# Scotch-Weld™

## Metal Bonder Acrylic Adhesive

## DP8407NS Grey

**Preliminary Technical Data Sheet** **October 2017**

**Product Description**

3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesive DP8407NS Grey is a high performance, two-part acrylic adhesive that offers excellent shear, peel, and impact performance. This toughened product provides excellent adhesion to many plastics and metals, including those with slightly oily surfaces. This special formulation provides outstanding durability on metal substrates (including bare steel, copper, brass, bronze, and galvanized steel), even when exposed to high temperature and humidity environments.

**Product Features**

- Excellent strength and durability on bare metals, plastics, and other materials
- Toughened
- Outstanding peel and impact strength
- 10:1 mix ratio
- Increased cure speed with applied heat
- Contains glass beads with 0.254 mm diameter (0.010" diameter) to control bond line thickness

**Note:** Unless otherwise indicated, all properties measured at 22°C (72°F).

**Note:** The following data is taken from tests conducted on a limited number of production runs. 3M will continue to test samples from additional manufacturing lots and issue a new Technical Data Sheet if the results change.

**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 | | 3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesive DP8407NS Grey |
|---|---|---|
| **Colour** | Base (B) | Brown |
| | Accelerator (A) | Dark Grey |
| **Viscosity**[1] | Base (B) | 15,000 cP |
| | Accelerator (A) | 50,000 cP |
| **Density**[2] | Base (B) | 0.98 g/cm$^3$ |
| | Accelerator (A) | 1.08 g/cm$^3$ |
| **Mix ratio** | By volume | 10 Parts B : 1 Part A |
| | By weight | 9 Parts B : 1 Part A |
| **Note: Cure times are approximate and depend on adhesive temperature** | | |
| **Work life**[3] | | 5–7 minutes |
| **Open time**[4] | | 6–8 minutes |
| **Time to handling strength**[5] | | 22–26 minutes |
| **Time to structural strength**[6] | | 28–32 minutes |

1. Viscosity measured using cone-and-plate viscometer; reported viscosity at 3.8 sec-1 shear rate.
2. Density measured using pycnometer.
3. Maximum time that adhesive can remain in a small static mixing nozzle and still be expelled without undue force on the applicator.
4. Maximum time allowed after applying a small amount of adhesive to one substrate before bond must be closed and fixed in place.
5. Minimum time required to achieve 50 psi of overlap shear strength.
6. Minimum time required to achieve 1,000 psi of overlap shear strength

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**Typical Mixed 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 | 3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesive |
|---|---|
| | DP8407NS Grey |
| **Colour** | Grey |
| **Full Cure Time** | 24 Hours |
| **Viscosity** | 20,000 cP |
| **Density** | 0.99 g/cm$^3$ |

**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.

**Overlap Shear (psi)**[7]

| Property | 3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesive |
|---|---|
| | DP8407NS Grey |
| **Aluminum** | 4,500 CF |
| **Stainless Steel** | 3,800 CF |
| **Cold Rolled Steel** | 3,500 CF |
| **Galvanized Steel** | 3,400 CF |
| **Copper** | 1,900 AF |
| **Brass** | 1,700 AF |
| **PVC** | 1,900 SF |
| **ABS** | 1,000 SF |
| **Acrylic** | 1,600 SF |
| **Polycarbonate** | 1,100 SF |
| **Polystyrene** | 450 SF |
| **Polyester (Fibre-Reinforced)** | 1,300 SF |
| **Epoxy Resin (Fibre-Reinforced)** | 4,100 CF |
| **Aluminum (Tested at -40°C/F)** | 3,400 CF |
| **Aluminum (Tested at 82°C/180°F)** | 1,400 CF |

7. Overlap shear values measured using ASTM D1002; 1 min open time; adhesive allowed to cure for 24 hours at room temperature; 12.7 mm (1/2") overlap; 0.254 mm (0.010") bond line thickness; samples pulled at 2.54 mm/min (0.1 in/min) for metals and 50 mm/min (2 in/min) for plastics; all surfaces prepared with light abrasion and solvent clean; substrates used were 1.588 mm (1/16") thick metals and 3.175 mm (1/8") thick plastics; failure modes:

   AF: adhesive failure CF: cohesive failure SF: substrate failure

**Note:** This adhesive has relatively low adhesion to low surface energy plastics (such as polypropylene, polyethylene, TPO, acetal, and PTFE). Applications involving any of these materials should be carefully evaluated by the end user for suitability.

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**Typical Cured Physical Properties (Continued)**

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

### Mechanical Properties[8]

| Property | 3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesive |
|---|---|
| | DP8407NS Grey |
| Tensile modulus (psi) | 170,000 |
| Tensile strength (psi) | 2,400 |
| Tensile strain at break (%) | 10% |

8. Tensile properties measured using ASTM D638; adhesives allowed to cure for 2 weeks at room temperature; 1/8" thick Type I test specimens; samples pulled at 0.2 in/min.

### Environmental Resistance[9]

| Condition | Substrate | 3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesive |
|---|---|---|
| | | DP8407NS Grey |
| 149°C (300°F) | Aluminum | 100% |
| -40°C (-40°F) | | 100% |
| 49°C (120°F)+ 80% relative humidity | | 100% |
| 66°C (150°F) + 80% relative humidity | | 85% |
| 85°C (185°F) + 85% relative humidity | | 85% |
| Water | | 95% |
| 32°C (90°F) Water | | 90% |
| 49°C (120°F) Water | | 85% |
| Salt water (5 wt% in water) | | 95% |
| Gasoline | | 70% |
| Diesel fuel | | 100% |
| Motor Oil | | 100% |
| Antifreeze (50 wt% in water) | | 100% |
| Isopropyl alcohol | | 75% |
| Bleach (10 wt% in water) | | 95% |
| 392°F (200°C) for 30 minutes | | 90% |
| Condition | Substrate | 3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesive |
| | | DP8407NS Grey |
| 149°C (300°F) | Cold Rolled Steel | 100% |
| 49°C (120°F) + 80% relative humidity | | 95% |
| 85°C (185°F) + 85% relative humidity | | 65% |
| 120°F (49°C) Water | | 75% |
| 200°C (392°F) for 30 minutes | | 90% |

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**Typical Cured Physical Properties (Continued)**

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

| Condition | Substrate | 3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesive |
|---|---|---|
| | | DP8407NS Grey |
| -40°C (-40°F) | PVC | 100% |
| 49°C (120°F) + 80% relative humidity | | 95% |
| 66°C (150°F) + 80% relative humidity | | 95% |
| 85°C (185°F) + 85% relative humidity | | 85% |
| Water | | 100% |
| Salt Water (5 wt% in water) | | 95% |
| Hydrochloric acid (16 wt% in water) | | 100% |
| Sodium hydroxide (10 wt% in water) | | 95% |

8. Tensile properties measured using ASTM D638; adhesives allowed to cure for 2 weeks at room temperature; 3.175 mm (1/8") thick Type I test specimens; samples pulled at 5.08 mm/min (0.2 in/min).

**Note:** Fully-cured structural adhesives can withstand short-term incidental contact with almost any solvent, chemical, or environmental condition. However, long-term continuous exposure of this acrylic adhesive to the following liquids should be avoided:

**1. Elevated temperature (>120°F) water**
**2. Ketone-type solvents (acetone, MEK)**

**Floating Roller Peel (lb/inch width)[10]**

| Substrate | 3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesive |
|---|---|
| | DP8407NS Grey |
| Aluminum | 50 CF |

10. Floating roller peel values measured using ASTM D3167; adhesives allowed to cure for 24 hours at room temperature; 25.4 mm (1 in) wide samples; 0.432 mm (0.017") bond line thickness; samples pulled at 152.4 mm/min (6 in/min); aluminum surfaces etched; substrates used were 1.588 mm (1/16") thick and 0.508 mm (0.020") thick aluminum; failure modes:

    AF: adhesive failure CF: cohesive failure SF: substrate failure

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

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**Directions for Use**

1. To obtain the highest strength structural bonds, paint, oxide films, oils, dust, mold release agents, and all other surface contaminants must be completely removed. The amount of surface preparation depends on the required bond strength and environmental aging resistance desired by user. For suggested surface preparations on common substrates, see the section on surface preparation.
2. **Mixing For Duo-Pak Cartridges**
   Store cartridges with cap end up to allow any air bubbles to rise towards the tip. To use, simply insert the cartridge into the EPX applicator and start the plunger into the cylinders using light pressure on the trigger. Then remove the cap and expel a small amount of adhesive to ensure material flows freely from both sides of cartridge. For automatic mixing, attach an EPX mixing nozzle to the cartridge and begin dispensing the adhesive. For hand mixing, expel the desired amount of adhesive and mix thoroughly. Mix approximately 15 seconds after obtaining a uniform colour.

   **Mixing For Bulk Containers**
   Mix thoroughly by weight or volume in the proportion specified on the product label or in the typical uncured properties section. Mix approximately 15 seconds after obtaining a uniform colour.
3. Apply adhesive and join surfaces within the open time listed for the specific product. Larger quantities and/or higher temperatures will reduce this working time.
4. The adhesive and all materials should be at 16°C (60°F) or above prior to assembly. Allow adhesive to cure at 16°C (60°F) or above until completely firm. Applying heat up to 66°C (150°F) will increase cure speed.
5. Keep parts from moving during cure. Apply contact pressure or fixture in place if necessary. Optimum bond line thickness ranges from 0.127 mm (0.005 in) to 0.508 mm (0.020 in); shear strength will be maximized with thinner bond lines, while peel strength reaches a maximum with thicker bond lines.
6. Excess uncured adhesive can be cleaned up with ketone-type solvents.*

**Surface Preparation**

3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesives are designed to be used on painted or coated metals, most plastics, and some bare metals. The following cleaning methods are suggested for common surfaces:

**Painted/Coated Metals:**

1. Wipe surface free of dust and dirt with clean cloth and pure isopropyl alcohol.*
2. Sandblast or lightly abrade using clean fine grit abrasives. Do not completely remove the paint layer or coating down to bare steel.
3. Wipe again with clean cloth and pure isopropyl alcohol to remove loose particles.*

**Metals:**

1. Wipe surface free of dust and dirt with clean cloth and pure acetone.*
2. Sandblast or lightly abrade using clean fine grit abrasives.
3. Wipe again with clean cloth and pure acetone to remove loose particles.*

**Plastics:**

1. Wipe surface free of dust and dirt with clean cloth and pure isopropyl alcohol.*
2. Lightly abrade using fine grit abrasives.
3. Wipe again with clean cloth and pure isopropyl alcohol to remove loose particles.*

***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 product at 27°C (80°F) or below. Refrigeration at 4°C (40°F) will help extend shelf life. Do not freeze. Allow product to reach room temperature prior to use. |
| **Shelf Life** | 3M™ Scotch-Weld™ Metal Bonder Acrylic Adhesive DP8407NS Grey has a shelf life of 12 months from date of manufacture in unopened original containers kept at recommended storage conditions. |
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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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