

3M

Scotch-Weld™

Epoxy Adhesive/Coating

2290

Technical Data

July, 2011

Product Description

3M™ Scotch-Weld™ Epoxy Adhesive/Coating 2290 is an amber tinted thermo-setting adhesive/coating for metal to metal bonding and coating. It can be used to assemble laminated steel cores for electrical motor stators and rotors, to adhere copper foil to B-staged epoxy in the manufacture of printed circuits, and to coat, protect, and utilize coils and electronic subassemblies.

Features

- Offers exceptionally high shear and peel strength properties.
- One-part formula; no premixing required.
- Dries to a tack-free film. Bonds can be made up to 3 months later.
- Excellent wetting during cure – only one surface need be coated.
- Requires only sufficient pressure to keep bonded parts dimensionally stable.

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Epoxy Adhesive/Coating
 2290

Typical Uncured Properties

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

Physical

Color	Light Amber
Viscosity	40-80 centipoise
Solids Content	19.5-23% by weight
Base	Epoxy resin
Solvent	Methyl Ethyl Ketone (MEK) Tetrahydrofuran
Net Weight	7.2-7.6 lbs/gal
Flash Point	6°F [-14°C)] (c.c.)

Electrical

Dielectric Constant	5.2 (1 Kz @ 23°C)
Dielectric Strength	2400 volts/mil
Dissipation Factor	.011 (1 Kz @ 23°)
Volume Resistivity	1.2 x 10 ¹⁵ ohm-cm @ 23°C

Thermal

Glass Transition Temperature	203°F (95°C)
Coefficient of Thermal Expansion	262 x 10 ⁻⁶ in./in./°C between -20 to +70°C 543 x 10 ⁻⁶ in./in./°C between +100 to +120°C

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Handling/Curing Information

Adhesive Application:

3M™ Scotch-Weld™ Epoxy/Adhesive Coating 2290 can be applied by brushing, flow coating, dip coating, roll coating, knife coating and spraying. For spray application, use a DeVilbiss JGA-70-FX spray gun or equivalent applicator. The atomizing air should be approximately 30 psi.

Apply the adhesive at a dry film thickness of 1 mil if coating only one surface. If coating two surfaces, apply a 0.5 mil dry film to each surface. For film thickness less than 1 mil, it may be necessary to dilute Scotch-Weld 2290.

For dilution, a 4 parts by weight methyl ethyl ketone to 1 part by weight tetrahydrofuran solution should be made. (A dilution of 1 part of this solution to 1 part of Scotch-Weld 2290 will give a dried film thickness of approximately 0.5 mil). Coverage per 1 mil dry film thickness is approximately 300 sq. ft./gal.

Adhesive B Stage Cycles:

Scotch-Weld 2290 will air dry to a tack free coating in approximately 10-15 minutes @ 75°F (24°C). However, for optimum performance the drying time at 75°F (24°C) should be followed by any of the B stage cycles below:

<u>Temperature</u>	<u>Time</u>
200°F (93°C)	45 minutes
250°F (121°C)	30 minutes
300°F (149°C)	10 minutes

After B-staging, Scotch-Weld 2290 need not be cured immediately. Protect the coated surface from contamination introduced by dust, fingerprints, oil, etc. Wrapping in unplasticized Kraft paper is generally satisfactory. Storage for 2-3 months is permissible.

Cure Cycle

Curing is accomplished with heat. Scotch-Weld 2290 must reach a minimum of 335°F (168°C) for curing to be initiated. A curing temperature of 350°F (177°C) for 30-60 minutes under a pressure of 75 psi is suggested for optimum results. Allow time for the bond lines to reach the cure temperature before timing the cycle. With experimentation and evaluation by the user, lower pressure and/or higher temperature cures for shorter times can be used to make satisfactory bonds depending upon the end use requirements of each individual application.

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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. The amount of surface preparation depends on the required bond strength and the environmental aging resistance desired by 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.

Aluminum:

1. Vapor Degrease: Perchloroethylene condensing vapors for 5-10 minutes.*
2. 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.
3. Acid Etch: Place panels in the following solution for 10 minutes at 150°F ± 5°F (66°C ± 2°C).

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	Balance of Volume

Note: Review and follow component supplier's environmental health and safety information prior to preparation of this etch solution.

4. Rinse: Rinse panels in clear running tap water.
5. Dry: Air dry 15 minutes; force dry 10 minutes at 150°F ± 5°F (66°C ± 2°C).

Plastics/Rubbers:

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

Glass:

1. Solvent wipe surface using acetone or methyl ethyl ketone (MEK)*
2. Apply a thin coating (0.1 mils or less) or primer such as 3M™ Scotch-Weld™ Primer EC-3901 to the glass surfaces to be bonded and allow the primer to dry before bonding.

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

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**Typical Adhesive
 Performance
 Characteristics**

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Metal to Metal Structural Applications

The following typical product performance data has been obtained in the 3M Laboratory under the conditions specified. All data reported in this section were developed under a cure cycle using 75 psi bonding pressure applied by a platen press and a 60 minute, 350°F (177°C) cure cycle.

Overlap Shear Strength

Tests were conducted in accordance with ASTM D-1002 methods. Properties were measured on 1" wide x 1/2" overlap specimens cut from 0.063" thick 4" x 7" bonded panels of 2024 T-3 clad aluminum. The aluminum surface was cleaned using the procedure described in the "Surface Preparation" section.

Test Temperature	Shear Strength (psi)
-67°F (-55°C)	5000
75°F (24°C)	5000
180°F (82°C)	3500
250°F (120°C)	1200
300°F (150°C)	300

T-Peel Strength

Tests were performed per ASTM D-1876. Test samples were 1" wide, 2024 T-3 clad, .032" thick aluminum. The aluminum surface was cleaned using the procedure described in the "Surface Preparation" section.

Test Temperature	Peel Strength
75°F (24°C)	10 lbs/inch width

Environmental Aging

Overlap shear strength (psi) after environmental aging. Aluminum to aluminum (ASTM D-1002-72).

Tap Water 30 days @ 75°F (24°C)	20% Salt Spray 30 days @ 95°F (35°C)	Hydraulic Oil 7 days @ 75°F (24°C)	Aromatic Fuels 7 days @ 75°F (24°C)
5000	5000	5000	5000

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Storage and Handling Store products at 60-80°F (15-27°C) for maximum storage life. 3M™ Scotch-Weld™ Epoxy Adhesive/Coating 2290 will have a shelf life of 15 months from the date of shipment from 3M in unopened containers. Rotate stock on a “first in-first-out” basis.

Precautionary Information Refer to Product Label and Material Safety Data Sheet for Health and Safety Information before using this product.

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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