English-US

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Technical Data Sheet

3M™ Scotch-Weld™ Light Activated Epoxy Adhesive 5001 Clear

Regulatory Info/SDS

Product Description

3M™ Scotch-Weld™ Light Actived Epoxy Adhesive 5001 Clear is a one-part epoxy exhibiting a UV or blue-light activated cure with long room temperature pot life and low viscosity.

Product Features

- One-part adhesive
- UV and blue light activated cure
- Great depth of cure
- Low viscosity
- Excellent adhesion to glass, epoxy and aluminum

Technical Information Note

The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Typical Uncured Physical Properties

Attribute Name	Test Method	Value
Color		Clear
Components		1-Part
UV Tracer		No
Density - Liquid		1.11 g/mL [1]
Pot Life	ASTM D7867	4 weeks [2]
Halogens (Cl, Br)		Representative samples have been tested and meet the chlorine and bromine content requirements of IEC 61249-2-21 [3]

[1] Measured by Helium gas pycnometer at 23°C

[2] Determined by meeting minimum application viscosity requirements of the adhesive over time @ 23°C

[3] Per IEC 61249-2-21

Temperature: 25 °C
Test Method: ASTM D7867

Attribute Name	Test Condition	Value
Viscosity - Cone and Plate	0.1 Hz	23 Pa·s [1]
Viscosity - Cone and Plate	1 Hz	11 Pa·s [1]
Viscosity - Cone and Plate	10 Hz	8 Pa·s [1]
Thixotropic Index	0.1 Hz / 1 Hz	3.2 [1]
Thixotropic Index	1 Hz / 10 Hz	1.4 [1]

[1] 40mm, 2.0°, 50um truncation cone and Peltier plate. 60s pre-shear at 100 Hz. 5 min flow ramp form 0.01 to 100 Hz @ 25°C

Typical Cure Profiles

Activate with 450nm light at 360mW/cm^2 for 2 seconds.

Temperature: 25 °C
Test Method: ASTM D4473

Attribute Name	Value
Time to Double Complex Viscosity	14 s [1]
Time to 1,000 Pa.s Complex Viscosity	2.1 min [1]
Time to 0.1 MPa Storage Modulus	24 min [1]
Time to 1 MPa Storage Modulus	2.5 h [1]
Time to 80% Storage Modulus Max	10 h [1]

[1] Parallel Plate Rheometer: Isothermal - 25mm parallel plate, 1 Hz. 450nm light, 360 mW/cm² for 2 seconds

Rate of overlap shear strength build after light activation (450nm; 360mW/cm^2 for 2 seconds).

Substrate: Etched Aluminum
Temperature: 23 °C (73 °F)
Test Method: ASTM D1002, ISO 4587

Attribute Name	Value
Time to Handling Strength	< 5 min [1]
Time to 80% Strength	4 h [2]
Time to Full Strength	24 h [3]
Overlap Shear Strength	12 MPa (Mixed Mode Failure) [4]

[1] 2mm thick substrate. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Time to consistent >50 psi (0.34 MPa) overlap shear strength after light exposure (450nm light, 360 mW/cm² for 2 seconds).

[2] 2mm thick substrate. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Time to 80% of maximum overlap shear strength after light exposure (450nm light, 360 mW/cm² for 2 seconds).

[3] 2mm thick substrate. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Time to maximum overlap shear strength after light exposure (450nm light, 360 mW/cm² for 2 seconds).

[4] 2mm thick substrate. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Time to consistent >50 psi (0.34 MPa) overlap shear strength after light exposure (450nm light, 360 mW/cm² for 2 seconds).

Fast cure with 450nm light at 500mW/cm^2 for 15 seconds.

Temperature: 25 °C
Test Method: ASTM D4473

Attribute Name	Value
Time to 1,000 Pa.s Complex Viscosity	18 s [1]
Time to 0.1 MPa Storage Modulus	1 min [1]
Time to 1 MPa Storage Modulus	2.5 min [1]
Time to 80% Storage Modulus Max	1.7 h [1]

[1] Parallel Plate Rheometer: Isothermal - 25mm parallel plate, 1 Hz. 450nm light, 500 mW/cm² for 15 seconds

Rate of overlap shear strength build after fast cure dose (450nm; 500mW/cm^2 for 15 seconds).

Substrate: Soda-lime Glass
Temperature: 23 °C (73 °F)
Test Method: ASTM D1002, ISO 4587

Attribute Name	Value
Time to Handling Strength	Less than 5 min [1]
Time to 80% Strength	30 min [2]
Time to Full Strength	1 h [3]
Overlap Shear Strength	>10 MPa (Substrate Failure) [4]

[1] 6mm thick substrates. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Time to consistent >50 psi (0.34 MPa) overlap shear strength after light exposure (450nm light, 500 mW/cm² for 15 seconds).

[2] 6mm thick substrates. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Time to 80% of maximum overlap shear strength after light

exposure (450nm light, 500 mW/cm² for 15 seconds).

[3] 6mm thick substrates. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Time to maximum overlap shear strength after light exposure (450nm light, 500 mW/cm² for 15 seconds).

[4] 6mm thick substrates. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Overlap shear strength 24 hours after light exposure (450nm light, 500 mW/cm² for 15 seconds).

Depth of Cure

Temperature: 25 °C

Value
14 mm [1]
4.8 mm [2]
2.3 mm [3]

[1] Liquid adhesive is dispensed to fill a 7mm diameter cylindrical rubber sleeve. The adhesive is then exposed to 450nm light at 500 mW/cm² for 3 minutes at one side of the sleeve. The sample is heat accelerated at 65°C for one hour. The solidified portion of the adhesive is then removed from the rubber sleeve 1 hour after light exposure. The depth of cure is reported as the thickness of the solidified portion measured using a digital caliper.

[2] Liquid adhesive is dispensed to fill a 7mm diameter cylindrical rubber sleeve. The adhesive is then exposed to 450nm light at 500 mW/cm² for 15 seconds at one side of the sleeve. The sample is heat accelerated at 65°C for one hour. The solidified portion of the adhesive is then removed from the rubber sleeve and the depth of cure is reported as the thickness of the solidified portion measured using a digital caliper.

[3] Liquid adhesive is dispensed to fill a 7mm diameter cylindrical rubber sleeve. The adhesive is then exposed to 450nm light at 360 mW/cm² for 2 seconds at one side of the sleeve. The sample is heat accelerated at 65°C for one hour. The solidified portion of the adhesive is then removed from the rubber sleeve and the depth of cure is reported as the thickness of the solidified portion measured using a digital caliper.

Typical Cured Characteristics

Temperature: 23 °C (73 °F)

Attribute Name	Test Method	Value
Density - Cured Solid	ASTM D1875	1.16 g/mL [1]
Volume Shrinkage	ASTM D1875	4.1 % [1]
Peak Stress	ASTM D638, ISO 527	34 MPa [2]
Young's Modulus	ASTM D638, ISO 527	1,920 MPa [3]
Poisson's Ratio	ASTM D638, ISO 527	0.4 [3]
Toughness	ASTM D638, ISO 527	4.2 J/m³ [3]
Elongation at Break	ASTM D638, ISO 527	11 % [3]
Shore D Hardness	ASTM D2240	65 [4]
Notched Izod Impact	ASTM D256-10	50 J/m [5]

[1] Measured by Helium gas pycnometer. Cured with 450nm light at 500mW/cm² for 3 minutes.

[2] Cured with 450nm light at 500mW/cm² for 3 minutes. 0.5mm film conditioned for >5 days in 23°C/50%RH. Die cut type IV dog bone. 100mm/min pull rate. Digital Image Correlation (DIC) used for strain measurements.

[3] Cured with 450nm light at 500mW/cm² for 3 minutes. 0.5mm film conditioned for >5 days in 23°C/50%RH. Die cut type IV dog bone. 100mm/min pull rate. Digital Image Correlation (DIC) used for strain measurements.

[4] 1 mm films stacked to 6 mm. Cured with 450nm light at 500mW/cm² for 3 minutes.

[5] 3 mm thick sample. Cured with 450nm light at 500mW/cm² for 3 minutes.

Attribute Name	Test Method	Temperature	Test Condition	Value
Storage Modulus: DMA Temp Ramp	ASTM D4065	-20 °C (-4 °F)	1 Hz	2,700 MPa [1]
Storage Modulus: DMA Temp Ramp	ASTM D4065	0 °C	1 Hz	2,400 MPa [1]
Storage Modulus: DMA Temp Ramp	ASTM D4065	25 °C	1 Hz	1,900 MPa [2]
Storage Modulus: DMA Temp Ramp	ASTM D4065	45 °C	1 Hz	900 MPa [3]

Attribute Name	Test Method	Temperature	Test Condition	Value
Storage Modulus: DMA Temp Ramp	ASTM D4065	65 °C	1 Hz	50 MPa [3]
Storage Modulus: DMA Temp Ramp	ASTM D4065	85 °C	1 Hz	13 MPa [3]
Tg: DMA Temp Ramp	ASTM D7028		1 Hz	62 °C [1]
Storage Modulus: DMA Master Curve	ASTM D4065	25 °C	0.1 Hz	1,500 MPa [4]
Storage Modulus: DMA Master Curve	ASTM D4065	25 °C	1 Hz	1,600 MPa [4]
Storage Modulus: DMA Master Curve	ASTM D4065	25 °C	10 KHz	1,900 MPa [4]

[1] Cured with 450nm light at 500mW/cm² for 3 minutes. 0.5mm film conditioned for >5 days in 23°C/50%RH (CTH). 1Hz film tension DMA Heat from -20°C to 100°C at 3°C/min. Tg reported as peak of Tan Delta.

[2] Cured with 450nm light at 500mW/cm² for 3 minutes. 0.5mm film conditioned for >5 days in 23°C/50%RH (CTH). 1Hz film tension DMA Heat from -20°C to 100°C at 3°C/min. Tg reported as peak of Tan Delta.

[3] Cured with 450nm light at 500mW/cm² for 3 minutes. 0.5mm film conditioned for >5 days in 23°C/50%RH (CTH). 1Hz film tension DMA Heat from -20°C to 100°C at 3°C/min.

[4] 0.5mm film conditioned for >5 days in 23°C/50%RH (CTH). Multi-frequency incremental temperature sweep film tension DMA Heat from -20°C to 100°C.

Typical Performance Characteristics

Overlap Shear Strength

Temperature: 23 °C (73 °F)
Test Method: ASTM D1002, ISO 4587

Substrate	Value
Etched Aluminum	14 MPa (Mixed Adhesive Failure) [1]
Stainless Steel	4.1 MPa (Adhesive Failure) [2]
FR-4	17 MPa (Mixed Adhesive Failure) [3]
PC/ABS Glass-filled	5.2 MPa (Mixed Adhesive Failure) [3]
PC/Siloxane	2.7 MPa (Adhesive Failure) [3]
PBT Glass-filled	3.2 MPa (Adhesive Failure) [3]
Polyamide Glass-filled	4.8 MPa (Adhesive Failure) [3]
Soda-lime Glass	>10 MPa (Substrate Failure) [3]

[1] Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Pull rate: 10 mm/min. Tested 72 hours after light exposure (450nm light at 360 mW/cm² for 2 sec)

[2] Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Pull rate: 10 mm/min. Substrate grit blasted with AC130-2 3M Surface Treatment Solution. Tested 72 hours after light exposure (450nm light at 360 mW/cm² for 2 sec)

[3] Bond dimensions: 6.35mm x 25.4mm x 0.15mm. Pull rate: 10 mm/min. Tested 72 hours after light exposure (450nm light at 360 mW/cm² for 2 sec)

Electrical and Thermal Properties

Attribute Name	Test Method	Temperature	Test Condition	Value
Dielectric Strength	ASTM D149	25 °C		38 kV/mm [1]
Volume Resistivity	ASTM D1257	23 °C (73 °F)	500 V, 60 s	3.4×10^{14} Ω-cm

[1] Measured at 0.26 mm

Handling/Application Information

Directions for Use

For opaque substrates: Activate cure with 450nm light source at 360mW/cm² for 2 seconds and close bond in less than 5 seconds.
For transparent substrates: Adhesive can be fast cured at 450nm with 500mW/cm² for 15 seconds.

Application Techniques

- Dispensing
- Molding

Application Examples

- Mobile device bonding
- Wearable electronic device bonding
- Electronic Assembly
- Encapsulation

Storage and Shelf Life

Store product at 0°C to 4°C (32°F to 39.2°F) in the original, unopened packaging. For best performance, use this product within 12 months from date of manufacture.

Available Sizes

Attribute Name	Value
Packaging	30 mL syringe, 591 mL cartridge

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