



# Scotch-Weld™

## Structural Plastic Adhesive

### DP-8005

Technical Data

February, 1999

#### Product Description

Scotch-Weld DP-8005 Structural Plastic Adhesive 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 Thermoplastic Elastomers (TPE's), such as Santoprene® Rubber without special surface preparation.

Scotch-Weld DP-8005 Structural Plastic Adhesive 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

#### 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.**

Property	Accelerator (Part A)	Base (Part B)
Color	White	White/Translucent
Lbs./gal.	8.75-9.15	8-8.4
Viscosity (cps) <sup>(1)</sup>	35,000-55,000	17,000-30,000
Base Resin	Amine	Methyl Methacrylate
Mix Ratio (volume) (weight)	1 1	10 9.16
Time to Handling Strength (50 psi @ 73°F [23°C])	2-3 hrs.	
Full Cure Time @ 73°F (23°C)	8-24 hrs.	
Worklife at 73°F (23°C)	2.5-3 min.	

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**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.**

<b>Color</b>	Yellow
<b>Tg (°C) onset point    DSC 10°C/min<sup>(2)</sup></b>	34-38°C (93-104°F)
<b>Shore D Hardness (ASTM D-2240)</b>	55
<b>Coefficient of Thermal Expansion<sup>(3)</sup>    Below TG (between -40°F-86°F [-40°C-30°C])</b>	6.6 x 10 <sup>-6</sup> (in./in./°C)
<b>Mechanical Properties<sup>(4)</sup>    Strain at peak load    Stress at peak load (psi)    Modulus at 1% Strain (psi)</b>	5.3% 1889 85,669

**Typical Adhesive  
 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<sup>(5)</sup>**

<b>Substrate</b>	<b>Temp</b>	<b>OLS (psi)</b>	<b>Failure Mode</b>
<b>Extruded PE</b>	75°F (24°C)	1000	Substrate
<b>Extruded PP</b>	75°F (24°C)	1040	Substrate
<b>UHMW PE</b>	75°F (24°C)	770	Substrate
<b>LDPE</b>	75°F (24°C)	330	Substrate
<b>ABS</b>	75°F (24°C)	970	Substrate
<b>Polycarbonate</b>	75°F (24°C)	850	Substrate
<b>PMMA (Acrylic)</b>	75°F (24°C)	810	Substrate
<b>Rigid PVC</b>	75°F (24°C)	1540	Substrate
<b>Polystyrene</b>	75°F (24°C)	550	Substrate
<b>Nylon-6,6 30% glass filled</b>	75°F (24°C)	825	Cohesive
<b>FRP</b>	75°F (24°C)	2370	Cohesive
<b>Galvanized/PE</b>	75°F (24°C)	985	Substrate (PE)
<b>Galvanealed/PE</b>	75°F (24°C)	970	Substrate (PE)
<b>Cold Rolled Steel/PE</b>	75°F (24°C)	970	Substrate (PE)
<b>2024 Aluminum (.063")</b>	75°F (24°C)	2150	Cohesive
<b>Oily Steel (Galvanized)</b>	75°F (24°C)	2150	Cohesive

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**Typical Adhesive  
 Performance  
 Characteristics**  
*(continued)*

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**Environmental Exposure Tests<sup>(6)</sup>**

**Overlap Shear Strength of HDPE bonds**

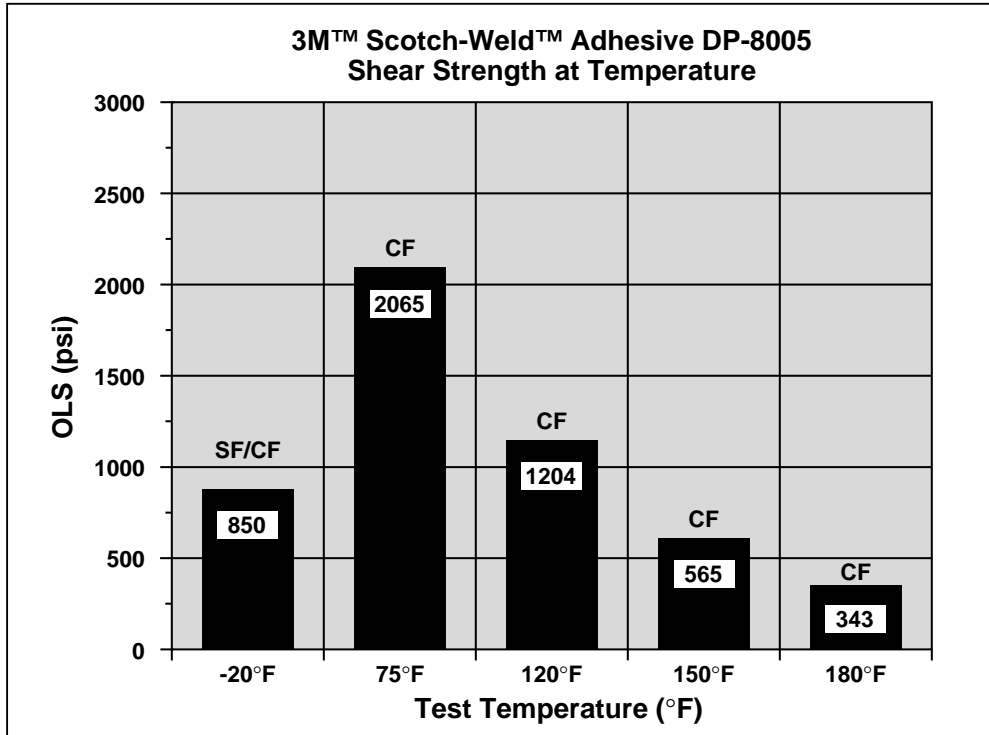
Condition	Time	Temp	OLS (psi)	Failure Mode
Control	—	75°F (24°C)	980	Substrate-PE
160°F/100% RH	14-days	160°F (71°C)	810	Substrate-PE
160°F/100% RH	30-days	160°F (71°C)	790	Substrate-PE
10% NaOH	14-days	75°F (24°C)	960	Substrate-PE
16% HCL	14-days	75°F (24°C)	970	Substrate-PE
20% Bleach	14-days	75°F (24°C)	980	Substrate-PE
IPA	14-days	75°F (24°C)	940	Substrate-PE
Pump Oil	14-days	75°F (24°C)	1010	Substrate-PE
50% Antifreeze	14-days	75°F (24°C)	960	Substrate-PE
Gasoline	14-days	75°F (24°C)	150	Cohesive
Diesel Fuel	14-days	75°F (24°C)	840	Cohesive
Toluene	14-days	75°F (24°C)	14	Cohesive

**180° Peel Strength<sup>(7)</sup>**

Substrate	Temp	Strength (piw)	Failure Mode
HDPE	75°F (24°C)	16	Cohesive
Santoprene® Rubber	75°F (24°C)	18	Substrate

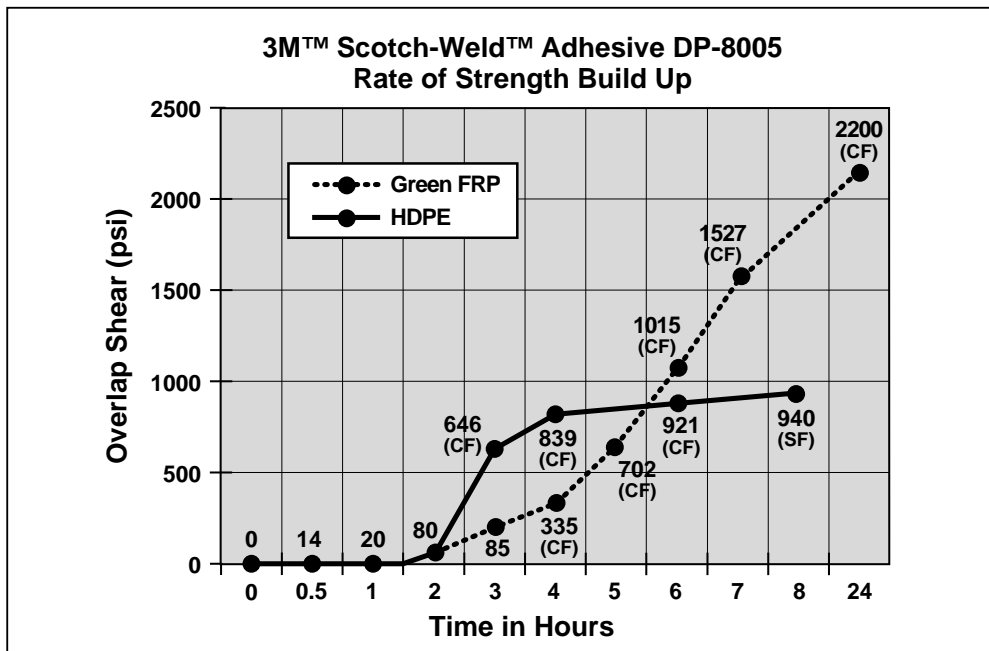
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**Figure 1**  
**BSI 118505-9**



SF: Substrate Failure, CF = Cohesive Failure  
 The above overlap shear tests data was collected on 1" x 4" x 1/8" Green FRP specimens overlapped .5", allowed to cure at 75°F (24°C) for 24 hours and then tested at a rate of .5"/minute in overlap shear mode, at the temperature shown. All values are reported in psi.

**Figure 2**  
**BSI 118505-52**



The above rate of strength build up was collected on 1" x 4" x 1/8" HDPE and Green FRP specimens overlapped .5", allowed to cure at 75°F (24°C) for 24 hours and then tested at a rate of .5"/minute in overlap shear mode, at 75°F (24°C). All values are reported in psi.

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**Test Methods and Footnotes**

- 1) Viscosity obtained by Brookfield, DV-II, #7 Spindle, 20 rpm at 75°F (24°C).
- 2) Tg determined by differential scanning calorimetry, TA Instruments 2920, Scanning rate -58°F (-50°C) to 54°F (130°C) at 10°C/min reported data is for TG onset.
- 3) Coefficient of thermal expansion (CTE) obtained by use of TA Instruments 2940, Sample was heated from -58°F (-30°C) to 302°F (150°C) at 5°C/min. 0.03N static force was applied. Reported CTE represent value below Tg.
- 4) Mechanical properties obtained by use of Sintech 5 GL Mechanical Tester with a 500# load cell. Test specimen with approximate dimensions of 1.5" x 0.5" x 0.03". Elongation was determined by crosshead displacement, pull rate was 0.5"/min.
- 5) 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.
- 6) Environmental tests were conducted by immersing bonded coupons of extruded PP to extruded HDPE prepared in accordance to description in footnote 5.
- 7) Peel tests on .020" HDPE and .063" Santoprene® Rubber, .017" bondline thickness 8" x 1" in T-Peel mode, peel rate 2"/min.

**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 Scotch-Weld Structural Plastic Adhesive DP-8005 is appropriate for a given application.**

<b>Potential Primary Surfaces</b>	Polypropylene (PP) Polyethylene (PE) (HDPE) (LDPE) Thermoplastic Elastomers (Santoprene® Rubber)	
<b>Potential Secondary Surfaces</b>	Fiber Reinforced Plastic (FRP) Polycarbonate (PC) Wood Aluminum Glass	Rigid PVC ABS Acrylic (PMMA) Polystyrene Concrete
<b>Note Recommended Surfaces</b> Inconsistent results have been exhibited with substrates that contain oils and anti-stats.	PTFE (Teflon®) Silicone Surfaces Mold-release Agents Polyimide	

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### Handling/Curing Information

### Directions for Use:

**Important:** Use only the specified 3M™ EPX™ 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 of 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: 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. Dispense and discard a small amount of adhesive until the adhesive has a milky white appearance, if adhesive is clear check and small orifice for debris.

#### **Meter-Mix Equipment**

Follow manufacturer's precautions and 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 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 hrs. 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.

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**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**

Scotch-Weld Structural Plastic Adhesive DP-8005 can bond Polypropylene, Polyethylene and PTFE 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 (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.\*
- 2) Abrade using fine grit abrasives (180 grit or finer).
- 3) Remove residue by wiping again with isopropyl alcohol.\*

**Glass**

- 1) Solvent wipe surface using acetone.\*

**\*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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**Storage and Shelf Life**

**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.

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**Precautionary Information** Refer to Product Label and Material Safety Data Sheet for Health and Safety Information before using the product.

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**For Additional Information** To request additional product information or to arrange for sales assistance, call toll free 1-800-362-3550. Address correspondence to: 3M Adhesives Division, 3M Center, Building 220-8E-05, St. Paul, MN 55144-1000. 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: 5-270-2180.

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

For Additional Product Safety and Health Information, See Material Safety Data Sheet, or call:



**Adhesives Division**  
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