Technical Data Sheet

3M™ Scotch-Weld™ Epoxy Adhesive DP490

Regulatory Info/SDS

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive DP490 is a black, two component epoxy adhesive with particularly good application characteristics. It is designed for use where high toughness and strength are required. The material also features heat and environmental resistance.

Product Features

- 90 minute worklife
- Designed for toughness and strength
- Non-sag for application to vertical surfaces
- 2:1 mix ratio

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	Black
Mix Ratio by Volume (B:A)	2:1

Attribute Name	Test Method	Temperature	Value
Base Color			Black
Accelerator Color			White
Accelerator Viscosity	3M TM-1	23 °C (73 °F)	78,000 cP (78,000 mPa.s)
Base Viscosity	3M TM-1	23 °C (73 °F)	313,000 cP (313,000 mPa.s) [1]

[1] Procedure involves Brookfield RVT, #6 spindle, 2 rpm. Measurement taken after 3 minutes of agitation at 100 rpm and 1 hour of rest.

Typical Mixed Physical Properties

Temperature: 23 °C (73 °F)

Attribute Name	Test Method	Substrate	Value
Worklife, 45g mixed	3M T-234		90 min [1]
Time to Full Strength	ASTM D1002, ISO 4587	Etched Aluminum	48 h [2]

[1] Procedure involves periodically measuring a 45 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] Bond dimensions: 12.7mm x 25.4mm x 0.15mm. Time to maximum strength. Pull rate: 10mm/min

Typical Cured Characteristics

Temperature: 23 °C (73 °F)
Dwell Time: 7 d

Attribute Name	Test Method	Value
Shore D Hardness	ASTM D2240	77

Typical Performance Characteristics

Overlap Shear Strength

Temperature: 23 °C (73 °F)
Dwell Time: 7 d

Test Method	Test Condition	Substrate	Surface Prep	Value
ASTM D1002, ISO 4587		Aluminum	Sandblasted	23 MPa (3336 lb/in²) (CF) [1]
ASTM D1002, ISO 4582		Stainless Steel	Sandblasted	24 MPa (3481 lb/in²) (CF) [2]
ASTM D1002, ISO 4583		Steel DD11	Sandblasted	27 MPa (3916 lb/in²) (CF) [2]
ASTM D1002, ISO 4584		Titanium	Sandblasted	20 MPa (2901 lb/in²) (AF) [2]
ASTM D1002, ISO 4587		ABS	IPA Wipe	1.3 MPa (188 lb/in²) (AF) [1]
ASTM D1002, ISO 4587		Polycarbonate (PC)	IPA Wipe	2.5 MPa (363 lb/in²) (AF) [3]
ASTM D1002, ISO 4587		Acrylic (PMMA)	IPA Wipe	530 kPa (76.9 lb/in²) (AF) [1]
ASTM D1002, ISO 4586		FR4	IPA Wipe	20 MPa (2901 lb/in²) (SF/AF) [2]
ASTM D1002, ISO 4587		CRF Epoxy	IPA Wipe	19 MPa (2756 lb/in²) (AF/CF) [1]
ASTM D1002, ISO 4587	-40 °F	Aluminum	Sandblasted	23 MPa (3336 lb/in²) [4]
ASTM D1002, ISO 4587	82 °C (180 °F)	Aluminum	Sandblasted	9.5 MPa (1378 lb/in²) [4]

[1] 25 mm by 12.7 mm (1" x 1/2"), bondline thickness: 0.07-0.25 mm (3-10 mil). Substrate size: 102mm x 25mm (1" x 4"). Separation rate 1.2 mm/min (0.05 in/min) for metal, 51 mm/min (2 in/min) for plastic, 510 mm/min (20 in/min) for rubber.

Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

[2] Overlap shear (OLS) strengths were measured on 1in wide 1/2in overlap specimens on 1in x 4in x .060in substrates. Jaw separation 0.05 in/min. 10 mil bondline. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)

[3] 25 mm by 12.7 mm (1" x 1/2"), bondline thickness: 0.07-0.25 mm (3-10 mil). Substrate size: 102mm x 25mm (1" x 4"). Separation rate 1.2 mm/min (0.05 in/min) for metal, 51 mm/min (2 in/min) for plastic, 510 mm/min (20 in/min) for rubber.
Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

[4] 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: Sandblasted
Temperature: 23 °C (73 °F)
Dwell Time: 7 d

Attribute Name	Test Method	Value
Bell Peel	DIN EN 1464	34.49 N/cm

Attribute Name	Value
Additional Test notes	The following product performance data was obtained in the 3M laboratory under the conditions specified. The following data show typical results obtained with 3M™ Scotch-Weld™ Epoxy Adhesive DP490 when applied to properly prepared substrates, cured, and tested according to the specifications indicated. This data was generated using the 3M™ EPX™ Applicator System equipped with an EPX static mixer, according to manufacturer's directions. Thorough hand mixing should afford comparable results.

Typical Environmental Performance

Overlap Shear Strength

Dwell Time: 240 h

Test Method	Temperature	Environmental Condition	Substrate	Surface Prep	Value
ASTM D1002, ISO 4588	23 °C (73 °F)	Diesel Fuel Submersion	Aluminum	Sandblasted	23 MPa (3336 lb/in²) (CF) [1]
ASTM D1002, ISO 4589	23 °C (73 °F)	Water Submersion	Aluminum	Sandblasted	23 MPa (3336 lb/in²) (CF) [1]
ASTM D1002, ISO 4590	23 °C (73 °F)	E10 Fuel Submersion	Aluminum	Sandblasted	23 MPa (3336 lb/in²) (CF) [1]
ASTM D1002, ISO 4591	85 °C (185 °F)	85 %RH	Aluminum	Sandblasted	15 MPa (2176 lb/in²) (AF) [1]
ASTM D1002, ISO 4592	49 °C (120 °F)	80 %RH	PVC	IPA Wipe	4.83 MPa (701 lb/in²) (CF/AF) [1]

[1] Performance % to control sample @RT. Samples were cured @RT for at least 7 days prior to Environmental Exposure. Overlap shear (OLS) strengths were measured on 1in wide 1/2in overlap specimens on 1in x 4in x .060in substrates. Jaw separation 0.05 in/min. 10 mil bondline. Cohesive Failure (CF), Adhesive Failure (AF), Substrate Failure (SF)

Electrical and Thermal Properties

Attribute Name	Test Method	Temperature	Value
Thermal Conductivity	ASTM E1530	40 °C (104 °F)	0.202 W/m/K
Volume Resistivity	ASTM D257	23 °C (73 °F)	7.5 x 10^{14} Ω-cm

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 DP490 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 90 minutes. Larger quantities and/or higher temperatures will reduce this working time.
6. Join the adhesive coated surfaces and allow to cure at 16 °C (60 °F) or above until completely firm. Heat up to 93 °C (200 °F), in order to speed curing. These products will cure in 48 hours @ 24 °C (75 °F).
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 88 °C ± 5 °C(190 °F ± 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 66 °C ± 2 °C (150 °F ± 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 88 °C ± 5 °C(190 °F ± 10 °F).
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.

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. The product can be stored in the original package for up to 39 months for cartridges and 48 months for bulk, from the date of production.

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.

3M™ Industrial Adhesives and Tapes Division
3M Center, St. Paul, MN 55144-1000
3M.com/iatd

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