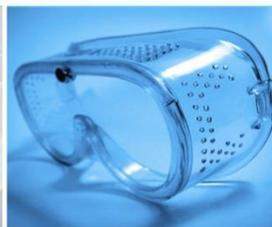
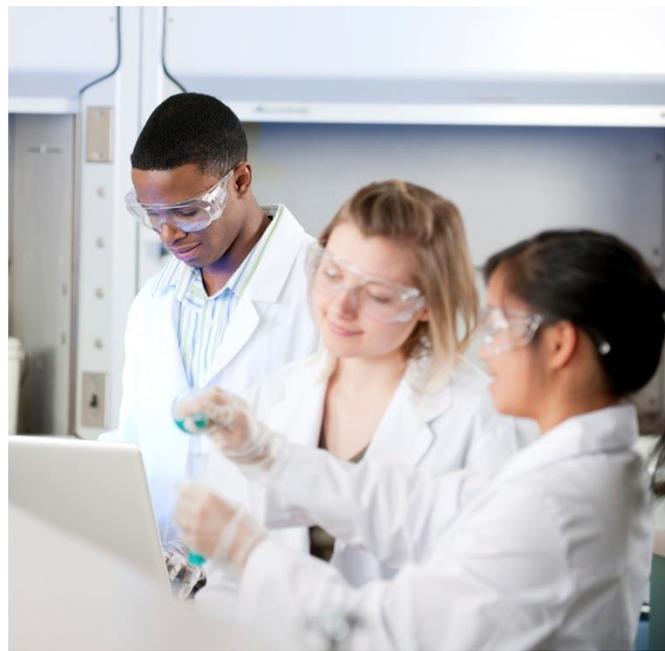


UV Optically Clear Hard Coatings Selector Guide





The Dymax Edge

Oligomers. Adhesives. Coatings. Equipment. And one priceless resource. That's the Dymax Edge.

At Dymax, we're committed to providing our customers with the solutions they need for their specific application challenges. Inherent in the Dymax Edge approach is the commitment to view a customer's challenge differently by listening, focusing, and using an entire toolbox of resources and expertise to deliver the most efficient solution. This expertise isn't limited to the formulation of chemistry or the calibration of a machine. Rather, it's defined by a depth and breadth of knowledge that allows us to devise innovative solutions based on an optimal balance of material, chemistry, and equipment. The Dymax Edge is more than the combined resources of product, technology, and service. It's the fundamental belief that you best serve a customer when you look at the need from their perspective, not yours.

DYMAXEDGE[®]
LISTEN. ENVISION. DELIVER.

UV-Curable, Optically Clear Hard Coatings

Dymax optically clear hard coatings are engineered for superior scratch, abrasion, and chemical resistance in applications requiring 5 to 12 microns in thickness on various film substrates (TAC, PET, PC, and PMMA). They have an enhanced ability to withstand damage from sharp objects and resist wear caused by rubbing.

These hard coatings cure quickly when exposed to UV light, enabling faster processing, greater output, and lower processing costs. The cure is tack free, eliminating the possibility of defects from handling

products before they are cured. Post-cure coatings are also optically clear, providing excellent transparency, low haze, and non-yellowing characteristics to the substrates they are applied to. These characteristics are particularly useful in the manufacture of high-performance films for electronic touch panels, polarized sunglasses, safety glasses and goggles, and LCD polarized displays. LCD polarized displays are used in a wide variety of applications, including LCD televisions, laptops, tablets, smart phones, and others.

Features	Benefits
Durability	Hard coating increases the life of a film. Durability is improved by abrasion, chemical, and impact resistance
Optical Properties	Hard coatings have excellent transparency with very low haze
Surface Energy (OC-4021 only)	Excellent for most applications that require printing on top of the coating
Scratch & Abrasion Resistance	Enhanced ability to withstand damage from sharp objects and resist wear caused by rubbing
Excellent Adhesion	Excellent adhesion to the following substrates: PET, TAC, PC, and PMMA
Chemical Resistance	Superior chemical resistance
Low Viscosity	Perfect for spray, roll, or flow coat applications
Solvent Free	<ul style="list-style-type: none"> No hazardous solvent emissions when used in neat form Non-hazardous waste Maximum material usage 100% solids Corrosion resistant Reduced production, energy, and shipping costs
Tack-Free Touch after UV Curing	<ul style="list-style-type: none"> Prevents defects from handling too soon Rapid curing with multiple substrate compatibility for quick turnaround times
ISO 9001, RoHS Compliant, Halogen-Free	Allows for easier and faster qualification

Coatings with Less Environmental Impact

Over the last 30 years, Dymax products have become the industry standard for fast, environmentally conscious assembly. Dymax products continue to replace technologies that contain hazardous ingredients, produce waste, or require higher amounts of energy to process.

Dymax understands that safe, ecologically friendly products benefit our customers and the environment. Our hard coatings are formulated with 100% solids to lower production, shipping, and life-cycle costs, while reducing ecological impact. They are also RoHS compliant, contain very low volatile organic compounds (VOC), and are Bisphenol A (BPA) and halogen free.



Common Applications

Scratch-Resistant Hard Coat for PC Lens

Dymax scratch-resistant hard coatings are ideal for protecting PC lenses commonly used in safety glasses and equipment. They provide longer life for the PC and extended visual clarity.



Hard, Protective Coating on PMMA Roof Tiles

PMMA roof tiles must be able to withstand harsh weather conditions and retain their look for many years. Dymax hard coatings increase the tiles' resistance to weather and corrosion and help maintain lasting color even after long-term exposure to the elements.

Common Applications

Protective Coating for TAC Films

Dymax hard coatings can be used to protect tri-acetyl cellulose (TAC) films. TAC films are most commonly used to protect LCD polarizers and displays found in a number of consumer electronics including LCD TVs, computers, cell phones, tablets, and navigation systems. These films are also used in the sunglass industry for polarized sunglass lenses.



Hard Coatings for PET

When used as a hard coating for PET, these products are virtually indistinguishable from glass yet have higher durability and chemical resistance than glass. They also provide outstanding weatherability. Some typical applications for hard coating on PET films are display applications such as mobile phone displays, graphic overlays, name plates, screen printing, and touch panel displays.

Automotive Applications

Dymax hard coatings are also an excellent choice for sunroof applications. Laminates made from these products are lighter weight than traditional safety glass and provide markedly improved impact resistance over most other glass constructions.



Medical Imaging Applications

UV hard coatings are an excellent alternative to solvent-based coatings typically used in the manufacturing of PET film for X-ray and digital medical imaging. UV hard coatings offer significantly shorter processing times than solvent-based processes, allowing for greater throughput. Reduced shipping costs are also a benefit of using the UV-cure process.

Available Hard Coatings

At Dymax, we are committed to helping our customers meet their most difficult application challenges. Our standard hard coating products are listed below. If a standard hard coating does not fit your application needs, we also have the ability to develop proprietary products that meet the precise needs of your specific application. Please contact Dymax Application Engineering for information regarding the development of these proprietary custom-produced products.



Product	Characteristics	Recommended Thickness, μm	Viscosity, cP	Shore Hardness	T_g , $^{\circ}\text{C}$	Refractive Index	% Haze	Pencil Hardness*
OC-3021	<ul style="list-style-type: none"> Superior adhesion to PET & PMMA with excellent adhesion to TAC & PC Fast curing Low surface energy 	5	200	90D	120	1.52	0.6	3H* 5H**
OC-4021	<ul style="list-style-type: none"> Superior adhesion to PET & TAC with excellent adhesion to PC & PMMA Ideal for printing applications that require printing on top of the hard coatings 	5	200	>80D	115	1.52	0.5	4H*
OC-4122	<ul style="list-style-type: none"> Superior adhesion to PC Ideal as a scratch-resistant hard coating for PC lenses impact resistance 	12	600	80D	100	1.51	0.5	4H [‡]

* Measured on PET

**Measured on PMMA

‡ Measured on PC

Application Guidelines

Dymax hard coatings are sold as 100% solids so viscosity can be modified by the customer to fit individual manufacturing needs. The table to the right lists the typical dilution range for some common solvents.

Suggested Solvent	Solids (%)
Methyl Ethyl Ketone	30-60
Isopropanol	30-60
Ethanol	30-60
Isobutanol	30-60
Ethyl Acetate	30-60
Butyl Acetate	30-60
Acetone	30-60

Example: 50:50 acetone and ethanol at 30% solids

Dispensing Methods

Our optically clear hard coatings can be applied on various substrates through a number of different methods. Typical application methods include flow coating, and roll coating but other methods can be supported.

If using flow or roll coating equipment, it may be necessary to use yellow lights to provide ambient lighting. Standard florescent or incandescent light sources can cause coatings to cure in any open reservoir of dispense equipment. All dispensing equipment (valves, tubing, reservoirs, etc.) must be chemically compatible with the coating.

For more information, please contact Dymax Application Engineering to discuss your specific application needs.



Recommended Curing Equipment

Fusion F300 Microwave-Powered Lamps

Fusion F300 lamps are microwave-powered curing lamps which provide high intensity ($\sim 2,500 \text{ mW/cm}^2$) over a 1" x 6" curing area. These lamps require 220/230 Volts AC and, with normal use, retain 80% of their intensity up to 5,000 hours. One or two of the lamps can be mounted on Dymax's UVCS series conveyor systems for convenient conveyORIZED curing. All UVCS conveyor configurations have adjustable belt speeds of 1 to 32 fpm, and adjustable lamp-to-belt distance to address a variety of application requirements.

WIDECURE™ Conveyor

The WIDECURE™ offers a 25"-wide conveyor belt for fast, consistent UV curing of large parts. Dymax WIDECURE conveyors run 4-50 feet per minute and can be outfitted with either a longwave bulb (for most Dymax materials) or a shortwave bulb (for inks). No stray UV light, durable construction, tightly controlled line speed, and 5" to 12" adjustable lamp heights make these conveyors very production friendly.

ACCU-CAL™ Radiometers

Measurement of the lamp intensity and dosage is critical to the successful implementation of light-curing technology. Dymax ACCU-CAL™ radiometers allow operators to monitor and document the light-curing process. A low UV/Visible measurement signals an operator to replace the bulb or reflector. Degradation of curing bulbs, lightguides, and reflectors can decrease intensity, resulting in incomplete cures. Radiometers can also be used to confirm that operators are properly shielded from UV/Visible light exposure.





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