



Scotch-Weld™ Urethane Adhesive DP605NS, Off-White

Technical Data Sheet

September 2016

Product Description 3M™ Scotch-Weld™ Urethane Adhesive DP605NS Off-White is a two-part, non-sag urethane adhesive. It provides tough, flexible bonds with good adhesion to a wide variety of substrates, especially wood and many properly abraded and cleaned plastics. Good adhesion can also be obtained on painted metals and ceramics and glass. For maximum bond durability under moisture conditions, priming of glass is required.

- Features**
- Tough, flexible bonds
 - Non-Sag/Thixotropic
 - 1:1 Mix Ratio
 - 5 minute work life
 - Bonds wood and many plastics
 - Low Halogen Content

**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	DP605NS
Appearance	Part B Part A	White Tan
Mix Ratio (B:A)	By volume By weight	1:1 1:1
Viscosity ¹ (Approx.) time to deliver 20 gms @ 20 psi through a .104" orifice @ 75°F (24°C) seconds.	Part B Part A	11-20 11-20
Density	Part B Part A	8.8-9.2 9.7-10.2
Work Life @ 73°F (23°C)	10 g, 1/4" thick	5 minutes

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.

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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.

Property	DP605NS
Appearance	Off-White
Shore D Hardness (ASTM D 2240)	60-65
Time to Handling Strength ¹	15-20 min. @ 23°C (73°F)
Cure Time ²	48 hours @ 23°C (73°F)
Elongation ³	100%
Electrical	
Dielectric Constant (ASTM D 150)	3.1 @ 1 KHz @ 23°C
Dissipation Factor (ASTM D 150)	.021 @ 1 KHz @ 23°C
Dielectric Strength (ASTM D 149)	640 volts/mil
Volume Resistivity (ASTM D 257)	1.0 x 10 ¹⁴ ohm-cm
Thermal	
Wt. loss by Thermal ⁴ Gravimetric Analysis	5% @ 300°C
Coefficient of Thermal ⁵ Expansion (in./in./°C)	121 x 10 ⁻⁶ below 41°C 219 x 10 ⁻⁶ above 41°C
Thermal Conductivity ⁶ (btu-ft./sq. ft.-hr. °F)	0.101 @ 45°C
Glass Transition Temp ⁷	41°C

1. Handling strength determined per 3M test method C-3179. Time to handling strength taken to be that time required to achieve 50 psi OLS strength using aluminum substrates.
2. The cure time is defined as that time required for the adhesive to achieve a minimum of 80% of the ultimate strength as measured by aluminum - aluminum OLS.
3. Elongation is determined using 3M test method C-3094/ASTM D 882.
4. Weight loss by TGA reported as that temperature at which 5% weight loss occurs by TGA in air at 5°C rise per minute per ASTM 1131-86.
5. TCE determined with TMA Analyzer using a heating rate of 50°F (10°C) per minute. Second heat values given.
6. Thermal conductivity determined using ASTM C177 and C-matic Instrument with 2" diameter samples.
7. Glass transition temperature (Tg) determined using DSC Analyzer with a heating rate of 68°F (20°C) per minute. Second heat values given.

3M™ Scotch-Weld™ Urethane Adhesive DP605NS can be considered “low halogen”. Low halogen is defined by the Electrotechnical Commission (IEC) 61249-2-21 standard as having less than 900 ppm chlorine, 900 ppm bromine, and less than 1500 ppm total chlorine and bromine.

3M™ Scotch-Weld™ Urethane Adhesive DP605NS Test Results Halogens (determined by ion chromatography)

Total Chlorine (ppm)	Total Bromine (ppm)	Total Halogens (ppm)
670	< 10	< 800

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**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	DP605NS
-40°F (-40°C)	1340
73°F (23°C)	650
180°F (82°C) (15 min.) ¹	340

¹Represents time in test chamber oven before test.

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

Product	DP605NS
Aluminum MEK/abrade/MEK	650
Cold Rolled Steel MEK/abrade/MEK	660
Nylon IPA/abrade/IPA	470
Polycarbonate IPA/abrade/IPA	720
Acrylic IPA/abrade/IPA	700
SMC IPA/abrade/IPA	640
Rigid PVC IPA/abrade/IPA	620
ABS IPA/abrade/IPA	640
HIPS IPA/abrade/IPA	550

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

Temperature	DP605NS
73°F (23°C)	33

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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	DP605NS
Room Temperature	73°F(23°C)/50%RH, 30 days	100%
Water Vapor	150°F (66°C)/ 80% RH, 30 days	85%
Water Soak	73°F (23°C) , 30 days	65%
IPA	73°F (23°C), 30 days immersion	95%

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 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.

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Handling and Application Information

Directions for Use

3M™ Scotch-Weld™ Urethane Adhesive DP605NS is 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 and 200 ml configurations. 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).

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Surface Preparation (Continued)

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.
- D. Isopropyl Alcohol Wipe Only Surface Preparation
Wipe surface with an isopropyl alcohol soaked swab.* Allow solvent to evaporate before applying adhesive.
- 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.

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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 in original duo-pak containers at room temperature.

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