



Scotch-Weld™

Polyurethane Reactive Adhesives

TE031 • TE040 • TS115 HGS • TS230

Technical Data

May, 2006

Product Description

3M™ Scotch-Weld™ Polyurethane Reactive Adhesives are a family of one-component, moisture curing, urethane adhesives. These adhesives are applied warm and bond a wide variety of substrates such as wood, fiber reinforced plastic (FRP) and many other **plastics** to themselves, to metal and to glass.

3M™ Scotch-Weld™ TE031

Extrudable grade with fast set time ideal for bonding a wide variety of **plastics** including polystyrene and polyacrylic.

3M™ Scotch-Weld™ TE040

Low viscosity adhesive has a fast set time and is ideal for bonding most wood, **plastics**, metal and glass.

3M™ Scotch-Weld™ TS115 HGS

Applied warm and can bond a variety of substrates such as wood, fiber reinforced plastic (FRP) and many other **plastics** to themselves, to metal, and to glass.

3M™ Scotch-Weld™ TS230

Sprayable/extrudable grade with long set time ideal for bonding a wide variety of **plastics** including polystyrene and polyacrylic. Bonds aluminum and glass to plastic and wood.

Features

- 100% solids
- Rapid rate of strength build-up
- Broad substrate adhesion
- Highly plasticizer resistant
- High strength bonds
- One component
- Various set times
- Can be used to bond heat sensitive materials

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.

	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
	TE031	TE040	TS115 HGS	TS230
Application Temperature	250°F (121°C)	250°F (121°C)	250°F (121°C)	250°F (121°C)
Viscosity (@250°F/121°C) ¹	13,000 cps	7,000 cps	16,000 cps	9,000 cps
Color (solid)	White/Off-White	White/Off-White	White/Off-White	White/Off-White
Open Time ^{2,4}	2 minutes	2 minutes	10 minutes	4 minutes
Set Time ^{3,4}	30 seconds	40 seconds	1 minute	2.5 minutes
Density, Lbs/Gallon (molten)	8.7	8.9	9.0	9.1

¹Measured on Brookfield viscometer with Thermosel using spindle #27.

²The bonding range of a 1/8" bead of molten adhesive on a non-metallic substrate.

³The minimum amount of time required between when the bond is made and when it will support a 5 psi tensile load.

⁴Open times and set times are based on a room temperature environment. High temperatures will lengthen open times and set times while lower environmental temperatures will shorten open times and set times.

Scotch-Weld™

Polyurethane Reactive Adhesives

TE031 • TE040 • TS115 HGS • TS230

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.

Property	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
	TE031	TE040	TS115 HGS	TS230
Shore D Hardness ¹	50	35	47	45
Modulus ²	5,600 psi	2,850 psi	3,300 psi	5,400 psi
Tensile Strength @ Break ²	3,900 psi	2,750 psi	3,200 psi	3,300 psi
Elongation @ Break ²	725%	860%	600%	700%

¹Measured on .090" - .110" thick bars

²ASTM D 638, Die C, measured on .011" - .017" thick films cured 7 days at 77°F (25°C)/50% relative humidity (RH)

Handling/Curing Information

Directions for Use

Apply to clean, dry surfaces. Remove oil, grease and other contaminants by wiping with isopropyl alcohol.* For fiber reinforced plastics and other materials that are often contaminated with mold release agents, it is recommended that the surface be solvent wiped, abraded and solvent-wiped.* For additional information, see section on surface preparation. After heating to recommended application temperature, apply adequate amount of 3M™ Scotch-Weld™ Polyurethane Reactive Adhesive to one of the substrates to be bonded. Join the substrates within the adhesives specified open time and hold/fixture the bonded part until the adhesive has adequately set. Do not use to bond metal or glass to itself or each other or cure will not occur due to low moisture vapor transmission of the substrate.

(Important: Adhesive heated at application temperature for more than 16 hours should be discarded.)

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

Dispensing Equipment

3M™ Scotch-Weld™ Polyurethane Reactive Adhesive Cartridges can only be dispensed through the 3M™ Scotch-Weld™ Polyurethane Reactive Adhesive Applicator. Other container sizes can be dispensed through bulk equipment specifically designed for use with hot melt polyurethane reactive adhesives (P.U.R.). For more information on P.U.R. application equipment, contact your local 3M sales representative. All equipment must be used in strict accordance with the recommendations of the manufacturer.

WARNING: Do not use Scotch-Weld polyurethane reactive adhesive above 275°F (135°C). Scotch-Weld polyurethane reactive adhesive should not be applied to substrates that exceed 275°F (135°C).

Caution: Wear heat resistant gloves and safety glasses when handling.

Container sizes available: 10 fl. oz. cartridge, 2 kilogram foil bag, 1 gallon can, five gallon pail, 55 gallon drum.

Scotch-Weld™

Polyurethane Reactive Adhesives

TE031 • TE040 • TS115 HGS • TS230

Handling/Curing Information *(continued)*

Cleanup: Allow product to solidify. Remove uncured waxy material (usually within the first 20 minutes after application) by scraping with a putty knife or similar tool. For cured material, remove by cutting or sanding. **Do not use heat or flame to remove adhesive.**

Cure Time: The cure rate will vary depending on air temperature, relative humidity, substrate type and bond line thickness. Cure rate is more rapid on wood (moisture-rich substrate) than on plastic.

Typical Performance Characteristics

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

A. Overlap Shear Strength

Overlap shear (OLS) strengths were measured on 1" wide 1/2" overlap specimens. These bonds were made individually using 1" x 4" sample coupons. The thickness of the bond line was .003-.006". The thickness of the substrates were: plastics, .125", Maple, .375".

The separation rate of the testing jaws was 2" per minute.

Overlap Shear Strength (psi), tested @ 73°F (23°C)

Substrate	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
	TE031	TE040	TS115 HGS	TS230
Maple	1,540	970	1,390	1,570
FRP	1,890	2,310	1,690	2,250
Polycarbonate	2,100	1,590	1,000	1,490
Polyacrylic	1,330 ¹	1,110	1,150	1,280 ¹
Polystyrene	710 ¹	690	520 ¹	590 ¹
ABS	1,350 ¹	1,290 ¹	880	930
PVC	1,670 ¹	2,110 ¹	1,470 ¹	1,780 ¹

¹Substrate failure

Overlap Shear Strength (psi), tested @ 180°F (82°C)

Substrate	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
	TE031	TE040	TS115 HGS	TS230
Maple	340	260	60	410
FRP	800	880	40	720

Scotch-Weld™

Polyurethane Reactive Adhesives

TE031 • TE040 • TS115 HGS • TS230

Typical 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. 180° Peel Strength (piw)

180° peel strengths were measured on 1" x 8" pieces of flexible cotton duck (canvas) bonded to rigid 1" x 4" substrates. The rigid substrates were approximately .125" thick and the separation rate of the testing jaws was 2" per minute. All strengths were measured at 73°F (23°C).

Substrate	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
	TE031	TE040	TS115 HGS	TS230
FRP	96 ¹	66	95 ¹	90 ¹
Polycarbonate	95 ¹	60	87 ¹	95 ¹
Polyacrylic	77 ¹	67	54	54
Polystyrene	65 ¹	22	1	50
ABS	84 ¹	65	62	55
PVC	100 ¹	90 ¹	92 ¹	76 ¹
Aluminum	3 ²	52	72	51
Glass	3	54	81	62

¹Cotton duck failed during test

²Note: 3M™ Scotch-Weld™ Polyurethane Reactive Adhesive TE031 is not suggested for use on uncoated aluminum.

C. Plasticized Vinyl, T-Peel (piw), tested @ 73°F (23°C)

T-Peel strengths were measure on 1" wide pieces of plasticized vinyl at 73°F (23°C). The separation rate of the testing jaws was 2" per minute.

Condition	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
	TE031	TE040	TS115 HGS	TS230
Initial	16 ¹	22 ¹	21 ¹	16 ¹
Aged @ 160°F (71°C) for 2 weeks	22 ¹	35 ¹	25 ¹	22 ¹

¹Substrate failure

Scotch-Weld™

Polyurethane Reactive Adhesives

TE031 • TE040 • TS115 HGS • TS230

Typical 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.

D. Typical Rate of Strength Build-Up

FRP, Overlap Shear Strength (psi), tested @ 73°F (23°C) at various times after bonding. The FRP was conditioned for 7 days at 77°F (25°C)/50% RH prior to bonding.

Time	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
	TE031	TE040	TS115 HGS	TS230
10 minutes	340	230	50	290
1 hour	610	385	210	530
24 hours	1,910	810	780	1,470
1 week	1,890	945	1,340	2,250

The cure rate will vary depending on air temperature, relative humidity, substrate and bond line thickness. Cure rate is more rapid on wood (moisture-rich substrate) than on plastic.

E. Cure Cycle

With the exception of rate of strength build-up, all bonds, unless otherwise noted, were cured for a minimum period of 7 days at 77°F (25°C)/50% RH before testing or subjecting to further conditioning or environmental aging. Bonds were prepared using the suggested procedure for the particular substrate tested.

Surface Preparation

Plastic: Wipe with isopropanol soaked cheesecloth.* Allow solvent to evaporate before bonding. Note: 3M™ Scotch-Weld™ Polyurethane Reactive Adhesives are not recommended for bonding untreated polyolefins.

Plastic contaminated with mold release: Wipe with isopropyl alcohol soaked cheesecloth, abrade with fine grit abrasive, wipe with isopropyl alcohol soaked cheesecloth.* Allow solvent to evaporate before bonding.

FRP, Rubber and Aluminum (uncoated): Wipe with methyl ethyl ketone (MEK) soaked cheesecloth, abrade with fine grit abrasive, wipe with MEK soaked cheesecloth.* Allow solvent to evaporate before bonding. Priming may be necessary on aluminum if part will be subjected to hot/humid conditions.

Glass: Wipe with MEK-soaked cheesecloth.* Allow solvent to evaporate before bonding. Priming may be necessary on glass if subject part will be subjected to hot/humid conditions.

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

Scotch-Weld™

Polyurethane Reactive Adhesives

TE031 • TE040 • TS115 HGS • TS230

Storage For maximum shelf life, store product at normal indoor warehouse storage (below 120°F/49°C).

Shelf Life Products in 10 fluid ounce cartridge and 2 kilogram have 12 months while all others have a 6 month shelf life in unopened containers.

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.

Product Use All statements, technical information and recommendations contained in this document are based upon tests or experience that 3M believes are reliable. However, many factors beyond 3M's control can affect the use and performance of a 3M product in a particular application, including the conditions under which the product is used and the time and environmental conditions in which the product is expected to perform. Since these factors are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method of application.

Warranty and Limited Remedy Unless stated otherwise in 3M's product literature, packaging inserts or product packaging for individual products, 3M warrants that each 3M product meets the applicable specifications at the time 3M ships the product. Individual products may have additional or different warranties as stated on product literature, package inserts or product packages. 3M MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING, CUSTOM OR USAGE OF TRADE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's application. If the 3M product is defective within the warranty period, your exclusive remedy and 3M's and seller's sole obligation will be, at 3M's option, to replace the product or refund the purchase price.

Limitation of Liability Except where prohibited by law, 3M and seller will not be liable for any loss or damage arising from the 3M product, whether direct, indirect, special, incidental or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability.



This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9001:2000 standards.



Industrial Business
Industrial Adhesives and Tapes Division
3M Center, Building 21-1W-10, 900 Bush Avenue
St. Paul, MN 55144-1000
800-362-3550 • 877-369-2923 (fax)
www.3M.com/industrial



Recycled Paper
40% pre-consumer
10% post-consumer

Printed in U.S.A.
©3M 2006 78-9236-7119-8 (5/06)