

3M

Scotch-Weld™

Structural Plastic Adhesive

DP-8005 Translucent • DP-8005 Black

Technical Data

September, 2010

Product Description

3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005 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 Adhesive DP-8005 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
- Ability to Structurally Bond Polyolefins
- Room Temperature Cure
- Excellent Water and Humidity Resistance
- Very Good Chemical Resistance
- One Step Process - No Pre-Treatment of the Substrates Needed
- Solvent-free Adhesive System
- Convenient Hand-Held Applicator System
- Available in Bulk

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Typical Uncured Physical Properties

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

Product		3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005	
		Translucent	Black
Color	Base (B) Accelerator (A)	Amber White	Black White
Lbs./gal.	Base (B) Accelerator (A)	8-8.4 8.75-9.15	8-8.4 8.75-9.15
Viscosity (cPs.) ⁽¹⁾	Base (B) Accelerator (A)	17,000-30,000 35,000-55,000	15,000-30,000 35,000-55,000
Base Resin	Base (B) Accelerator (A)	Methacrylate Amine	Methacrylate Amine
Mix Ratio (B:A)	By Volume By Weight	10:1 9.16:1	10:1 9.16:1
Full Cure Time @ 73°F (23°C)		8-24 hrs.	
Time to Handling Strength (minimum of 50 psi shear at 73°F/23°C)		2-3 hrs.	
Work Life at 73°F (23°C)		2.5-3 min.	

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

The accelerator formula is common to both Scotch-Weld Adhesive DP-8005 Translucent and DP-8005 Black

Typical Cured Physical Properties

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

Product		Scotch-Weld Adhesive DP-8005	
		Translucent	Black
Color		Yellow	Black
Shore D Hardness (ASTM D-2240)		55	60
Mechanical Properties ⁽²⁾			
	Strain at Peak Load	5.3%	4.5%
	Stress at Peak Load (psi)	1889	1692
	Modulus at 1% Strain (psi)	85,669	58,782
Tg onset (°C) ⁽³⁾		33	
Coefficient of Thermal Expansion (ppm/°C) ⁽³⁾			
	Below Tg	125	
	Above Tg	170	

(2) 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.

(3) 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).

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Typical Performance Characteristics

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

Product	3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005	
	Translucent	Black
Substrate	OLS (psi)	OLS (psi)
HDPE	1100 SF	1100 SF
PE	1075 SF	875 SF
PP	1100 SF	1150 SF
UHMWPE	750 SF	750 SF
LDPE	400 SF	400 SF
ABS	1525 SF	1575 SF
Polycarbonate	850 SF	1100 AF
Plexiglass (PMMA)	950 SF	1075 SF
PVC	2050 SF	1900 SF
HIPS	550 SF	575 SF
Green FRP	2475 CF	2500 CF
PTFE	250 AF	200 AF
Polystyrene	775 SF	750 SF
Glass (3/16" thick)	650 SF	525 SF
Gel Coat (3/16" thick)	1500 SF	1425 SF
Copper (1/16" thick)	2275 CF	2050 CF
Aluminum (1/16" thick)	2275 CF	2075 CF
Cold-Rolled Steel (1/32" thick)	2500 AF	2275 CF
304 Stainless Steel (1/32" thick)	2300 CF	1100 AF
HDPE/HDG	975 SF (HDPE)	850 MM
HDPE/Galvanealed	950 SF (HDPE)	1025 SF (HDPE)
HDPE/CRS (non-abraded CRS)	950 SF (HDPE)	1025 MM
Oily HDG	2150 CF	1225 MM

SF = Substrate Failure/Break/Yield

CF = Cohesive Failure

AF = Adhesive Failure

MM = Mixed (Mode of AF and CF)

(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" (unless other thicknesses indicated) with an overlap area of 1" x 1/2". Plastics and glass substrates were cleansed with isopropyl alcohol (IPA) wipes; metal substrates were abraded with 150-grit sandpaper and cleansed with methyl ethyl ketone (MEK) wipes. All bonds were allowed to cure for a minimum of 48 hours at 73°F (23°C) before tested. Data were collected using a Sintech 5GL Mechanical Tester with the 2000-lb or 5000-lb load cells. Test rate was 2"/min. for plastic bonds, and 0.1"/min. for metal and glass bonds at 73°F (23°C).

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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⁽⁵⁾, tested @ 73°F (23°C)

Product	3M™ Scotch-Weld™ Structural Plastic Adhesive DP-8005	
Substrate	Translucent	Black
HDPE	17 pli SF	9 C sh

SF = Substrate Failure/Break/Yield
C sh = Cohesive but shociky

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

Environmental & Chemical Exposure Test on HDPE⁽⁶⁾

All Exposure Times 14 Days Unless Otherwise Noted

All Temperatures are Room Temperature Unless Otherwise Noted

Product	Scotch-Weld Adhesive DP-80005	
	Translucent	Black
Condition	Overlap Shear (psi)	Overlap Shear (psi)
Control - no chemical exposure	1100 SF	1100 SF
160°F (71°C)/100% RH	950 MM	950 MM
160°F (71°C) Water Soak	975 CF	1000 SF
Room Temperature Salt Water Soak (5% by wt.)	1100 SF	975 SF
160°F (71°C)/100% RH Salt Water Soak (5% by wt.)	925 CF	925 CF
NaOH (10% by wt.)	1075 SF	1025 SF
HCl (16% by vol.)	1100 SF	1000 SF
Isopropyl Alcohol	950 SF	1000 SF
Antifreeze Coolant	1000 SF	1025 SF
Gasoline	325 CF	450 CF
Diesel Fuel	1050 SF	950 SF
Toluene	25 CF	50 CF
Acetone	100 CF	200 CF

SF = Substrate Failure/Break/Yield
CF = Cohesive Failure

AF = Adhesive Failure
MM = Mixed (Mode of AF and CF)

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

OLS Bond Strengths at Elevated Temperatures⁽⁷⁾

Product	Scotch-Weld Adhesive DP-8005			
	Translucent (HDPE)	Black (HDPE)	Translucent (Green-FRP)	Black (Green-FRP)
-20°F (-29°C)	750 CF	875 CF	975 AF	900 AF
73°F (23°C)	1100 SF	1100 SF	2475 AF	2450 AF
120°F (49°C)	700 CF	700 CF	1875 MM	1550 MM
150°F (66°C)	500 CF	475 MM	1150 MM	1025 MM
180°F (82°C)	300 CF	300 MM	750 MM	975 MM

OLS bond strength expressed in psi.
SF = Substrate Failure/Break/Yield
CF = Cohesive Failure

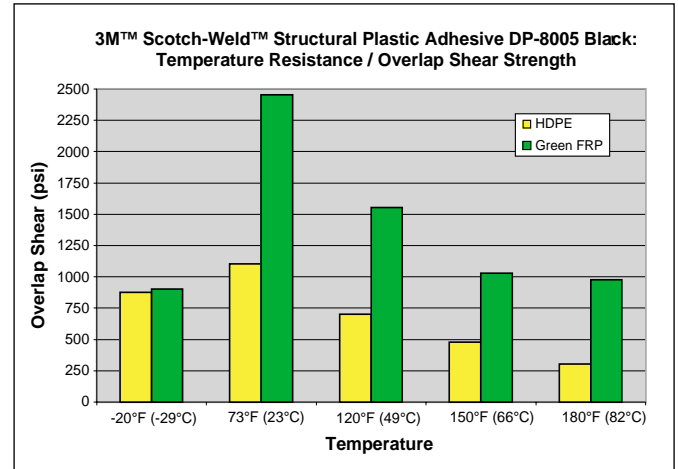
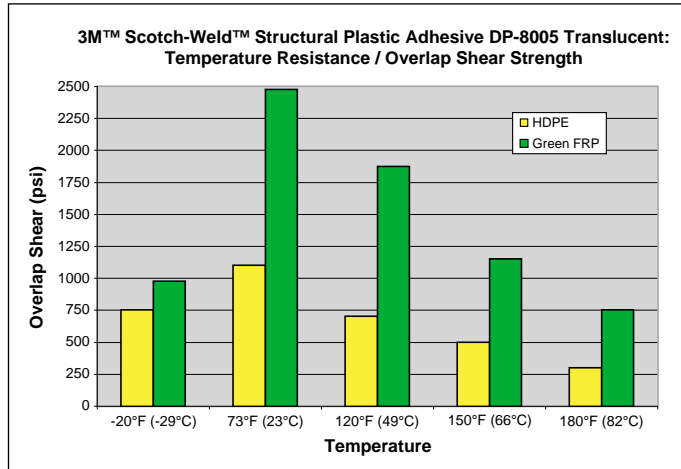
AF = Adhesive Failure
MM = Mixed (Mode of AF and CF)

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

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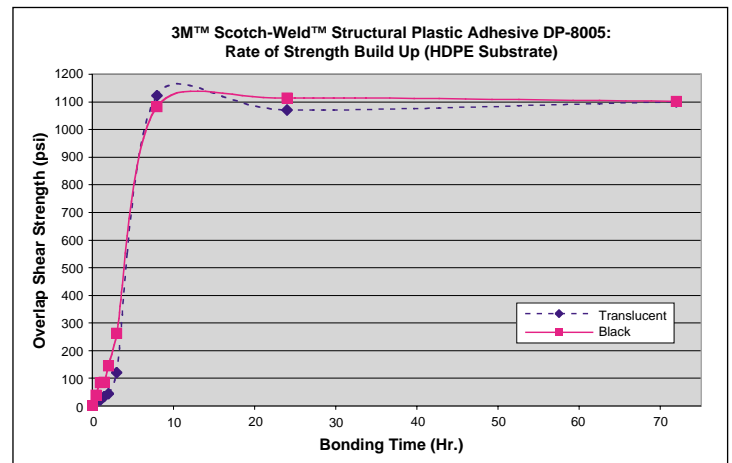
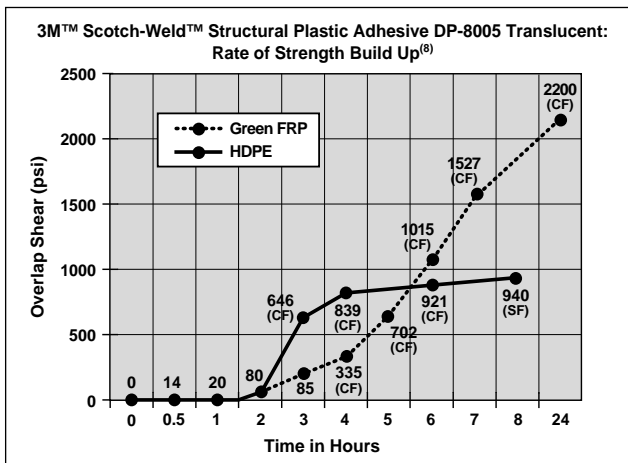
Temperature Resistance

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



Typical Rate of Strength Build-Up⁽⁸⁾

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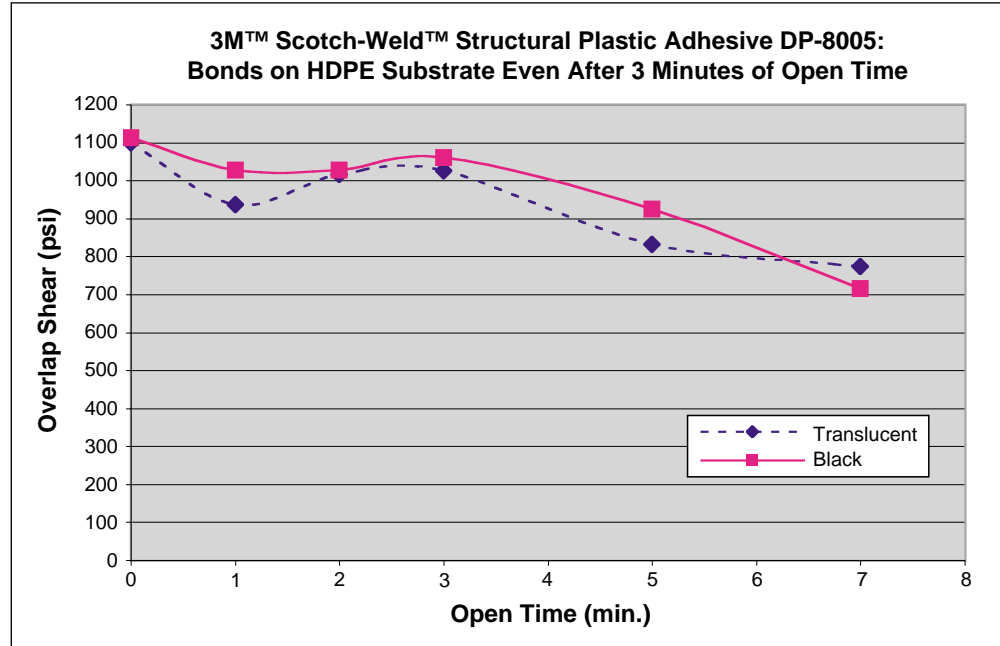


(8) Rate of strength testing done using overlap shear test described in footnote 4.

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Times and Substrates⁽⁹⁾

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(9) Open Time Overlap Shear Test done using test method 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-8005 is appropriate for a given application.

Potential Primary Surfaces	Polypropylene (PP) Polyethylene (PE, HDPE, LDPE)
Potential Secondary Surfaces	Fiber Reinforced Plastic (FRP) PVC Polycarbonate (PC) ABS Wood Acrylic (PMMA) Aluminum Polystyrene Glass Concrete Thermoplastic Elastomers (TPE) Metals
Not Recommended Surfaces Inconsistent results have been exhibited with substrates that contain oils and anti-stats.	PTFE Silicone Surfaces Surfaces Containing Mold-Release Agents Polyimide Nylons

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Handling/Curing Information

Directions for Use:

Important: Use only the specified 3M™ EPX™ Plus II 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 loose paint, oxide films, oils, dust, mold release agents and all other surface contaminants. See the Surface Preparation section for specific substrate preparation methods.

35 ml Cartridge:

Place duo-pak cartridge in EPX applicator. Remove cap. Remove rubber plug. Dispense and discard a small amount of adhesive to assure even ratio and free flow. Clear orifice if necessary. Use only orange 10:1 mixing nozzle by: (a) aligning nozzle notch with cartridge recess, and (b) 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. Dispense and discard a small amount of adhesive until the mixed adhesive has a milky white appearance. If adhesive is clear, check the small orifice for debris or flow.

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, 2-2.5 minutes or sooner 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 up curing. The parts should be dwelled for a minimum of 10 minutes at room temperature prior to heating to allow more adhesive penetration into the substrates before heat-accelerated cure.

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Handling/Curing Information *(continued)*

- 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.

Approximate Coverage – By Size of Container [Figures do not include nozzle waste]

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) [Figures do not include nozzle waste]

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-8005 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

- 1) Wipe free of dust with oil-free solvent such as acetone or isopropyl alcohol.
- 2) Sandblast or abrade using clean fine grit abrasives (150 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 (or see instructions pertinent to a specific primer).

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

Plastic/Rubber

- 1) Wipe with isopropyl alcohol.*
- 2) Abrade using fine grit abrasives (150 grit or finer).
- 3) Remove residue by wiping again with isopropyl alcohol.*
- 4) Allow solvent to evaporate before use.

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

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Surface Preparation (continued)

Thermoplastic Polyolefin (TPO)

- 1) Wipe with isopropyl alcohol.*
- 2) Allow solvent to evaporate before use.

Glass

- 1) Solvent wipe surface using acetone or isopropyl alcohol.*
- 2) Allow solvent to evaporate before use.

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

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.

Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

Product Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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Industrial Adhesives and Tapes Division

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