

# 3M

## Scotch-Weld™

### Epoxy Adhesive

#### DP110 Translucent and Gray

Technical Data

March, 2004

**Product Description** 3M™ Scotch-Weld™ Epoxy Adhesive DP110 Translucent and Gray are two-part epoxy adhesives which combine a fast cure with flexibility.

- Features**
- Controlled flow
  - 20 minute handling strength
  - Duo-Pak cartridge dispensing system
  - Good adhesion to many plastics and metals

**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   |                     | Scotch-Weld Epoxy Adhesive DP110 Translucent | Scotch-Weld Epoxy Adhesive DP110 Gray |
|---|---------------------|--|---------------------------------------|
| <b>Viscosity @ 72°F (23°C), 73°F (24°C) (CPS)</b> | Base<br>Accelerator | 30,000 - 70,000<br>30,000 - 70,000           | 40,000 - 90,000<br>40,000 - 90,000    |
| <b>Base Resin</b>                                 | Base<br>Accelerator | Modified Epoxy<br>Amine                      | Modified Epoxy<br>Amine               |
| <b>Color</b>                                      | Base<br>Accelerator | Translucent White<br>Light Yellow            | White<br>Black                        |
| <b>Net Weight (Lbs./Gallon)</b>                   | Base<br>Accelerator | 9.1 - 9.4<br>9.0 - 9.3                       | 9.1 - 9.4<br>9.0 - 9.3                |
| <b>Mix Ratio B : A</b>                            | Volume<br>Weight    | 100 : 100<br>100 : 99                        | 100 : 100<br>100 : 99                 |
| <b>Worklife @ 73°F (24°C) (minutes)</b>           |                     | 8 - 13                                       | 8 - 13                                |

**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 Epoxy Adhesive DP110 Translucent | Scotch-Weld Epoxy Adhesive DP110 Gray |
|-----------------------------------|--|---------------------------------------|
| <b>Color</b>                      | Yellow Translucent                           | Gray                                  |
| <b>Shore D Hardness (approx.)</b> | 40   | 45                                    |
| <b>Elongation (approx.)</b>       | 40%  | 40%                                   |

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#### Typical Cured Thermal 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™ Epoxy Adhesive DP110 Translucent | 3M™ Scotch-Weld™ Epoxy Adhesive DP110 Gray      |
|---|---|---|
| Thermal Conductivity<br>BTU/Hr/Ft <sup>2</sup> /°F/Ft.  | .106 @ 113°F (45°C)                               | .104 @ 113°F (45°C)                             |
| Thermal Coefficient of Expansion<br>-58°F (-50°C) - 32°F (0°C)<br>-58°F (-50°C) - 166°F (110°C) | 80 x 10 <sup>-6</sup><br>200 x 10 <sup>-6</sup>   | 73 x 10 <sup>-6</sup><br>165 x 10 <sup>-6</sup> |
| Glass Transition Temp.  | 55°F (13°C)                                       | 61°F (16°C)                                     |

#### Typical Cured Electrical 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 Epoxy Adhesive DP110 Translucent | Scotch-Weld Epoxy Adhesive DP110 Gray |
|---------------------------------|--|---------------------------------------|
| Dielectric Strength (volts/mil) | 520  | 470                                   |
| Volume Resistivity (ohms - cm)  | 4.5 x 10 <sup>10</sup>                       | 6.9 x 10 <sup>10</sup>                |

#### 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.

The following product performance data was obtained in the 3M laboratory under the conditions specified. The following data show typical results obtained with Scotch-Weld epoxy adhesive DP110 Translucent and Gray when applied to properly prepared substrates and cured for 48 hours at 73°F (23°C) under 2 psi pressure and tested according to the specifications indicated.

Note: All data developed after a 48 hour cure @ 75°F (24°C) under 2 psi pressure unless noted otherwise.

##### A. Aluminum Overlap Shear

Overlap shear strength was measured on FPL etched 1 in. wide by 1/2 in. overlap specimens. The bonds were made from 2 panels of 4 in. x 7 in. x .063 in., 2024 T3 clad aluminum bonded together and cut into 1 in. wide specimens. The separation rate of the testing jaws was .1 in./minute. Tests similar to ASTM D-1002.

| Test Temp     | Scotch-Weld Epoxy Adhesive DP110 Translucent | Scotch-Weld Epoxy Adhesive DP110 Gray |
|---------------|--|---------------------------------------|
| -67°F (-55°C) | 2500 psi                                     | 2700 psi                              |
| 75°F (24°C)   | 2500 psi                                     | 3500 psi                              |
| 160°F (71°C)  | 270 psi                                      | 270 psi                               |
| 180°F (82°C)  | 200 psi                                      | 250 psi                               |

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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.**

**B. Aluminum T-Peel**

T-Peel bonds were measured on 1 in. wide specimens cut from two FPL etched 8 in. x 8 in. x .032 in., 2024 T3 clad aluminum panels bonded together. The separation rate of the testing jaws was 20 in./minute. Tests similar to ASTM D-1876.

| Test Temp   | 3M™ Scotch-Weld™ Epoxy Adhesive DP110 Translucent | 3M™ Scotch-Weld™ Epoxy Adhesive DP110 Gray |
|-------------|---|--|
| 75°F (24°C) | 20 piw  | 20 piw                                     |

**C. Overlap shear on abraded metals, plastics, and rubber**

Overlap shear strengths were measured on 1 in. wide 1/2 in. overlap specimens. These bonds were made individually using 1 in. x 4 in. pieces of substrate.

The thickness of the substrates were: cold rolled, galvanized and stainless steel – 0.056-0.062 in., copper – 0.032 in., brass – 0.036 in., rubbers – 0.125 in., plastics – 0.125 in. All surfaces were prepared by solvent wiping/abrading/solvent wiping.

The jaw separation rate used for testing was 0.1 in. per minute for metals, 2 in. per minute for plastics, and 20 in. per minute for rubbers.

| Substrate   | Overlap Shear (psi) @ 75°F (24°C)            |                                       |
|---|--|---------------------------------------|
|   | Scotch-Weld Epoxy Adhesive DP110 Translucent | Scotch-Weld Epoxy Adhesive DP110 Gray |
| Aluminum/Aluminum                                     | 1000   | 2300                                  |
| Cold Rolled Steel/Cold Rolled Steel                   | 1500   | 2500                                  |
| Stainless Steel/Stainless Steel                       | 1500   | 2450                                  |
| Galvanized Steel/Galvanized Steel                     | 1500   | 2600                                  |
| Copper/Copper   | 1500   | 1750                                  |
| Brass/Brass   | 1500   | 2450                                  |
| Styrene Butadiene Rubber/Steel                        | 80 - 100                                     | 80 - 100                              |
| Neoprene Rubber/Steel                                 | 40 - 60                                      | 40 - 60                               |
| ABS/ABS Plastic                                       | 500  | 680                                   |
| PVC/PVC, Rigid  | 400  | 390                                   |
| Polycarbonate/Polycarbonate                           | 500  | 660                                   |
| Acrylic/Acrylic                                       | 250  | 480                                   |
| Fiber Reinforced Polyester/Fiber Reinforced Polyester | 1400*  | 1400*                                 |

\*The substrate broke during the test instead of the bond.

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## Environmental Resistance

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

Overlap shear specimens were prepared on aluminum as above and exposed to the environment conditions described below.

| Environment                              | Overlap Shear (psi) @ 75°F (24°C)                 |         |  |         |
|--|---|---------|--|---------|
|  | 3M™ Scotch-Weld™ Epoxy Adhesive DP110 Translucent |         | 3M™ Scotch-Weld™ Epoxy Adhesive DP110 Gray |         |
|  | Etched  | Abraded | Etched                                     | Abraded |
| Initial                                  | 2500  | 1000    | 2500                                       | 2300    |
| 30 days tap water @ 75°F (24°C)          | 2300  | 1250    | 2300                                       | 1250    |
| 3 days, 160°F (71°C), 100% rel. humidity | 1200  | 700     | 1200                                       | 700     |
| 14 days in 5% salt spray @ 95°F (35°C)   | 500   | 150     | 500  | 150     |

**Note:** Avoid using either Scotch-Weld epoxy adhesive DP110 Translucent or Gray on metals where the bonded parts will experience high humidity/hot water conditions. User must test thoroughly adhesive performance for any environments which will be encountered.

## 3M™ EPX™ Pneumatic Applicator Delivery Rates

### 400 ml Applicator – Maximum Pressure 73 psi

| Adhesive*  | 6mm Nozzle<br>gms/minute | 10mm Nozzle<br>gms/minute |
|--|--------------------------|---------------------------|
| Scotch-Weld epoxy adhesive DP110 Gray              | 8.3                      | 31.5                      |
| Scotch-Weld epoxy adhesive DP110 Gray 100°F (38°C) | 14.0                     | 50.3                      |

### 200 ml Applicator – Maximum Pressure 58 psi

|  |       |         |
|--|-------|---------|
| Scotch-Weld epoxy adhesive DP110 Gray              | 6.6   | 25.6    |
| Scotch-Weld epoxy adhesive DP110 Gray 100°F (38°C) | 35.1  | 115.9   |
| Scotch-Weld epoxy adhesive DP110 Gray 125°F (49°C) | 53.8  | 129.6   |
| Scotch-Weld epoxy adhesive DP110 Gray 150°F (66°C) | 332.0 | 687.0** |

### 50 ml Applicator – Maximum Pressure 50 psi

| Adhesive*                                    | 1/4 in. Nozzle<br>gms/minute       |
|--|------------------------------------|
| Scotch-Weld epoxy adhesive DP110 Translucent | 6.3                                |
|  | 6.2 (nozzle cut back 2 divisions)  |
| Scotch-Weld epoxy adhesive DP110 Gray        | 12.3                               |
|  | 12.1 (nozzle cut back 2 divisions) |

\*Tests were run at a temperature of 70°F ± 2°F (21°C ± 1°C) and at maximum applicator pressure.

\*\*Did not mix adequately.

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#### Handling/Curing Information

#### Directions for Use

1. For high strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed from substrates to be bonded. However, the amount of surface preparation necessary directly depends on the user's required bond strength, environmental aging resistance and economic practicalities. For specific surface preparations on common substrates, see the section on surface preparation.
2. These products consist of two parts.

#### Mixing

##### For Duo-Pak Cartridges

3M™ Scotch-Weld™ Epoxy Adhesive DP110 Translucent and Gray are supplied in a dual syringe plastic duo-pak cartridge as part of the 3M™ EPX™ Applicator system. To use, simply insert the duo-pak cartridge into the EPX applicator and start the plunger into the cylinders using light pressure on the trigger. 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 automatic mixing of Part A and Part B is desired, attach the EPX mixing nozzle to the duo-pak cartridge and begin dispensing the adhesive. For hand mixing, expel the desired amount of adhesive and mix thoroughly. Mix approximately 15 seconds after a uniform color is obtained.

##### For Bulk Containers

Mix thoroughly by weight or volume in the proportions specified on the product label or in the uncured properties section. Mix approximately 15 seconds after a uniform color is obtained.

3. For maximum bond strength apply product evenly to both surfaces to be joined.
4. Application to the substrates should be made within 8 minutes. Larger quantities and/or higher temperatures will reduce this working time.
5. Join the adhesive coated surfaces and allow to cure at 60°F (16°C) or above until completely firm. Heat up to 200°F (93°C), will speed curing. These products will fully cure in 48 hours @ 75°F (24°C).
6. Keep parts from moving during cure. Contact pressure necessary. Maximum shear strength is obtained with a 3-5 mil bond line.
7. Excess uncured adhesive can be cleaned up with ketone type solvents.\*

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

**Adhesive Coverage:** A 0.005 in. thick bondline will typically yield a coverage of 320 sq. ft./gallon.

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#### Application Equipment Suggestions

These products may be applied by spatula, trowel or flow equipment.

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

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#### Surface Preparation

For high strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed from substrate to be bonded. However, the amount of surface preparation necessary directly depends on the user's required bond strength, environmental aging resistance and economic practicalities.

The following cleaning methods are suggested for common surfaces:

##### Steel:

1. Wipe free of dust with oil-free solvent such as acetone or isopropyl alcohol solvents.\*
2. Sandblast or abrade using clean fine grit abrasives.
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 EC1945 B/A is used, apply a thin coating (0.5 mils) on the metal surfaces to be bonded, air dry for 60 minutes, then cure for 30 minutes at 180°F (82°C) prior to bonding.

##### Aluminum:

1. Alkaline Degrease: Oakite 164 solution (9-11 oz./gallon water) at 190°F ± 10°F (88°C ± 23°C) for 10-20 minutes. Rinse immediately in large quantities of cold running water.
2. Acid Etch: Place panels in the following solution for 10 minutes at 150°F ± 5°F (66°C ± 23°C).

|                                |                        |
|--------------------------------|------------------------|
| Sodium Dichromate              | 4.1 - 4.9 oz./gallon   |
| Sulfuric Acid, 66°Be           | 38.5 o 41.5 oz./gallon |
| 2024-T3 aluminum (dissolved)   | 0.2 oz./gallon minimum |
| Tap water as needed to balance |                        |
3. Rinse: Rinse panels in clear running tap water.
4. Dry: Air dry 15 minutes; force dry 10 minutes at 150°F ± 10°F (66°C ± 23°C).
5. If primer is to be used, it should be applied within 4 hours after surface preparation.

##### Plastics/Rubber:

1. Wipe with isopropyl alcohol.\*
2. Abrade using fine grit abrasives.
3. Wipe with isopropyl alcohol.\*

**\*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 (16-27°C) for maximum storage life.

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**Shelf Life** 3M™ Scotch-Weld™ Epoxy Adhesive DP110 Translucent and Gray have a shelf life of 15 months in their unopened containers. Duo-pak cartridges have a shelf life of two years in their unopened bulk containers.

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**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.

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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 or visit [www.3M.com/adhesives](http://www.3M.com/adhesives). Address correspondence to: 3M Industrial Adhesives and Tapes Division, Building 21-1W-10, 900 Bush Avenue, St. Paul, MN 55144-1000. Our fax number is 651-778-4244. In Canada, phone: 1-800-364-3577. In Puerto Rico, phone: 1-787-750-3000. In Mexico, phone: 52-70-04-00.

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