

3M Scotch-Weld™ Epoxy Adhesives DP190 Translucent and Gray

Technical Data

April, 2010

Product Description 3M™ Scotch-Weld™ Epoxy Adhesive DP190 Translucent is a 1:1 mix ratio similar to 3M™ Scotch-Weld™ Epoxy Adhesive 2216 B/A Translucent but faster curing.

3M™ Scotch-Weld™ Epoxy Adhesive DP190 Gray is a 1:1 by volume mix ratio of 3M™ Scotch-Weld™ Epoxy Adhesive 2216 B/A Gray and exhibits good peel, shear and environmental aging properties.

Available in bulk containers as 3M™ Scotch-Weld™ Epoxy Adhesive 2216 B/A.

- Features**
- 90 minute worklife
 - Flexible
 - Translucent or gray color
 - High shear and peel strength
 - 1:1 mix ratio

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.

		Scotch-Weld Epoxy Adhesive DP190 Translucent	Scotch-Weld Epoxy Adhesive DP190 Gray
Base Resins		Epoxy/Amine	Epoxy/Amine
Viscosity¹, Approximate @ 75°F	Base (B) Accelerator (A)	2,000-8,000 cps 7,000-15,000 cps	75,000-150,000 cps 40,000-80,000 cps
Net Weight (Lbs./gal.)	Base (B) Accelerator (A)	9.3-9.7 8.2-8.6	11.0-11.4 10.6-11.0
Color (Lbs./gal.)	Base (B) Accelerator (A)	Clear Amber	White Gray
Mix Ratio (B:A)	By Volume By Weight	1:1 1.15:1	1:1 1.06:1
Worklife² @ 73°F (23°C)	2 gram 20 gram	80 min. 60 min.	— 90 min.

Footnotes:

1. Viscosity determined using 3M test method C-1D. Procedure involves Brookfield RVF, #7 spindle, 20 rpm and 80°F (26°C). Measurement taken after 1 minute rotation.
2. Worklife determined using 3M test method C-3180. Procedure involves periodically measuring a 2 gram mixed mass for self-leveling and wetting properties. This time will also approximate the usable worklife in an 3M™ EPX™ Applicator mixing nozzle.

3M™ Scotch-Weld™ Epoxy Adhesives DP190 Translucent and Gray

Typical Cured Properties

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

Physical

Footnotes:

3. Tack-free time determined per 3M test method C-3173. Involves dispensing 0.5 gram amount of adhesive onto substrate and testing periodically for no adhesive transfer to metal spatula.
4. Handling strength determined per 3M test method C-3179. Time to handling strength taken to be that required to achieve a 50 psi OLS strength using aluminum substrates.
5. 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.
6. Tensile and Elongation. Used procedure in 3M test method C-3094/ATSM D 882. Samples were 2 in. dumbbells with .0125 in. neck and .030 in. sample thickness. Separation rate was 2 inches per minute. Samples cured 2 hrs RT plus 2 hrs/ 160°F (71°C).
7. 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.
8. TCE determined using TMA Analyzer using a heating rate of 50°F (10°C) per minute. Second heat values given.
9. Glass Transition Temperature (Tg) determined using DSC Analyzer with a heating rate of 68°F (20°C) per minute. Second heat values given.
10. Thermal conductivity determined using ASTM C177 and C-matic Instrument using 2 in. diameter samples.
11. Thermal shock resistance run per 3M test method C-3174. Involves potting a metal washer into a 2 in. x 0.5 in. thick section and cycling this test specimen to colder and colder temperatures.

	3M™ Scotch-Weld™ Epoxy Adhesive DP190 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP190 Gray
Color	Translucent	Gray
Hardness (ASTM D 2240) Shore D	35	60
Worklife²	80 minutes	90 minutes
Tack-free Time³	~ 4 hrs	~ 6 hrs
Time to Handling Strength⁴	6 hrs	8-12 hrs
Full Cure Time⁵	14 days	7 days
Elongation⁶	120%	30%
Tensile Strength⁶	2750 psi	3500 psi

Thermal

	Scotch-Weld Epoxy Adhesive DP190 Translucent	Scotch-Weld Epoxy Adhesive DP190 Gray
Weight Loss by Thermal Gravimetric Analysis (TGA)⁷	1% @ 390°F (199°C) 5% @ 594°F (312°C)	1% @ 477°F (247°C) 5% @ 639°F (337°C)
Thermal Coefficient of Expansion (TCE) by TMA⁸ ($\infty \times 10^{-6}$ units/unit/°C)		
Below Tg	86 (41-68°F [5-20°C] range)	62 (41-68°F [5-25°C] range)
Above Tg	166 (167-284°F [75-140°C] range)	177 (167-284°F [65-140°C] range)
Glass Transition Temperature (Tg) by DCS⁹		
Onset	50°F (10°C)	45°F (7°C)
Mid-Point	80°F (27°C)	68°F (20°C)
Thermal Conductivity¹⁰ (@ 110°F on .250 in. samples)		
BTU - ft./ft.² - hr. - °F)	.079	.220
Cal./sec. - cm - °C)	.39 x 10 ⁻³	90.9 x 10 ⁻²
Watt/m - °C)	.136	.381
Thermal Shock Resistance¹¹ Potted Washer Olyphant Test (3M ITSD Test Method C-3174 +100°C [air] to -50°C [liquid])	Pass 5 cycles without cracking	Pass 5 cycles without cracking

Electrical

	Scotch-Weld Epoxy Adhesive DP190 Translucent	Scotch-Weld Epoxy Adhesive DP190 Gray
Dielectric Constant @ 1 KHz @ 73°F (23°C) (ASTM D 150)	6.2	6.5
Dissipation Factor @ 1 KHz @ 73°F (23°C) (ASTM D 150)	0.16	0.09
Dielectric Strength (ASTM D 149) Sample Thickness Approx. 30 mil.	875 volts/mil	830 volts/mil
Volume Resistivity (ASTM D 257)	7.5 x 10 ¹⁰ ohm-cm	5.0 x 10 ¹² ohm-cm

3M™ Scotch-Weld™ Epoxy Adhesives DP190 Translucent and Gray

Typical Adhesive Performance Characteristics

The following product performance data were obtained in the 3M laboratory under the conditions specified. The following data show typical results obtained with the 3M™ Scotch-Weld™ Adhesives when applied to properly prepared substrates, cured, and tested according to the specifications indicated. The data were generated using the 3M™ EPX™ Applicator System equipped with an EPX applicator static mixer, according to manufacturer’s directions. Thorough hand mixing should afford comparable results.

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 (OLS) to¹² (Bonds cured 24 hrs @ RT + 2 hrs 160°F [71°C])

	3M™ Scotch-Weld™ Epoxy Adhesive DP190 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP190 Gray
Etched Aluminum	1800 psi	2500 psi
Sanded Aluminum (60 grit)	850 psi	1500 psi
Cold Rolled Steel	850 psi	1400 psi
Wood, Fir	650 psi	1100 psi
Glass, Borosilicate	260 psi	300 psi
Glass, +3M™ Scotch-Weld™ Primer 3901	300 psi	300 psi
Polycarbonate	400 psi	800 psi
Acrylic	350 psi	500 psi
Fiberglass	1000 psi	1600 psi
ABS	400 psi	700 psi
PVC	650 psi	800 psi
Polypropylene	90 psi	50 psi

Rate of Strength Buildup (OLS on Etched Aluminum)¹² Bonds tested after:

	Scotch-Weld Epoxy Adhesive DP190 Translucent	Scotch-Weld Epoxy Adhesive DP190 Gray
1 hr @ RT	10 psi	10 psi
6 hrs @ RT	200 psi	50 psi
24 hrs @ RT	800 psi	1000 psi
7 days @ RT	1200 psi	2000 psi
1 mo @ RT	1800 psi	2200 psi
3 mos @ RT	1800 psi	2500 psi

Footnotes:

12. Overlap shear (OLS) 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 bond line was 0.005-0.008 in. All strengths were measured at 70°F (21°C) except where noted. (Test per ASTM D 1002-72.)

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.; rubber, 0.125 in.; plastics, 0.125 in.

3M™ Scotch-Weld™ Epoxy Adhesives DP190 Translucent and Gray

Typical Adhesive Performance Characteristics (continued)

Footnotes:

12. Overlap shear (OLS) 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 bond line was 0.005-0.008 in. All strengths were measured at 70°F (21°C) except where noted. (Test per ASTM D 1002-72.)

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.; rubber, 0.125 in.; plastics, 0.125 in.

13. Solvent resistance was determined using cured (24 hrs RT + 2 hrs 160°F [71°C] samples (1/2 in. x 4 in. x 1/8 in. thickness) immersed in the test solvent for 1 hour and 1 month. After the allotted period of time the sample was removed and visually examined for surface attack as compared to the control.

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

Environmental Aging

(OLS on Etched Aluminum)¹² Bonds tested after:

	3M™ Scotch-Weld™ Epoxy Adhesive DP190 Translucent	3M™ Scotch-Weld™ Epoxy Adhesive DP190 Gray
24 hrs RT + 2 hrs @ 160°F (71°C)	1700 psi	2500 psi
24 hrs RT + 2 hrs @ 240°F (115°C)	3200 psi	3000 psi
1 wk RT + wk @ 90°F/90% RH	1400 psi	2400 psi
1 wk RT + 1 wk 248°F (120°C)	3500 psi	3500 psi
1 wk RT + 1 wk H ₂ O Immersion	1700 psi	2500 psi

Overlap Shear Strength vs Temperature¹²

(Bonds cured 24 hr @ RT + 2 hrs @ 160°F [71°C]) Bonds tested at:

	Scotch-Weld Epoxy Adhesive DP190 Translucent	Scotch-Weld Epoxy Adhesive DP190 Gray
-67°F (-55°C)	3500 psi	1500 psi
70°F (21°C)	1200 psi	2500 psi
120°F (49°C)	290 psi	1000 psi
150°F (66°C)	200 psi	600 psi
180°F (82°C)	160 psi	400 psi

180°F Peel Strength vs Temperature¹²

(Bonds cured 24 hr @ RT + 4 hrs @ 160°F [71°C]) Bonds tested at:

	Scotch-Weld Epoxy Adhesive DP190 Translucent	Scotch-Weld Epoxy Adhesive DP190 Gray
-67°F (-55°C)	3 piw	3 piw
70°F (21°C)	20 piw	20 piw
120°F (49°C)	3 piw	10 piw
150°F (66°C)	2 piw	4 piw
180°F (82°C)	1 piw	2 piw

Solvent Resistance¹³

One Hour/One Month

One Hour/One Month

	Scotch-Weld Epoxy Adhesive DP190 Translucent	Scotch-Weld Epoxy Adhesive DP190 Gray
Acetone	A/A	A/A
Isopropyl Alcohol	A/A	A/A
Freon TF	A/A	A/A
Freon TMC	A/B	A/A
1,1,1-Trichlorethane	A/A	A/A
RMA Flux	A/A	A/A

Key: A - Unaffected, B - Slight Attack, C - Moderate/Severe Attack

3M™ Scotch-Weld™
Epoxy Adhesives
 DP190 Translucent and Gray

3M™ EPX™
Pneumatic Applicator
Delivery Rates

200 ml Applicator – Maximum Pressure 58 psi

Adhesive*	6mm Nozzle gms/minute	10mm Nozzle gms/minute
3M™ Scotch-Weld™ Epoxy Adhesive DP190 Gray	11.9	46.0

50 ml Applicator – Maximum Pressure 50 psi

Adhesive*	1/4 in. Nozzle gms/minute
3M™ Scotch-Weld™ Epoxy Adhesive DP190 Translucent	112
Scotch-Weld epoxy adhesive DP190 Gray	16.9
Scotch-Weld epoxy adhesive DP190 Gray	21.5 (nozzle cut back 2 divisions)
Scotch-Weld epoxy adhesive DP190 100°F (38°C)	41.1

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

Handling/Curing
Information

Directions For Use

1. For high strength structural bonds, paints, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed. However, the amount of surface preparation necessary directly depends on the required bond strength and the environmental aging resistance desired by the user. For suggested surface preparations on common substrates, see the section on surface preparation.
2. Mixing

For Duo Pak Cartridges

3M™ Scotch-Weld™ Epoxy Adhesives DP190 Translucent and DP190 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 applicator 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 uniform color is obtained.

For Bulk Containers

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

3. For maximum bond strength, apply adhesive evenly to both surfaces to be joined.
4. Application to the substrates should be made within 75 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 cure in 7 to 14 days @ 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 manufacturer's precautions and directions for use.

Adhesive Coverage (typical): A 0.005 in. thick bondline will yield a coverage of 320 sq. ft./gallon.

3M™ Scotch-Weld™ Epoxy Adhesives DP190 Translucent and Gray

Surface Preparation

For high strength structural bonds, paint, oxide films, oils, dust, mold release agents and all other surface contaminants must be completely removed. However, the amount of surface preparation necessary directly depends on the required bond strength and the environmental aging resistance desired by the user.

The following cleaning methods are suggested for common surfaces:

Steel:

1. Wipe free of dust with oil-free solvent such as acetone, isopropyl or 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.

Aluminum:

1. Alkaline Degrease: Oakite 164 solution (9-11 oz./gallon water) at 190°F (87°C) ± 10°F 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 (65°C) ± 5°F*:

Sodium Dichromate	4.1 - 4.9 oz./gallon
Sulfuric Acid, 66°Be	38.5 - 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 (65°C) ± 10°F.
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.*

Glass:

1. Solvent wipe surface using acetone or MEK.*
2. Apply a thin coating (0.0001 in. or less) of 3M™ Scotch-Weld™ Metal Primer EC3901 or equivalent to the glass surfaces to be bonded and allow the primer to dry before bonding.

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

Application Equipment Suggestions

For smaller or intermittent applications, the 3M™ EPX™ Applicator is a convenient method of application.

For larger applications these products may be applied by use of flow equipment.

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

3M™ Scotch-Weld™ Epoxy Adhesives DP190 Translucent and Gray

Storage	Store products at 60-80°F (15-27°C) for maximum shelf life.
Shelf Life	These products have a shelf life of two years in their unopened original bulk containers and 15 months in duo-pak containers from date of shipment.
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.
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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This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9001:2000 standards.



Industrial Adhesives and Tapes Division

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10% post-consumer*

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PRODUCT NAME: 3M(TM) Scotch-Weld(TM) Epoxy Adhesive DP-190, Gray
MANUFACTURER: 3M
DIVISION: Industrial Adhesives and Tapes Division

ADDRESS: 3M Center
St. Paul, MN 55144-1000

EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)

Issue Date: 02/14/2007
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This product is a kit or a multipart product which consists of multiple, independently packaged components. An MSDS for each of these components is included. Please do not separate the component MSDSs from this cover page. The document numbers of the MSDSs for components of this product are:

10-3349-7, 10-3348-9

Revision Changes:

Copyright was modified.

Page Heading: Product name was modified.

Kit: Product name was modified.

Kit: Division name was modified.

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SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: 3M(TM) Scotch-Weld(TM) Epoxy Adhesive DP-190, Gray (Part B)

MANUFACTURER: 3M

DIVISION: Industrial Adhesives and Tapes Division

ADDRESS: 3M Center
St. Paul, MN 55144-1000

EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)

Issue Date: 04/26/10

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Document Group: 10-3348-9

Product Use:

Specific Use: Part B of 2 part Adhesive

Intended Use: Structural adhesive

SECTION 2: INGREDIENTS

<u>Ingredient</u>	<u>C.A.S. No.</u>	<u>% by Wt</u>
EPOXY RESIN	25068-38-6	70 - 100
KAOLIN	1332-58-7	10 - 30

SECTION 3: HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Specific Physical Form: Viscous

Odor, Color, Grade: white cream, very slight odor

General Physical Form: Liquid

Immediate health, physical, and environmental hazards: May cause allergic skin reaction.

3.2 POTENTIAL HEALTH EFFECTS

Eye Contact:

Moderate Eye Irritation: Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Vapors released during curing may cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Dust created by cutting, grinding, sanding, or machining may cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Skin Contact:

Moderate Skin Irritation: Signs/symptoms may include localized redness, swelling, itching, and dryness.

Allergic Skin Reaction (non-photo induced): Signs/symptoms may include redness, swelling, blistering, and itching.

Inhalation:

Vapors released during curing may cause irritation of the respiratory system. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Dust from cutting, grinding, sanding or machining may cause irritation of the respiratory system. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Prolonged or repeated exposure may cause:

Pneumoconiosis: Sign/symptoms may include persistent cough, breathlessness, chest pain, increased amounts of sputum, and changes in lung function tests.

Ingestion:

Gastrointestinal Irritation: Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

SECTION 4: FIRST AID MEASURES

4.1 FIRST AID PROCEDURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

Eye Contact: Flush eyes with large amounts of water. If signs/symptoms persist, get medical attention.

Skin Contact: Remove contaminated clothing and shoes. Immediately flush skin with large amounts of water. Get medical attention. Wash contaminated clothing and clean shoes before reuse.

Inhalation: Remove person to fresh air. If signs/symptoms develop, get medical attention.

If Swallowed: Do not induce vomiting unless instructed to do so by medical personnel. Give victim two glasses of water. Never

give anything by mouth to an unconscious person. Get medical attention.

SECTION 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

Autoignition temperature	<i>Not Applicable</i>
Flash Point	≥ 248 °C [<i>Test Method: Pensky-Martens Closed Cup</i>]
Flammable Limits - LEL	<i>Not Applicable</i>
Flammable Limits - UEL	<i>Not Applicable</i>

5.2 EXTINGUISHING MEDIA

Material will not burn. Ordinary combustible material. Use fire extinguishers with class A extinguishing agents (e.g., water, foam).

5.3 PROTECTION OF FIRE FIGHTERS

Special Fire Fighting Procedures: Water may be used to blanket the fire. Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA).

Unusual Fire and Explosion Hazards: Not applicable. No unusual fire or explosion hazards are anticipated.

Note: See STABILITY AND REACTIVITY (SECTION 10) for hazardous combustion and thermal decomposition information.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Accidental Release Measures:

Ventilate the area with fresh air.

Place in a closed container approved for transportation by appropriate authorities.

Observe precautions from other sections. Call 3M- HELPS line (1-800-364-3577) for more information on handling and managing the spill. Contain spill. Collect as much of the spilled material as possible.

In the event of a release of this material, the user should determine if the release qualifies as reportable according to local, state, and federal regulations.

SECTION 7: HANDLING AND STORAGE

7.1 HANDLING

Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Avoid breathing of vapors, mists or spray. Avoid breathing of dust created by cutting, sanding, grinding or machining. Avoid contact with oxidizing agents.

7.2 STORAGE

Store away from acids. Store away from heat. Store away from oxidizing agents.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 ENGINEERING CONTROLS

Use with appropriate local exhaust ventilation. Use in an enclosed process area is recommended. Provide appropriate local exhaust for cutting, grinding, sanding or machining. Use in a well-ventilated area. Provide ventilated enclosure for heat curing.

8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.2.1 Eye/Face Protection

Avoid eye contact.

The following eye protection(s) are recommended: Safety Glasses with side shields

Indirect Vented Goggles

8.2.2 Skin Protection

Avoid skin contact.

Select and use gloves and/or protective clothing to prevent skin contact based on the results of an exposure assessment. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible materials.

Gloves made from the following material(s) are recommended: Polyethylene/Ethylene Vinyl Alcohol

8.2.3 Respiratory Protection

Avoid breathing of vapors, mists or spray. Avoid breathing of dust created by cutting, sanding, grinding or machining.

Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: Half facepiece or fullface air-purifying respirator with P100 particulate filters

Half facepiece or fullface air-purifying respirator with P95 particulate filters

Half facepiece or fullface air-purifying respirator with N95 particulate filters

. Consult the current 3M Respiratory Selection Guide for additional information or call 1-800-243-4630 for 3M technical assistance.

8.2.4 Prevention of Swallowing

Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water.

8.3 EXPOSURE GUIDELINES

<u>Ingredient</u>	<u>Authority</u>	<u>Type</u>	<u>Limit</u>	<u>Additional Information</u>
KAOLIN	ACGIH	TWA, respirable fraction	2 mg/m ³	

SOURCE OF EXPOSURE LIMIT DATA:

ACGIH: American Conference of Governmental Industrial Hygienists

CMRG: Chemical Manufacturer Recommended Guideline

OSHA: Occupational Safety and Health Administration

AIHA: American Industrial Hygiene Association Workplace Environmental Exposure Level (WEEL)

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Specific Physical Form:	Viscous
Odor, Color, Grade:	white cream, very slight odor
General Physical Form:	Liquid
Autoignition temperature	<i>Not Applicable</i>
Flash Point	>=248 °C [<i>Test Method: Pensky-Martens Closed Cup</i>]
Flammable Limits - LEL	<i>Not Applicable</i>
Flammable Limits - UEL	<i>Not Applicable</i>

Boiling point	<i>Not Applicable</i>
Density	1.33 g/ml
Vapor Density	<i>Not Applicable</i>
Vapor Pressure	<=0.1 mmHg [@ 25 °C]
Specific Gravity	1.33 [<i>Ref Std: WATER=1</i>]
pH	<i>Not Applicable</i>
Melting point	<i>Not Applicable</i>
Solubility in Water	Nil
Evaporation rate	<i>Not Applicable</i>
Hazardous Air Pollutants	0 % weight
Kow - Oct/Water partition coef	<i>No Data Available</i>
VOC Less H2O & Exempt Solvents	0.8 g/l [<i>Test Method: tested per EPA method 24</i>]
VOC Less H2O & Exempt Solvents	< 12 g/l [<i>Test Method: tested per EPA method 24</i>] [<i>Details: when mixed as intended with Part A</i>]
Viscosity	100,000 centipoise

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable.

Materials and Conditions to Avoid:

10.1 Conditions to avoid

Heat is generated during cure. Do not cure a mass larger than 50 grams in a confined space to prevent a premature reaction (exotherm) with production of intense heat and smoke.

10.2 Materials to avoid

Strong acids
Strong oxidizing agents

Hazardous Polymerization: Hazardous polymerization will not occur.

Hazardous Decomposition or By-Products

<u>Substance</u>	<u>Condition</u>
Aldehydes	During Combustion
Carbon monoxide	During Combustion
Carbon dioxide	During Combustion
Ketones	During Combustion

SECTION 11: TOXICOLOGICAL INFORMATION

Please contact the address listed on the first page of the MSDS for Toxicological Information on this material and/or its components.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

Not determined.

CHEMICAL FATE INFORMATION

Not determined.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method: Dispose of completely cured (or polymerized) wastes in a sanitary landfill. As a disposal alternative, incinerate uncured product in an industrial or commercial incinerator in the presence of a combustible material.

EPA Hazardous Waste Number (RCRA): Not regulated

Since regulations vary, consult applicable regulations or authorities before disposal.

SECTION 14: TRANSPORT INFORMATION

Not regulated per U.S. DOT, IATA or IMO.

*These transportation classifications are provided as a customer service. As the shipper YOU remain responsible for complying with all applicable laws and regulations, including proper transportation classification and packaging. 3M's transportation classifications are based on product formulation, packaging, 3M policies and 3M's understanding of applicable current regulations. 3M does not guarantee the accuracy of this classification information. This information applies only to transportation classification and **not the packaging, labeling, or marking requirements**. The original 3M package is certified for U.S. ground shipment only. If you are shipping by air or ocean, the package may not meet applicable regulatory requirements.*

SECTION 15: REGULATORY INFORMATION

US FEDERAL REGULATIONS

Contact 3M for more information.

311/312 Hazard Categories:

Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No Immediate Hazard - Yes Delayed Hazard - Yes

STATE REGULATIONS

Contact 3M for more information.

CHEMICAL INVENTORIES

The components of this product are in compliance with the chemical notification requirements of TSCA.

All applicable chemical ingredients in this material are listed on the European Inventory of Existing Chemical Substances (EINECS), or are exempt polymers whose monomers are listed on EINECS.

Contact 3M for more information.

INTERNATIONAL REGULATIONS

Contact 3M for more information.

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: OTHER INFORMATION

NFPA Hazard Classification

Health: 2 Flammability: 0 Reactivity: 1 Special Hazards: None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

Revision Changes:

Copyright was modified.

Section 3: Potential effects from skin contact information was modified.

Section 3: Potential effects from inhalation information was modified.

Section 7: Handling information was modified.

Section 8: Engineering controls information was modified.

Section 8: Respiratory protection information was modified.

Section 8: Eye/face protection information was modified.

Section 8: Skin protection - recommended gloves information was modified.

Section 8: Respiratory protection - recommended respirators information was modified.

Section 4: First aid for inhalation - termination of exposure - was modified.

Section 4: First aid for inhalation - medical assistance - was modified.

Section 14: Transportation legal text was modified.

Section 15: 311/312 Delayed Hazard score was modified.

Section 9: Property description for optional properties was modified.

Section 2: Ingredient table was added.
Section 8: Exposure guidelines ingredient information was added.
Section 8: Exposure guidelines data source legend was added.
Section 10.1 Conditions to avoid heading was added.
Section 10.2 Materials to avoid heading was added.
Section 6: Personal precautions information was added.
Section 6: Environmental procedures information was added.
Section 6: Methods for cleaning up information was added.
Section 10: Materials to avoid physical property was added.
Section 10: Conditions to avoid physical property was added.
Section 6: Release measures information was deleted.
Section 10: Materials and conditions to avoid physical property was deleted.

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Material Safety Data Sheet

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SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: 3M(TM) Scotch-Weld(TM) Epoxy Adhesive DP-190, Gray (Part A)
MANUFACTURER: 3M
DIVISION: Industrial Adhesives and Tapes Division
ADDRESS: 3M Center
 St. Paul, MN 55144-1000

EMERGENCY PHONE: 1-800-364-3577 or (651) 737-6501 (24 hours)

Issue Date: 02/14/2007
Supercedes Date: 10/24/2005

Document Group: 10-3349-7

Product Use:

Specific Use: Part A of 2-Part Epoxy Adhesive
Intended Use: Structural adhesive

SECTION 2: INGREDIENTS

<u>Ingredient</u>	<u>C.A.S. No.</u>	<u>% by Wt</u>
ALIPHATIC POLYMER DIAMINE	68911-25-1	40 - 70
KAOLIN	1332-58-7	15 - 40
4,7,10-TRIOXATRIDECANE-1,13-DIAMINE	4246-51-9	7 - 13
TOLUENE	108-88-3	< 0.7

SECTION 3: HAZARDS IDENTIFICATION

3.1 EMERGENCY OVERVIEW

Specific Physical Form: Viscous Liquid

Odor, Color, Grade: gray, amine odor

General Physical Form: Liquid

Immediate health, physical, and environmental hazards: May cause chemical eye burns. May cause allergic skin reaction.
 May cause severe skin irritation. Contains a chemical or chemicals which can cause birth defects or other reproductive harm.

3.2 POTENTIAL HEALTH EFFECTS

Eye Contact:

Corrosive (Eye Burns): Signs/symptoms may include cloudy appearance of the cornea, chemical burns, severe pain, tearing, ulcerations, significantly impaired vision or complete loss of vision.

Vapors released during curing may cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Dust created by cutting, grinding, sanding, or machining may cause eye irritation. Signs/symptoms may include redness, swelling, pain, tearing, and blurred or hazy vision.

Skin Contact:

Severe Skin Irritation: Signs/symptoms may include localized redness, swelling, itching, dryness, cracking, blistering, and pain.

Prolonged or repeated exposure may cause:

Allergic Skin Reaction (non-photo induced): Signs/symptoms may include redness, swelling, blistering, and itching.

May be absorbed through skin and cause target organ effects.

Inhalation:

Vapors released during curing may cause irritation of the respiratory system. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

Dust from cutting, grinding, sanding or machining may cause irritation of the respiratory system. Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

May be absorbed following inhalation and cause target organ effects.

Ingestion:

Gastrointestinal Irritation: Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

May be absorbed following ingestion and cause target organ effects.

Target Organ Effects:

Contains a chemical or chemicals which can cause birth defects or other reproductive harm.

SECTION 4: FIRST AID MEASURES

4.1 FIRST AID PROCEDURES

The following first aid recommendations are based on an assumption that appropriate personal and industrial hygiene practices are followed.

Eye Contact: Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

Skin Contact: Remove contaminated clothing and shoes. Immediately flush skin with large amounts of water. Get medical attention. Wash contaminated clothing and clean shoes before reuse.

Inhalation: If signs/symptoms develop, remove person to fresh air. If signs/symptoms persist, get medical attention.

If Swallowed: Do not induce vomiting unless instructed to do so by medical personnel. Give victim two glasses of water. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

Autoignition temperature	No Data Available
Flash Point	≥ 94 °C [Test Method: Closed Cup]
Flammable Limits - LEL	No Data Available
Flammable Limits - UEL	No Data Available
OSHA Flammability Classification:	Class IIIB Combustible Liquid

5.2 EXTINGUISHING MEDIA

Material will not burn. Ordinary combustible material. Use fire extinguishers with class A extinguishing agents (e.g., water, foam). Use fire extinguishers with class B extinguishing agents (e.g., dry chemical, carbon dioxide).

5.3 PROTECTION OF FIRE FIGHTERS

Special Fire Fighting Procedures: Water may be used to blanket the fire. Wear full protective equipment (Bunker Gear) and a self-contained breathing apparatus (SCBA).

Unusual Fire and Explosion Hazards: No unusual fire or explosion hazards are anticipated.

Note: See STABILITY AND REACTIVITY (SECTION 10) for hazardous combustion and thermal decomposition information.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Accidental Release Measures: Observe precautions from other sections. Call 3M- HELPS line (1-800-364-3577) for more information on handling and managing the spill. Ventilate the area with fresh air. Contain spill. Collect as much of the spilled material as possible. Place in a closed container approved for transportation by appropriate authorities.

In the event of a release of this material, the user should determine if the release qualifies as reportable according to local, state, and federal regulations.

SECTION 7: HANDLING AND STORAGE

7.1 HANDLING

Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Avoid breathing of dust created by cutting, sanding, grinding or machining. For industrial or professional use only. Keep out of the reach of children. Avoid eye contact. Avoid skin contact. Keep container closed when not in use.

7.2 STORAGE

Store away from heat. Keep container in well-ventilated area. Keep container tightly closed.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 ENGINEERING CONTROLS

Not applicable. Provide appropriate local exhaust for cutting, grinding, sanding or machining. Use in a well-ventilated area. Provide ventilated enclosure for heat curing.

8.2 PERSONAL PROTECTIVE EQUIPMENT (PPE)

8.2.1 Eye/Face Protection

Avoid eye contact.

The following eye protection(s) are recommended: Safety Glasses with side shields, Indirect Vented Goggles.

8.2.2 Skin Protection

Avoid skin contact.

Select and use gloves and/or protective clothing to prevent skin contact based on the results of an exposure assessment. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible materials.

Gloves made from the following material(s) are recommended: Polyethylene/Ethylene Vinyl Alcohol.

8.2.3 Respiratory Protection

Avoid breathing of dust created by cutting, sanding, grinding or machining.

Select one of the following NIOSH approved respirators based on airborne concentration of contaminants and in accordance with OSHA regulations: Half facepiece or fullface air-purifying respirator with P100 particulate filters, Half facepiece or fullface air-purifying respirator with P95 particulate filters, Half facepiece or fullface air-purifying respirator with N95 particulate filters.

Consult the current 3M Respiratory Selection Guide for additional information or call 1-800-243-4630 for 3M technical assistance.

8.2.4 Prevention of Swallowing

Do not eat, drink or smoke when using this product. Wash exposed areas thoroughly with soap and water. Not applicable. Do not ingest. Wash hands after handling and before eating.

8.3 EXPOSURE GUIDELINES

<u>Ingredient</u>	<u>Authority</u>	<u>Type</u>	<u>Limit</u>	<u>Additional Information</u>
KAOLIN	ACGIH	TWA, respirable	2 mg/m3	Table A4
KAOLIN	OSHA	TWA, respirable	5 mg/m3	Table Z-1
KAOLIN	OSHA	TWA, Vacated, as dust	10 mg/m3	
KAOLIN	OSHA	TWA, as total dust	15 mg/m3	Table Z-1
TOLUENE	ACGIH	TWA	50 ppm	Skin Notation*; Table A4
TOLUENE	CMRG	STEL	75 ppm	Skin Notation*
TOLUENE	OSHA	TWA, Vacated	100 ppm	
TOLUENE	OSHA	STEL, Vacated	150 ppm	
TOLUENE	OSHA	TWA	200 ppm	Table Z-2
TOLUENE	OSHA	CEIL	300 ppm	Table Z-2

* Substance(s) refer to the potential contribution to the overall exposure by the cutaneous route including mucous membrane and eye, either by airborne or, more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

VAC Vacated PEL: Vacated Permissible Exposure Limits [PEL] are enforced as the OSHA PEL in some states. Check with your local regulatory agency.

SOURCE OF EXPOSURE LIMIT DATA:

ACGIH: American Conference of Governmental Industrial Hygienists

CMRG: Chemical Manufacturer Recommended Guideline

OSHA: Occupational Safety and Health Administration

AIHA: American Industrial Hygiene Association Workplace Environmental Exposure Level (WEEL)

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Specific Physical Form:	Viscous Liquid
Odor, Color, Grade:	gray, amine odor
General Physical Form:	Liquid
Autoignition temperature	<i>No Data Available</i>
Flash Point	>=94 °C [<i>Test Method:</i> Closed Cup]
Flammable Limits - LEL	<i>No Data Available</i>
Flammable Limits - UEL	<i>No Data Available</i>
Boiling point	>=250 °F
Density	1.26 g/ml [<i>@ 20 °C</i>]
Vapor Density	<i>Not Applicable</i>
Specific Gravity	1.26 [<i>Ref Std:</i> WATER=1]
pH	<i>Not Applicable</i>
Melting point	<i>Not Applicable</i>
Solubility in Water	Nil
Evaporation rate	Negligible
Volatile Organic Compounds	43 g/l [<i>Test Method:</i> tested per EPA method 24]
Percent volatile	0.00 % weight
VOC Less H2O & Exempt Solvents	43 g/l [<i>Test Method:</i> tested per EPA method 24]
Viscosity	40,000 - 65,000 centipoise [<i>@ 75 °F</i>] [<i>Test Method:</i> Brookfield]

SECTION 10: STABILITY AND REACTIVITY

Stability: Stable.

Materials and Conditions to Avoid: Heat is generated during cure. Do not cure a mass larger than 50 grams in a confined space to prevent a premature reaction (exotherm) with production of intense heat and smoke.

Hazardous Polymerization: Hazardous polymerization will not occur.

Hazardous Decomposition or By-Products

<u>Substance</u>	<u>Condition</u>
Amine Compounds	During Combustion
Carbon monoxide	During Combustion
Carbon dioxide	During Combustion
Oxides of Nitrogen	During Combustion
Toxic Vapor, Gas, Particulate	During Combustion

SECTION 11: TOXICOLOGICAL INFORMATION

Please contact the address listed on the first page of the MSDS for Toxicological Information on this material and/or its components.

SECTION 12: ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

Not determined.

CHEMICAL FATE INFORMATION

Not determined.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal Method: Dispose of completely cured (or polymerized) wastes in a sanitary landfill. As a disposal alternative, incinerate uncured product in an industrial or commercial incinerator in the presence of a combustible material.

EPA Hazardous Waste Number (RCRA): Not regulated

Since regulations vary, consult applicable regulations or authorities before disposal.

SECTION 14: TRANSPORT INFORMATION

Not regulated per U.S. DOT, IATA or IMO.

*These transportation classifications are provided as a customer service. As the shipper YOU remain responsible for complying with all applicable laws and regulations, including proper transportation classification and packaging. 3M's transportation classifications are based on product formulation, packaging, 3M policies and 3M's understanding of applicable current regulations. 3M does not guarantee the accuracy of this classification information. This information applies only to transportation classification and **not the packaging, labeling, or marking requirements**. The original 3M package is certified for U.S. ground shipment only. If you are shipping by air or ocean, the package may not meet applicable regulatory requirements.*

SECTION 15: REGULATORY INFORMATION

US FEDERAL REGULATIONS

Contact 3M for more information.

311/312 Hazard Categories:

Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No Immediate Hazard - Yes Delayed Hazard - Yes

STATE REGULATIONS

Contact 3M for more information.

CALIFORNIA PROPOSITION 65

Ingredient
TOLUENE

C.A.S. No.
108-88-3

Classification
*Developmental Toxin

* WARNING: contains a chemical or chemicals which can cause birth defects or other reproductive harm.

CHEMICAL INVENTORIES

The components of this product are in compliance with the chemical notification requirements of TSCA.

All applicable chemical ingredients in this material are listed on the European Inventory of Existing Chemical Substances (EINECS), or are exempt polymers whose monomers are listed on EINECS.

Contact 3M for more information.

INTERNATIONAL REGULATIONS

Contact 3M for more information.

This MSDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: OTHER INFORMATION

NFPA Hazard Classification

Health: 3 **Flammability:** 0 **Reactivity:** 1 **Special Hazards:** None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

Revision Changes:

Section 1: Product use information was modified.

Section 1: Division name was modified.

Copyright was modified.

Section 3: Potential effects from skin contact information was modified.

Section 3: Potential effects from inhalation information was modified.

Section 3: Potential effects from ingestion information was modified.

Section 5: Unusual fire and explosion hazard information was modified.

Section 7: Handling information was modified.

Section 7: Storage information was modified.

Section 8: Engineering controls information was modified.
Section 8: Respiratory protection information was modified.
Section 8: Prevention of swallowing information was modified.
Section 10: Hazardous decomposition or by-products table was modified.
Section 4: First aid for inhalation - termination of exposure - was modified.
Section 4: First aid for inhalation - medical assistance - was modified.
Section 4: First aid for ingestion (swallowing) - decontamination - was modified.
Section 4: First aid for ingestion (swallowing) - medical assistance - was modified.
Section 2: Ingredient table was modified.
Section 15: 311/312 Delayed Hazard score was modified.
Section 8: Exposure guidelines ingredient information was modified.
Section 9: Density information was modified.
Section 9: Boiling point information was modified.
Sections 3 and 9: Specific physical form information was modified.
Section 5: Flammable limits (UE) information was modified.
Section 5: Flammable limits (LEL) information was modified.
Section 5: Autoignition temperature information was modified.
Section 9: Property description for optional properties was modified.
Section 9: Flammable limits (LEL) information was modified.
Section 9: Flammable limits (UEL) information was modified.
Section 9: Autoignition temperature information was modified.
Section 3: Other potential health effects heading was added.
Section 5: OSHA flammability heading was added.
Section 5: OSHA flammability data was added.
Section 3: Immediate other hazard(s) was added.
Section 15: California proposition 65 ingredient information was added.
Section 15: California proposition 65 heading was added.
Section 15: California proposition 65 reproductive harm warning was added.
Section 8: Exposure guideline note was added.
Section 3: Other health effects information (reproductive hazards) was added.

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