



Science.
Applied to Life.™

**3M™ Scotch-Weld™
Structural Adhesives**
Bonding Composite Parts to
Multiple Materials

Bonding for the Future

Solving the challenge of bonding composites and multiple materials.

Advantages of Adhesives for Composite and Multi-Material Assembly

Designing with composites and multiple materials allows you to use thinner, lighter substrates to create products with improved flexibility and higher resistance to vibration and movement. Joining these parts within your assembly requires new methods of bonding beyond mechanical fasteners and welding, and recent advances in structural adhesives (such as epoxies, acrylics and urethanes) are enabling designers to create products that meet structural integrity requirements.

Structural adhesives are simply one of the most versatile and reliable solutions for joining composites and multi-materials. They offer application ease and convenience, and with faster throughput, adhesives can also help you meet higher production standards.

Adhesive performance advantages

- High performance strength, plus impact and energy absorption
- Maximum durability by distributing stress across the entire bonded area
- Excellent weather and chemical resistance

- Prevention of galvanic corrosion between dissimilar metals
- Bond Low Surface Energy (LSE) plastics, such as thermoplastic polyolefin (TPO), polypropylene (PP), and polyethylene (e.g. HDPE)
- Bond high performance composites, from carbon fiber to polyester sheet molding compound (SMC)
- Fast cure times for process improvement
- Many adhesive options with little to no surface preparation
- Manage thermal expansion and temperature resistance

Design advantages of adhesives

- Increased design flexibility
- Enhance aesthetics with cleaner bonded joints
- Lightweight, high strength seal with load distribution across the entire bonding area
- Bond multiple materials including plastics, metals, and composites
- Lower overall costs than traditional fastening methods



Structural Adhesives — General Characteristics

All structural adhesives provide at least 1,000 psi (7 Mpa) of overlap shear strength. Epoxy, acrylic and urethane adhesives feature the following specific properties.



Epoxy adhesives generally have the highest strength and overall performance. They also provide the best resistance to high temperatures, solvents and outdoor weathering. They adhere well to metals, ceramics, wood, and thermoset plastics, and usually require clean, abraded surfaces to obtain maximum bond strength.



Acrylic adhesives provide excellent bond strength and durability, although slightly lower than epoxy adhesives. However, they provide faster cure speed, higher tolerance for oily or unabrased bonding surfaces, and the ability to bond a wide variety of plastics and composites, as well as metals.



Urethane adhesives tend to have excellent impact resistance and good adhesion to most plastics and composites, as well as ceramics, metal and wood. They are relatively flexible when cured, making them a good choice for bonding materials with different coefficients of thermal expansion when temperature cycling is foreseen. They tend to have reduced strength high temperatures.

Selecting the Optimal Adhesive Solution

When selecting an adhesive, it's important to consult with a 3M application specialist. Preliminary adhesive selection can be done by matching end use requirements to the processing and performance characteristics of 3M structural adhesives. The key process factors to consider include:

Substrates

- What materials will be bonded?

Environment

- What are the expected conditions during end use: temperature, humidity, UV exposure?
- Is chemical resistance required: fluids (motor oil, gasoline, diesel fluid, jet fuel), cleaning solutions (weak acids and bases), specialized chemicals which may contact the bonded part?

Stress

- What types of joints are in the design – are there joint designs that put the adhesive bond under shear, tension, or compression forces?
- What are the mechanical challenges: Impact, vibration, stress type and magnitude?

Production Factors

- Do you require manual or automated application?
- Do you need fast or slow adhesives?
- Will the parts be dirty or clean?
- What are the cleanliness/environmental issues during production and end use: outgassing, ionics, corrosion potential, toxicity, disposal?

The specific answers to these questions will help determine which the most appropriate products to begin to test and evaluate for suitability of your end product and application.

3M™ Scotch-Weld™ Structural Adhesives Selector Guide

Choose your substrate combination and identify the recommended 3M™ Scotch-Weld™ Structural Adhesive options.

		SUBSTRATE 2					
		Metals - Aluminum - Colled Rolled Steel - Galvanized Steel	Fiber-Reinforced Epoxy - Carbon Fiber (CFRP) - Glass Fiber	Fiber-Reinforced Thermosets - Polyester (FRP) - Phenolic - SMC	Thermoplastics - Polyolefin - PET	Other Thermoplastics - Acrylic/PMMA - Polycarbonate (PC) - Rigid PVC and HIPS	Fiber-Reinforced Nylon
SUBSTRATE 1	Metals - Aluminum - Colled Rolled Steel - Galvanized Steel	DP420NS DP125 Gray	DP420NS DP6310NS	DP6310NS DP8410NS	DP8010 Blue	DP8410NS DP6310NS	DP6310NS
	Fiber-Reinforced Epoxy - Carbon Fiber (CFRP) - Glass Fiber		DP420NS DP6310NS 760	DP6310NS DP8410NS 760	DP8010 Blue	DP8410NS DP6310NS	DP6310NS
	Fiber-Reinforced Thermosets - Polyester (FRP) - Phenolic - SMC			DP6310NS DP8410NS 760	DP8010 Blue	DP8410NS DP6310NS	DP6310NS
	Thermoplastics - Polyolefin - PET - HDPE				DP8010 Blue	DP8010 Blue	DP8010 Blue
	Other Thermoplastics - Acrylic/PMMA - Polycarbonate (PC) - Rigid PVC and HIPS					DP8010 Blue	DP8010 Blue
	Fiber-Reinforced Nylon						DP6310NS

For more detailed selection options please visit our website 3M.com/compositebonding

Adhesive Science for Multi-Material Composite Bonding

Toughened Epoxy



DP420NS BLACK

- Excellent environmental resistance
- High impact strength
- Excellent fatigue performance
- 20 minute open time

Toughness & Flexibility

Flexible Epoxy



DP125 GRAY

- Bonds to most substrates, including many plastics
- High strength and high peel
- 25 minute open time

NEW! Multi-Material & Composite Adhesive DP6310NS



- Outstanding strength & performance
- Slightly flexible to distribute load
- Bonds to most surfaces
- 10 minute open time

Speed & Toughness

Toughened Acrylic



DP8410NS GREEN

- MMA acrylic adhesive
- High impact resistance
- Minimal surface preparation
- Non-sag
- 10 minute open time

Thermoplastics

Polyolefin Bonding Acrylic



DP8010 BLUE

- Structural bonds to low surface energy plastics
- Medium viscosity
- 10 minute open time

Low Modulus Adhesive Sealant 760



- Reliable elastomeric adhesive sealant
- Will not degrade when exposed to UV
- Paintable when wet; low VOC
- 30 minute skin time

INCREASED IMPACT & DURABILITY PERFORMANCE

INCREASED FLEXIBILITY

LSE BONDING

INCREASED SPEED

LARGE SURFACE BONDING

NEW 3M™ Scotch-Weld™ Multi-Material Composite Urethane Adhesives DP6310NS & DP6330NS

Designed specifically for multi-material and composite assemblies, the new 3M™ Scotch-Weld™ Multi-Material Composite Urethane Adhesives DP6310NS and DP6330NS deliver outstanding strength and performance. These flexible urethane adhesives have excellent elongation and stress strain properties for durable bonding of composite parts and multi-material assemblies.



- Strong and durable
- Fast time-to-handling strength
- Little to no surface preparation
- Low odor
- Excellent performance in high and low temperatures

3M™ Scotch-Weld™ Structural Adhesives Ordering Information

Product	Size	Unit/Case	Unit/Case Stock #	UPC
DP6310NS	48.5 mL	12/CV	62-3590-1448-7	00-076308-86407-1
	400 mL	6/CV	62-3590-3630-8	00-076308-86398-2
DP6330NS	48.5 mL	12/CV	62-3565-1448-9	00-076308-86431-6
	400 mL	6/CV	62-3565-3630-0	00-076308-86433-0
DP420NS Black	37 mL	12/CV	62-3299-1435-2	00-021200-39285-6
	200 mL	12/CV	62-3299-3832-8	00-021200-39286-3
	400 mL	6/CV	62-3299-3532-4	00-021200-39287-0
DP125 Gray	50 mL	12/CV	62-3293-1435-5	00-021200-87215-0
	200 mL	12/CV	62-3293-3830-5	00-021200-87844-2
	400 mL	6/CV	62-3293-3530-1	00-021200-87845-9
DP8010 Blue	45 mL	12/CV	62-2863-1445-5	00-051115-71600-3
	490 mL	6/CV	62-2863-3630-0	00-051115-71600-3
	5 Gallon Part B	1/CV	62-2863-8530-7	00-051115-71669-0
	55 Gallon Part B	1/CV	62-2863-9530-6	00-051115-81460-0
	1 Gallon Part A	1/CV	62-2883-7530-6	00-021200-49113-9
	5 Gallon Part A	1/CV	62-2883-8530-5	00-021200-49115-3
DP8410NS	45 mL	12/CV	62-2860-1445-1	00-051115-70994-4
	490 mL	6/CV	62-2860-3630-6	00-051115-70995-1
	5 Gallon Part B	1/CV	62-2860-8530-3	00-051115-70997-5
	55 Gallon Part B	1/CV	62-2860-9530-2	00-051115-71101-5
	1 Gallon Part A	1/CV	62-2952-7530-9	00-051115-68981-9
	5 Gallon Part A	1/CV	62-2952-8530-8	00-051115-68980-2
760 Adhesive Sealant	600mL Sausage Pack	12/CV	62-5277-3932-0	00-048011-62816-5

3M™ Scotch-Weld™ Structural Adhesive

Application and Market Examples

Transportation – Truck, Bus, Trailer, RV, Emergency Vehicles, Vehicle Interiors, High End Automotive



Manufacturing of commercial buses, boats and specialty vehicles can utilize multiple bonding options to help withstand the loads applied to the panels during use, and to accommodate movement created by vibration and differential thermal expansion. 3M™ Structural Adhesives are used in many applications to build these vehicles.

Sporting Goods – Golf Clubs, Tennis Racquets, Hockey Sticks, Recreational Sporting Equipment



Sporting goods was one of the first industries to utilize composite materials in the manufacturing of their products. Sports equipment needs to be very high performance, and the sporting goods industry has relied on 3M™ Structural Adhesives to take their design and performance to the next level.

General Industry – Signage, Pumps & Tanks, Electronics, Construction, Plus Many More



The use of composite materials in all industries is growing. The proven reliability and benefits of these materials, along with the ability of adhesives to provide optimal bonding and assembly solutions, are making it easier than ever to work with composite materials. You can rely on 3M™ Structural Adhesives to bring your design to reality!



3M Composite and Multi-Material Solution Center

Finding the right science to match your application is key. 3M is here to help, bringing over 60 years of proven adhesive science leadership to composite bonding applications, and offering the expertise to apply them to the right materials for an unmatched bond quality. From the rugged strength of the first composite golf club to applying a powerful hold to airplane wings, 3M has brought the industry new solutions, making adhesive science what it is today, with progressive products formulated to solve the manufacturing challenges of the future.

Your next design starts here!

It's time to design with new materials and enhance your process efficiencies – with the help of 3M adhesives and the support of the 3M team. We offer technical service and testing to help you maximize your product designs. 3M is your go-to resource for application and adhesive expertise! Wherever you are in the process, we can help guide you with the advice and information you need.

What's your challenge? Solve it with a smarter bond.



Industrial Adhesives & Tapes Division

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