UV Light-Curable Lens-Bonding and Fiber Optic Adhesives

Dymax high-strength, low-stress, OP-Series optical assembly adhesives cure in seconds upon exposure to UV/Visible light. Dymax optical adhesives are single component, low outgassing, low shrinkage, and have a gap-filling capability to 0.25 in [6.4 mm] or more. High-performance fiber optic adhesives minimize movement of parts during cure and thermal excursions. By combining new ingredients in novel ways, Dymax fiber optic adhesives offer improved durability and reliability along with superior optical transmission, low outgassing, and complete cure in seconds.

Features and Benefits

- Low to no movement during cure and thermal excursions (from -50°C to 200°C)
- Exceptionally low shrinkage to 0.1%
- Low to high glass transition points (T_g)
- A range of refractive indices from 1.40-1.58
- Low outgassing to 10^{-6} grams/gram
- Superior optical transmission
- Single component, no mixing required
- Gap filling to 6.4 mm [0.25 in] or more
- Environmentally resistant
- No VOCs
- Low odor

Dymax offers a complete line of high-performance light-curable adhesives and light-curing equipment for optical applications for the industrial, commercial, medical, military, aerospace, and electro-optical markets. Over 30 years of experience in this industry has led to a superior product line of adhesives, applicators, and UV light-curing sources.

The First Adhesives Developed for High-Speed Fiber Optic Assembly

Easily automate production of products such as lenses, fiber optics, prisms, mirrors, and other assemblies. Dymax OP Series UV light-curable fiber optic adhesives cure in seconds, have unlimited pot life, long shelf life, and are not frozen.

Want to learn more?

Visit [www.dymax.com](http://www.dymax.com) to register to download the white paper “Advances in Light-Curing Adhesives”
### Product Selector Guide

<table>
<thead>
<tr>
<th>Products</th>
<th>Description</th>
<th>Linear Shrinkage</th>
<th>Refractive Index (cured)</th>
<th>Viscosity (cP)</th>
<th>Durometer Hardness</th>
<th>Adhesion</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP-24-REV-B (501-E)</td>
<td>Clear; Multi-Cure® (UV/light/heat/activator); tack and bond with UV, heat, or activator where light won’t reach; lens mounting</td>
<td>0.39%</td>
<td>1.50</td>
<td>800</td>
<td>D80</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>OP-29</td>
<td>Clear; UV light cure; doublet bonding; lens mounting; fiber optic splicing</td>
<td>0.79%</td>
<td>1.50</td>
<td>2,500</td>
<td>D60</td>
<td>✓ ✓ o</td>
</tr>
<tr>
<td>OP-29-GEL</td>
<td>Clear; UV light cure; doublet bonding; lens mounting; fiber optic splicing</td>
<td>0.79%</td>
<td>1.50</td>
<td>20,000</td>
<td>D65</td>
<td>✓ ✓ o</td>
</tr>
<tr>
<td>OP-67-LS</td>
<td>White/opaque; UV/Visible light cure; low shrinkage; low outgassing for alignment stability; doublet bonding</td>
<td>0.08%</td>
<td>N/A</td>
<td>135,000</td>
<td>D80</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>OP-4-20632</td>
<td>Clear; tenacious adhesion to glass and metal; low shrink on cure; T_g increases with heat exposure; moisture resistant; resists yellowing</td>
<td>0.39%</td>
<td>1.55</td>
<td>480</td>
<td>D80</td>
<td>✓ ✓ ✓</td>
</tr>
<tr>
<td>OP-4-20632-GEL</td>
<td>Clear; tenacious adhesion to glass and metal; low shrink on cure; T_g increases with heat exposure; moisture resistant; resists yellowing</td>
<td>1.10%</td>
<td>1.54</td>
<td>57,500</td>
<td>D80</td>
<td>✓ ✓ ✓</td>
</tr>
</tbody>
</table>

✓ Recommended  o Limited Applications

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**TMA, Glass Transition Curves**

Modified UV vs. Leading high T_g = Epoxy

High T_g’s of new UV’s compared to those of epoxy

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**TMA, Glass Transition Curves Low Shrink™ UV Technology**

Minimal movement with temperature change means improved durability
### Product Selector Guide

<table>
<thead>
<tr>
<th>Products</th>
<th>$T_g$ Glass Transition Temperature °C (By TMA)</th>
<th>Outgassing ASTM E595-77 85°C at 5x10⁻⁶ torr for 24 Hours TWL/CVCM</th>
<th>Tensile Bar Strength ASTM D638</th>
<th>Bond Strength Compressive Shear</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tensile (psi [MPa])</td>
<td>Modulus of Elasticity (psi [MPa])</td>
</tr>
<tr>
<td>OP-24-Rev. B (501-E)</td>
<td>79° 92 m</td>
<td>5.2% &lt;0.04%</td>
<td>5,200 [36]</td>
<td>320,000 [2,206]</td>
</tr>
<tr>
<td>OP-29</td>
<td>64° 67 m</td>
<td>3.66% 0.25%</td>
<td>3,000 [22]</td>
<td>34,000 [234]</td>
</tr>
<tr>
<td>OP-29-Gel</td>
<td>56° 58 m</td>
<td>3.66% 0.25%</td>
<td>3,500 [24]</td>
<td>30,000 [200]</td>
</tr>
<tr>
<td>OP-67-LS</td>
<td>86° 125 m</td>
<td>nm</td>
<td>4,000 [28]</td>
<td>83,000 [570]</td>
</tr>
<tr>
<td>OP-4-20632</td>
<td>78° 87 m</td>
<td>nm</td>
<td>6,200 [43]</td>
<td>134,000 [923]</td>
</tr>
<tr>
<td>OP-4-20632-Gel</td>
<td>78° 87 m</td>
<td>nm</td>
<td>4,100 [28]</td>
<td>131,000 [903]</td>
</tr>
</tbody>
</table>

* m = UV plus heat (75 minutes @ 110°C) cure  
* u = UV-only cure  
* nm = not measured

Dymax OP series adhesives show superior optical transmission

Dymax Optically Clear Adhesive  
Mercaptoester  
Epoxy

Transmission curves from graph on left expanded from 70% level and higher

Diode Curing  
Lens Bonding  
Lens Laminating  
Prism Curing

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UV Light-Curing Systems for Optical Adhesives

Tired of short storage and shelf life, of mixing two components, and waiting for adhesives to thaw? Dymax UV light-curable adhesives and systems cure completely in seconds. Make automation easier!

Dymax BlueWave® 200 UV-Curing Spot Lamp with patented 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.

Dymax BlueWave® 75 UV-Curing Spot Lamp Shown with single lightguide includes a patented intensity adjustment feature and an auto-switching power supply to neutralize the effects of variations in line voltage. CE Marked.

ECE 2000 UV-Curing Flood-Lamp System Shown with Light Shield protective enclosure and manual shutter. Ideal for single component or batch curing processes requiring moderate intensity and a 20.3 cm x 20.3 cm cure area. CE Marked.

ECE 5000 UV-Curing Flood-Lamp System Shown with Light Shield protective enclosure and ZIP™ shutter. Ideal for single component or batch curing processes requiring moderate intensity and a 12.7 cm x 12.7 cm cure area. CE Marked.