



Scotch-Weld™

Structural Plastic Adhesive

DP8005 Off-White • DP8005 Black

Technical Data

February, 2016

Product Description

3M™ Scotch-Weld™ Structural Plastic Adhesive DP8005 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*.

3M™ Scotch-Weld Adhesive DP8005 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
- Contains 0.008" glass beads for bondline thickness control
- 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 DP8005 | |
|---|-----------------------------|---|--------------------------------|
| | | Off-White | 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 DP8005 Off-White and DP8005 Black

Typical Cured Physical Properties

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| Product | | 3M™ Scotch-Weld™ Structural Plastic Adhesive DP8005 | |
|--|----------------------------|---|--------|
| | | Off-White | 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 DP8005 | |
|-----------------------------------|---|----------------|
| | Off-White | 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 DP8005 | |
|-----------|---|--------|
| Substrate | Off-White | Black |
| HDPE | 17 pli SF | 9 C sh |

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

(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 | 3M™ Scotch-Weld™ Structural Plastic Adhesive DP80005 | |
|--|--|---------------------|
| | Off-White | 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 | 3M™ Scotch-Weld™ Structural Plastic Adhesive DP8005 | | | |
|------------------|---|--------------|-----------------------|-------------------|
| | Off-White (HDPE) | Black (HDPE) | Off-White (Green-FRP) | Black (Green-FRP) |
| Test Temperature | | | | |
| -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 |

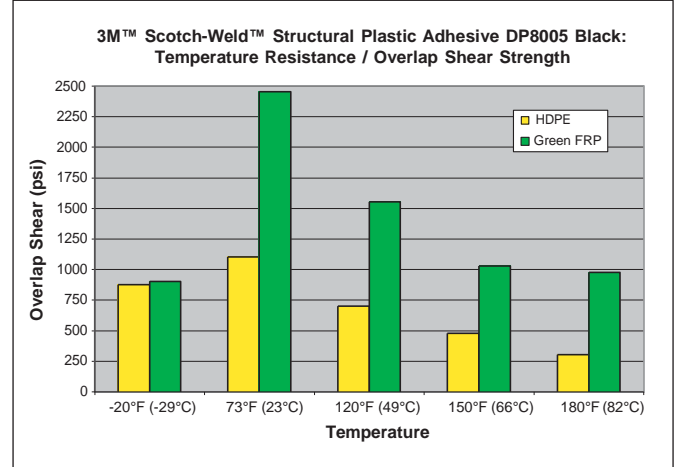
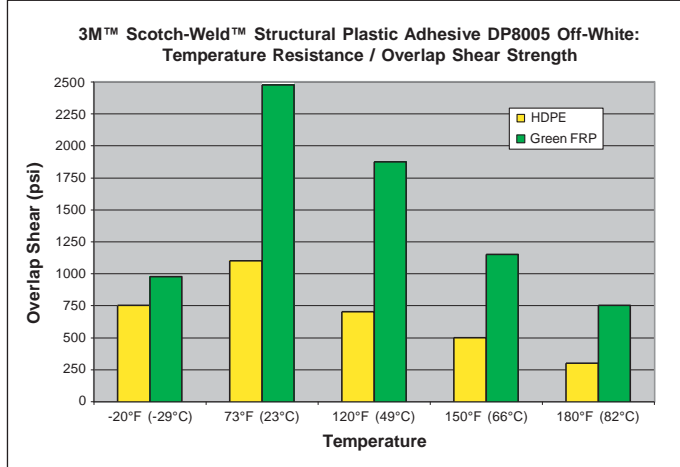
OLS bond strength expressed in psi.

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

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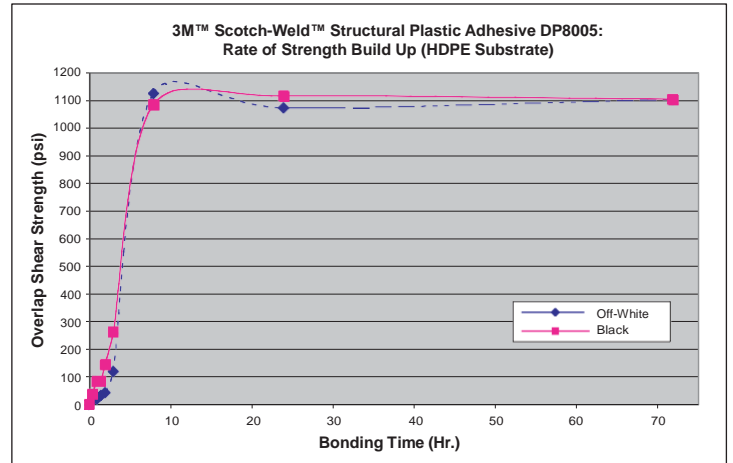
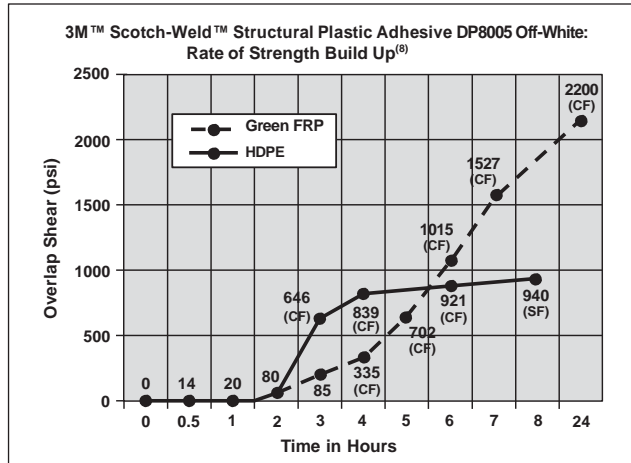
Temperature Resistance

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⁾

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

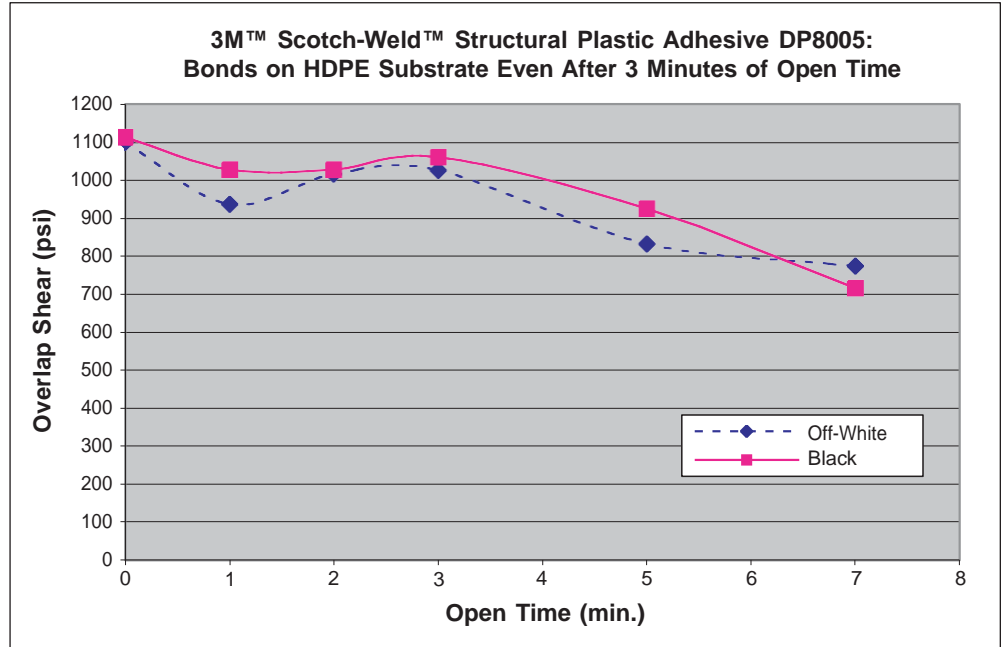


(8) Rate of strength testing done using overlap shear test described in footnote 4.

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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 DP8005 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.

45 ml Cartridge:

Place duo-pak cartridge in EPX applicator. Twist to remove cap. 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 onto cartridge tip, and (b) twist the gray nut into place. Dispense and discard a small amount of adhesive through nozzle until the adhesive is mixed.

490 ml Cartridge:

While holding duo-pak cartridge in an upright position, unscrew the plastic nut and remove and discard the cartridge plug. Place cartridge in a 10:1, 490 ml EPX applicator.

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

- (a) sliding the nozzle onto the cartridge orifice;
- (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" microspheres 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 45 ml | Linear ft per 490 ml | Linear ft per mixed gallon |
|-----------|---------------------|----------------------|----------------------------|
| 1/2" | 2.4 | 26 | 196 |
| 3/8" | 4.5 | 45 | 350 |
| 1/4" | 10.5 | 102 | 785 |
| 1/8" | 37.2 | 405 | 3,130 |
| 1/16" | 147.7 | 1600 | 12,240 |

Coverage in square feet – (.008" bond line) [Figures do not include nozzle waste]

| Square ft per 45 ml | Square ft per 490 ml | Square ft per mixed gallon |
|---------------------|----------------------|----------------------------|
| 2.5 | 49 | 200 |

Surface Preparation

3M™ Scotch-Weld™ Structural Plastic Adhesive DP8005 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 twelve 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.

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ISO 9001

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