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Technical Data Sheet

3M™ Scotch-Weld™ Epoxy Adhesive DP100 Plus Clear

Additional Info

Regulatory Info/SDS

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP100 Plus Clear is a flexible, fast setting, two-part, 1:1 mix ratio mercaptan-cured epoxy adhesive. It is unique among fast setting mercaptan cure epoxies in that it combines high shear strength with good peel performance properties. Scotch-Weld epoxy adhesive DP100 Plus Clear is clear when cured. Available in bulk containers as 3M™ Scotch-Weld™ Epoxy Adhesive DP100 Plus B/A Clear.

Product Features

- 2-5 minute worklife
- Good shear and excellent peel strength
- Flexible
- 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	Test Method	Temperature	Value
Color			Clear, colorless to light yellow/amber
Mix Ratio by Volume (B:A)			1:1
Mix Ratio by Weight (B:A)			1:0.98
Accelerator Resin			Mercaptan
Accelerator Color			Clear, colorless to light yellow/amber
Accelerator Net Weight			1.14 g/cm³ (9.5 lb/gal)
Accelerator Density			1.14 g/cm³ (9.5 lb/gal)
Accelerator Viscosity		27 °C (80 °F)	11,000 cP [1]
Base Resin			Epoxy
Base Color			Clear
Base Net Weight			1.16 g/cm³ (9.7 lb/gal)
Base Density			1.16 g/cm³ (9.7 lb/gal)
Base Viscosity	3M C1d	27 °C (80 °F)	9,000 cP [2]

[1] Viscosity measured using Brookfield RTV, spindle #7, 20 RPM

[2] Procedure involves Brookfield RVF, #7 spindle, 20 rpm. Measurement taken after 1 minute rotation.

Typical Mixed Physical Properties

Attribute Name	Test Method	Temperature	Value
Worklife, 20g mixed	3M C3180	23 °C (73 °F)	2-5 min [1]
Open Time			5 min [2]
Time to Handling Strength		23 °C (73 °F)	15 min
Time to Structural Strength		23 °C (73 °F)	5 h [3]

[1] Procedure involves periodically measuring a 20 gram mixed mass for self leveling and wetting properties. This time will also approximate the usable worklife in an 3M™ EPX™ Applicator mixing nozzle.

[2] 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.

[3] 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 Cured Characteristics

Attribute Name	Test Method	Dwell Time	Temperature	Value
Shore D Hardness	ASTM D2240		23 °C (73 °F)	65
Poisson's Ratio	ASTM D638, ISO 527	7 d		0.39 [1]
Young's Modulus	ASTM D638, ISO 527	7 d	23 °C (73 °F)	10.413 MPa [1]
Peak Stress	ASTM D638, ISO 527	7 d	23 °C (73 °F)	2.39 MPa [2]
Peak Stress	ASTM D638, ISO 527	7 d	23 °C (73 °F)	5.04 MPa [3]

[1] Tested in accordance with ASTM D638 test method, Type IV dogbone. Jaw separation 5 mm/min at a strain range between 0.1 and 1.0%. Sample removed from a dry condition and tested after equilibriation at 25 °C / 50%RH for 40 hrs.

[2] Tested in accordance with ASTM D638 test method, Type IV dogbone. Jaw separation 5 mm/min. Sample removed from a dry condition and tested after equilibriation at 25 °C / 50%RH for 40 hrs.

[3] Tested in accordance with ASTM D638 test method, Type IV dogbone. Jaw separation 100 mm/min. Sample removed from a dry condition and tested after equilibriation at 25 °C / 50%RH for 40 hrs.

Typical Performance Characteristics

Attribute Name	Test Method	Temperature	Test Condition	Substrate	Surface Prep	Value
Elongation	ASTM D638, ISO 527	23 °C (73 °F)	10 mm/min			70 % [1]
Impact Shear Strength	ASTM D950		Pendulum Impact	Aluminum	MEK,Sandblast, MEK	4.02 J [2]

[1] Type IV dogbone

[2] 21.7J Hammer

Substrate: Etched Aluminum
Temperature: 23 °C (73 °F)
Test Condition: 23 °C
Dwell Time: 24 h
Environmental Condition: +2 hr @ 71 °C (160 °F)

Attribute Name	Test Method	Value
Bell Peel	ASTM D3167	10.4 N/mm (59.4 lb/in) [1]

[1] 25 mm (1 in) wide samples; 0.4 mm (0.017 in) bond line thickness. The testing jaw separation rate was 15 cm/min (6 in/min). The bonds are made with 1.6 mm (0.064 in) bonded to 0.64 mm (0.025 in) thick adherends.

Substrate: Etched Aluminum
Temperature: 23 °C (73 °F)
Test Condition: 23 °C
Dwell Time: 24 h
Environmental Condition: +2 hr @ 71 °C (160 °F)

Attribute Name	Test Method	Value
Overlap Shear Strength	ASTM D1002, ISO 4587	22.4 MPa (3250 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: 0.76-0.13 mm (3-5 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)

Typical Environmental Performance

Overlap Shear Strength

Temperature: 23 °C (73 °F)
Test Condition: 23 °C
Dwell Time: 7 d
Test Method: ASTM D1002, ISO 4587

Environmental Condition	Substrate	Surface Prep	Value
200°C / 30 minutes	Aluminum	MEK,Sandblast,MEK	23.2 MPa (3370 lb/in²) [1]
85 °C + 85 %RH: 500 hrs	Aluminum	MEK,Sandblast,MEK	6.7 MPa (974 lb/in²) [1]
Diesel Fuel: 500 hrs	Aluminum	MEK,Sandblast,MEK	17.3 MPa (2513 lb/in²) [1]
Gasoline: 500 hrs	Aluminum	MEK,Sandblast,MEK	15.2 MPa (2204 lb/in²) [1]
Salt water (5% wt in water): 500 hrs	Aluminum	MEK,Sandblast,MEK	16.0 MPa (2317 lb/in²) [1]
Water: 500 hrs	Aluminum	MEK,Sandblast,MEK	15.3 MPa (2215 lb/in²) [1]
200°C / 30 minutes	CRS	Acetone/Abrade/Acetone	21.1 MPa (3061 lb/ft²) [1]
49 °C + 80 %RH: 500 hrs	PVC	IPA Wipe	6.6 MPa (959 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: 0.76-0.13 mm (3-5 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)

Electrical and Thermal Properties

Attribute Name	Test Method	Test Condition	Value
Coefficient of Thermal Expansion		Below Tg	60.9 x 10^{-6} m/m/°C [1]
Coefficient of Thermal Expansion		Above Tg	197.8 x 10^{-6} m/m/°C [1]
Glass Transition Temperature (Tg)			27 °C (80 °F) [2]
Thermal Conductivity	ASTM E1530	50 °C, 25 psi	0.19 W/m·K

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

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

Handling/Application Information

Directions for Use

1. 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 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 Adhesive DP100 Plus Clear is 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 duo- pak cartridge cap and expel a small amount of adhesive to ensure 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 3 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), in order to speed curing. These products will cure in 48 hours @ 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 methyl ethyl ketone (MEK).*
Adhesive Coverage: A 0.005 in thick bond line will yield a coverage of 320 sqft/gallon.
*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow manufacturer's precautions and directions for use.

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. Acid Etch: Place panels in the following solution for 10 minutes at 150°F ± 5°F (66°C ± 2°C).

Sodium Dichromate 4.1 - 4.9 oz./gallon
Sulfuric Acid, 66°Be 38.5 - 41.5 oz./gallon 2024-T3 aluminum (dissolved) 0.2 oz./gallon minimum
Tap water as needed to balance
3. Rinse: Rinse panels in clear running tap water.
4. Dry: Air dry 15 minutes; force dry 10 minutes at 190°F ± 10°F (88°C ± 5°C).
5. If primer is to be used, it should be applied within 4 hours after surface preparation.

Note: Read and follow component supplier's environmental health and safety information prior to preparing this etch solution.
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.*

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

Application Equipment

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

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

Two-part meter/mixing/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

Information

Intended Use: This product is intended for bonding of materials specified and described in its Technical Data Sheet, when used in accordance with the guidance provided by 3M in such Technical Data Sheet and other product instructions. Since there are many factors that can affect a product's use, the customer remains responsible for determining whether the 3M product is suitable and appropriate for the customer's specific application and system, including customer conducting an appropriate risk assessment and evaluating the 3M product in customer's application and system.

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ISO Statement

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

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