Technical Data Sheet

3M™ Scotch-Weld™ One-Part Epoxy Adhesive 6104 Black

Regulatory Info/SDS

Product Description

3M™ Scotch-Weld™ One-Part Epoxy Adhesive 6104 Black is a one-part epoxy exhibiting a low temperature cure with long room temperature pot life and low viscosity. It is flexible and toughened resulting in high impact performance.

Product Features

- One-part with stability at room temperature
- Low temperature cure and fast cure
- Low Viscosity
- Excellent impact resistance
- Bonds a variety of plastics and metals

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		Black
Components		1-Part
UV Tracer		No
Density - Liquid		1.12 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	29 Pa·s [1]
Viscosity - Cone and Plate	1 Hz	19 Pa·s [1]
Viscosity - Cone and Plate	10 Hz	15 Pa·s [1]
Thixotropic Index	0.1 Hz / 1 Hz	1.5 [1]
Thixotropic Index	1 Hz / 10 Hz	1.3 [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

Temperature: 65 °C
Test Method: ASTM D4473

Attribute Name	Value
Time to Double Complex Viscosity	3.8 min [1]
Time to 1,000 Pa.s Complex Viscosity	6.1 min [1]
Time to 0.1 MPa Storage Modulus	6.7 min [1]
Time to 1 MPa Storage Modulus	7.4 min [1]
Time to 90% Storage Modulus Max	9.6 min [1]

[1] Parallel Plate Rheometer: Isothermal - 25mm parallel plate, 1 Hz

Substrate: Etched Aluminum
Temperature: 65 °C
Test Condition: 22°C
Test Method: ASTM D1002, ISO 4587

Attribute Name	Dwell Time	Value
Time to Handling Strength		15 min [1]
Time to Cure		20 min [2]
Overlap Shear Strength	15 min	18 MPa [3]
Overlap Shear Strength	20 min	20 MPa [3]
Overlap Shear Strength	60 min	26 MPa [4]

[1] 2mm thick substrate. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Dwell time refers to time coupons are exposed to condition in oven. Time to consistent >50 psi (0.34 MPa) overlap shear strength. Tested 5±1 minutes out of oven.

[2] 2mm thick substrate. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Dwell time refers to time coupons are exposed to condition in oven. Time to 80% overlap shear full strength

[3] 2mm thick substrate. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Temperature refers to dwell time coupons are exposed to condition in oven. Coupons are tested 5±1 minutes after removing from oven. Pull rate 10 mm/min.

[4] 2mm thick substrate. Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Temperature refers to dwell time coupons are exposed to condition in oven. Coupons are tested 24 hours after removing from oven. Pull rate 10 mm/min.

Typical Cured Characteristics

Temperature: 23 °C

Attribute Name	Test Method	Value
Density - Cured Solid	ASTM D1875	1.17 g/mL [1]
Volume Shrinkage	ASTM D1875	4.1 % [1]
Peak Stress	ASTM D638	27 MPa [2]
Young's Modulus	ASTM D638	560 MPa [2]
Poisson's Ratio	ASTM D638	0.45 [2]
Toughness	ASTM D638	17 J/m³ [2]
Elongation at Break	ASTM D638	120 % [2]
Shore D Hardness	ASTM D2240	66 [3]
Notched Izod Impact	ASTM D256-10	140 J/m [4]
Notched Izod Impact	ASTM D256-10	100 J/m [4]

[1] Measured by Helium gas pycnometer

[2] 0.5mm film cured at 65°C for 1 hour. 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] 1 mm films stacked to 6 mm

[4] 3 mm thick sample

Attribute Name	Test Method	Test Condition	Value
Tg: DMA Temp Ramp	ASTM D7028	1 Hz	42 °C [1]
Storage Modulus: DMA Temp Ramp	ASTM D7028	1 Hz	1,100 MPa [1]
Storage Modulus: DMA Master Curve	ASTM D4065	0.1 Hz	230 MPa [1]
Storage Modulus: DMA Master Curve	ASTM D4065	1 Hz	350 MPa [1]
Storage Modulus: DMA Master Curve	ASTM D4065	10 KHz	1,200 MPa [1]

[1] 0.5mm film cured at 65°C for 1 hour. 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.

Typical Performance Characteristics

Overlap Shear Strength

Test Condition: 1 hr at 65°C + 24 hr at 22°C
Test Method: ASTM D1002, ISO 4587

Substrate	Value
Etched Aluminum	26 MPa (Mixed Mode Failure) [1]
Stainless Steel	23 MPa (Mixed Mode Failure) [2]
FR-4	33 MPa (Mixed Mode Failure) [3]
PC/ABS Glass-filled	>11 MPa (Substrate Failure) [3]
PC/Siloxane	8.7 MPa (Adhesive Failure) [3]
PBT Glass-filled	13 MPa (Mixed Mode Failure) [3]
Polyamide Glass-filled	12 MPa (Adhesive Failure) [3]

[1] Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Pull rate: 10 mm/min.

[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.

[3] Bond dimensions: 6.4mm x 25.4mm x 0.15mm. Pull rate: 10 mm/min.

Electrical and Thermal Properties

Attribute Name	Test Method	Temperature	Test Condition	Value
Dielectric Strength	ASTM D149	25 °C		62 kV/mm [1]
Dielectric Constant (Dk)	ASTM D150	23 °C	100 KHz	4.2
Dissipation Factor (Df)	ASTM D150	23 °C	100 KHz	0.039
Volume Resistivity	ASTM D1257	23 °C	500v 60s	1.8^{15} Ω-cm

[1] Measured at 0.26 mm

Handling/Application Information

Directions for Use

Thaw for one to two hours at room temperature before using. Do not heat syringe above 27°C when warming.

Application Techniques

- Dispensing
- Molding

Application Examples

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

Storage and Shelf Life

Store product at -20°C (-4°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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