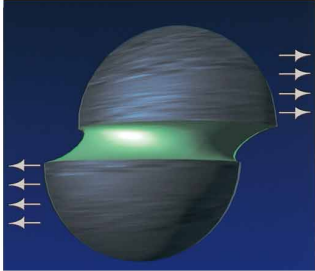


3M™ Scotch-Weld™ Structural Adhesives

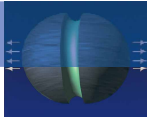


Product Selection Guide



Matching 3M structural adhesives to your performance requirements





Simplifying adhesive decisions for your application

The following questions will help you narrow adhesive choices to two or three possibilities for evaluation.

Q1 What surfaces are to be bonded?

Understanding surface conditions is the first step to determining how much bonding strength will be needed and which adhesives may work best. For example, is the surface painted and with what kind of paint? If the material is a plastic, what kind? For bare metals, will the surface be clean?

Q2 What are the general characteristics of the structural adhesive types?

As a rule of thumb, 3M™ Structural Strength Adhesives bond the load-bearing parts of a product with a minimum of 1,000 psi overlap shear strength.

- **Epoxy adhesives** in one and two-part formulations provide the highest strength at elevated temperature and chemical resistance of all 3M adhesives.
- **Acrylic adhesives** bond the widest variety of substrates including hard-to-bond plastics and oily metal. The distinction is high strength bonding without the surface preparation needed for epoxies and urethanes
- **Urethane adhesives** are generally lower cost and cure quickly to an elastic bond in applications requiring flexibility between dissimilar materials. Impact resistance is a distinctive characteristic.
- **Cyanoacrylate adhesives** are high strength liquid formulations known as instant adhesives. On rigid plastic, glass, metal, rubber, and other low porosity substrates, they harden in seconds through reaction with surface moisture.

Q3 What is the present bonding or joining method?

When the answer provides likes/dislikes and advantages/disadvantages of the current method, it is easier to determine if structural adhesive can improve the end product quality and/or the production process.

Q4 What is the preferred bonding range?

This is often the biggest clue to help understand which product will work best. Start with worklife – the amount of time you have to apply and reposition – and then ask about time to handling strength and full cure. This could lead to productivity improvements.

Q5 Can simple surface preparation be included in the production process?

Maximum bond strength and environmental resistance can be easily achieved by cleaning with IPA/water (50:50 mix) and abrading with Scotch-Brite® Surface Conditioning Products if the surface is very smooth.

Q6 What is the joint design and how will parts fit together?

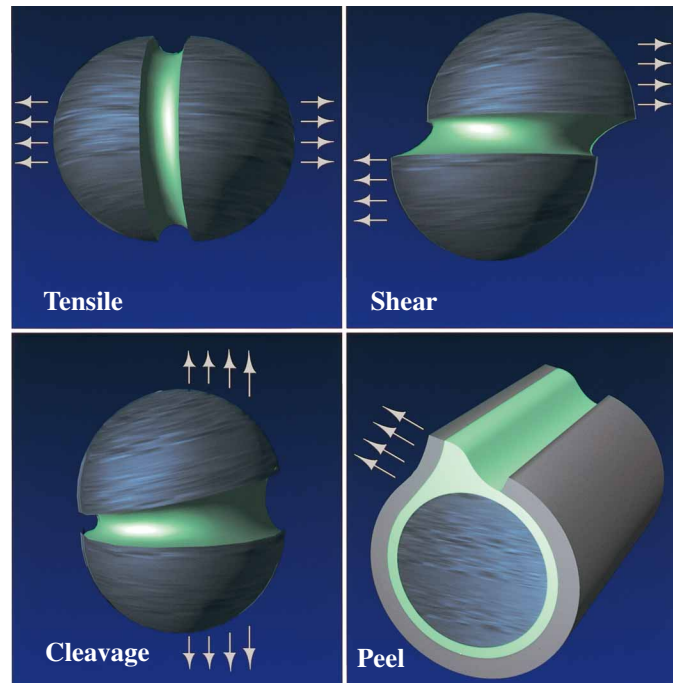
For the best adhesive bond, there should be at least a .003"-.005" gap between the parts for shear and 0.015" - 0.020" for peel. The gap should be as consistent as possible.

Q7 To what types of environments and stresses will the bond be subjected?

Consider bond line stresses, inside/outside end use, UV exposure, chemical exposure, moisture, and temperature ranges.

Strength can be readily matched to the substrate and stress characteristics to which the bond will be subjected. Most adhesives and tapes perform better when the primary stress is tensile or shear. In most industrial applications, however, a combination of stresses are involved that may include cleavage and peel.

In general, epoxies hold up best to harsh environments.



Tensile is pull exerted equally over the entire joint. Pull direction is straight and away from the adhesive bond.

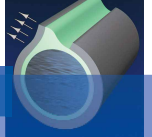
Shear is pull directed across the adhesive, forcing the substrates to slide over each other.

Cleavage is pull concentrated at one edge of the joint, exerting a prying force on the bond. The other edge of the joint is theoretically under zero stress.

Peel is concentrated along a thin line at the edge of the bond where one substrate is flexible. The line is the exact point where an adhesive would separate if the flexible surface were peeled away from its mating surface. Once peeling has begun, the stress line stays out in front of the advancing bond separation.

Q8 What is the preferred method of application?

Depending on formulation, 3M structural adhesives are available in a variety of cartridge sizes, 5-gallon pails, and 55-gallon drums. You can apply manually or with automated bulk systems.



3M™ Scotch-Weld™ Structural Adhesives in Duo-Pak Cartridges and Bulk

Product (Color)	Key Features	Mix Ratio (Volume) B:A	Approximate Viscosity 75°F (24°C) (cps)	Approximate Mixed Worklife at 75°F (24°C)	Approximate Time to Handling Strength at 75°F (24°C)	Average T-Peel at 75°F (24°C) (piw)	Overlap Shear (psi)		
							-67°F (-55°C)	75°F (24°C)	180°F (82°C)
DP100 (Clear)	General Purpose Rigid bonds	1:1	13,000	5 minutes	20 minutes	2	900	1,500	300
DP100 Plus (Clear)	Very flexible Colorless	1:1	8,500	4 minutes	20 minutes	10	3,000	3,500	200
DP100NS (Translucent)	General Purpose Non-sag	1:1	95,000	5 minutes	20 minutes	2	900	1,500	300
DP100FR (White)	Flame Retardant UL94 V-0 rating	1:1	80,000	6 minutes	20 minutes	2	1,250	2,200	800
DP105 (Clear)	Very flexible Colorless	1:1	6,500	5 minutes	20 minutes	35	3,500	2,000	150
DP110 (Gray)	General Purpose Flexible bonds	1:1	55,000	8 minutes	20 minutes	20	2,700	3,500	250
DP110 (Translucent)	General Purpose Flexible bonds	1:1	50,000	8 minutes	20 minutes	20	2,500	2,500	200
DP125 (Gray)	High Performance Very flexible bonds	1:1	52,500	25 minutes	2.5 hours	35	3,400	4,300	400
DP125 (Translucent)	High Performance Very flexible bonds	1:1	15,000	25 minutes	2.5 hours	35	4,000	2,500	150
DP190 (Gray)	High Performance Flexible bonds	1:1	80,000	90 minutes	10 hours	20	1,500	2,500	400
DP190 (Translucent)	High Performance Flexible bonds	1:1	10,000	80 minutes	6 hours	20	3,500	1,200	150
EC2216* (Gray)	High Performance Very flexible bonds	2:3	80,000	90 minutes	10 hours	25	3,000	3,200	400
DP270 (Black, Clear)	Rigid potting compound Non-corrosive	1:1	12,000	60 minutes	3 hours	2	1,200	2,500	300
DP420 (Off-White)	Tough durable bonds High impact resistance	2:1	30,000	20 minutes	2 hours	50	4,500	4,500	450
DP420 (Black)	Tough durable bonds High impact resistance	2:1	30,000	20 minutes	2 hours	50	4,500	4,500	1,250
DP420NS (Black)	Tough durable bonds Non-sag	2:1	180,000	20 minutes	2 hours	50	4,500	4,500	1,250
DP460 (Off-White)	Tough durable bonds High impact resistance	2:1	30,000	60 minutes	4 hours	60	4,500	4,500	700
DP460NS (Off-White)	Tough durable bonds Non-sag	2:1	125,000	60 minutes	4 hours	60	4,900	4,650	1,350

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

* Available in Duo-Pak Cartridges only.

Duo-Pak Cartridges continued on next page.



3M™ Scotch-Weld™ Epoxy Adhesive DP420 bonds the stainless steel shaft into the stainless steel head of a golf club with handling strength in two hours.



3M™ Scotch-Weld™ Low Odor Acrylic Adhesive DP810 requires minimal surface preparation for bonding metal hinges into awning frames.



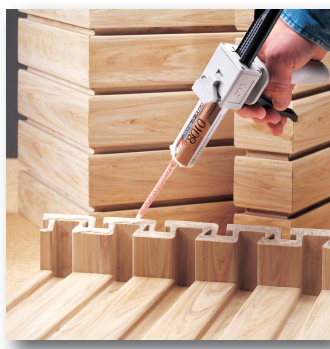
3M™ Scotch-Weld™ Structural Adhesive EC2216 bonds honeycomb to aluminum for common applications in aerospace and transportation.

3M™ Scotch-Weld™ Structural Adhesives in Duo-Pak Cartridges and Bulk (continued)

Product (Color)	Key Features	Mix Ratio (Volume) B:A	Approximate Viscosity 75°F (24°C) (cps)	Approximate Mixed Worklife at 75°F (24°C)	Approximate Time to Handling Strength at 75°F (24°C)	Average T-Peel at 75°F (24°C) (piw)	Overlap Shear (psi)			
							-67°F (-55°C)	75°F (24°C)	180°F (82°C)	
Urethane	DP600 (Gray)	Concrete repair Self-leveling	1:1	6,000	1 minute	4 minutes		2,300		
	DP600NS (Gray)	Concrete repair Non-sag	1:1	Paste	1 minute	2 minutes		2,300		
	DP601 (Gray)	Flexible Self-leveling	1:1	6,000	1 minute	4 minutes		2,300		
	DP601NS (Gray)	Flexible Non-sag	1:1	Paste	1 minute	2 minutes		2,300		
	DP604NS (Black)	Flexible Non-sag	1:1	Paste	4 minutes	20 minutes		900		
	DP605NS (Off-White)	Semi-rigid Non-sag	1:1	150,000	5 minutes	20 minutes		1,350		
	DP608 (Black)	Flexible Non-sag	1:1	Paste	10 minutes	90 minutes		2,000		
	DP620NS (Black)	Flexible Non-sag	1:1	Paste	20 minutes	4 hours		2,500		
	DP640* (Brown)	Tough flexible bonds Non-sag	1:1	25,000	40 minutes	8 hours		2,000		
	DP5001 (Black)	Flexible Conveyor belt repair	1:1	100,000	1 minute	15 minutes		600		
	DP5003 (Black)	Non-sag Vertical applications	1:1	Paste	3 minutes	60 minutes		500		
	DP5105 (Gray)	Low temperature flexibility Expansion joint seals	1:1	32,000	5 minutes	9 hours		150		
DP5106 (Gray)	High strength Control joint seals	1:1	34,000	4 minutes	40 minutes		1,100			
Acrylic	DP805 (Light Yellow)	Fast strength build Minimal surface prep	1:1	110,000	3 minutes	10 minutes	35	2,500	3,500	2,200
	DP810 (Tan, Black)	Tough durable bonds High impact resistance	1:1	20,000	10 minutes	20 minutes	30	1,200	3,600	500
	DP810NS (Tan)	Tough durable bonds Non-sag	1:1	95,000	10 minutes	20 minutes	20	1,200	4,000	500
	DP820* (Light Yellow)	Tough durable bonds Minimal surface prep	1:1	55,000	15 minutes	40 minutes	20	3,100	3,150	1,900
	DP8005 (Off-White, Black)	Bonds polyolefins and low surface energy materials	10:1	25,000	3 minutes	3 hours	10		2,400	300
	DP8010 (Off-White)	Bonds polyolefins and low surface energy materials	10:1	20,000	10 minutes	2 hours	35		1,800	400
	DP8010NS (Off-White)	Bonds polyolefins and low surface energy materials	10:1	65,000	10 minutes	2 hours	30		2,400	400

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

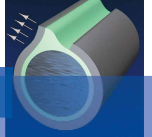
* Available in Duo-Pak Cartridge only.



With no surface preparation, 3M™ Scotch-Weld™ Structural Acrylic Adhesive DP8010 bonds the mitered corners of a simulated-wood composite plastic P.O.P. display, eliminating nails that would compromise appearance.



3M™ Concrete Repair DP600 Self-Leveling sets quickly to anchor bolts and repair deep cracks and spalls in concrete.



3M™ Scotch-Weld™ Two-Part Structural Adhesives

	Product (Color)	Key Features	Mix Ratio (Volume) B:A	Approximate Viscosity 75°F (24°C) (cps)	Approximate Mixed Worklife at 75°F (24°C)	Approximate Time to Handling Strength at 75°F (24°C)	Average T-Peel at 75°F (24°C) (piw)	Overlap Shear (psi)		
								-67°F (-55°C)	75°F (24°C)	180°F (82°C)
Epoxy	1751 B/A (Gray)	Excellent void filler Rigid bonds	3:2	700,000	45 minutes	10 hours	4	1,400	2,000	500
	1838 B/A (Green)	Multi-purpose Rigid bonds	4:5	400,000	60 minutes	8 hours	4	1,500	3,000	500
	1838 B/A (Tan)	Multi-purpose Rigid bonds	5:6	250,000	60 minutes	8 hours	4	1,500	2,000	500
	1838L B/A (Translucent)	Multi-purpose Rigid bonds	1:1	10,000	60 minutes	8 hours	4	2,000	2,500	300
	2158 B/A (Gray)	Multi-purpose Rigid bonds	1:1	375,000	2 hours	10 hours	3	1,500	2,000	400
	2216 B/A (Gray)	High performance Very flexible bonds	2:3	80,000	90 minutes	10 hours	25	3,000	3,200	400
	2216 B/A (Translucent)	General purpose Very flexible bonds	1:1	10,000	2 hours	14 hours	25	3,000	1,700	140
	2216 B/A NS (Tan)	High performance Non-sag	2:3	350,000	2 hours	10 hours	25	2,000	2,500	400
	3501 B/A (Gray)	Multi-purpose Rigid bonds	1:1	500,000	7 minutes	25 minutes	4	1,500	2,400	300
Urethane	3532 B/A (Brown)	Multi-purpose Semi-rigid bonds	1:1	30,000	10 minutes	90 minutes	25	2,500	2,000	300
	3535 B/A (Off-White)	Multi-purpose Semi-rigid bonds	1:1	30,000	3 minutes	30 minutes	25	2,500	2,000	300
	3549 B/A (Brown)	Tough Flexible bonds Non-sag	1:1	30,000	60 minutes	8 hours	25	2,500	2,000	300

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

3M™ Scotch-Weld™ One-Part Epoxy Adhesives and Metal Primers

	Product (Color)	Key Features	Approximate Viscosity 75°F (24°C) (cps)	Cure Conditions			Average T-Peel at 75°F (24°C) (piw)	Overlap Shear (psi)			
				Time (min)	Temperature (°F/°C)	Pressure (psi)		-67°F (-55°C)	75°F (24°C)	180°F (82°C)	250°F (121°C)
Epoxy	1386 (Cream)	High temperature strength Impact resistance	150,000	60	350/177	10	10	3,000	5,500	4,500	2,500
	1469 (Cream)	High temperature strength Low viscosity	60,000	120	350/177	10	2	3,150	3,700	3,700	3,600
	2086 (Gray)	High temperature strength High viscosity	Paste	60	350/177	10	5	3,000	5,000	5,000	2,200
	2214 Regular (Gray)	High temperature strength Low temp curing	Paste	60	250/121	10	5	3,000	4,500	4,500	1,500
	2214 Hi-Density (Gray)	High temperature strength Deaerated, dense bonds	Paste	60	250/121	10	5	3,000	4,500	4,500	1,700
	2214 Hi-Temp Original (Gray)	High temperature strength and environmental resistance	Paste	60	250/121	10	2	2,000	2,000	3,000	2,500
	2214 Hi-Temp New Formula (Gray)	High temperature strength and environmental resistance	Paste	60	250/121	10	2	2,800	2,800	2,800	2,500
	2214 Non-Metallic Filled (Cream)	High temperature strength Higher insulation value	Paste	60	250/121	10	7	3,000	4,000	4,500	1,500
	2290 (Amber)	Low solids liquid coating for metal laminations	60	30	350/177	50	10	5,000	5,000	3,500	1,200
Primer	3901 (Red)	Adhesion promoter Organo-silane base Brush or spray	5								

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

3M™ EPX Applicators for Duo-Pak Cartridges

For low volume applications and take-it-to-the-job convenience, the 3M™ EPX Plus II and EPX metal manual applicators comfortably dispense any of the many 3M™ Scotch-Weld™ Duo-Pak Structural Adhesives.

For higher volume, select the 200ml manual dispenser or the 200ml or 400ml pneumatic dispenser.

For concrete repair, you also have manual or pneumatic options.

Manual Applicators



EPX Plus II Applicator
35ml with 10:1 plunger
37ml with 2:1 plunger*
50ml with 1:1 plunger*



EPX Metal Applicator
with 2:1 plunger*



EPX 200ml Applicator
with 2:1 and 1:1 plunger*



Concrete repair 12-ounce
cartridge applicator

* Included with applicator

Pneumatic Applicators



EPX 50ml Applicator
for 50ml 1:1 and for 37ml
2:1 low viscosity products



EPX 200ml Applicator
for 200ml 1:1 and 2:1, and
250ml 10:1 (conversion kit)



EPX 400ml Applicator
for 1:1 and 2:1



Concrete repair 12-ounce
cartridge applicator

3M™ Nozzles for EPX Applicators and Duo-Pak Cartridges

Choose either the square gold or helical nozzle.

The helical design is your choice whenever you want extended reach for convenience and access.

With the unique chambered design of the square gold, the two parts of the adhesive cascade through the nozzle with just low pressure to mix and apply even higher viscosity adhesives.



Helical 35ml 10:1
and 250ml 10:1



Helical and
square gold 37ml
2:1, 50ml 1:1,
and 43ml 2:1



Helical and square
gold 200/400ml
1:1 and 2:1



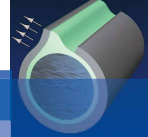
Concrete repair
helical



Concrete repair
square for 8.4 oz.
cartridge



3M™ EPX Nozzles simultaneously mix, meter, and dispense 3M™ Scotch-Weld™ 2-Part Adhesives or Concrete Repair from Duo-Pak cartridges. Extended reach helical nozzle is shown here bonding ABS components of a pump housing.



3M™ Scotch-Weld™ Instant Adhesives

Product	Description	Base	Time ⁽¹⁾ To Handling Strength (Sec.)	Viscosity (cps)	Average ⁽²⁾ T-Peel At 75°F (24°C) (PIW)	Overlap Shear Strength ⁽³⁾ @ 75°F (24°C) (PSI)					
						Steel	Alumi- num	Nitrile Rubber	Neoprene Rubber	ABS	Rigid PVC
CA4	• Fast setting for a variety of plastics and rubbers	ethyl	5-40	150	1-2	2300	2800	35*	55*	800*	800*
CA5	• Higher viscosity, slower setting version of CA4 for filling gaps • Meets CID A-A-3097, Type II, Class 3	ethyl	15-60	2000	1-2	2500	650	35*	55*	800*	800*
CA7	• Very fast setting • Excellent adhesion to metals, plastics, and rubbers	methyl	1-30	15-40	2-4	2500	2400	35*	55*	900*	1000*
CA8	• Slower setting than CA7 • Excellent adhesion to metals, plastics and rubbers • Meets CID A-A-3097, Type II, Class 2	ethyl	5-40	70-130	2-4	2000	2100	35*	55*	900*	1000*
CA9	• Slower setting version of CA8 for wire tacking and coil terminating • Meets CID A-A-3097, Type II, Class 3	ethyl	20-70	1000-1700	2-4	2000	2400	35*	55*	900*	1000*
CA40	• Very fast setting • Excellent adhesion to many substrates including flexible vinyl and EPDM rubber	ethyl	3-20	20	1-2	1700	2600	35*	55*	800*	800*
CA40H	• Higher viscosity version of CA40 • Better void filling capabilities.	ethyl	5-40	400-600	1-2	1500	1500	35*	55*	900*	1000*
CA50 Gel	• High-viscosity, non-sag gel • Less sensitive to acidic surfaces.	ethyl	60-120	45,000-85,000	1-2	2000	900	105*	130*	800*	600*
CA100	• High peel and impact strength • High thermal shock and heat resistance	ethyl	20-70	2500-4500	15	2000	2900	95*	120*	600*	700*
Surface Activator	• Clear, colorless organic-based liquid helps speed curing and prime surfaces • Comes with brush and spray pump										

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

(1) The time it takes assembled parts to reach a strength where further handling and processing can take place. Times will depend on surface to be bonded, temperature and humidity.

(2) Tested per ASTM D 1876-61T.
(3) Tested per ASTM D 1002-64.
* Substrate failure.



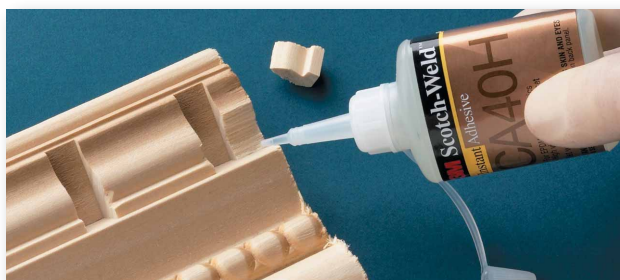
22

3M™ Scotch-Weld™ CA40 Instant Adhesive works on many problem surfaces where other adhesives may fail, such as EPDM rubber.



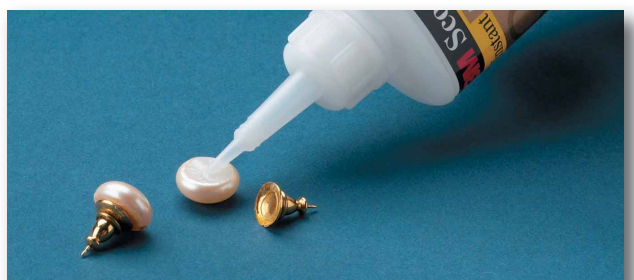
23

For repair of fiberglass/concrete cast pottery, 3M™ Scotch-Weld™ Instant Adhesive CA50 Gel bonds with high tensile and shear strength. Non-sagging for neat application.



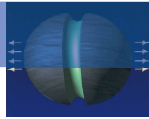
24

For wood and veneer repair, 3M™ Scotch-Weld™ Instant Adhesive CA40H is a high viscosity liquid for a fast void-filling bond.



25

3M™ Scotch-Weld™ Instant Adhesive CA8 is a multi-purpose product for use in a variety of assembly applications.



3M™ Scotch-Weld™ Structural Adhesives Coverage Guide

Approximate Coverages for 3M™ Scotch-Weld™ Adhesives in Duo-Pak Cartridges

Bead Size Dimension*	Linear Ft. per 35 ml (10:1 Cart.)	Linear Ft. per 37 ml (2:1 Cart.)	Linear Ft. per 43 ml (3:2 Cart.)	Linear Ft. per 50 ml (1:1 Cart.)	Linear Ft. per 200 ml (1:1 & 2:1 Cart.)	Linear Ft. per 250 ml (10:1 Cart.)	Linear Ft. per 250 ml (1:1 Caulk Cart.)	Linear Ft. per 12 fl. oz. (355 ml) (1:1 & 2:1 Cart.)	Linear Ft. per 400 ml (1:1 & 2:1 Cart.)
1/2 in.	1.9	2.0	2.2	2.5	10	12.5	12.5	19	21
3/8 in.	3.3	3.5	3.9	4.5	18	22.5	22.5	33	37
1/4 in.	7.5	8.0	9.0	10.5	41	52	52	75	83
1/8 in.	29.3	31.0	35.7	41.5	165	205	205	298	331
1/16 in.	115.2	122.0	142.0	165.0	656	825	825	1182	1313

Coverages per Gallon for Various Thicknesses of 100% Solids 3M Adhesives

Wet Thickness per 1000 Square Ft.	Square Ft per gal. (approx.)	Approx. gal. reqd. per 1000 Square Ft.
1/2 in.	3.2	312.0
1/8 in.	12.8	78.0
1/16 in.	25.6	39.0
1/32 in.	51.2	20.0
25 mils	64.0	16.0
1 mil	1600.0	0.62

Coverages per Gallon for Various Bead Sizes of 100% Solids 3M Adhesives

Bead Size Dimension*	Approx. Lineal Ft. per gal.	Approx. gal. per 1000 Lineal Ft.
1/2 in.	196	5.0
3/8 in.	350	3.0
1/4 in.	785	1.3
1/8 in.	3,130	0.32
1/16 in.	12,420	0.08

* Bead size is semi-circular bead with width equal to size noted and height at center of bead equal to 1/2 the width.

NOTE: The technical information and data provided here should be considered representative or typical only and should not be used for specification purposes.

Surface Preparation Tips

The following surface preparation steps are generally recommended for most substrates and structural adhesives:

Metals

1. Wipe surface with isopropyl alcohol (IPA) or methyl ethyl ketone (MEK) using a clean cloth. A heavier degreaser may be needed if the substrate contains a layer of processing oil.

2. Lightly abrade surface with sandblasting, fine grit sandpaper, or 3M™ Scotch-Brite™ 7447 maroon pads.
3. Wipe surface with IPA or MEK to remove debris.
4. Allow solvent to evaporate before applying adhesive.

Plastics and Rubbers

1. Lightly abrade surface with sandblasting, fine grit sandpaper, or 3M™ Scotch-Brite™ 7447 maroon pads.

2. Wipe surface with IPA using a clean cloth to remove debris.
3. Allow solvent to evaporate before applying adhesive.

Glass

1. Wipe surface using a clean cloth with acetone or MEK containing 0.5 wt% silane adhesion promoter.
2. Allow solvent to evaporate before applying adhesive.

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:** 3M warrants that each 3M product meets the applicable specifications at the time 3M ships the product. **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, your exclusive remedy and 3M's and seller's sole obligation will be, at 3M's option, to repair or 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.



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