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English-US

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Technical Data Sheet

3M™ Scotch-Weld™ Epoxy Adhesive DP190 Gray

Product Details

Regulatory Info/SDS

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP190 Gray is a 1:1 by volume mix ratio of 3M™ Scotch-Weld™ Epoxy Adhesive 2216 B/A Gray and exhibits good peel, shear and environmental aging properties.
Available in bulk containers as 3M™ Scotch-Weld™ Epoxy Adhesive 2216 B/A.

Product Features

- 90 minute worklife
- High shear and peel strength
- Flexible
- 1:1 mix ratio
- Gray
- 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	Value
Color	Gray [1]
Mix Ratio by Volume (B:A)	1:1
Mix Ratio by Weight (B:A)	1.06:1

[1] Colors may vary from nearly white to yellow/amber. Adhesive performance is not affected by color variation.

Attribute Name	Temperature	Value
Base Color		White
Accelerator Color		Gray
Base Resin		Epoxy
Accelerator Resin		Amine
Base Net Weight		11.0 — 11.4 lb/gal
Accelerator Net Weight		10.6 — 11.0 lb/gal
Base Viscosity	22 °C (72 °F)	75,000-150,00 cP
Accelerator Viscosity	22 °C (72 °F)	40,000-80,000 cP

Typical Mixed Physical Properties

Rate of Strength Buildup

Substrate: Etched Aluminum
Temperature: 22 °C (72 °F)
Test Method: ASTM D1002, ISO 4587

Dwell Time	Value
1 h	10 lb/in² [1]
6 h	50 lb/in² [1]
24 h	1,000 lb/in² [1]

Dwell Time	Value
7 d	2,000 lb/in² [1]
1 month	2,200 lb/in² [1]
3 month	2,500 lb/in² [1]

[1] 1 in wide 1/2 in overlap specimens with 1 in x 4 in substrates. 0.005-0.008in bondline.
Jaw separation 0.1 in/min.
Substrate thickness 0.05-0.064 in
Cohesive (CF), Adhesive (AF), Substrate (SF) Failure

Attribute Name	Test Method	Temperature	Value
Worklife, 2g mixed	3M C3180	22 °C (72 °F)	90 min [1]
Worklife, 20g mixed	3M C3180	22 °C (72 °F)	90 min [2]
Open Time			90 min [3]
Tack Free Time	3M C3173		6 h [4]
Time to Handling Strength		22 °C (72 °F)	8 — 12 h [5]

[1] Procedure involves periodically measuring a 2 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] 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.

[3] 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 1/8" bead of molten adhesive on a non-metallic surface.

[4] Involves dispensing 0.5 gram amount of adhesive onto substrate and testing periodically for no adhesive transfer to metal spatula.

[5] Minimum time required to achieve 50 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

Attribute Name	Test Method	Temperature	Value
Shore D Hardness	ASTM D2240	22 °C (72 °F)	60 [1]
Weight Loss by Thermal Gravimetric Analysis (TGA)	ASTM E1131	247 °C (477 °F)	1 % [2]
Weight Loss by Thermal Gravimetric Analysis (TGA)	ASTM E1131	337 °C (639 °F)	5 % [2]

[1] Tensile and Elongation. Samples were 51 mm (2") dumbbells with 3 mm (0.125") neck and 0.8 mm (0.03" sample thickness. Separation rate was 51 mm/min (2"/min)

[2] Weight loss by Thermal Gravimetric Analysis reported as that temperature at which 5% weight loss occurs by TGA in air at 5°C (9°F) rise per minute.

Test Condition: Potted Washer Olyphant Test, 100°C [air] ~ -50°C [liquid]

Attribute Name	Test Method	Value
Thermal Shock Resistance	3M C3174	Pass 5 cycles without cracking [1]

[1] Involves potting a metal washer into a 2 in. x 0.5 in. thick section and cycling this test specimen to colder and colder temperatures.

Typical Performance Characteristics

T-Peel Adhesion

Substrate: Etched Aluminum
Test Method: ASTM D1876

Temperature	Value
-55 °C (-67 °F)	3 lb/in width [1]
22 °C (72 °F)	20 lb/in width [1]
49 °C (120 °F)	10 lb/in width [1]
66 °C (150 °F)	4 lb/in width [1]
82 °C (180 °F)	2 lb/in width [1]

[1] T-peel strengths were measured on 1 in. wide bonds. Jaw separation 20 in/min. The substrates were 0.020 in. thick, 0.005-0.008in bondline. Samples dwelled for 24 hrs at 23C + 2 hrs at 71C before testing.

Temperature: 22 °C (72 °F)
Dwell Time: 2 h
Test Method: ASTM D882
Environmental Condition: +2 hr @ 71°C (160°F)

Attribute Name	Value
Elongation	30 % [1]
Tensile Strength	3,500 lb/in² [1]

[1] Samples were 2 in. dumbbells with 0.125 in. neck and .030 in. sample thickness. Separation rate was 2 inches per minute.

Typical Environmental Performance

Solvent Resistance

Environmental Condition	Value
24hr @ RT + 2hr @ 71°C (160°F) + Isopropyl Alcohol 1hr	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + Acetone 1hr	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + 1, 1, 1 - Trichloroethane 1hr	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + Freon TF 1hr	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + Freon TMC 1hr	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + RMA Flux 1hr	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + Isopropyl Alcohol 1mo	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + Acetone 1mo	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + 1, 1, 1 - Trichloroethane 1mo	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + Freon TF 1mo	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + Freon TMC 1mo	A [1]
24hr @ RT + 2hr @ 71°C (160°F) + RMA Flux 1mo	A [1]

[1] Cured OLS samples immersed in solvent and after dwell, examined for surface attack compared to control.
A: Unaffected, no color or texture change
B: Slight attack, slight swelling of surface.
C: Moderate/severe attack, extreme swelling of surface.

Electrical and Thermal Properties

Attribute Name	Test Condition	Value
Glass Transition Temperature (Tg)	Onset	7 °C (45 °F) [1]
Glass Transition Temperature (Tg)	Mid-Point	20 °C (68 °F) [1]
Coefficient of Thermal Expansion	Below Tg (5°C to 20°C)	62 [2]
Coefficient of Thermal Expansion	Above Tg (75°C to 140°C)	177 [2]

[1] Glass Transition Temperature (Tg) determined using DSC Analyzer with a heating rate of 68°F (20°C) per minute. Second heat values given.

[2] CTE determined using TMA Analyzer using a heating rate of 10°C per minute. Second heat values given.

Temperature: 110 °F

Attribute Name	Test Method	Value
Thermal Conductivity	C177	0.38 W/m/K (90.9 x 10^-2 Cal/s/cm/°C) (0.22 (btu-ft)/(h-ft²-°F)) [1]

[1] Thermal conductivity determined using C-matic Instrument using 2 in. diameter samples.

Temperature: 22 °C (72 °F)

Attribute Name	Test Method	Test Condition	Value
Dielectric Constant	ASTM D150	1 KHz	6.5
Dissipation Factor	ASTM D150	1 KHz	0.09
Volume Resistivity	ASTM D257		5.0 x 10^{12} Ω-cm

3M™ EPX™ Pneumatic Applicator Delivery Rates

Pneumatic Applicator Delivery Rates

Test Condition	Value
200 ml Applicator – Maximum Pressure 58 psi. 6mm Nozzle	11.9 g/min [1]
200 ml Applicator – Maximum Pressure 58 psi. 10mm Nozzle	46 g/min [1]
48.5/50 ml Applicator – Maximum Pressure 50 psi. 1/4 in. Nozzle	16.9 g/min [1]

[1] Tests were run at a temperature of 70°F ± 2°F (21°C ± 1°C) and at maximum applicator pressure.

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 necessary directly depends on the required bond strength and the environmental aging resistance desired by the user. For suggested surface preparations on common substrates, see the section on surface preparation.
2. Mixing
For Duo Pak Cartridges
3M™ Scotch-Weld™ Epoxy Adhesives DP190 Gray 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 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.
3. For maximum bond strength, apply adhesive evenly to both surfaces to be joined.
4. Application to the substrates should be made within 75 minutes. Larger quantities and/or higher temperatures will reduce this working time.
5. 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 to 14 days @ 75°F (24°C).
6. Keep parts from moving during cure. Contact pressure necessary. Maximum shear strength is obtained with a 3-5 mil bond line.
7. 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 necessary directly depends on the required bond strength and the environmental aging resistance desired by the 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 (87°C) ± 10°F 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 (65°C) ± 5°F.*
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 150°F (65°C) ± 10°F.
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 or equivalent to the glass surfaces to be bonded and allow the primer to dry before bonding.
*Note: When using solvents, extinguish all ignition sources, including pilot lights, and follow manufacturer’s precautions and directions for use.

Application Equipment

For smaller 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/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 12 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

Select Automotive Applications:
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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