Scotch-Weld™
Polyurethane Reactive Adhesives
TE031 • TE040 • TS115 HGS • TS230

Technical Data | **November 2017**

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

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

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

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

[4]Open 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.

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Typical Cured Properties

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	3M™ Scotch-Weld™ Polyurethane Reactive			
Property	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%

[1]Measured on .090" - .110" thick bars

[2]ASTM 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.

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)

	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
Substrate	TE031	TE040	TS115 HGS	TS230
Maple	1,372	1,334	1,722	1,210
FRP	1,199	1,205	1,110[1]	1,241[1]
Polycarbonate	1,374	1,331	1,373	1,822
Polyacrylic	1,219[1]	953[1]	1,016[1]	1,110[1]
ABS	1,213[1]	1,094[1]	1178	1,272[1]
PVC	1,795	1,354[1]	1,583[1]	1,779[1]

[1]Substrate failure

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

	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
Substrate	TE031	TE040	TS115 HGS	TS230
Maple	499	382	109	340
FRP	421	377	53	368

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).

	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
Substrate	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
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

[1]Cotton duck failed during test
[2]Note: 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.

	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
Condition	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]

[1]Substrate failure

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.

	3M™ Scotch-Weld™ Polyurethane Reactive Adhesive			
Time	TE031	TE040	TS115 HGS	TS230
10 minutes	117	213	40	350
1 hour	250	302	160	387
24 hours	1,035	863	533	877
1 week	1,199	1,205	1,110	1,241

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.

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.
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Industrial Adhesives and Tapes Division
3M Center, Building 225-3S-06
St. Paul, MN 55144-1000
800-362-3550 • 877-369-2923 (Fax)
www.3M.com/structuraladhesives

78-9236-7119-8