3M Scotch-Weld™ Structural Plastic Adhesive DP-8010

Technical Data **January, 2003**

Product Description

3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8010 is a two-part acrylic-based adhesive (10:1 ratio by volume) that can bond many low surface energy plastics, including many grades of Polypropylene, Polyethylene, and TPO's without special surface preparation.

Scotch-Weld DP-8010 can replace screws, rivets, plastic welding, and two-step processes which include chemical etchants, priming or surface treatments in many applications.

Features

- Ability to Bond Dissimilar Substrates (Priming to Metal Surfaces May be Necessary)
- Ability to Structurally Bond Polyolefins
- Room Temperature Cure
- Excellent Water and Humidity Resistance
- One Step Process - No Pre-Treatment of the Polyolefin Substrates Needed
- Solvent-free Adhesive System
- Convenient Hand-Held Applicator System
- Available in Bulk

Typical Uncured Properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Color	**Base (B)** **Accelerator (A)**	Pink/Amber White
Lbs./gal.	**Base (B)** **Accelerator (A)**	8.4 8.5
Viscosity (cps)[1]	**Base (B)** **Accelerator (A)**	17,000 27,000
Base Resin	**Base (B)** **Accelerator (A)**	Methacrylate Amine
Mix Ratio	**(Volume)** **(Weight)**	10:1 9.8:1
Time to Handling Strength (50 psi)		1.5 - 2 hrs.
Full Cure 73°F (23°C)		8 - 24 hrs.
Worklife 73°F (23°C)		10 - 12 min.

(1) Viscosity obtained by Brookfield, DV-II, #7 Spindle, 20 rpm at 75°F (24°C).

Typical Cured Properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Color	Yellow
Tg onset (°C)[2]	34
Coefficient of Thermal Expansion (ppm/°C)[2]	
Below Tg	133
Above Tg	171
Mechanical Properties[3]	
Strain at Break	3%
Stress at Break (psi)	1,900
Modulus @ 1% Strain (psi)	70,000

(2) Tg and CTE determined by TMA -40°F to 249°F (-40°C to 120°C) at 10°F (5°C)/min. (after 2 heat cycles).

(3) Mechanical properties obtained using a Sintech 5GL Mechanical Tester. Approximate dimensions of the test specimen was 1.5" x 0.5" x 0.3". Elongation was determined by crosshead displacement. The crosshead velocity was 0.5"/min.

Typical Performance Characteristics

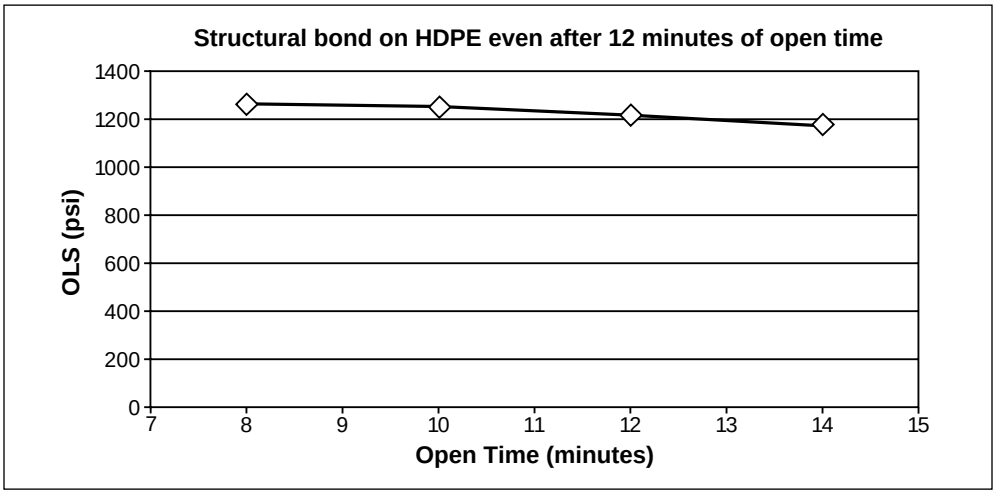
Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Overlap Shear Strength[4], tested @ 73°F (23°C)

Substrate	OLS (psi)
UHMWPE	754 SY
LDPE	353 SY
Black HDPE	850 CF
PP	1499 CF
ABS	1221 SF
Lexan	1252 CF
Plexiglass	1087 SF
PVC	1579 Mixed CF/SF
HIPS	468 SY
Teflon	340 SY
Nylon	Won't bond to Nylon
G-FRP	1861 MM
CRS/HDPE	846 AF to CRS
Aluminum/HDPE	424 AF to Al
ED-5000 E-Coated CRS/HDPE	1234 AF
EC 3924 Primed CRS	1590 CF
EC 3924 Primed AL/HDPE	1457 CF
DCT 5002X Top Coat CRS/HDPE	1219 Top Coat Failure
RK8010A Top Coat CRS/HDPE	147 AF

SY = Substrate Yield
SF = Substrate Failure/Break
CF = Cohesive Failure
MM = Mixed (Mode of AF and CF)
AF = Adhesive Failure

(4) Overlap Shear Test Method: overlap shear test for adhesion determined in accordance to ASTM D1002, sample dimensions were 1" x 4" x 1/8", with a 1/2 square inch of area of overlap, bonded to themselves unless otherwise noted, allowed to cure for at least 16 hours at 75°F (24°C) before testing. Data were collected using a Sintech 5GL Mechanical Tester with a 2000# or 5000# load cell. Test rate was 0.5"/minute. Strength determined at 75°F (24°C) unless otherwise noted.



Typical Performance Characteristics *(continued)*

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

T-Peel Strength (piw)[5], tested @ 73°F (23°C)

Substrate	Scotch-Weld DP-8010
HDPE	34 PIW

(5) Peel tests on 0.02" HDPE, 0.017" bondline thickness, 8" x 1" in T-peel mode at a rate of 2.0"/min.

Environmental Resistance

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Environmental & Chemical Exposure Test on HDPE[6]
All Exposure Times 14 Days Unless Otherwise Noted
All Temperatures are Room Temperature Unless Otherwise Noted

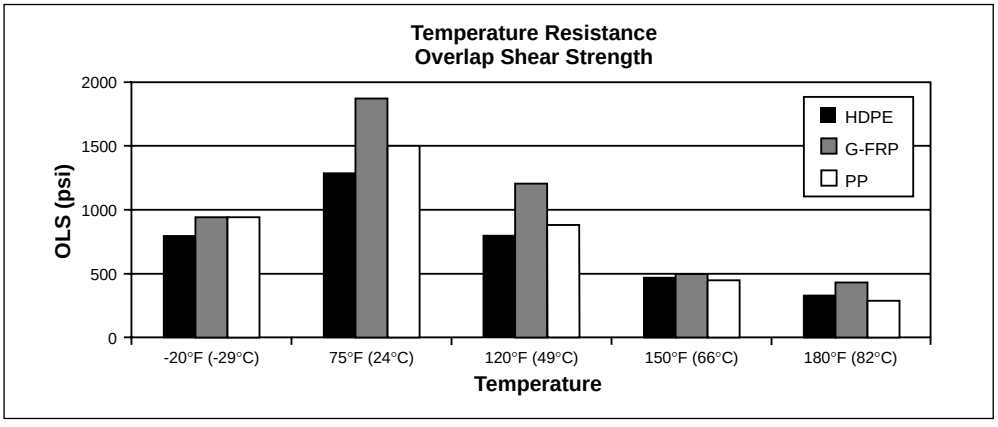
Condition	Overlap Shear (psi)
Control	1536 SF
106°F (41°C)/100% RH (14 Days)	1157 CF
106°F (41°C)/100% RH (30 Days)	1117 CF
160°F (71°C) Water Soak	1185 CF
10% NaOH	1477 SF/CF
16% HCl	1502 CF
20% Bleach	1504 SF/CF
IPA	1142 SF/CF
Antifreeze	1542 SF
Gasoline	757 CF
Diesel Fuel	1437 CF
Toluene	0

SF = Substrate Failure/Break
CF = Cohesive Failure

(6) Environmental tests were conducted by immersing bonded coupons of HDPE and subsequent testing in accordance with footnote 4.

Temperature Resistance[7]

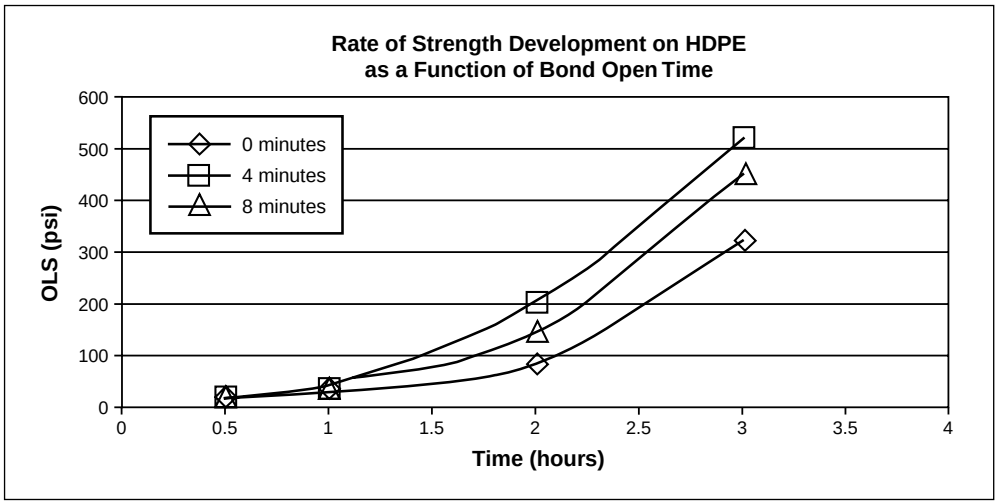
Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.



(7) Temperature resistance tests were conducted at specified temperature in accordance with footnote 4.

Typical Rate of Strength Build-Up[8]

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.



(8) Rate of strength testing done using overlap shear test described in footnote 4.

Suggested Substrates

Note: The following suggestions are based on laboratory tests on typical grades of the listed substrates. Because of the many combinations of process aids and additives that are used with plastic substrates, the user is responsible for determining whether 3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8010 is appropriate for a given application.

Potential Primary Surfaces	Polypropylene (PP) Polyethylene (PE) (HDPE) (LDPE) TPO
Potential Secondary Surfaces	Fiber Reinforced Plastic (FRP) Primed metals Polycarbonate Wood Glass TPE PVC ABS PMMA Polystyrene Concrete
Not Recommended Surfaces	Silicone Surfaces Surfaces Containing Mold Release Polyimide Nylons

Handling/Curing Information

Directions for Use:

Important: Use only the specified 3M™ EPX™ Plus Applicator system or appropriate meter mix equipment to ensure the proper 10:1 mix ratio and mix. Hand mixing is not recommended, and may result in unpredictable results.

1) Apply adhesive to clean, dry substrates, which are free of paint, oxide films, oils, dust, mold release agents and all other surface contaminants. See the Surface Preparation section for specific substrate preparation methods:

   35 mil cartridge:

   Place Duo-Pak cartridge in EPX applicator. Remove cap. Dispense and discard a small amount of adhesive to assure even and free flow. Clear orifice if necessary. Use only orange 10:1 mixing nozzle by: 1) aligning nozzle notch with cartridge recess, and 2) twisting into place. Dispense and discard a small amount of adhesive through nozzle until the adhesive is mixed.

   250 ml cartridge:

   While holding Duo-Pak cartridge in an upright position, remove and discard the insert from the cartridge by unscrewing plastic nut and removing metal washer. Place cartridge in a 10:1, 250 ml EPX applicator.

   Clean orifice if clogged, dispense and discard a small amount of adhesive to even pistons. Attach orange 10:1 EPX mixing nozzle by:

   A) sliding the nozzle over the cartridge orifice until the nozzle notch aligns and seats against the tab on the neck of the cartridge and;

   B) screwing the plastic nut back onto the cartridge to secure the nozzle. Check the small orifice for debris. Dispense and discard a small amount of adhesive until the adhesive has a milky white appearance.

   Meter-Mix Equipment

   Follow manufacturer's precautions, directions for use, and recommendations.

2) After the adhesive is applied, substrates must be mated within the worklife of the adhesive, 10 minutes for one-sided applications. Adhesive thickness less than .005" will yield unpredictable results. The joint design of the substrates should facilitate a .005" to .008" adhesive thickness at the bondline. Adhesive contains .008" micropheres for this purpose.

3) The bonded surfaces should be fixtured, or clamped, for at least 2 hours. The clamping pressure should be sufficient to keep the surfaces in contact during cure (typically 4-8 psi). Plastic parts can be designed to be self-fixturing, negating the need for external fixturing.

   Note: Heating the bondline to 150-175°F (66-80°C) for 30 minutes will speed curing.

4) Cured adhesive appearance: the adhesive will yellow with time, a rippling effect in the adhesive as it cures is normal and indicates that the adhesive is mixed properly and curing normally.

Handling/Curing Information *(continued)*

Approximate Coverage – By Size of Container

Bead Size	Linear ft per 35 ml	Linear ft per 250 ml	Linear ft per mixed gallon
1/2"	1.8	12.9	196
3/8"	3	23	350
1/4"	7	51.8	785
1/8"	28.9	206.7	3,130
1/16"	114.8	820	12,240

Coverage in square feet – (.008" bond line)

Square ft per 35 ml	Square ft per 250 ml	Square ft per mixed gallon
2	13	200

Surface Preparation

3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8010 can bond polypropylene, polyethylene and other thermoplastic polyolefins without special surface preparation. However, all substrates should be clean, dry and free of paint, oxide films, oils, dust, mold release agents and other surface contaminants. The amount of surface preparation directly depends on the bond strength and environmental resistance desired by the user.

The following cleaning methods are suggested for common surfaces.

Steel and Aluminum (Priming Recommended)

1) Wipe free of dust with oil-free solvent such as acetone or isopropyl alcohol.
2) Sandblast or abrade using clean fine grit abrasives (180 grit or finer).
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. If 3M™ Scotch-Weld™ Structural Adhesive Primer 1945 B/A is used, apply a thin coating (.0005") on the metal surfaces to be bonded, air dry at 75°F (24°C) for 1 hr, then cure for 30 minutes at 180°F (82°C), 5 minutes at 250°F (122°C) or 3 hours at 75°F (24°C).

Note: Aluminum may also be acid etched. Follow the manufacturer's precautions and directions for this procedure.

Plastic/Rubber

1) Wipe with isopropyl alcohol.*

***Note:** When using solvents, be sure to extinguish all ignition sources and follow the manufacturer's precautions and directions for use.

Scotch-Weld™
Structural Plastic Adhesive
DP-8010

Storage

For maximum shelf life, store Duo-Pak cartridges and bulk containers at 40°F (4°C) or below.

Shelf Life

When stored at the recommended temperatures in the original unopened containers, this product has a shelf life of six months from date of shipment.

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 or (651) 737-6501.

For Additional Information

To request additional product information or to arrange for sales assistance, call toll free 1-800-362-3550 or visit www.3M.com/adhesives. Address correspondence to: 3M Industrial Adhesives and Tapes Division, Building 21-1W-10, 900 Bush Avenue, St. Paul, MN 55106. Our fax number is 651-733-9175. In Canada, phone: 1-800-364-3577. In Puerto Rico, phone: 1-787-750-3000. In Mexico, phone: 52-70-04-00.

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ISO 9002

This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9002 standards.

3M

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