Scotch-Weld™
Structural Adhesives Selection Guide

Matching 3M structural adhesives to your bonding surfaces

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?

This is the first clue to how much strength will be needed and which products may work best. Be sure to understand the surface conditions. For example, is the surface painted and with what kind of paint? If the material is a plastic, what kind ? And is there a mold release on the surface? For bare metals, will the surface be clean or protected with a finish oil?

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

3M structural strength adhesives bond the load-bearing parts of a product. As a rule of thumb, structural strength adhesives reach a minimum of 1,000 psi overlap shear strength. 3M formulations include the following pastes and liquids:

- *Epoxy adhesives* are available in one and two-part formulations and 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 open time – 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 To what environment will the bonded part be exposed?

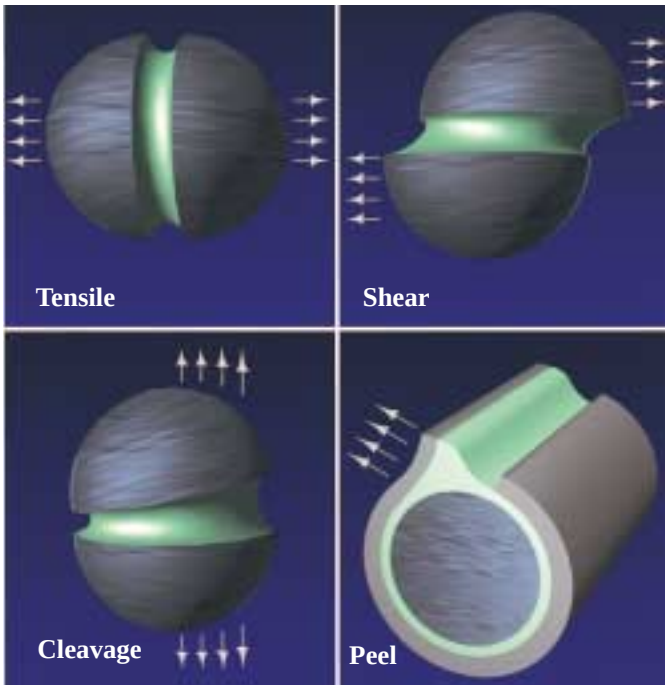
Remember that in general, epoxies hold up the best to harsh environments.

Q7 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.

Q8 To what types of stress will the bond be subjected?

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.



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.

Q9 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.

For more details...

Please visit *www.3M.com/adhesives* and consult the structural adhesives section in the 3M Adhesives and Tapes Design and Production Guide. You can call 3M tech service for personal assistance with all the information you need.

3M™ Scotch-Weld™ Adhesives/Substrate Selection Guide

	Wood	Metal	Rubber	EPDM	Glass	Plastics	Nylon	Rigid Foam	LSE Materials
Wood	DP-100 DP-605 DP-640	EC-2216* DP-460 DP-810	DP-100+ EC-2216* DP-640	CA-40H DP-8010 DP-8010 NS	DP-125 EC-2216* DP-620 NS	DP-100+ EC-2216* DP-620 NS	DP-125 EC-2216* DP-460	DP-100+ EC-2216* DP-620 NS	DP-8005 DP-8010 DP-8010 NS
Metal	EC-2216* DP-420/460 DP-810	DP-100+ DP-420/460 DP-810	DP-100+ DP-125 EC-2216*	CA-40 CA-40H	DP-100+ DP-125 EC-2216*	DP-100+ EC-2216* DP-8010	DP-125 EC-2216* DP-460	DP-100+ DP-125 EC-2216*	DP-8005
Rubber	DP-100+ EC-2216* DP-640	DP-100+ DP-125 EC-2216*	DP-100+ EC-2216* DP-640	CA-40 CA-40H DP-8010	DP-100+ DP-125 EC-2216*	DP-100+ EC-2216* DP-640	DP-125 EC-2216*	DP-100+ EC-2216* DP-640	DP-8010 DP-8010 NS
EPDM	CA-40H DP-8010 DP-8010 NS	CA-40 CA-40H	CA-40 CA-40H DP-8010	CA-40 CA-40H DP-8010	DP-8010 DP-8010 NS	CA-40 CA-40H DP-8010	CA-40 CA-40H	CA-40H DP-8010 DP-8010 NS	DP-8010 DP-8010 NS
Glass	DP-125 EC-2216* DP-620 NS	DP-100+ DP-125 EC-2216*	DP-100+ DP-125 EC-2216*	DP-8010 DP-8010 NS	DP-100+ DP-125 DP-620 NS	DP-125 EC-2216* DP-620 NS	DP-125 EC-2216*	DP-100+ DP-125 DP-620 NS	DP-8010 DP-8010 NS
Plastics[1]	DP-100+ EC-2216* DP-620 NS	DP-100+ EC-2216* DP-810	DP-100+ EC-2216* DP-640	CA-40 CA-40H DP-8010	DP-125 EC-2216* DP-620 NS	DP-100+ DP-125 EC-2216*	DP-125 EC-2216* DP-460	DP-100+ EC-2216* DP-640	DP-8005 DP-8010 DP-8010 NS
Nylon	DP-125 EC-2216* DP-460	DP-125 EC-2216* DP-460	DP-125 EC-2216*	CA-40 CA-40H	DP-125 EC-2216*	DP-125 EC-2216* DP-460	DP-125 EC-2216* DP-460	DP-125 EC-2216* DP-460	–
Rigid[2] Foam	DP-100+ EC-2216* DP-620 NS	DP-100+ DP-125 EC-2216*	DP-100+ EC-2216* DP-640	CA-40H DP-8010 DP-8010 NS	DP-100+ DP-125 DP-620 NS	DP-100+ EC-2216* DP-640	DP-125 EC-2216* DP-460	EC-2216* DP-620 NS DP-640	DP-8005 DP-8010 DP-8010 NS
LSE[3] Materials	DP-8005 DP-8010 DP-8010 NS	DP-8005	DP-8010 DP-8010 NS	DP-8010 DP-8010 NS	DP-8010 DP-8010 NS	DP-8005 DP-8010 DP-8010 NS	–	DP-8005 DP-8010 DP-8010 NS	DP-8005 DP-8010 DP-8010 NS

DP (Duo-Pak) EC (Elastomeric Cement)

Crack Spall Repair	3M™ Concrete Repair DP-600 SL
Anchoring	3M™ Concrete Repair DP-600 SL 3M™ Concrete Repair DP-600 NS

Epoxy Adhesive
Acrylic Adhesive
Urethane Adhesive
Cyanoacrylate Adhesive

1. Plastics include ABS, PVC, acrylic, etc. (polyolefins are not included in this list)
2. Rigid foam includes beadboard, styrene, and urethanes.
3. LSE (low surface energy) materials include polyolefin, polypropylene, and polyethylene.

*Available in 43ml Duo-Pak Cartridges.

The above chart is a general guide. Always test adhesives with actual substrates to endure acceptable performance. The adhesive candidates shown are among many 3M solutions that can bond your parts more efficiently, economically, and reliably. Please consult your local 3M sales representative for more information for product selection and dispensing equipment.

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 sq. ft.	Square ft per gal. (approx.)	Approx. gal.reqd. per 1000 sq. 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.

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**.**

3M

Industrial Adhesives and Tapes Division

3M Center Bldg. 21-1W-10
900 Bush Ave.
St. Paul, MN 55144
1-800-362-3550
www.3M.com/adhesives

Printed in U.S.A.

78-9236-7114-9