EPO-TEK® Specialty UV Curing Adhesives

Epoxy-Based Systems & Acrylate-Based Systems
What’s Special About EPO-TEK® UV Curing Epoxies

Epoxy-Based UV Benefits

Excellent adhesion and reliability
- Due to the **epoxy backbone** (rather than acrylate backbone)

Low shrinkage
- Average shrinkage is approximately 1-5% (acrylate is typically 10-15%)
- Low shrinkage leads to low internal stress aiding adhesion

Not subject to oxygen inhibition
- Cationic photoinitiators are not quenched by oxygen

Capable of “Dark” Cure
- Cation creates the “living polymer” and continues to be active in the absence of UV light
- Enables a small degree of curing in areas never seen by the UV light, for a limited distance

Most are thermally post-curable
- Greater degree of conversion than UV cure alone *(Initial UV cure is required for best thermal post cure results)*

Effect after UV cure with a thermal post cure on shadowed areas

- **300mil Si Die**
- **Shadowed Area**
- **Aluminum Foil Substrate**

- **Fully cured center**
- **Well cured fillet**
- **Good cure under edges of die**

Shadow curing is often critical to designs where access to UV light is limited

Epoxy UVs can be cured in ≤ 1 minute*

*With proper optimization through:
- UV lamp selection
- Using a UV source that generates heat
- Warming the formulation or substrate before application
- Down stream thermal curing following UV exposure—May also improve water resistance

For complete listing of UV products visit EPO-TEK.com
Epoxy Technology Inc. offers an exclusive line of high performance, UV curing adhesives based on Epoxy and Acrylate systems. Our unique formulations provide superior performance for a wide variety of applications.

This Guide will assist in determining which product(s) may be best suited for your application. Additional assistance in material selection, optimal lamp choice, and cure recommendations are readily available by contacting our Technical Application Experts at techserv@epotek.com or +1 978-667-3805.

### Epoxy-Based Product Selection Guide

#### UV + Thermal Post Cure

<table>
<thead>
<tr>
<th>Product</th>
<th>Viscosity @ 23°C (cPs)</th>
<th>Tg</th>
<th>Hardness</th>
<th>Nd*</th>
<th>Performance Features</th>
<th>Applications</th>
</tr>
</thead>
</table>
| OG116     | 88,979 @ 2.5rpm       | 146°C | 88D      | 1.5892 | Higher viscosity version of OG116-31  
High chemical resistance  
High Tg & high index  
Very high strength       | Edge seal  
Fiber optic assembly  
Glob top               |
| OG116-31  | 20,000 - 30,000 @ 10rpm | >115°C | 83D      | 1.5842 | High chemical resistance  
High Tg & high index  
ISO 10993 compliant   | Fiber optic assembly  
Gasket seal and glob top  
Medical devices        |
| OG142-87  | 250 - 600 @ 100rpm    | >100°C | 82D      | 1.5058 | Low viscosity  
Excellent bond strength  
Moisture resistance    | Fiber bundling/assembly  
Glob top fill  
Micromolded lens       |
| OG142-95  | 534 @ 100rpm          | >100°C | 82D      | 1.5123 | Low viscosity  
Excellent bond strength  
Moisture resistance    | Fiber optic assembly  
Glob top fill  
Optical packaging      |
| OG142-112 | 1,200 - 1,700 @ 100rpm | >90°C  | 83D      | 1.5560 | Medium viscosity  
High moisture resistance  
Exceptional bond strength | Glob top fill  
Micromolded lens  
Optical packaging       |
| OG146-104 | 164 @ 100rpm          | 81°C  | 80D      | 1.5251 | Very low viscosity  
Excellent non-yellowing properties  
Fast cure               | Fiber bundling/assembly  
LCD/Haptic  
Medical devices         |
| OG146-178 | 164 @ 100rpm          | 82°C  | 82D      | 1.5354 | Low viscosity & excellent flow  
Plastic bonding  
Fast cure               | Fiber bundling/assembly  
LCD/Haptic  
OLED/OPV                |
| OG159-2   | 100,000 - 140,000 @ 2.5rpm | >30°C  | 69D      | 1.5715 | Thixotropic  
Contains 1 mil glass beads  
Excellent moisture resistance | Glob top  
LCD/OLED gasket seal  
Optical packaging       |
| UJ1190    | 501 @ 100rpm          | 100°C | 80A      | 1.5091 | Low viscosity  
Good for thick sections       | OLED                                    |

For Enhanced Performance

**For complete listing of UV products visit EPO-TEK.com**

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</thead>
<tbody>
<tr>
<td>OG133-8</td>
<td>1,000 - 1,500 @ 100rpm</td>
<td>&lt;10°C</td>
<td>65A</td>
<td>1.5244</td>
<td>Thixotropic Low Tg &amp; hardness Excellent flexibility</td>
<td>Flex edge seal/glob top Fiber optic assembly Optical packaging</td>
</tr>
<tr>
<td>OG142</td>
<td>9,000 - 15,000 @ 20rpm</td>
<td>&gt;95°C</td>
<td>86D</td>
<td>1.5809</td>
<td>Medium viscosity High strength Moisture resistance</td>
<td>LCD plug and gasket seal Dental applications Glob top/OLED</td>
</tr>
<tr>
<td>OG154-1</td>
<td>26,000 - 34,000 @ 5rpm</td>
<td>&gt;100°C</td>
<td>80D</td>
<td>1.5692</td>
<td>High viscosity High Tg Low Modulus</td>
<td>Fiber optic/packaging assembly Glob top LCD gasket seal</td>
</tr>
</tbody>
</table>

### UV + Thermal Post Cure

#### For Shadow Curing

<table>
<thead>
<tr>
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<th>Hardness</th>
<th>Nd*</th>
<th>Performance Features</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>OG198-54</td>
<td>200 - 450 @ 100rpm</td>
<td>131°C</td>
<td>86D</td>
<td>1.5256</td>
<td>Low viscosity High Tg Excellent bond strength</td>
<td>Fiber optic assembly Optical packaging V-groove alignment</td>
</tr>
<tr>
<td>OG198-55</td>
<td>1,200 - 2,000 @ 100rpm</td>
<td>&gt;120°C</td>
<td>85D</td>
<td>1.5196</td>
<td>Thixotropic High viscosity High Tg</td>
<td>Fiber optic assembly Optical packaging V-groove alignment</td>
</tr>
</tbody>
</table>

### UV/Visible Light Cure

<table>
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<tr>
<th>Product</th>
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<th>Performance Features</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>OG178</td>
<td>300 - 600 @ 100rpm</td>
<td>&gt;50°C</td>
<td>86D</td>
<td>1.5445</td>
<td>Low viscosity Low Tg Excellent bond strength</td>
<td>Optical packaging</td>
</tr>
</tbody>
</table>

* Cured index measured at 589nm
Die Shear Increases Over Time*  

<table>
<thead>
<tr>
<th>Product</th>
<th>365nm Flood LED</th>
<th>Pulsed Hg Lamp</th>
<th>F Style Hg Flood Cure</th>
<th>F Style Hg Spot Cure</th>
</tr>
</thead>
<tbody>
<tr>
<td>OG116</td>
<td>★★</td>
<td>★★★★</td>
<td>★★★★★</td>
<td>★★</td>
</tr>
<tr>
<td>OG116-31</td>
<td>★★★★</td>
<td>★★★★★</td>
<td>★★★★★</td>
<td>★★</td>
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<td>OG142</td>
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<td>★★★★★</td>
<td>★★★★★</td>
<td>★★★★★</td>
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<tr>
<td>OG142-112</td>
<td>★★★★</td>
<td>★★</td>
<td>★★★★★</td>
<td>★★★★</td>
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<tr>
<td>OG142-87</td>
<td>★★★★</td>
<td>★★★★</td>
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<td>★★★★</td>
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</tr>
<tr>
<td>OG146-178</td>
<td>★★★★★</td>
<td>★★★★★</td>
<td>★★★★★</td>
<td>★★★★★</td>
</tr>
<tr>
<td>OG154-1</td>
<td>★★★★</td>
<td>★★★★</td>
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</tr>
<tr>
<td>OG159-2</td>
<td>★★★★</td>
<td>★★★★</td>
<td>★★★★★</td>
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</tr>
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<td>OG198-54</td>
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<td>OG198-55</td>
<td>★★★★</td>
<td>★★★★</td>
<td>★★★★★</td>
<td>★★★★</td>
</tr>
<tr>
<td>UJ1190</td>
<td>★</td>
<td>★★★★</td>
<td>★★★★★</td>
<td>★★★★</td>
</tr>
<tr>
<td>OG146-104</td>
<td>★★★★</td>
<td>★★★★</td>
<td>★★★★★</td>
<td>★★★★</td>
</tr>
<tr>
<td>OG178</td>
<td>★</td>
<td>★★★★</td>
<td>★★★★★</td>
<td>★★★★</td>
</tr>
</tbody>
</table>

Selecting Best UV Lamps/Cure Time

Both Thin And Thick Sections Can Be Cured With Epoxy UV’s

Thin Section  
UV passes easily through highly mobile polymer chains, *cures well.*

Thick Section  
Using a lower intensity, longer wave length and longer cure time, a *good cure can be achieved.*

*Above test results for OG116-31 show a die shear increase over time after 30 second UV cure. This type of result is representative of the EPO-TEK® Epoxy-Based UV line.
# EPO-TEK® Specialty UV Curing Selector Guide

## Acrylate-Based UV Benefits

- Extremely fast cure (seconds)
- Generally optically clear
- No thermal post cure needed
- Not sensitive to moisture or other bases

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<tr>
<td>OG603</td>
<td>150 - 250 @ 100rpm</td>
<td>&gt;70°C</td>
<td>84D</td>
<td>1.5037</td>
<td>Low viscosity, USP Class VI adhesive, Fast cure</td>
<td>Fiber optic components</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Medical implants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Optical assembly</td>
</tr>
<tr>
<td>OG653</td>
<td>650 - 850 @ 100rpm</td>
<td>&gt;40°C</td>
<td>76D</td>
<td>1.5106</td>
<td>Low viscosity, green colored, Light blocking properties,</td>
<td>RFID glob top</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very fast cure (1-3 sec @ 365nm)</td>
<td></td>
</tr>
<tr>
<td>OG675</td>
<td>3,426 @ 100rpm</td>
<td>0°C</td>
<td>70A</td>
<td>1.4950</td>
<td>Medium viscosity, Fast cure, Low Tg</td>
<td>Fiber optic assembly</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>LCD lamination</td>
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<td>★★★★</td>
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</tr>
</tbody>
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**Cure Time (min):**
- <1 ★★★★★
- 1-3 ★★★
- 3-5 ★★
- 5-10 ★
- >10 ◆

For additional information, please visit us at: [www.epotek.com](http://www.epotek.com), or email our Technical Services Group at: techserv@epotek.com

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