Biocompatibility		Yes	Yes	Yes	Yes	Pending
Nominal Viscosities (cP and mPas) Brookfield 25°C		425 • 6,500 • 25,000	55 • 600 • 3,500 • 11,000 • 25,000	160 • 450 • 6,500 • 12,000 • 25,000	135 • 5,000 • 12,000 • 25,000	500 • 5,000 • 11,000 • 25,000
Hardness (Shore)		D30	D80	D55	D65	D70
Tensile @ Break (psi • MPa)		1,400 • 10	5,200 • 36	1,700 • 12	2,800 • 19	4,400 • 30
% Elongation @ Break		280	50	175	110	55
Modulus (psi • MPa)		2,000 • 14	300,000 • 2070	25,000 • 170	230,000 • 1600	140,000 • 960
% Linear Shrinkage		1.6	3.0	3.1	1.1	0.4
CURE DATA						
Fixture Time: 0.002 inch (0.05 mm) depth (in seconds) Between Glass						
DYMAX BlueWave™ 200 Spot Lamp @ 3,700 mW/cm²**		<2	<2	<1	<1	<1
SUBSTRATE BONDING GUIDE						
ABS	Acrylonitrile-butadiene-styrene: Lustran®, Terluran®	✓	✓	✓	o	✓
Metal	Nitinol®		✓	o	o	✓
PA	Polyamide: Nylon® 6/6, 12	o	✓	✓	✓	✓
PC	Polycarbonate: Makrolon®, Lexan®, Apec®, Calibre®	✓	o	✓	✓	
PE	Polyethylene	st	st	st	st	st
PEBA	Polyether-block-amide: PEBAX®	o	o	✓	✓	o
PEEK	Poly (etheretherketone)	✓	✓	✓	o	
PET	Polyester Homopolymer: Vectra®, Celanex®, Xenoy®	✓	o	✓	o	
PETG	Copolyester: Eastar®	✓		o	✓	
PI	Polyimide: Kapton®	✓	o	✓	o	o
PS	Polystyrene: Novacor®	✓	✓	✓	o	o
PU	Polyurethane	o	o	✓	✓	✓
PVC	Polyvinyl chloride	o	o	✓	✓	o
SS	Stainless Steel	o	✓	✓	o	✓

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

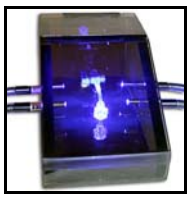
**Customized adhesives and viscosities may be available upon request.*

***3,700 mW/cm² measured 3/8" away from lightguide. Intensity at end of lightguide is 19,000 mW/cm². Measured by ACCU-CAL™ 30 radiometer.*

Bond a variety of catheter substrates

Bond in seconds or less

A selection of convenient package sizes



Curing catheter with four pole lightguide

Product Data Sheets are available for downloading at: www.dymax.com/products/medical/catheter_assembly.asp

MD® MULTI-PURPOSE BONDING ADHESIVES

DYMAX MD® "1000" Series Medical Device Adhesives cure in seconds upon exposure to UV/visible light, reducing assembly processing costs up to 50%. They offer superior adhesion and performance in bonding to a variety of substrates. Their ability to cure with UV/visible light permits bonding of UV blocked, heavily tinted and dissimilar substrates. MD® adhesives reach full cure in seconds and fluoresce under low intensity black light for immediate in-line functional testing and inspection. They are USP Class VI and ISO 10993 certified, moisture and humidity resistant, solvent-free, leave no residue and are available in gap filling viscosities. DYMAX MD® adhesives are compatible with gamma, EtO and E-Beam sterilization. These solvent-free adhesives replace ultrasonic welding applications and costly two-part products. They are ideal for a number of disposable medical device bonding applications, including reservoirs, heat exchangers, transducers, oxygenators and IV fittings and tubing.

PROPERTIES*	1128A-M	1136-M	1180-M	1181-M	1183-M	1184-M	1185-M	1187-M	1190-M	1191-M	1193-M	1197-M
Bondable Substrates Include:	ABS, CAP, PA, PEBA, PS, SAN, Metal	ABS, Glass, K-Resin®, PA, PU, SAN, Metal	ABS, Metal, PC, PS, PU, PVC	ABS, CAP PC, PETG PU, PS, PVC	CAP, PC, PU, PES, PETG, PSU, PVC	CAP, PU, PS, SAN, Metal	ABS, PC, PS, PU, PVC	PA, PC, PET, PS, PU, VC	Metal, , PS, PU, PVC	PA, PC, PET, PETG PMMA, PU, PVC, SAN	ABS, Metal, PC, PS, PU, PVC	Metal, PC, PMMA, PS, PU, PVC
Features	High strength; impact resistant; secondary thermal cure capability	High clarity; rigid	Multi-purpose; flexible; moisture resistant	Fast curing; high tensile strength	Flexible; high viscosity	Environ-mentally resistant coating	High clarity; moisture resistant; flexible	Moisture resistant; clear bond-lines; flexible	Bonds rigid plastics and metals	Flexible; fast curing; bonds to wide range of plastics	Flexible; moisture resistant	Moisture resistant
Applications	Needle and metal bonding	Needle and glass bonding; bio-chamber assembly	Needle, reservoir, transducer assembly; medical potting	Intravenous tube sets, oxygenators and reservoirs	Reservoir and transducer assembly; potting	Compo-nent and surface protection	IV tube set assembly	Reservoir bonding; tube sets; connectors	Potting, reservoir and transducer assembly	Stopcock, collection bag, tube set and reservoir assembly	Needle, reservoir, transducer assembly; medical potting	Heat exchange and oxygenator assembly
Fluorescing (U.S. Patent #6,080,450)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ISO 10993 Biocompatibility	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
USP Class VI Biocompatibility	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nominal Viscosities (cP and mPas) Brookfield 25°C	650 3,250 11,000 25,000	90 6,000 27,000	135 2,500 5,000 12,000 25,000	5,000 14,000 27,000	8,000	150 400 4,000 12,000	200 600 25,000	450 1,000 7,500 10,000 15,000 25,000	90 5,000 25,000	225 500 1,000 5,000 11,500 30,000	400 2,750	1,300 7,000 25,000
Hardness (Shore)	D75	D85	D70	D80	D50	D80	D70	D55	D80	D60	D60	D60
Tensile @ Break (psi • MPa)	3,000 • 21	6,000 • 41	2,800 • 19	6,000 • 41	2,500 • 17	6,200 • 43	3,000 • 21	1,700 • 12	4,500 • 31	2,600 • 18	2,800 • 19	1,600 • 11
% Elongation @ Break	26	12	60	55	225	5	40	170	2	115	70	120
Modulus (psi • MPa)	N/A	500,000 • 3450	230,000 • 1600	500,000 • 3450	32,000 • 220	60,000 • 410	100,000 • 690	30,000 • 210	275,000 • 1900	87,000 • 600	65,000 • 450	47,500 • 330
% Linear Shrinkage	3.0	1.8	2.0	1.2	1.2	2.0	2.1	3.0	3.0	2.4	0.8	2.4
CURE DATA												
Fixture Time: 0.002 inch (0.05 mm) depth (in seconds) Between Glass												
DYMAX BlueWave™ 200 Spot Lamp @ 3,700 mW/cm²**	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
DYMAX 5000-PC Flood Lamp @ 150 mW/cm²***	<2	<2	<1	<1	<1	<1	<1	1	<2	<1	<1	<2
DYMAX Conveyor @ 2,500 mW/cm²****	<1	<1	1	<1	<1	<1	<1	1	<1	<1	<1	<1

**Customized adhesives and viscosities may be available upon request.*
***3,700 mW/cm² measured 3/8" away from lightguide. Intensity at end of lightguide is 19,000 mW/cm². Measured by ACCU-CAL™ 30 radiometer.*
****150 mW/cm² measured 2.5" below bottom of lamp housing. Measured by ACCU-CAL™ 30 radiometer.*
*****2,500 mW/cm² measured by EIT Power Puck radiometer 2.1" below lamp housing.*

Product Data Sheets are available for downloading at: www.dymax.com/products/medical/selector_guides/selector_guide.asp

MD® MULTI-PURPOSE ADHESIVE / SUBSTRATE BONDING GUIDE

for Medical Plastics and Materials

PRODUCTS*	1128A-M	1136-M	1180-M	1181-M	1183-M	1184-M	1185-M	1187-M	1190-M	1191-M	1193-M	1197-M
PLASTICS: COMMON TRADENAMES												
ABS Acrylonitrile-butadiene-styrene: Lustran®, Terluran®	✓	✓	✓	✓		o	o	✓	✓	✓	✓	o
CAP Cellulose acetate propionate: Tenite®	o	o	✓	✓	✓				o	o		o
COPE Copolyester Ether: Ecdel®	o	✓	o				✓	✓	✓	✓	✓	✓
EP Epoxy, FR-4 Circuit Board	✓		✓			✓			✓		✓	
EVA Ethylene-vinyl acetate	st				o			o		o	o	
HDPE High-density polyethylene		st	st				st	st	st	st	st	st
LDPE Low-density polyethylene	st	st	st		st		st	st	st	st	st	st
MBS Methacrylate-butadiene-styrene: Zylar®	o	✓	✓	✓		✓		o	✓	o		o
PA Polyamide: Nylon 6/6, 12	✓		st		st			st	st	o	o	st
PC Polycarbonate: Makrolon®, Lexan®, Apec®, Calibre®			✓	✓	✓		✓	✓	✓	✓	✓	✓
PC/ABS Blend: Bayblend®			✓	✓	✓		✓	✓	✓	✓	✓	✓
PC/PCTG Blend: Makroblend®			✓	✓	✓		✓	o		✓	✓	✓
PCTG Copolyester	✓		✓	✓	o		o	o	✓	✓	✓	
PEBA Polyether-block-amide: PEBAX®			✓					✓		✓	o	✓
PEI Polyetherimide: Ultem®									o		o	o
PES Polyether sulfone: Ultrason®				o				o	o	o	o	
PET Polyester Homopolymer: Vectra®, Celanex®, Xenoy®			✓	✓	✓	✓	✓	✓	o	✓	✓	✓
PETG Copolyester: Eastar®			✓				✓	✓	o	✓	✓	✓
PI Polyimide: Kapton®	o	o								o	o	o
PMMA Poly (methyl methacrylate): Acrylic, Plexiglass®, Perspex®, Cyrolite®	o	o	o	o			o	o	o	o	o	o
PoM Polyoxymethylene: Acetal	st									st		
PPo Polyphenylene oxide: Noryl®	o	o	o				o	o	✓	o		✓
PS Polystyrene: Novacor®	o		✓						✓	✓	o	✓
PSU Polysulfone: Ultrason®				o				o	o	o	o	
PU Polyurethane: Pellethane®, Estane®			✓	✓			✓	✓	✓	✓	✓	✓
PVC Polyvinyl chloride			o				✓	✓	✓	✓	✓	o
SB Styrene-butadiene: K-Resin®		✓	✓			✓	✓		✓	o	o	✓
SAN Styrene-acrylonitrile: Lustran®	✓	o	✓	✓			✓	✓	✓	✓	✓	✓
TPU Thermoplastic Polyurethane: Texin®	o		o				o	o	o	o	o	
OTHER MATERIALS												
Ceramic	✓	✓				✓				o	o	
Glass: Borosilicate, Quartz, Mica	✓	✓							o		o	
Stainless Steel	✓	o	✓			o			o	o	✓	

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

**Customized adhesives and viscosities may be available upon request.*

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Reservoir bonding

Blood oxygenator assembly

Bond a variety of reservoirs and filters

Product Data Sheets are available for downloading at: www.dymax.com/products/medical/selector_guides/selector_guide.asp

NEEDLE BONDING and SYRINGE ASSEMBLY ADHESIVES

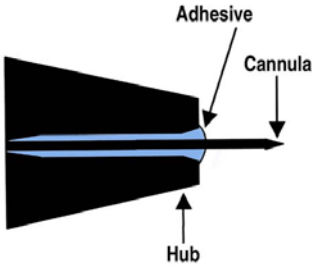
High speed, high volume, needle bonding and syringe assembly is possible with ISO 10993 and USP Class VI certified adhesives that bond on demand at room temperature when exposed to UV/visible light. DYMAX MD® 100% solvent-free medical device adhesives have proven very successful in cannula to hub assembly. They are single component, so no mixing is required. They are ideal for automated assembly lines and come in a broad range of product viscosities for design flexibility. Applications include the bonding of cannulas to hubs in various hypodermic and biopsy needles, syringes and winged infusion sets made from multiple plastics, metals, and glass. Compatible with gamma, EtO and E-Beam sterilization.

The combination of high intensity visible and longwave UV light greatly enhances the adhesives' speed and depth of cure. Visible light curing also permits bonding of UV blocking and heavily tinted plastics. Rapid cure speeds allow immediate in-line testing and packaging. These brilliantly fluorescing adhesives enhance the performance of automated sensing and vision systems. Adhesive coverage and volume are easily detectable, leading to higher production yields and improved quality assurance.

DESIGN CONSIDERATIONS for NEEDLE / HUB ASSEMBLY

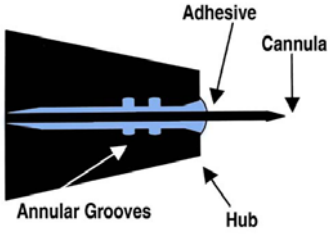
CYLINDRICAL HUB with ADHESIVE WELL

A hub that is flared at the distal end is described as incorporating a "well" configuration. Filling the well with adhesive secures the needle in place. In many cases the hubs are opaque but may be cured from above with UV/visible light. Adhesion to both the hub substrate and cannula are of critical importance. A cylindrical hub that is closely fitted to the cannula requires a low wicking grade viscosity adhesive. Recommended gap: 0.002"-0.004" (0.05-0.1 mm) per side. However, in designs with larger gap, it may be necessary to choose a mid-range viscosity adhesive. (Refer to our Adhesive Substrate Selector Guide on Page 7 for help in choosing a suitable adhesive and viscosity.)



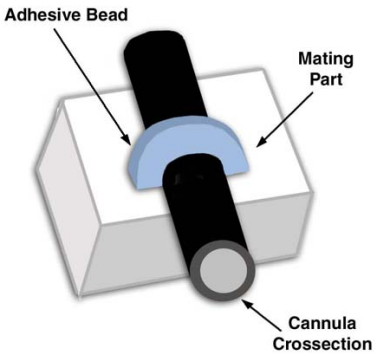
MECHANICAL LOCK

For greater pull strength, annular grooves may be molded into the inside diameter of a needle hub. The optimum number of grooves in each hub, and their dimensions, is contingent on the configuration of the hub, its wall thickness, the material it is made from, and the limitations of the manufacturer's molding equipment. 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 better suited to wick between the stainless steel cannula and hub. Hubs made from essentially any substrate may be used, providing the adhesive adheres to the stainless steel cannula.



BRIDGE BONDING

The cannula may 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 transmitting light into a shadowed or opaque area for the purpose of curing the adhesive.



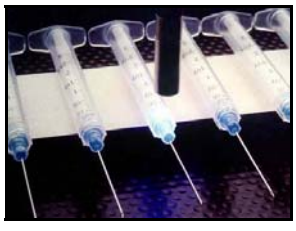
Note: Variables involving surface energy, component surface finish, dispensing systems, air entrapment, dwell time before curing, and cannula alignment may have significant impact on adhesive performance. For proper adhesive selection, it is recommended that all final testing be conducted with the actual components and processing equipment (or reasonable simulation) to obtain valid measurements of performance.

Product Data Sheets are available for downloading at: www.dymax.com/products/medical/needle_bonding.asp

NEEDLE BONDING and SYRINGE ASSEMBLY ADHESIVES

PROPERTIES*		1128-M-VLV	1160-M	1180-M	1186-M	1193-M-VLV
Bondable Substrates Include:		ABS, CAP, Glass, Metal, PMMA, PS, SAN	ABS, Metal, PC, PS, PU, PVC	ABS, Metal, PC, PS, PU, PVC	ABS, Glass, Metal, SAN	ABS, Metal, PC, PS, PU, PVC
Features		Impact resistant; secondary heat cure	Low shrink; low stress plastic bonder	Moisture resistant; flexible; general purpose	High strength; thin wicking viscosity	Resilient; moisture resistant
Fluorescing (U.S. Patent #6,080,450)		Yes	Yes	Yes	Yes	Yes
ISO 10993 Biocompatibility		Yes	Yes	Yes	Yes	Yes
USP Class VI Biocompatibility		Yes	Yes	Yes	Yes	Yes
Standard Nominal Viscosities (cP and mPas) Brookfield, 25°C		55	95 • 165 • 5,250	135 • 2,500 • 5,000 • 12,000 • 25,000	135 • 6,500 • 25,000	400 • 2,750
Hardness (Shore)		D75	D75	D70	D85	D60
Tensile @ Break (psi • MPa)		3,000 • 21	3,800 • 26	2,800 • 19	7,250 • 50	2,800 • 19
% Elongation @ Break		26	50	60	12	70
Modulus (psi • MPa)		N/A	240,000 • 1650	230,000 • 1600	800,000 • 5520	65,000 • 450
% Linear Shrinkage		3.0	0.8	2.0	2.0	0.8
CURE DATA						
Fixture Time: 0.002 inch (0.05 mm) depth (in seconds) Between Glass						
DYMAX BlueWave™ 200 Spot Lamp @ 3,700 mW/cm²**		<2	<1	<1	<1	<1
DYMAX 5000-PC Flood Lamp @ 150 mW/cm²***		<4	<1	<1	<1	<1
DYMAX Conveyor @ 2,500 mW/cm²****		<1	<1	<1	<1	<1
SUBSTRATE BONDING GUIDE						
ABS	Acrylonitrile-butadiene-styrene: Lustran®, Terluran®	✓	✓	✓	✓	✓
CAP	Cellulose acetate propionate: Tenite®	o	✓	✓		✓
Glass	Borosilicate, Quartz, Mica	✓	✓		✓	✓
PA	Polyamide: Nylon® 6/6, 12	o	o	o	o	o
PC	Polycarbonate: Makrolon®, Lexan®, Apec®, Calibre®		✓	✓	o	✓
PE	Polyethylene	st	st	st	st	st
PEBA	Polyether-block-amide: PEBAX®	✓	✓	✓	✓	o
PMMA	Poly (methyl methacrylate): Acrylic, Plexiglass®, Perspex®, Cyrolite®	o	✓	o	o	✓
PP	Polypropylene	st	st	st	st	st
PS	Polystyrene: Novacor®	✓	✓	✓	o	✓
PU	Polyurethane	✓	✓	✓	✓	✓
PVC	Polyvinyl chloride	o	✓	✓	o	✓
SS	Stainless Steel	✓	✓	✓	✓	✓

✓ *Recommended adhesive* o *Limited applications* st *Requires surface treatment (such as corona, etc., or a mechanical lock hub design)*
**Customized adhesives and viscosities may be available upon request.*
***3,700 mW/cm² measured 3/8" away from lightguide. Intensity at end of lightguide is 19,000 mW/cm². Measured by ACCU-CAL™ 30 radiometer.*
****150 mW/cm² measured 2.5" below bottom of lamp housing. Measured by ACCU-CAL™ 30 radiometer.*
*****2,500 mW/cm² measured by EIT Power Puck radiometer 2.1" below lamp housing.*


Automated syringe assembly


Crystal clear bonds with MD® adhesives


Adhesives fluoresce for in-line inspection


UV needle bonding
Photo courtesy of EFD Corp.

Product Data Sheets are available for downloading at: www.dymax.com/products/medical/needle_bonding.asp

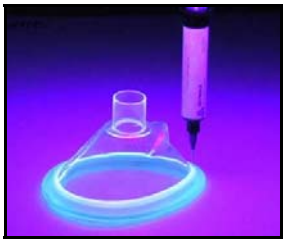
ANESTHESIA MASK, RESUSCITATOR BAG and BREATHING CIRCUIT ADHESIVES

The DYMAX "MSK" adhesives cure rapidly upon exposure to UV/visible light and are formulated to provide 100% solvent-free, cost saving assembly solutions for anesthesia mask manufacturing. "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. Strong, flexible bonds are produced which are resistant to climatic changes and harsh environments. The "MSK" series adhesives can be used to bond dissimilar substrates and highly plasticized plastics. The ability of the "MSK" series to fluoresce upon exposure to low intensity "black" light makes them ideally suited for in-line inspection. These adhesives are easily dispensed by syringe, dipping well, screen print or spray. Multiple viscosities and formulations are available.

PROPERTIES*	101-MSK	104-MSK	108-MSK	1-20323
Bondable Substrates Include:	CAP, PC, PU, PVC	PC, PET, PS, PU, PVC	ABS, PC, PS, PU, PVC	PC, PVC
Features	Low viscosity; aggressive bonds to highly plasticized PVC	Fast curing; cures through UV blocked plastics	Cures through UV blocked plastics	Moisture resistant; flexible
Fluorescing (U.S. Patent #6,080,450)	No	No	Yes	No
ISO 10993 Biocompatibility	----	----	Yes	----
USP Class VI Biocompatibility	----	Yes	Yes	Yes
Nominal Viscosities (cP and mPas) Brookfield 25°C	45	550 • 5,000 • 25,000	200 • 600 • 25,000	8,500
Hardness (Shore)	D80	D55	D70	D60
Tensile @ Break (psi • MPa)	7,000 • 48	2,500 • 17	3,000 • 21	3,660 • 25
% Elongation @ Break	6	125	40	55
Modulus (psi • MPa)	N/A	80,000 • 550	100,000 • 690	100,000 • 690
% Linear Shrinkage	2.0	3.0	2.3	2.0
CURE DATA				
Fixture Time: 0.002 inch (0.05 mm) depth (in seconds) Between Glass				
DYMAX 5000-PC Flood Lamp @ 150 mW/cm²**	<1	<1	<1	<1
DYMAX Conveyor @ 2,500 mW/cm²***	<1	<1	<1	<1
SUBSTRATE BONDING GUIDE				
CAP Cellulose acetate propionate: Tenite®	✓	✓	✓	
K-Resin® Styrene Butadiene	✓	✓	✓	
PC Polycarbonate: Makrolon®, Lexan®, Apec®, Calibre®	✓	✓	✓	✓
PVC Polyvinyl chloride	✓	✓	✓	✓
Styrene	✓	o	o	

✓ *Recommended adhesive* o *Limited applications* st *Requires surface treatment (e.g., plasma, corona treatment, etc.)*
**Customized adhesives and viscosities may be available upon request.*
***150 mW/cm2 measured 2.5" below bottom of lamp housing. Measured by ACCU-CAL™ 30 radiometer.*
****2,500 mW/cm2 measured by EIT Power Puck radiometer 2.1" below lamp housing.*


Automated facemask curing


Adhesives fluoresce for in-line inspection


Bonding anesthesia masks


MSK adhesives bond to a wide variety of substrates

Product Data Sheets are available for downloading at: www.dymax.com/products/medical/mask_assembly.asp

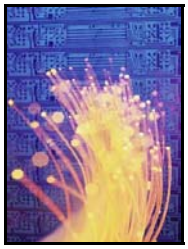
MEDICAL OPTICAL GRADE USP CLASS VI ADHESIVES

"THE STRENGTH OF EPOXY WITH THE SPEED OF UV™"

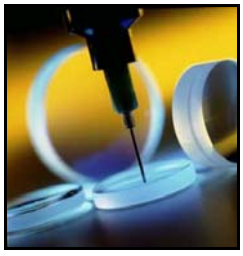
Precision bonding and mounting of glass, plastics and fiber optics may be achieved in seconds with high performance UV/visible light curing adhesives. High strength, low stress resins from DYMAX are USP Class VI certified to meet biocompatibility standards for optical applications in medical devices and are environmentally resistant after cure. These single-component products are low shrinkage, low outgassing, adhesives designed for opto-mechanical assembly. Medical optical adhesives have a gap filling capability to ¼" (6 mm) or more and are ideal for fiber optic bonding and splicing applications, lens bonding and the attachment of ceramic, glass, quartz, metal and plastic components.

PROPERTIES*	140-M	141-M	142-M 142-M-GEL	143A-M	144-M 144-M-T	145-M-LS	148 148-VT	149
Bondable Substrates Include:	Glass, Metal, Plastic	Glass, Metal, FR-4, Plastic	PC, PS, PMMA, Plastic, Metal, Glass	Glass, ABS Metal, Phenolic	Borosilicate/Soda Lime Glass, ABS, PI, Metal	Metal, Glass, Ceramic, FR-4, Plastic	Temporary Fixturing	Temporary Fixturing
Features	Resilient; low stress; resists yellowing, thermal shock, vibration	Low stress; flexible; clear; mounting and fixturing	Doublet and flexible plastic bonder; broad temperature range	Impact resistant; secondary thermal cure	Fiber optic and lens bundling and terminating; high optical clarity	Low shrinkage and outgassing; no movement during thermal cure	Water soluble; blocking and polishing; replace pitch and wax	Peelable; fast cure; no residue
Fluorescing (U.S. Patent #6,080,450)	No	No	No	Yes	No	No	No	Yes
ISO 10993 Biocompatibility	----	----	----	Yes	----	Pending	N/A	N/A
USP Class VI Biocompatibility	Yes	Yes	Yes	Yes	Yes	Pending	N/A	N/A
Nominal Viscosities (cP and mPas) Brookfield 25°C	3,000 • 5,000 • 11,000	400 • 2,500	440 • 25,000	700	100 • 6,500	160,000	7,000 • 25,000	50,000
Refractive Index (cured)	1.504	1.507	1.505	1.502	1.506	Opaque	N/A	N/A
Hardness (Shore)	D60	D45	D55	D80	D80	D80	D55	A75
Tensile @ Break (psi • MPa)	3,000 • 21	750 • 5	1,700 • 12	5,200 • 36	6,000 • 41	6,400 • 44	2,100 • 15	500 • 3.4
% Elongation @ Break	120	150	175	50	12	0.5	2.6	100
Modulus (psi • MPa)	35,000 • 240	2,500 • 17	25,000 • 170	300,000 • 2070	500,000 • 3450	2,000,000 • 14000	800,000 • 5500	800 • 5.5
% Linear Shrinkage	1.2	2.3	2.7	3.0	1.8	0.5	----	0.7
CURE DATA								
Fixture Time: 0.005 inch (0.05 mm) depth (in seconds) Between Glass Slides								
DYMAX BlueWave™ 200 Spot Lamp @ 3,700 mW/cm²**	<1	<2	<1	<2	<1	<1	<2	<1
DYMAX 5000-PC Flood Lamp @ 150 mW/cm²***	<2	<2	<1	<2	<1	<1	<4	<1
DYMAX Conveyor @ 2,500 mW/cm²****	<1	<1	<1	<1	<1	<1	<1	<1
TYPICAL MEDICAL/OPTICAL APPLICATIONS								
DOUBLETS	✔	✔	✔					
LENS MOUNTING	✔	✔	✔	✔		✔	✔	✔
FIBER OPTIC SPLICING	✔	✔			✔			
FIBER OPTIC TACKING			✔	✔	✔	✔	✔	✔

✔Recommended for this application
**Customized adhesives and viscosities may be available upon request.*
***3,700 mW/cm² measured 3/8" away from lightguide. Intensity at end of lightguide is 19,000 mW/cm². Measured by ACCU-CAL™ 30 radiometer.*
****150 mW/cm² measured 2.5" below bottom of lamp housing. Measured by ACCU-CAL™ 30 radiometer.*
*****2,500 mW/cm² measured by EIT Power Puck radiometer 2.1" below lamp housing.*


Fiber optic bundling


Endoscope lens curing


Ocular lens bonding

Product Data Sheets are available for downloading at: www.dymax.com/products/medical/medical_optical/medical_optical_adhesives.asp

MEDI-CURE® 222 SERIES CYANOACRYLATES

Low odor, low bloom cyanoacrylates offer exceptional product stability and faster cure speeds over other cyanoacrylates. The DYMAX *MEDI-CURE*® 222 Series may replace many different grades of both methyl and ethyl cyanoacrylates due to its ability to adhere to a wide selection of substrates over a broad temperature range. The 222 Series may lower your costs by reducing the number of inventoried cyanoacrylates necessary for the manufacturing of medical disposable devices. They are solvent-free, ISO 10993 approved Class VI certified and are suitable for bonding opaque and difficult to bond to substrates.

PRODUCT	FEATURES	SUSBTRATES 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		
Uncured		
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 @ 40°F (4°C)	One year from date of shipment in unopened containers	
*Cured**		
Shear Strength (.05" overlap, 73°F, 25% RH)(12 mm, 22.7°C, 25% RH)		
Steel	*2,000 - 4,500 psi*	*ASTM D-1002*
Stainless Steel	*1,000 - 2,500 psi*	*ASTM D-1002*
Aluminum	*400 - 1,400 psi*	*ASTM D-1002*
Polycarbonate	*400 - 1,000 psi*	*ASTM D-1002*
ABS	*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 n_D^{20}	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^{-6} (in/in/°C)	
	*Fixture Speed, Seconds**	
Cure Data	222/3 through 222/1700	222-GEL
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 (20°C)*

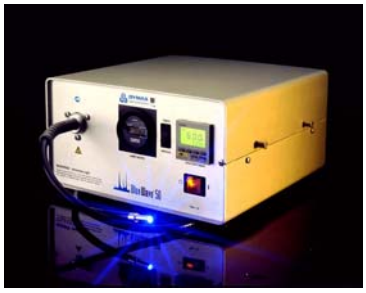
Product Data Sheets are available for downloading at: www.dymax.com/products/medical/cyanoacrylates.asp

UV LIGHT CURING EQUIPMENT FOR MEDICAL ADHESIVE BONDING

FLOOD CHAMBERS, SPOT LAMPS, CONVEYOR CURING SYSTEMS and RADIOMETERS

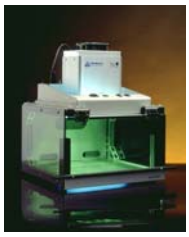
Successful UV processing demands that the curing equipment be matched to the resin to optimize both performance and cost savings. DYMAX manufactures both UV curable resins and UV curing equipment, and specializes in optimization of UV curing processes. Our technical specialists are ready to help you optimize your process, and maximize your profit and product performance. For resin and equipment selection assistance, please call the DYMAX Technical Service Department.

DYMAX BlueWave™ 200 Spot Lamp
Provides high intensity UV/visible light in a concentrated area. Ideal for integration with automated equipment and multiple output light-guides.



DYMAX BlueWave™ 50
Spot curing lamps provide the optimal combination of low operating cost with sufficient intensity output to accommodate a majority of bonding applications.

Multi-legged lightguides
Liquid lightguides come in an assortment of sizes and split wand configurations.



DYMAX 5000 Flood Lamp System with shutter and protective enclosure. Ideal for single component or batch curing processes requiring moderate intensity and a 5" (32.3 cm) x 5" (32.3 cm) cure area.

Modular System

DYMAX PC-400 Flood Lamp
provides UV and visible light curing of smaller assemblies, consistently and safely. Suitable for visible light curing dental resins.

Convoyeur DYMAX UV UVC-5

Convoyeur DYMAX UV UVC-8

ACCU-CAL™ 30 Radiometers are perfect for process monitoring of spot and flood light curing systems.

DYMAX sells a wide variety of accessories that complement our UV light curing systems.
Please log onto www.dymax.com/products/curing_equipment/accessories/accessories.asp for more information.

DYMAX Corporation is an ISO Certified manufacturing company whose corporate and production facilities are located in Torrington, CT, USA. Approximately 50% of corporate sales are in countries outside of the US. The Company operates wholly owned subsidiaries in Frankfurt Germany, Changzhou China and Hong Kong. Field service is provided by an international group of factory Sales Engineers, Manufacturers Representatives, and Specialty Distributors.

For a free consultation visit and demonstration or to try a DYMAX curing unit under the DYMAX Rental Program, please call the DYMAX Tech Center:

Call: +49-(0)69-7165-3568

OR

Visit DYMAX at:

www.dymax.com/products/medical/medical.asp

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