# See-Cure 3220-GEL-SC
# High-Viscosity Adhesive for Bonding Plastics

## APPLICATIONS

- **Plastic Housing Assembly**
- **Plastics Lamination**
- **Plastic Window Bonding**
- **Appliance Assembly**

## FEATURES

- **Blue-to-Clear Upon Exposure to UV/Visible Light**
- **UV/Visible Light Cure**
- **Flexible**
- **High Viscosity**

## RECOMMENDED SUBSTRATES

- **PC**
- **PVC**
- **PET**
- **ABS**
- **PU**

DYMAX Ultra Light-Weld® material 3220-GEL-SC is designed for rapid bonding and laminating of plastics such as PC, PVC, PET, ABS, and PU. The blue color of DYMAX See-Cure products disappears when they are fully cured. DYMAX Ultra Light-Weld® materials contain no nonreactive solvents and cure upon exposure to light. Their ability to cure in seconds enables faster processing, greater output, and lower processing costs. When cured with DYMAX light-curing spot lamps, focused-beam lamps, or flood lamps, they deliver optimum speed and performance for plastics assembly. DYMAX lamps offer the optimum balance of UV and visible light for the fastest, deepest cures. This product is in full compliance with the RoHS Directives 2002/95/EC and 2003/11EC.

**UNCURED PROPERTIES ***

| Property | Value | Test Method |
|---|---|---|
| Solvent Content | No Nonreactive Solvents | N/A |
| Chemical Class | Acrylated Urethane | N/A |
| Appearance | Blue Translucent Gel | N/A |
| Soluble in | Organic Solvents | N/A |
| Density, g/ml | 1.01 | ASTM D1875 |
| Viscosity, cP (20 rpm) | 38,000 (nominal) | ASTM D2556 |

**CURED MECHANICAL PROPERTIES ***

| Property | Value | Test Method |
|---|---|---|
| Durometer Hardness | D55 | ASTM D2240 |
| Tensile at Break, MPa [psi] | 15.0 [2,200] | ASTM D638 |
| Elongation at Break, % | 180 | ASTM D638 |
| Modulus of Elasticity, MPa [psi] | 110 [16,000] | ASTM D638 |

**OTHER CURED PROPERTIES ***

| Property | Value | Test Method |
|---|---|---|
| Appearance | Clear | N/A |
| Refractive Index (20˚C) | 1.50 | ASTM D542 |
| Boiling Water Absorption, % (2 hr) | 4.2 | ASTM D570 |
| Water Absorption, % (25˚C, 24 hr) | 4.7 | ASTM D570 |
| Linear Shrinkage, % | 2.5 | ASTM D2566 |

* Not Specifications
N/A Not Applicable

**ADHESION**

| Substrate | Recommendation |
|---|---|
| **ABS** acrylonitrile-butadiene-styrene | ✓ |
| **PA** polyamide | o |
| **PC** polycarbonate | ✓ |
| **PEBA** polyether block amide | ✓ |
| **PET** poly(ethylene terephthalate) | ✓ |
| **PMMA** poly(methyl methacrylate) | o |
| **PU** polyurethane | ✓ |
| **PVC** poly(vinyl chloride) | ✓ |

✓ Recommended Adhesive o Limited Applications
st Requires Surface Treatment (e.g. plasma, corona treatment, etc.)

RoHS Compliant

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# INDUSTRIAL ADHESIVES

## 3220-GEL-SC Product Data Sheet

## CURING GUIDELINES

The blue color of DYMAX See-Cure products disappears when they are fully cured. Full cure is achieved when additional light exposure does not improve cured properties. The charts below provide information on how long it takes to complete the transition from blue to clear, using different light sources and adhesive thicknesses.

| DYMAX Curing System (Intensity) | 5000-EC (200 mW/cm$^2$) [A] |
|---|---|
| **Adhesive Thickness, mm [mil]** | **Time to complete transition, sec [B]** |
| 0.10 [4.0] | 11 |
| 0.20 [8.0] | 11 |
| 0.41 [16] | 12 |
| 0.81 [32] | 22 |

| DYMAX Curing System (Intensity) | BlueWave® 200 (10.0 W/cm$^2$) [A, C] |
|---|---|
| **Adhesive Thickness, mm [mil]** | **Time to complete transition, sec [B]** |
| 0.10 [4.0] | 2 |
| 0.20 [8.0] | 3 |
| 0.41 [16] | 3 |
| 0.81 [32] | 4 |

| DYMAX Curing System (Intensity) | UVCS Conveyor with Fusion F300 (2.5 W/cm$^2$) [D] |
|---|---|
| **Adhesive Thickness, mm [mil]** | **Belt speed to complete transition, m/min [ft/min] [B]** |
| 0.10 [4.0] | 1.5 [5] |
| 0.20 [8.0] | 1.4 [4.5] |
| 0.41 [16] | 1.2 [4] |
| 0.81 [32] | 1.2 [4] |

**A** *Intensity was measured over the UVA range (320-395 nm) using a DYMAX ACCU-CAL™ 50 Radiometer.*

**B** *Curing through light-blocking substrates may limit the ability of See-Cure adhesives to transition from blue to clear and may require longer light exposure at critical wavelengths (320-400 nm for UV light curing; 320-450 nm for UV/Visible light curing). These times/speeds are typical for curing through 100% light transmitting substrates.*

**C** *Due to the distance between the end of the lightguide and adhesive, intensity at the curing area was measured as 4.0 W/cm$^2$.*

**D** *At 53 mm [2.1 in] focal distance. Maximum speed of conveyor is 8.2 m/min [27 ft/min]. Intensity was measured over the UVA range (320-395 nm) using the DYMAX ACCU-CAL™ 100 Radiometer.*

## OPTIMIZING PERFORMANCE AND HANDLING

1. This product cures with exposure to UV and visible light. Exposure to ambient and artificial light should be kept to a minimum before curing. Dispensing components including needles and fluid lines should be 100% light blocking, not just UV blocking.
2. All bond surfaces should be clean and free from grease, mold release, and other contaminants prior to dispensing the adhesive.
3. Cure and color transition speed are dependent upon many variables, including lamp intensity, distance from the light source, required depth of cure, bond gap, and percent light transmission of the substrate.
4. Oxygen in the atmosphere may inhibit surface cure. Surfaces exposed to air may require high-intensity (>150 mW/cm$^2$) UV light to produce a dry surface cure. Flooding the bond area with an inert gas, such as nitrogen, can also reduce the effects of oxygen inhibition.
5. Parts should be allowed to cool after cure before testing and subjecting to any loads.
6. In rare cases, stress cracking may occur in assembled parts. Three options may be explored to eliminate this problem. One option is to heat anneal the parts to remove molded-in stresses. A second option is to open the gap between mating parts to reduce stress caused by an interference fit. The third option is to minimize the amount of time the liquid adhesive remains in contact with the substrate(s) prior to curing.
7. Light curing generally produces some heat. If necessary, cooling fans can be placed in the curing area to reduce the heating effect on components.
8. At the point of curing, an air exhaust system is recommended to dissipate any heat and vapors formed during the curing process.

## DISPENSING THE ADHESIVE

This material may be dispensed with a variety of manual and automatic applicators or other equipment as required. Questions relating to dispensing and curing systems for specific applications should be referred to DYMAX Applications Engineering.

## CLEAN UP

Uncured material may be removed from dispensing components and parts with organic solvents. Cured material will be impervious to many solvents and difficult to remove. Clean up of cured material may require mechanical methods of removal.

## PERFORMANCE AFTER TEMPERATURE EXPOSURE

DYMAX light-curable materials typically have a lower thermal limit of -54˚C [-65˚F] and an upper limit of 150˚C [300˚F]. Many DYMAX products can withstand temperatures outside of this range for short periods of time. Please contact DYMAX Applications Engineering if you need further assistance.

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## STORAGE AND SHELF LIFE

Store the material in a cool, dark place when not in use. Do not expose to light. This product may polymerize upon prolonged exposure to ambient and artificial light. Keep covered when not in use. This material has a minimum six-month shelf life from date of shipment, unless otherwise specified, when stored between 10˚C [50˚F] and 32˚C [90˚F] in the original, unopened container.

## GENERAL INFORMATION

This product is intended for industrial use only. Keep out of the reach of children. Avoid breathing vapors. Avoid contact with skin, eyes, and clothing. Wear impervious gloves. Repeated or continuous skin contact with uncured material may cause irritation. Remove material from skin with soap and water. Never use organic solvents to remove material from skin and eyes. For more information on the safe handling of this material, please refer to the Material Safety Data Sheet before use.

## RECOMMENDED DYMAX LITERATURE

| | |
|---|---|
| LIT010AA | Guide to Selecting and Using UV Light-Curing Systems |
| LIT077 | Chemical Safety |
| LIT133 | UV Light-Curing System Safety Considerations |
| LIT159 | ACCU-CAL™ 50 Radiometer |
| LIT206 | Flood and Focused-Beam UV Light-Curing Systems |
| LIT218 | BlueWave® 200 UV Light-Curing Spot Lamp |
| LIT249 | Industrial Adhesive Selector Guide |

Literature is available through our website, www.dymax.com, or by calling any DYMAX location.





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