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Technical Data Sheet

3M™ Scotch-Weld™ Epoxy Adhesive DP125 Gray

Additional Info

Regulatory Info/SDS

Product Description

Scotch-Weld epoxy adhesive DP125 Gray is a filled, pigmented version of the Scotch-Weld epoxy adhesive DP125 Translucent and has similar performance and flexibility properties.

Available in bulk containers as 3M™ Scotch-Weld™ Epoxy Adhesive 125 B/A Gray.

Product Features

- 25 minute worklife
- Flexible
- Gray
- Excellent peel strength
- 1:1 mix ratio
- Recognized as meeting UL 94 HB

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	Temperature	Value
Accelerator Density		1.02 g/cm³ (8.5 lb/gal)
Base Density		1.25 g/cm³ (10.5 lb/gal)
Mix Ratio by Volume (B:A)		1:1
Mix Ratio by Weight (B:A)		1:0.81
Accelerator Viscosity	23 °C (73 °F)	30,000 cP (30,000 mPa.s) [1]
Base Viscosity	23 °C (73 °F)	58,000 cP (58,000 mPa.s) [1]
Accelerator Resin		Amine
Base Resin		Epoxy
Accelerator Color		Clear Amber
Base Color		Dark Gray

[1] Viscosity measured using cone-and-plate viscometer; reported viscosity at 4 sec^{-1} shear rate.

Typical Mixed Physical Properties

Attribute Name	Temperature	Value
Open Time		25 min [1]
Time to Handling Strength	23 °C (73 °F)	2 h
Time to Structural Strength	23 °C (73 °F)	16 h [2]

[1] Max time allowed after applying adhesive to a substrate before bond must be closed and fixed. Cure times approximate and depend on adhesive temperature. Hotmelts: The approx. bonding range of a 3.2 mm (1/8 in) bead of molten adhesive on a non-metallic surface.

[2] Minimum time required to achieve 6.9 MPa (1,000 psi) of overlap shear strength. Cure times are approximate and depend on adhesive temperature.

Typical Physical Properties

Attribute Name	Value
Cured Color	Gray

Typical Cured Characteristics

Temperature: 23 °C (73 °F)

Attribute Name	Test Method	Value
Shore D Hardness	ASTM D2240	70

Typical Performance Characteristics

Overlap Shear Strength

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

Dwell Time	Substrate	Surface Prep	Value
7 d	ABS	IPA Wipe	4.5 MPa (650 lb/in²) [1]
7 d	Acrylic (PMMA)	IPA Wipe	2.1 MPa (310 lb/in²) [1]
7 d	Aluminum	Sandblasted	16.9 MPa (2450 lb/in²) [1]
24 h	Aluminum	Etched	28.9 MPa (4190 lb/in²) [1]
7 d	CRS	Acetone/Abrade/Acetone	14.3 MPa (2080 lb/in²) [1]
7 d	FRP (Epoxy)	Acetone/Abrade/Acetone	30.3 MPa (4400 lb/in²) [1]
7 d	FRP (Polyester)	Acetone/Abrade/Acetone	12.6 MPa (1830 lb/in²) [1]
7 d	Polycarbonate (PC)	IPA Wipe	3.8 MPa (559 lb/in²) [1]
7 d	Polyvinyl chloride (PVC)	IPA Wipe/Abrade/IPA Wipe	4.5 MPa (650 lb/in²) [1]

[1] 25 mm (1") wide, 12.7 mm (1/2") overlap samples, 25 mm (1") x 102 mm (4") substrates, bondline thickness: 0.13-0.20 mm (5-8 mil)
Separation rate 2.5 mm/min (0.1 in/min) metal, 51 mm/min (2 in/min) plastic, 510 mm/min (20 in/min) rubber.
Substrate thickness: steel 1.5 mm (60 mil), other metal 1.3-1.6 mm (50-64 mil), rubber and plastic 3.2 mm (125 mil)
Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Overlap Shear Strength

Substrate: Aluminum
Surface Prep: Sandblasted
Temperature: 23 °C (73 °F)
Dwell Time: 7 d
Test Method: ASTM D1002, ISO 4587

Test Condition	Value
-40 °F	16.7 MPa (2420 lb/in²) [1]
49 °C (120 °F)	2.9 MPa (420 lb/in²) [1]
82 °C (180 °F)	1.4 MPa (210 lb/in²) [1]
200 °C (392°F)	1.1 MPa (170 lb/in²) [1]

[1] Overlap shear (OLS) strengths were measured on 25 mm wide x 13 mm overlap (1 x 0.5 in) specimens on 25 x 102 x 1.5 mm (1 x 4 x 0.06 in) substrates.
Jaw separation 2.5 mm/min (0.1 in/min). 0.25 mm (10 mil) bondline.

Substrate: Aluminum
Surface Prep: Etched
Temperature: 23 °C (73 °F)
Test Condition: 23 °C

Attribute Name	Test Method	Value
Bell Peel	ASTM D3167	13.8 N/mm (79 lb/in) [1]

[1] Floating roller peel; adhesives allowed to cure for 24 hours @RT; 25 mm (1 in) wide samples;
Samples pulled at 15 mm/min (6 in/min)
Cohesive (CF), Adesive (AF) and Substrate (SF) Failure

Test Method: ASTM D638, ISO 527

Attribute Name	Temperature	Test Condition	Value
Elongation	23 °C (73 °F)	10 mm/min	95 % [1]
Modulus			19.6 MPa
Tensile Strength			14.9 MPa

[1] Type IV dogbone

Substrate: Aluminum
Surface Prep: MEK,Sandblast,MEK
Test Condition: Pendulum Impact

Attribute Name	Test Method	Value
Impact Shear Strength	ASTM D950	10 J [1]

[1] 21.7J Hammer

Typical Environmental Performance

Overlap Shear Strength

Substrate: Aluminum
Surface Prep: MEK,Sandblast,MEK
Temperature: 23 °C (73 °F)
Dwell Time: 7 d
Test Method: ASTM D1002, ISO 4587

Environmental Condition	Value
200°C / 30 minutes	19.9 MPa (2800 lb/in²) (118%) [1]
85 °C + 85 %RH: 500 hrs	16.0 MPa (2320 lb/in²) (95%) [1]
Diesel Fuel: 500 hrs	16.5 MPa (2400 lb/in²) (98%) [1]
Gasoline: 500 hrs	0.1 MPa (20 lb/in²) (1%) [1]
Salt water (5% wt in water): 500 hrs	10.5 MPa (1520 lb/in²) (62%) [1]
Water: 500 hrs	10.8 MPa (1570 lb/in²) (64%) [1]

[1] 25 mm (1") wide, 12.7 mm (1/2") overlap samples, 25 mm (1") x 102 mm (4") substrates, bondline thickness: 0.13-0.20 mm (5-8 mil)
Separation rate 2.5 mm/min (0.1 in/min) metal, 51 mm/min (2 in/min) plastic, 510 mm/min (20 in/min) rubber
Substrate thickness: steel 1.5 mm (60 mil), other metal 1.3-1.6 mm (50-64 mil), rubber and plastic 3.2 mm (125 mil)
Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Substrate: PVC
Surface Prep: 50/50 IPA
Temperature: 23 °C (73 °F)
Dwell Time: 7 d
Environmental Condition: 49 °C + 80 %RH

Attribute Name	Test Method	Value
Overlap Shear Strength	ASTM D1002, ISO 4587	6.3 MPa (910 lb/in²) (140%) [1]

[1] 25 mm (1") wide, 12.7 mm (1/2") overlap samples, 25 mm (1") x 102 mm (4") substrates, bondline thickness: 0.13-0.20 mm (5-8 mil)

Separation rate 2.5 mm/min (0.1 in/min) metal, 51 mm/min (2 in/min) plastic, 510 mm/min (20 in/min) rubber
Substrate thickness: steel 1.5 mm (60 mil), other metal 1.3-1.6 mm (50-64 mil), rubber and plastic 3.2 mm (125 mil)
Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Substrate: Cold Rolled Steel
Surface Prep: Acetone/Abrade/Acetone
Temperature: 23 °C (73 °F)
Dwell Time: 7 d
Environmental Condition: 200°C / 30 minutes

Attribute Name	Test Method	Value
Overlap Shear Strength	ASTM D1002, ISO 4587	16.3 MPa (2370 lb/in²) (114%) [1]

[1] 25 mm (1") wide, 12.7 mm (1/2") overlap samples, 25 mm (1") x 102 mm (4") substrates, bondline thickness: 0.13-0.20 mm (5-8 mil)
Separation rate 2.5 mm/min (0.1 in/min) metal, 51 mm/min (2 in/min) plastic, 510 mm/min (20 in/min) rubber
Substrate thickness: steel 1.5 mm (60 mil), other metal 1.3-1.6 mm (50-64 mil), rubber and plastic 3.2 mm (125 mil)
Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

Electrical and Thermal Properties

Attribute Name	Test Method	Test Condition	Value
Glass Transition Temperature (Tg)			34 °C (93 °F) [1]
Thermal Conductivity	ASTM E1530	50 °C, 25 psi	0.24 W/m·K
Coefficient of Thermal Expansion		Above Tg	206.1 x 10^{-6} m/m/°C [2]
Coefficient of Thermal Expansion		Below Tg	93.8 x 10^{-6} [2]

[1] Glass Transition Temperature (Tg) determined using DSC Analyzer with a heating rate of 10 °C per minute. Second heat values given.

[2] CTE determined using TMA Analyzer using a heating rate of 3 °C per minute. Second heat values given.

Handling/Application Information

Directions for Use

1. For high strength structural bonds, paints, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed. However, the amount of surface preparation directly depends on the required bond strength and the environmental aging resistance desired by user. For specific surface preparations on common substrates, see the section on surface preparation.

2. Use gloves to minimize skin contact. Do not use solvents for cleaning hands.

3. Mixing.
For Duo Pak Cartridges
3M™ Scotch-Weld™ Epoxy Adhesives DP125 Translucent and Gray are supplied in a dual syringe plastic duo-pak cartridge as part of the 3M™ EPX™ Applicator System. To use, simply insert the duo-pak cartridge into the EPX applicator and start the plunger into the cylinders using light pressure on the trigger. Next, remove the duopak cartridge cap and expel a small amount of adhesive to be sure both sides of the duo-pak cartridge are flowing evenly and freely. If automatic mixing of Part A and Part B is desired, attach the EPX applicator mixing nozzle to the duo-pak cartridge and begin dispensing the adhesive. For hand mixing, expel the desired amount of adhesive and mix thoroughly. Mix approximately 15 seconds after uniform color is obtained.

For Bulk Containers
Mix thoroughly by weight or volume in the proportions specified in the typical uncured properties section. Mix approximately 15 seconds after uniform color is obtained.

4. For maximum bond strength, apply adhesive evenly to both surfaces to be joined.

5. Application to the substrates should be made within 20 minutes. Larger quantities and/or higher temperatures will reduce this working time.

6. Join the adhesive coated surfaces and allow to cure at 60°F (16°C) or above until completely firm. Heat up to 200°F (93°C), will speed curing. These products will cure in 7 days @ 75°F (24°C).

7. Keep parts from moving during cure. Contact pressure necessary. Maximum shear strength is obtained with a 3-5 mil

bond line.

8. Excess uncured adhesive can be cleaned up with ketone type solvents.*

*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow manufacturer's precautions and directions for use.

Adhesive Coverage (typical): A 0.005 in. thick bondline will yield a coverage of 320 sqft/gallon.

Surface Preparation

For high strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed. However, the amount of surface preparation directly depends on the required bond strength and the environmental aging resistance desired by user. The following cleaning methods are suggested for common surfaces:

Steel

1. Wipe free of dust with oil-free solvent such as acetone, isopropyl or alcohol solvents.*

2. Sandblast or abrade using clean fine grit abrasives.

3. Wipe again with solvent to remove loose particles.

4. If a primer is used, it should be applied within 4 hours after surface preparation.

Aluminum

1. Alkaline Degrease: Oakite 164 solution (9-11 oz./gallon water) at 190°F ± 10°F (88°C ± 5°C) for 10-20 minutes. Rinse immediately in large quantities of cold running water.

2. Optimized FPL Etch Solution (1 liter):

Distilled Water - 700 ml plus balance of liter (see below)

Sodium Dichromate - 28 to 67.3 grams

Sulfuric Acid - 287.9 to 310.0 grams

Aluminum Chips - 1.5 grams/liter of mixed solution

To prepare 1 liter of this solution, dissolve sodium dichromate in 700 ml of distilled water. Add sulfuric acid and mix well. Add additional distilled water to fill to 1 liter. Heat mixed solution to 66 to 71°C (150 to 160°F). Dissolve 1.5 grams of 2024 bare aluminum chips per liter of mixed solution. Gentle agitation will help aluminum dissolve in about 24 hours.

To etch aluminum panels place them in FPL etch solution heated to 66 to 71°C (150 to 160°F). Panels should soak for 12 to 15 minutes.

3. Rinse: Rinse panels in clear running tap water.
4. Dry: Air dry 15 minutes; force dry 10 minutes at 150°F ± 10°F (66°C ± 5°C).
5. If primer is to be used, it should be applied within 4 hours after surface preparation.

Plastics/Rubber

1. Wipe with isopropyl alcohol.*

2. Abrade using fine grit abrasives.

3. Wipe with isopropyl alcohol.*

Glass

1. Solvent wipe surface using acetone or MEK.*

2. Apply a thin coating (0.0001 in. or less) of 3M™ Scotch-Weld™ Metal Primer EC3901 to the glass surfaces to be bonded and allow the primer to dry 60 minutes before bonding.

*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use.

Application Equipment

For small or intermittent applications the 3M™ EPX™ Applicator System is a convenient method of application.

For larger applications these products may be applied by use of flow equipment.

Two part meter/mixing/proportioning/dispensing equipment is available for intermittent or production line use. These systems may be desirable because of their variable shot size and flow rate characteristics and are adaptable to many applications.

Industry Specifications

UL 94 HB

Storage and Shelf Life

Store under normal conditions of 16° to 27°C (60° to 80°F) in the original, unopened packaging, out of direct sunlight. For best performance, use this product within 24 months from date of manufacture.

Precautionary Information

Refer to Product Label and Material Safety Data Sheet for health and safety information before using this product. For additional health and safety information, call 1-800-364-3577

Automotive Disclaimer

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This product is an industrial product and has not been designed or tested for use in certain automotive applications, such as automotive electric powertrain battery or high voltage applications, which may require the product to be manufactured in a IATF certified facility, meet a Ppk of 1.33 for all properties, undergo an automotive production part approval process (PPAP), or fully adhere to automotive design or quality system requirements (e.g., IATF 16949 or VDA 6.3). Customer assumes all responsibility and risk if customer chooses to use this product in these applications.

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ISO Statement

This product was manufactured under a 3M quality system registered to ISO 9001 standards.

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