Bonding, attaching, mounting, laminating, fastening, sealing, labeling, protecting
3M Product Portfolio
for applications success

### LSE (Low Surface Energy) Adhesives

<table>
<thead>
<tr>
<th>PTFE</th>
<th>Polystyrene</th>
<th>Acrylic</th>
<th>PVC</th>
<th>ABS</th>
<th>Polyester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-part Acrylic</td>
<td>Two-part Epoxy</td>
<td>Two-part Urethane</td>
<td>Instant Adhesive (CA)</td>
<td>Instant Adhesive (CA) Primer</td>
<td>Polyurethane Reactive (PUR)</td>
</tr>
</tbody>
</table>

### HSE (High Surface Energy) Adhesives

**Structural**

- Instant Adhesive (CA)
- Instant Adhesive (CA) Primer

**Non-Structural**

- Aerosol
- Cylinders
- Hot Melt Extrudable
- Hot Melt Sprayable
- Solvent-based***
- Water-based
- Sealants

- Bonding Films

### Bonding Tapes

- Adhesive Transfer Tapes
- Double Coated Tapes
- General Purpose Foam Tapes
- 3M™ VHB™ Tapes

### Other Solutions

- Reclosable Fasteners
- Protective Tapes (Short Term) - except PVCs
- High Performance Polyester Label Materials

**NOTE:** The optimal curing guideline for plastics solutions ranges from 72 hours to 7 days.

* Structural strength adhesives reach a minimum of 1,000 psi overlap shear strength.
** Non-structural strength adhesives typically reach less than 1,000 psi overlap shear strength.
*** Solvent-based adhesives may craze (attack) some surfaces.

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3M™ Scotch-Weld” Plastic & Rubber Instant Adhesive PR600 permanently bonds difficult-to-bond plastics and rubbers together, or in combination with metals and/or composites.

In bonding plastic feathers and nocks onto arrow shafts, 3M™ Scotch-Weld” Industrial Plastic Adhesive 4475 dries quickly to a firm bond that resists plasticizers and water.

For thin bondlines in automotive interior trim attachment, 3M™ Quick Bonding Adhesive 360 bonds with strength greater than many thicker tapes.

3M™ Scotch-Weld” Epoxy Adhesive 8405 readily bonds many difficult-to-bond plastics in applications ranging from computers to signage.

For ease of assembly and precise fit, die-cut 3M™ VHB™ Tape bonds and seals plastic components throughout a GPS unit.
Keeping pace with the growth in plastics products — 3M solutions for improved design, performance, and productivity

Applications success… for wherever people live, work, or play

In 1976 plastics had become the most commonly used material in the world. By 2001 plastics was the fourth largest manufacturing segment in the United States. Today, wherever you live, work, or play, the use of plastics is growing, and with it the use of 3M adhesive and tape technologies to assemble, protect, and label products made of plastics or plastics combined with metal, wood, or other materials.

3M adhesive and tape benefits

- Bond strength matched to the job, for example, replacing screws and other mechanical fasteners; bonding LSE plastics with little or no surface preparation
- Virtually invisible fastening for an aesthetically-pleasing product
- Increased material options — bond more plastics than ever, including inexpensive hard-to-bond plastics
- Increased manufacturing efficiency with faster assembly speed and fewer assembly steps in many applications
- Bond and seal simultaneously

This guide is an overview to help you match 3M technologies to specific thermoplastics for applications success.

Types of plastics

Thermoplastics are polymers that can be repeatedly softened with heat for molding, becoming solid when cooled.

Thermosetting plastics soften with heat once, then cool to an insoluble solid.

Thermoset parts are easily bonded, while thermoplastics have a wide range of surface energy characteristics which must be considered for successful bonding or labeling.

At the same time, however, thermoplastics are more commonly used because of a wide variety of production and end use properties. For example, polypropylene is inexpensive with high chemical resistance, but is hard to bond due to its low surface energy. Nylon is more expensive, resists wear and heat, and is easier to bond given its high surface energy.

Low to high surface energy

An unwaxed car hood exhibits high surface energy (HSE) and water spreads across the surface. Similar to water, adhesive on a high energy surface flows and “wets out” the surface. “Wetting” is necessary for effective bonding.

A waxed hood exhibits low surface energy (LSE). In effect, the “energy of the wax” repels the water, forcing it into beads. Adhesive also beads up and does not effectively wet an LSE substrate.

For bonding success with LSE thermoplastics, 3M offers several specially formulated adhesives and tapes.

Using the selection chart

This guide focuses on thermoplastics because of their complexity, versatility, and wide use. Thermoplastics are presented in the adjacent chart, moving left to right from low to high surface energy. At the intersections of 3M technology and plastic, 3M product numbers represent starting points for further evaluation.

For more information:
1-800-362-3550
www.3M.com/adhesives

3M Solutions

Benefits

Two-part Acrylic
Versatile; eliminates or minimizes surface preparation even on LSE plastics

Two-part Epoxy
Highest strength and elevated temperature resistance of all 3M™ Adhesives

Two-part Urethane
Fast curing to a flexible, impact resistant bond; lower cost than epoxy or acrylic

Instant Adhesive (CA)
One-part liquid reaches handling strength in 5-10 seconds at room temperature

Instant Adhesive (CA) Primer**
Prepares LSE plastics for secure adhesive bonding

Polyurethane Reactive (PUR)
Hot melt production speed with performance typical of structural adhesive

Aerosol
Convenient竺ial of bonding power and versatility

Cylinders
Aerosol convenience, bulk productivity for large area coverage

Hot Melt Extrudable
Fast bonding with a targeted bead of solventless adhesive; move assemblies immediately

Hot Melt Sprayable
Fast wide area application; fast bonding for lightweight parts; solventless

Solvent-based
Solvent speeds and strengthens the bond between a wide range of plastics and other surfaces

Water-based
Easier environmental compliance; speed to handling exceeds most solvent-based systems

Sealants
Flexible seals on many plastics to keep air, wind, dirt, and water in or out

Bonding Films
Precision shape, size, and fit; bonds in seconds with heat; solventless

Adhesive Transfer Tapes
Clean, precise application of dry pressure sensitive adhesive for bonding on contact

Double Coated Tapes
Benefits of adhesive transfer tapes but with a carrier for handling stability and die-cutting

General Purpose Foam Tapes
Benefits of double coated tapes but with foam carrier for gap filling

3M™ VHB™ Tapes
Pressure sensitive adhesive on a roll to replace mechanical fasteners and solvent welding

Re closable Fasteners
Stick to a variety of plastic surfaces that need repeated attachments and removals

Protective Tapes (Short Term)
Protect plastic surfaces from scratching, abrasion, and chipping; remove cleanly

High Performance Polyester Label Materials
Abrasion and solvent resistant facestocks; permanent adhesion even to LSE plastics

NOTE: The technical information and data on these pages should be considered representative or typical only and should not be used for specification purposes.
**Product Selection should only be made by the users after evaluation of sample bonds and consideration of a variety of factors such as application and end-use conditions.**

Matching 3M technology to the thermoplastics of your choice...even LSE

### LSE (Low Surface Energy)

<table>
<thead>
<tr>
<th>PTPE</th>
<th>Polypropylene</th>
<th>TPO</th>
<th>Polyethylene</th>
<th>Polystyrene</th>
<th>Acrylic</th>
<th>PVC - Plasticized</th>
<th>PVC - Unplasticized</th>
<th>ABS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP8005, DP8010</td>
<td>DP8005, DP8010</td>
<td></td>
<td>DP8005, DP8010</td>
<td>DP807, DP810, DP812, DP825, DP810</td>
<td></td>
<td>DP807, DP810, DP812, DP825, DP810</td>
<td>DP807, DP810, DP812, DP825, DP810</td>
<td></td>
</tr>
<tr>
<td>Primer AC77*</td>
<td>Primer AC77*</td>
<td></td>
<td>Primer AC77* with PR600 or SF100</td>
<td>CA40H, CA100, PR600, SF100</td>
<td></td>
<td>CA40H, CA100, PR600, SF100</td>
<td>CA40H, CA100, PR600, SF100</td>
<td></td>
</tr>
<tr>
<td>Acetone</td>
<td>Acetone</td>
<td></td>
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### Contact Information

- For product selection guidance, please use the online product selector tool at [www.3M.com/ProtectiveTapes](http://www.3M.com/ProtectiveTapes).
- **Short term surface protection tape solutions vary depending on substrate and conditions of application/usage.**
- **Contact 3M for recommended products*** 1-800-241-2031.

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**Use or typical only and should not be used for specification purposes.** Various other plastics. Many plastics can vary from supplier to supplier. Different additives or plasticizers which can affect adhesion, final performance of a variety of factors such as application and end-use conditions.

* Not for sale or use in California.

**Recommended for a wide variety of LSE plastics and hard-to-bond elastomers:**
- **AC77** (with SF100) for HIPS (High Impact Polystyrene), PBT (Polybutylene Terephthalate), PMP (Polymethylmethacrylate), EPM (Polyethylene propylene elastomer), acetal resin, STYRON, VALOX, TPR, and ISOPLAST.
- **AC78** (with PR1500, SF20, or SF600) for Silicone, Santoprene, fluoroelastomer, and EPDM.
Matching 3M technology to the thermoplastics of your choice...even LSE plastics

- PMP (Polymethylpentene)
- POM (Polyoxymethylene) acetal resin
- STYRON ™
- VALOX ®
- TPX ™
- ISOPLAST ™
- AC77 (with SF100)
- HIPS (High Impact Polystyrene)
- PBT (Polybutylene Terephthalate)

Recommended for a wide variety of LSE plastics and hard-to-bond elastomers:

- AC78 (with PR1500, SF20, SF100, or SF600)
- Silicone
- Santoprene ™
- fluoroelastomer
- EPDM

For product selection guidance, please use the online product selector tool at www.3M.com/ProtectiveTapes.

2000NF, 30NF, 49, 100,
2216 B/A
9495MP, 9629PC
9088FL, 9495LE,
9086, 9087, 9088,
SF100
CA40H, CA100, PR600,
SB20, SF100
615, 615S, 668, 690
7816, 7868, 7871

For product selection guidance, please use the online product selector tool at www.3M.com/ProtectiveTapes.

2000NF, 30NF, 49, 100,
2216 B/A
9495MP, 9629PC
9088FL, 9495LE,
9086, 9087, 9088,
SF100
CA40H, CA100, PR600,
SB20, SF100
615, 615S, 668, 690
7816, 7868, 7871

The Thermoplastics properties and typical applications:

**PTFE (Polytetrafluoroethylene)**
- Very low friction; excellent dielectric
- Slippery, non-stick surfaces; insulator

**Polypropylene**
- Toughness; chemical resistance
- Furniture, luggage, containers, fishing tackle

**TPO (Thermoplastic polyolefin)**
- UV and impact resistance for outdoors
- Automotive bumper fascia, roofing membrane

**Polyethylene**
- Water, oil, and solvent resistance
- Housewares; many injection molded parts

**Polystyrene**
- Lightweight, rigid, water resistance
- Signs, diys, appliance trim, shower tray, light cover

**Acrylic**
- Stiff, durable, weather resistance: unlimited color
- Signs, diys, appliance trim, shower tray, light cover

**PVC (Polyvinyl chloride)**
- Lightweight, stiff, hard, durable
- Window extrusions; gutters

**ABS (Acrylonitrile-Butadiene-Styrene)**
- Tough, rigid, heat/weathering/chemical resistance
- Refrigerator liner, housings, dashboard, handles

**Polycarbonate**
- High impact resistance, toughness, transparency
- Medical equipment, electrical/electronics, toys

**Polyester (PET – Polyethylene terephthalate)**
- Electrical properties, chemical/abrasion resistance
- Motor housing, small appliances, cable connectors

**Polyurethane (RIM – Reaction Injection Molding)**
- Hold fine detail, tough, wear resistance
- Carved wood simulations, housings

**Nylon**
- Impact/fatigue/abrasion resistance, low coefficient of friction, good electrical properties
- Bearings, gears, hinges, casters, valves, bike wheels

*** Short term surface protection tape solutions vary depending on substrate and conditions of application/usage. For product selection guidance, please use the online product selector tool at www.3M.com/ProtectiveTapes.
Surface preparation will typically enhance adhesion and contribute to greater consistency of bond strength. This is especially important when moving from High Surface Energy plastics (which are easier to bond) to Low Surface Energy plastics (which are more difficult to bond).

For any type of plastics, it’s important to consider the different options for surface preparation. While 3M has products that minimize or eliminate surface preparation for LSE plastics, the general rule of thumb is the lower the surface energy, the greater the need for additional surface preparation steps. All adhesives are recommended to have good surface preparations before applying the adhesive.

Solutions through science and service

Solutions in this brochure are only a few of the many available from 3M now. 3M R&D is also ongoing with more than a billion dollars a year invested to develop innovative new solutions for the future. But since science and innovation are practical only to the extent that end users can put them to work, 3M also emphasizes service:

- 3M representatives for sales assistance in more than 50 countries
- Highly trained technical service teams to help customers evaluate 3M products for specific applications
- Authorized distributor networks for local assistance and product availability
- Authorized converters to adapt 3M technologies to meet special requirements for form, fit, and function

More information

- **3M™ Adhesives, Tapes, Reclosable Fasteners, and Protective Products:** 1-800-362-3550 or www.3M.com/adhesives
- **3M™ Performance Label Materials:** 1-800-422-8116 or www.3M.com/converter

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