

3M

Scotch-Weld™

Urethane Adhesives

DP600 Self-Leveling and DP600NS

Technical Data Sheet

July, 2015

Product Description 3M™ Scotch-Weld™ Urethane Adhesives DP600 Self-Leveling and DP600NS are gray, rapid setting, two component polyurethanes. They are packaged as 1:1 ratio liquids in a duo-pak cartridge. With the squeeze of a trigger, the components are automatically mixed and easily dispensed as a bubble-free self-leveling or non-sag liquid.

Features

- Fast Setting
- Easy Mixing
- 1:1 Mix Ratio
- Tough, non-brittle bonding

Suggested Applications:

- Rapid repair of spalled or cracked concrete floors or pool decks in high traffic areas
- Custom tapping of bolts and screws into wood, concrete and masonry
- Tough, non-brittle bonding of wood, metal, glass and plastic
- Bonding of dis-similar substrates
- Non-brittle bonding to primed PVC and to ABS pipe

Building & Construction

Maintenance & Repair

Pool Maintenance & Repair

Manufacturing & Assembly

Self-Leveling:

- Re-installing posts and rails
- Fixturing of hand/grabrails into pool decks
- Rapid repair of pool decks prior to being coated

Non-Sag:

- Used as a vertical grade repair material and adhesive for numerous substrates such as concrete, ceramic, wood, metal and glass
- Repairing leading edges of stairs
- Fixturing bolts

Note: The data in this sheet were generated using the 3M™ EPX™ Applicator System equipped with an EXP static mixer, according to manufacturer's directions. Thorough hand-mixing will afford comparable results.

3M™ Scotch-Weld™

Urethane Adhesives

DP600 Self-Leveling • DP600NS

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	Condition	DP600 Self-Leveling	DP600NS
Appearance	Part B Part A	Opaque Black Clear Yellowish	Opaque Black Clear Yellowish
Mix Ratio (B:A)	By volume By weight	1:1 1:1	1:1 1:1
Viscosity ¹ , centipoise	Part B Part A	1100 - 6000 cP 1000 - 3000 cP	1500 - 3000 cP 1000 - 3000 cP
Density, lb/gal	Part B Part A	8.5 - 8.9 9.5 - 9.9	8.5 - 8.9 9.5 - 9.9
Work Life @ 73°F (23°C)	10 g, 1/4" thick, @ 77°F (25°C)	70 seconds	50 seconds

¹Brookfield CP #52 @ 100 rpm, 77°F (25°C)

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.

Property	Condition	DP600 Self-Leveling	DP600NS
Appearance	Cured	Medium-Gray	Medium-Gray
Tack-Free Time	10 g, 1/4" thick, @ 77°F (25°C)	4 minutes	2 minutes
Full Cure Time	10 g, 1/4" thick, @ 77°F (25°C)	1 hour	1 hour
Hardness After Cure	1 hour @ 77°F (25°C)	70 Shore D	70 Shore D
Temperature Range	Continuous Exposure	-60°F (-51°C) to 250°F (121°C)	-60°F (-51°C) to 250°F (121°C)

3M™ Scotch-Weld™ Urethane Adhesives

DP600 Self-Leveling • DP600NS

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.

Aluminum, Overlap Shear, at Temperature (PSI) (ASTM D1002)

Temperature	DP600 Self-Leveling	DP600NS
-40°F (-40°C)	2800	2550
73°F (23°C)	2300	2300
180°F (82°C) (15 min.) ¹	700	670

¹Represents time in test chamber oven before test.

Overlap Shear, Tested @ 73°F (23°C) (PSI) (ASTM D1002)

Product	DP600 Self-Leveling	DP600NS
Aluminum MEK/abrade/MEK	2300	2300
Cold Rolled Steel MEK/abrade/MEK	2250	1190
Nylon IPA/abrade/IPA	300	300
Polycarbonate IPA/abrade/IPA	300	480
Acrylic IPA/abrade/IPA	430	470
SMC IPA/abrade/IPA	340	370
Rigid PVC IPA/abrade/IPA	430	450
ABS IPA/abrade/IPA	500	500
HIPS IPA/abrade/IPA	320	380

See Surface Preparation Section for additional information.

Aluminum (Etched), Floating Roller Peel, Tested @ 73°F (23°C) (PIW) (ASTM D3167)

Temperature	DP600 Self-Leveling	DP600NS
73°F (23°C)	20	9

3M™ Scotch-Weld™ Urethane Adhesives

DP600 Self-Leveling • DP600NS

**Typical Adhesive
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.

**Environmental Resistance, Aluminum (Etched),
Measured by Overlap Shear Tested @ 73°F (23°C) (PSI) (ASTM D1002)**

Environment	Condition	DP600 Self-Leveling	DP600NS
Room Temperature	73°F (23°C)/50% RH, 30 days	100%	100%
Water Vapor	150°F (66°C)/ 80% RH, 30 days	100%	125%
Water Soak	73°F (23°C) , 30 days	70%	50%
IPA	73°F (23°C), 30 days immersion	70%	75%
Gasoline	73°F (23°C), 30 days immersion	75%	100%

**Installation
Instructions
for Concrete
Repair**

Preparation

Prepare the Concrete for the Vertical Repair and/or Custom Tap

1. Remove all loose aggregate, dust, old caulks, grease and waterproofing compounds from repair surface. (Grind away any absorbed oils to ensure a clean surface.)
2. Clean repair surface with a bristle brush and use moisture and oil-free compressed air to blow out debris.
3. Mask off area surrounding repair.

Repairing Concrete Damage from Corrosion

1. Apply a pre-coat of cement corrosion inhibitor or protectant to excessively corroded areas.
2. Allow pre-coat to dry thoroughly.
3. Follow the procedure for general concrete repairs.

**Installation
Instructions
for Concrete
Repair**
(Continued)

Self-Leveling Procedure for Doing Concrete Repairs

1. Keeping the mixer tip at the deepest portion of the repair area, dispense into the prepared cavity, depression, void, groove or crack.
2. Keep the end of the mix tip immersed in the product as the repair is being filled.
3. Use a spreader to cover the repair and leave an excess of at least 1" around the repair edges.
Overfilling 3M™ Scotch-Weld™ Urethane Adhesive DP600 and allowing it to overlap approximately one inch along the edges of the repair tapering to just a few mils thickness provides a substantial tie into the concrete and increases the lifetime of the repair.
4. Place the spreader over the filled repair.
5. Press down and hold for about 30 seconds to spread the repair compound.
6. Let repair cure before removing the spreader.
7. 3M™ Scotch-Weld™ Urethane Adhesive DP600 will self-level and set approximately within one minute and leave a slight meniscus. If desired, one can create a repair flush and level to the concrete floor on smaller areas up to 6 inches square by overlaying a slightly stiff polyethylene sheet (approximately the modulus of a plastic spreader) just prior to the set of 3M™ Scotch-Weld™ Urethane Adhesive DP600.
8. At 75°F (24°C), a 1/4"-thick section sets and becomes tack-free within 4 minutes and will cure within one hour. Note: Thicker masses or substrates at higher temperature take less time to cure. Thinner masses or substrates at lower temperature take more time to cure.

Repairing Leading Edges on Steps and Stairways

1. For sharp edges: Follow the procedures above and shape edge by using two spreaders. Use one spreader to flatten the vertical edge of repair and the other spreader for the top of repair.
2. For round edges: Form round edges with a piece of plastic contouring sheet on small repairs (less than 3" x 3"). Plastic must be at least 1" larger around than the edges of the repair.

Repair Clean-up and Finishing

1. Remove masking tape from repair.
2. Shave or grind cured product with 36 grit sandpaper to achieve desired shape.
3. Sand with 80 grit sandpaper to remove any scratches.
4. If 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS is applied in a traffic area, apply sand or some type of grip to repaired surface area.

3M™ Scotch-Weld™ Urethane Adhesives

DP600 Self-Leveling • DP600NS

Installation Instructions for Custom Tapping and Fastening

Custom Tapping and Fastening

Custom tapping is a form of chemical anchoring where cupboards, wall hangers or other heavy cabinetry can be secured in place. However, the bolts or screws holding heavy cantilevered items can be easily removed facilitating the re-location of the cabinetry. Custom tapping is done by molding the threads of bolts and screws into an adhesive plug, rather than being mechanically anchored into lag shields. The tough molding properties of this product allow it to form and retain a high-strength, non-brittle interlock between holes cored into concrete, wood or masonry and the threads of the inserted bolt or screw. The release characteristics, upon removal, are achieved by simply spraying the bolt or screw with 3M™ 5-Way Penetrant (or another release agent) before the bolt or screw is inserted into the liquid 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS prior to its setting. To achieve a more permanent fixture, the bolts and screws simply are not lubricated before embedding into the liquid 3M™ Scotch-Weld™ Urethane Adhesive DP600NS prior to curing.

Preparation For Custom-tapping:

1. Drill holes into the concrete, wood or masonry to the specified depth using the chart below.

Bolt Width (in.)	Minimum Hole Diameter (in.)	Minimum Hole Depth (in.)
1/4	3/8	2
3/8	1/2	3-1/2
1/2	5/8	4-1/4
5/8	3/4	5
3/4	7/8	6-3/8
7/8	1	7-1/2
1	1-1/8	8-1/4
1-1/8	1-1/4	9
1-1/4	1-3/8	9-3/4
1-3/8	1-1/2	10-1/2
1-1/2	1-5/8	11-1/4

2. Use a round bristle brush to clean the cored holes if they have not been freshly drilled.
3. Use moisture-free and oil-free compressed air to blow out the debris.
4. Lightly coat the bolts or screws with 3M™ 5-Way Penetrant.

3M™ Scotch-Weld™

Urethane Adhesives

DP600 Self-Leveling • DP600NS

Installation Instructions for Custom Tapping and Fastening (Continued)

Procedure for Custom Tapping Concrete:

1. Dispense 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS into the hole nearly halfway full. To obtain a consistent fill, judge for under-fill or overfill by counting the number of squeezes of the trigger.
2. Insert the bolt or screw within the first 20 seconds after dispensing. The paste characteristic of 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS will hold the bolt or screw in place until it cures. Once the work life has been exceeded, do not disturb the bolt.
3. Move to the next hole to keep 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS flowing in the mixer tip. If material sets in the mixer tip, replace the tip and start dispensing again.
4. 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS will become tack-free within 2 minutes and cure within one hour. **Note:** It is best to wait for one full hour before extracting the bolt or screw for securing the cupboards, wall hangers or other cabinetry in place.
5. Allow 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS to fully cure before applying a load. The maximum torque recommended is 9.5 pounds.

Procedures for Custom Tapping Hollow Concrete Blocks, Wood or Masonry:

1. Use a reinforcement patch to create a mesh net around the bolt. Leave at least a 1" excess of mesh around the diameter of the bolt. Push the bolt and mesh through the hole.
2. Remove the bolt and then fill the net 3/4-full with 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS while slowly backing the nozzle out of the hole.
3. Place the bolt in the hole and complete the fill, if necessary, to adjust for any under-fill.
4. Allow 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS to fully cure before removing the bolt and reinstalling it along with the supported load.

3M™ Scotch-Weld™ Urethane Adhesives

DP600 Self-Leveling • DP600NS

Installation Instructions for Re- Anchoring Handrails

Note: Not for use in repairing or anchoring diving boards.

Re-Anchoring Handrails and Grabrails

Preparation of Hand/Grabrails

1. Bore a hole through the base of the hand/grabrail just above grade level to allow introduction of the product.
2. Using 80 grit sandpaper, roughen the footing surface of the hand/grabrail which is to be imbedded below the concrete grade.
3. Refer to instructions on cartridge for dispensing.

Preparation of Concrete for Re-anchoring

1. Chip away the cracked or broken concrete to allow removal of the hand/grabrail.
2. Leave the concrete as close as possible around the hand/grabrail. It is best to allow the concrete to remain intact as close as possible (within 1/2 to 1 inch all around) to the base of the hand/grabrail.
3. Dig down to the base of the concrete, typically 4- to 6-inches deep.
4. Expose any rebar, if possible, in order to create a ground connection to the rebar.
5. Create as much as a 1-inch undercut under the concrete in a smooth taper from the concrete surface.
6. Remove all of the loose concrete particles and dust prior to encasing the replacement hand/grabrail.
7. Attach the replacement hand/grabrail to surrounding rebar using a copper wire. Cinch the connection down tightly, allowing a slight amount of slack in the wire connection.
8. Create a shield to corrosion at the base of the hand/grabrail by laying a piece of polyethylene plastic at the base of the hole.
9. Insert the hand/grabrail in the hole. Align the hand/grabrail for its elevation and vertical plumb.

Encasement Procedure

1. Dispense 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS into the concrete hole. Product will remain liquid for approximately 50 seconds, and fully cure in 1 hour. Dispense more cartridges as necessary to bring the fill level up to the concrete surface level.
2. Dispense 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS into the inside of the hand/grabrail. Fill with product up to and slightly above the grade level. (Filling the inside of the post provides extra strength and protection against corrosion.)
3. Apply cement dust or sand, if desired, to blend the surface appearance into the surrounding concrete.
4. If 3M™ Scotch-Weld™ Urethane Adhesive DP600 Self-Leveling or DP600NS is applied in a traffic area, apply sand or some type of grit to repaired surface area.

Repair Clean-up and Finishing

Shave or grind cured product with 36 grit sandpaper to achieve desired shape.

3M™ Scotch-Weld™

Urethane Adhesives

DP600 Self-Leveling • DP600NS

Substrates and Testing

A. Overlap Shear (ASTM D1002)

Overlap Shear (ASTM D-1002-64, 3M Test Method C-236) strength was measured on 1" wide x 1/2" overlap specimen. These bonds were made individually using 1" x 4" pieces of substrates except for Aluminum. Two panels 0.063 in. thick, 4 in. x 7y in of 2024T-3 clad aluminum were bonded and cut into 1 in. wide samples after 24 hours. The thickness of the adhesive bond line was approximately 0.005". All strengths were measured at 73°F (23°C) except when noted.

The separation rate of the testing jaws was 0.1 in. per minute for metals, 2 in. per minute for plastics and 20 in. per minute for rubbers. The thickness of the substrates were: steel, 0.060 in.; other metals, 0.05-0.064 in.; rubbers, 0.125in.; plastics, 0.125 in. and samples were allowed to cure at 75°F (24°C) and approximately 50% RH for 1 week before tested. The separation rate of the testing jaws was 0.1 inch per minute for metals and 2 inches per minute for plastics.

B. Floating Roller Peel (Bell Peel) (ASTM D3167)

Bell peel strengths were measured on 1/2 in. wide bonds at the temperatures noted. The testing jaw separation rate was 6 in. per minute. The bonds were made with 0.064 in. bonded to 0.025 in. thick adherends.

C. Cure Cycle

All bonds were cured 7 days at 73°F (23°C) at 50% RH before testing or subjected to further conditioning or environmental aging.

Handling and Application Information for Adhesive Bonding

Directions for Use

3M™ Scotch-Weld™ Urethane Adhesives DP600 Self-Leveling and DP600NS are supplied in dual syringe plastic duo- pak cartridges as part of the 3M™ EPX™ Applicator System. The duo-pak cartridges are supplied in 50 ml configuration. To use the EPX cartridge system simply insert the duo-pak cartridge into the EPX applicator. Next, remove the duo-pak cartridge cap and expel a small amount of adhesive to be sure both sides of the duo-pak cartridge are flowing evenly and freely. If simultaneous mixing of Part A and Part B is desired, attach the EPX mixing nozzle to the duo-pak cartridge and begin dispensing the adhesive.

When mixing Part A and Part B manually the components must be mixed in the ratio indicated in the typical uncured properties section of this data sheet. Complete mixing of the two components is required to obtain optimum properties.

Two-part mixing/proportioning/dispensing equipment is available for intermittent or production line use. These systems are ideal for line uses because of their variable shot size and flow rate characteristics and are adaptable to most applications.

Apply adhesive to clean, dry surfaces, joint parts and secure until adhesive sets.

Surface Preparation

The following surface preparations were used for substrates described in this Technical Data Sheet.

A. Aluminum Etch

Optimized FPL Etch - 3M (test method C-2803)

1. Alkaline degrease – Oakite 164 solution (9-11 oz./gallon water) at 190°F ± 10°F (88°C ± 5°C) for 10-20 minutes. Rinse immediately in large quantities of cold running water (3M test method C-2802).
2. Optimized FPL Etch Solution (1 liter):

Material	Amount
Distilled Water	700 ml plus balance of liter (see below)
Sodium Dichromate	28 to 67.3 grams
Sulfuric Acid	287.9 to 310.0 grams
Aluminum Chips	1.5 grams/liter of mixed solution

To prepare 1 liter of this solution, dissolve sodium dichromate in 700 ml of distilled water. Add sulfuric acid and mix well. Add additional distilled water to fill to 1 liter. Heat mixed solution to 66 to 71°C (150 to 160°F). Dissolve 1.5 grams of 2024 bare aluminum chips per liter of mixed solution. Gentle agitation will help aluminum dissolve in about 24 hours.

To FPL etch panels, place them in the above solution at 150 to 160°F (66 to 71°C) for 12 to 15 minutes.

Note: Review and follow precautionary information provided by chemical suppliers prior to preparation of this etch solution.

Rinse immediately in large quantities of clear running tap water.

Dry – air dry approximately 15 minutes followed by force dry at 140°F (60°C) maximum for 10 minutes (minimum).

3. Both surface structure and chemistry play a significant role in determining the strength and permanence of bonded structures. It is therefore advisable to bond or prime freshly primed clean surfaces as soon as possible after surface preparation in order to avoid contamination and/or mechanical damage. Please contact your 3M sales representative for primer recommendations.

B. Oakite Degrease

Oakite 164 solutions (9-11 oz./gallon of water) at 190°F ± 10°F (88°C ± 5°C) for 2 minutes. Rinse immediately in large quantities of cold running water.

C. MEK/Abrade/MEK

Wipe surface with a methyl ethyl ketone (MEK) soaked swab, abrade and wipe with a MEK soaked swab.* Allow solvent to evaporate before applying adhesive.

***Note:** When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use.

3M™ Scotch-Weld™

Urethane Adhesives

DP600 Self-Leveling • DP600NS

D. Isopropyl Alcohol Wipe Only Surface Preparation

Wipe surface with an isopropyl alcohol soaked swab.* Allow solvent to evaporate before applying adhesive.

***Note:** When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use.

E. Isopropyl Alcohol/Abrade/Isopropyl Alcohol Surface Preparation

Wipe surface with an isopropyl alcohol soaked swab, abrade using clean fine grit abrasives, and wipe with an isopropyl alcohol soaked swab.* Then allow solvent to evaporate before applying adhesive.

***Note:** When using solvents, extinguish all ignition sources, including pilot lights, and follow the manufacturer's precautions and directions for use.

3M™ Scotch-Weld™

Urethane Adhesives

DP600 Self-Leveling • DP600NS

Storage

Store products at 60-80°F (15-27°C) for maximum shelf life.

Shelf Life

These products have a shelf life of 12 months from date of manufacture in original duo-pak containers at room temperature.

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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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

3M Center, Building 225-3S-06
St. Paul, MN 55144-1000
800-362-3550 • 877-369-2923 (Fax)

www.3M.com/Structuraladhesives

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