3M Science. Applied to Life.™

English-US

Last Revision Date: June, 2024

Supersedes: May, 2022

Technical Data Sheet

3M™ Scotch-Weld™ Epoxy Adhesive 2214 Hi-Temp New Formula

Product Details

Regulatory Info/SDS

Product Description

• One part 250°F (121°C) curing 100% solids, 3M™ Scotch-Weld™ Epoxy Adhesive 2214 is a paste consistency epoxy adhesive designed for bonding metals and many high temperature plastics such as fiberglass reinforced plastic, polyester, and phenolics.
• 3M™ Scotch-Weld™ Adhesive 2214 Hi-Temp New Formula is an aluminum filled, deaerated product for use where higher strengths are required between 180°F to 350°F (82°C to 177°C).

Technical Information Note

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

Typical Uncured Physical Properties

Attribute Name	Value
Color	Gray Brown [1]
Viscosity	100 — 250 s [2]
Viscosity	>1,000,000 cP [3]
Net Weight	13.8 lb/gal
Base	Modified Epoxy

[1] Colors may vary from nearly white to yellow/amber. Adhesive performance is not affected by color variation.
[2] Time to deliver 20 gms@ 50 psi thru a 0.10in orifice
[3] Because of Thixotropic paste nature of these products Brookfield viscosity will be over 1,000,000 cps.

Typical Mixed Physical Properties

Temperature: 121 °C (250 °F)

Attribute Name	Value
Time to Full Cure	60 min

Typical Physical Properties

Attribute Name	Value
Cured Color	Gray Brown

Typical Cured Characteristics

Temperature: 22 °C (72 °F)

Attribute Name	Test Method	Value
Shore D Hardness	ASTM D2240	85 [1]

[1] Tensile and Elongation. Samples were 51 mm (2") dumbbells with 3 mm (0.125") neck and 0.8 mm (0.03" sample thickness. Separation rate was 51 mm/min (2"/min)

Typical Performance Characteristics

Substrate: Cold Rolled Steel
Surface Prep: MEK/Abrade/MEK
Temperature: 22 °C (72 °F)
Dwell Time: 7 d

Attribute Name	Test Method	Value
Overlap Shear Strength	ASTM D1002, ISO 4587	2,500 lb/in² [1]

[1] 25 mm (1") wide, 12.7 mm (1/2") overlap samples, 25 mm (1") x 102 mm (4") substrates, Separation rate 2.5 mm/min (0.1 in/min) metal, 51 mm/min (2 in/min) plastic, 510 mm/min (20 in/min) rubber. Cohesive Failure (CF), Adhesive Failure (AF), Mixed Failure (MF), Substrate Failure (SF)

T-Peel Adhesion

Temperature: 22 °C (72 °F)
Test Method: ASTM D1876

Substrate	Surface Prep	Value
Aluminum		2 lb/in width [1]
Steel	MEK Wipe	5 lb/in width [2]

[1] 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 note of the testing jaws was 20 in./minute.

[2] T-Peel bonds were measured on two 1" wide x 8" long specimens bonded together. After bonding they were then pulled apart in 180° Peel at a jaw separation rate of 20"/minute rate.

Attribute Name	Value
Elongation at Break	1 %

Electrical and Thermal Properties

Attribute Name	Test Condition	Value
Coefficient of Thermal Expansion	-60°C ~ 80°C	44 x 10^{-6} m/m/°C
Thermal Conductivity		0.244 (btu-ft)/(h-ft²-°F)

Handling/Application Information

Directions for Use

CAUTION: Use caution if your bond line is thicker than 1 mm as an exothermic reaction may occur during cure with production of intense heat and smoke. The likelihood of this happening depends on your joint design, the mass of material cured, and the ability for heat to be dissipated by the substrates.

1. Warm products to room temperature before opening containers to restore proper application consistency and to prevent moisture condensation on adhesive surface. Containers may be stored at room temperature for 1-2 days to thaw. Do not warm at temperatures above 80°F (27°C).

2. 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 directly depends on the substrates, the required bond strength, environmental aging resistance, and requirements determined by the user in light of the user's particular purpose and method of application. For specific surface preparations on common substrates, see the section on surface preparation.

3. Use gloves to minimize skin contact and do not use solvents for cleaning hands.

4. For maximum bond strength, apply product evenly to both surfaces to be joined.

5. Join the adhesive coated surfaces and heat cure using the appropriate bondline temperature and time for the specific product being used.

6. Keep parts from moving during cure as contact pressure is necessary.

7. Cleanup can be accomplished with solvent such as 3M™ Scotch-Grip™ Solvent No. 3 or Methyl Ethyl Ketone.*
*Note: Prior to use of these solvents, extinguish or eliminate any ignition sources and read and follow supplier's environmental, health, and safety recommendations listed on the MSDS and product label.

Surface Preparation

The following cleaning methods are suggested for common surfaces:
Steel:
1. Wipe free of dust with oil-free solvent such as Methyl Ethyl Ketone.*
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 (87°C ± 5°C) for 10-20 minutes. Rinse immediately in large quantities of cold running water.
3. Acid (FPL) Etch – Place panels in their 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 as needed to balance
4. Rinse – Rinse panels in clear running tap water.
5. Dry – Air dry 15 minutes; force dry 10 minutes at 150°F ± 10°F (66°C ± 5°C).
6. If primer is to be used, it should be applied within 4 hours after surface preparation.
Plastics:
1. Solvent wipe with Isopropyl Alcohol.*
2. Abrade using clean fine grit abrasives.
3. Solvent wipe with Isopropyl Alcohol.*
Rubbers:
1. Solvent wipe with Methyl Ethyl Ketone.*
2. Abrade using clean fine grit abrasives.
3. Solvent wipe with Methyl Ethyl Ketone.*
Glass:
1. Solvent wipe with acetone or Methyl Ethyl Ketone.*
Note: For glass applications which will be subjected to high moisture/humidity conditions, 3M™ Scotch-Weld™ Primer EC-3901 should be used to prime the glass.
***Note:**Prior to use of these solvents, extinguish or eliminate any ignition sources and read and follow supplier's environmental, health, and safety recommendations listed on the MSDS and product label.

Application Equipment

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

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 most applications. For more information, contact your local 3M sales representative.

Note: Minimum pumping temperature is 65°F (18°C) for all products.

3M™ Scotch-Weld™ Epoxy Adhesive 2214 Regular Production Extrusion Equipment
• Pump: Ratio 55:1 with a chopping check valve and priming piston, 8 in. air motor. 3.7in³ cycle
• Ram: Pneumatic type capacity-12 psi on material surface
• Hose: Super high pressure with standard lining
• Flow Gun: High pressure type

Output based on 1/4 in tip flow gun (material temperature 65°F [18°C]) (minimum pumping temperature is 65°F [18°C])
Hose Assembly Material Pressure (psi) (Output lb/min)
Length-20', I.D.-1/2 in 4800* .36
Length-20', I.D.-3/4 in 4800* 1.0

3M™ Scotch-Weld™ Epoxy Adhesive 2214 Non-Metallic Filled Production Extrusion Equipment
• Pump: Ratio 38:1 with a chopping check valve and priming piston
• Ram: Pneumatic type capacity-10 psi on material surface
• Hose: Super high pressure with standard lining
• Flow Gun: High pressure type

Output based on 1/4 in tip flow gun (material temperature 65°F [18°C]) (minimum pumping temperature is 65°F [18°C])
Hose Assembly Material Pressure (psi) (Output lb/min)
Length-10', I.D.-3/4 in 3000 2.3
Length-20', I.D.-3/4 in 3000 1.6
Length-20', I.D.-3/4 in
+10, I.D.-1/2 in 3000 1.2
Length-20', I.D.-1/2 in 3000 0.84

3M™ Scotch-Weld™ Epoxy Adhesive 2214 Hi-Temp Production Extrusion Equipment
• Pump: Ratio 40:1 with a chopping check valve and priming piston, 6 in. air motor. 2in³/cycle
• Ram: Pneumatic type capacity-12 psi on material surface
• Hose: Super high pressure with standard lining
• Flow Gun: High pressure type

Output based on 1/4 in tip flow gun (material temperature 65°F [18°C])

Hose Assembly Material Pressure (psi) (Output lb/min)
Length-20', I.D.-1/2 in 2400 0.4
Length-20', I.D.-3/4 in 2400 1.1

3M™ Scotch-Weld™ Epoxy Adhesive 2214 Hi-Dense Production Extrusion Equipment
• Pump: Ratio 55:1 with a chopping check valve and priming piston, 8 in. air motor. 3.7in³/cycle
• Ram: Pneumatic type capacity-12 psi on material surface
• Hose: Super high pressure with standard lining
• Flow Gun: High pressure type

Output based on 1/4 in tip flow gun (material temperature 65°F [18°C]) (minimum pumping temperature is 65°F [18°C])
Hose Assembly Material Pressure (psi) (Output lb/min)
Length-20', I.D.-1/2 in 4500* 0.45
Length-20', I.D.-3/4 in 4500* 0.9

3M™ Scotch-Weld™ Epoxy Adhesive 2214 Hi-Temp New Formula Production Extrusion Equipment
• Pump: Ratio 55:1 with a chopping check valve and priming piston, 8 in. air motor. 3.7in³/cycle
• Ram: Pneumatic type capacity-12 psi on material surface
• Hose: Super high pressure with standard lining
• Flow Gun: High pressure type

Output based on 1/4 in tip flow gun (material temperature 65°F [18°C]) (minimum pumping temperature is 65°F [18°C])
Hose Assembly Material Pressure (psi) (Output lb/min)
Length-20', I.D.-1/2 in 4800* 0.36
Length-20', I.D.-3/4 in 4800* 1.0

*These pressures will require a special consideration during hose selection. They are actual working pressures.

Storage and Shelf Life

Store products at 4°C (40°F) or below for maximum storage life. Higher temperatures reduce normal storage life. **CAUTION: Products are heat sensitive. Storage above 54°C (130°F) may cause an exothermic reaction resulting in evolution of excessive heat, noxious fumes, and possibly fire. All of these products have a shelf life of 12 months from the date of manufacture when stored in their unopened containers at 4°C (40°F) or below, or 18 months at -20°C (0°F) or below.**

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

Automotive Disclaimer

Select Automotive Applications:
This product is an industrial product and has not been designed or tested for use in certain automotive applications, such as automotive electric powertrain battery or high voltage applications, which may require the product to be manufactured in a IATF certified facility, meet a Ppk of 1.33 for all properties, undergo an automotive production part approval process (PPAP), or fully adhere to automotive design or quality system requirements (e.g., IATF 16949 or VDA 6.3). Customer assumes all responsibility and risk if customer chooses to use this product in these applications.

Information

Technical Information: The technical information, guidance, and other statements contained in this document or otherwise provided by 3M are based upon records, tests, or experience that 3M believes to be reliable, but the accuracy, completeness, and representative nature of such information is not guaranteed. Such information is intended for people with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license under any 3M or third party intellectual property rights is granted or implied with this information.

Product Selection and Use: Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. As a result, customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment and reviewing all applicable regulations and standards (e.g., OSHA, ANSI, etc.). Failure to properly evaluate, select, and use a 3M product and appropriate safety products, or to meet all applicable safety regulations, may result in injury, sickness, death, and/or harm to property.

Warranty, Limited Remedy, and Disclaimer: Unless a different warranty is specifically stated on the applicable 3M product packaging or product literature (in which case such warranty governs), 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ARISING OUT OF A COURSE OF DEALING, CUSTOM, OR USAGE OF TRADE. If a 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.

Limitation of Liability: Except for the limited remedy stated above, and except to the extent prohibited by law, 3M will not be liable for any loss or damage arising from or related to the 3M product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability.

Disclaimer: 3M industrial and occupational products are intended, labeled, and packaged for sale to trained industrial and occupational customers for workplace use. Unless specifically stated otherwise on the applicable product packaging or literature, these products are not intended, labeled, or packaged for sale to or use by consumers (e.g., for home, personal, primary or secondary school, recreational/sporting, or other uses not described in the applicable product packaging or literature), and must be selected and used in compliance with applicable health and safety regulations and standards

(e.g., U.S. OSHA, ANSI), as well as all product literature, user instructions, warnings, and limitations, and the user must take any action required under any recall, field action or other product use notice. Misuse of 3M industrial and occupational products may result in injury, sickness, or death. For help with product selection and use, consult your on-site safety professional, industrial hygienist, or other subject matter expert. For additional product information, visit www.3M.com.

ISO Statement

This product was manufactured under a 3M quality system registered to ISO 9001 standards.

3M™ Industrial Adhesives and Tapes Division
3M Center, St. Paul, MN 55144-1000
3M.com/iatd