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Technical Data | September 2026

3M™ Thermal Bonding Film 406

Product Description

3M™ Thermal Bonding Film 406 is a flexible, light colored, thermoplastic adhesive bonding film which exhibits good adhesion to a variety of substrates, especially metals.

Key Features

- Consistent, uniform adhesive thickness
- Excellent metal adhesion
- Good solvent resistance
- Quick fixturing/holding strength
- 100% solids
- Reworkable

Product Construction

Ethylene Acrylic Acid Copolymer: 3.0 mil

Material Description

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

3M™ Thermal Bonding Film 406	
Property	**Value**
Base Resin	Ethylene Acrylic Acid Copolymer
Adhesive Thickness	3.0 mil (0.08 mm)
Liner	None
Color	Translucent
Solids	100%
Ball & Ring Softening Range	300 to 310°F (149 to 160°C)
Tensile Strength @ Break	2600 psi (3.0 mil film)
Elongation @ Break	750% (3.0 mil film)
Two Lb. Dead Load Heat Resistance	200°F (93°C)

Typical Applications

- Plastic to metal decoration
- Memory card bonding
- FPC bonding
- Die-cut shape bonding
- Please work with your 3M Application Engineer to discuss other potential joining and bonding applications.

3M™ Thermal Bonding Film 406
Application Equipment Suggestions

Note: Appropriate application equipment can enhance bonding film performance. We suggest the following equipment for the user's evaluation considering the user's particular purpose and method of application.

The type of application equipment used to bond 3M™ Thermal Bonding Film 406 will depend on the application involved and on the type of equipment available for the user. Thin films and flexible substrates can be bonded using a heated roll laminator where heat and pressure can be varied to suit the application. Larger, thicker substrates can be bonded using a heated static press or, in some cases, an autoclave. For applications where a shaped adhesive is to be transferred to a flat or three-dimensional part, a hot shoe or thermode method may be appropriate.

It is recommended that whatever method of bonding the user chooses, the user should determine the optimum bonding conditions using the specific substrates involved.

Directions For Use

To make a bond using 3M™ Thermal Bonding Film 406, the adhesive can be first tacked (lightly bonded) to one of the substrates using low heat and placing the second substrate to the exposed adhesive surface, making the bond using heat and pressure. Alternatively, place the adhesive film between the two substrates and make the bond through heat and pressure using a heated press, a hot roll laminator, a hot shoe thermode method or similar equipment.

Suggested TACKING Conditions
240 to 250°F (116 to 121°C) bondline temperature
1-2 seconds dwell time
5-10 psi pressure

For optimum bonding, heat, pressure and dwell time will depend upon the type and thicknesses of the substrates being bonded together. A suggested starting point, however, is to use bonding conditions described below.

Suggested BEGINNING Bonding Conditions
300 to 320°F (149 to 160°C) bondline temperature
2-5 seconds dwell time
10-20 psi pressure

One approach to establishing the optimum bonding conditions for a user's application is to evaluate a series of bonding temperatures, for example 250, 270, 290, and 310°F (121, 132, 143, and 154°C). Time and pressure will be dictated by the thickness of the substrate and the type of substrate being bonded. Thicker substrates and more difficult to bond surfaces will require longer times, higher pressures and/or higher temperatures.

Once the bond is made, the bondline should be allowed to cool somewhat before stress is applied to the bond. Generally, cooling the bondline below 200°F (93°C) is adequate to allow the bonded parts to be unfixtured/unclamped and handled.

3M™ Thermal Bonding Film 406
Directions For Use (continued)

For reference, the following table shows typical bond strengths for bonds made at various temperatures. **Such a table can be used to evaluate optimum bondline temperatures.** It is very important to note that this table is valid only for the specific substrates shown. Varying temperature, pressure, or substrates can affect bond strengths. **User should develop a similar table using the specific substrates involved, their application equipment and their facility conditions.**

Note: Temperatures shown are bondline temperatures and not heat block or roll settings! The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

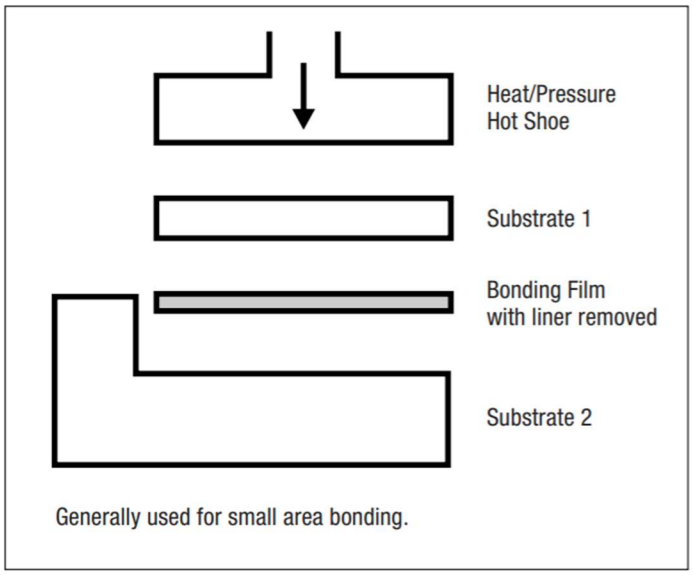
T-Peel Adhesion Vs Bonding Temperature (piw)			
Bondline Temperature	**AL/AL**	**AL/CRS**	**AL/FR-4**
120°F (49°C)	0.2	-	-
130°F (54°C)	0.2	-	-
140°F (60°C)	0.3	-	-
150°F (66°C)	0.5	-	-
160°F (71°C)	1.2	-	-
170°F (77°C)	1.8	-	-
180°F (82°C)	5.0	-	-
190°F (88°C)	5.8	-	-
200°F (93°C)	6.3	-	-
210°F (99°C)	6.8	-	-
220°F (104°C)	7.5	-	-
230°F (110°C)	7.8	-	-
240°F (116°C)	8.1	6.0	1.2
250°F (121°C)	8.2	-	-
255°F (124°C)	-	9.1	1.5
260°F (127°C)	8.4	-	-
270°F (132°C)	8.7	11.1	1.7
280°F (138°C)	9.0	-	-
285°F (141°C)	-	14.3	1.7
290°F (143°C)	9.5	-	-
300°F (149°C)	10.5	13.3	2.3
310°F (154°C)	10.8	-	-
315°F (157°C)	-	17.4	3.4
320°F (160°C)	10.2	-	-
330°F (166°C)	9.8	12.9	4.8
340°F (171°C)	9.7	-	-
345°F (174°C)	-	12.5	5.2

- Bonds are made using 3 second dwell, 5 lbs. gauge pressure.
- Peels done at 90° angle, 2 in/minute, Instron tester.
- AL is 4.5 mil etched aluminum foil.

3M™ Thermal Bonding Film 406
Typical Methods for Bonding 3M™ Bonding Film Adhesives

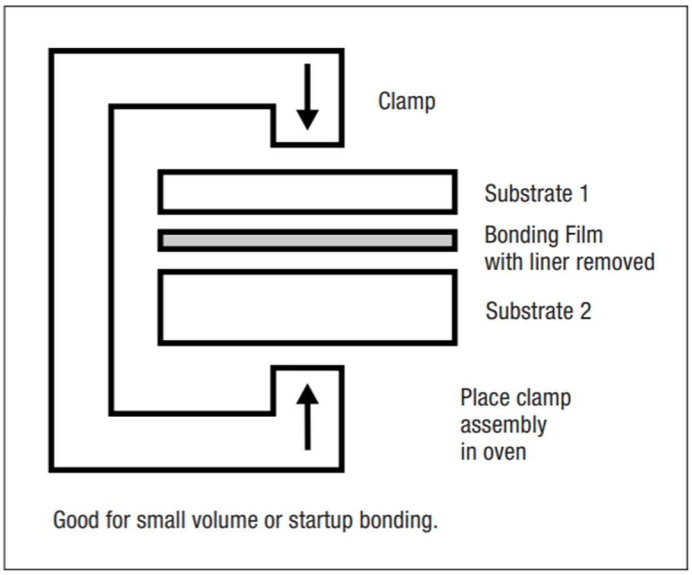
The following illustrations show several of the many methods that can be used to make bonds using 3M™ Bonding Film Adhesives. Such equipment is generally available commercially or can be built or modified by the user to fit a particular application.

Hot Shoe or Thermode Bonding



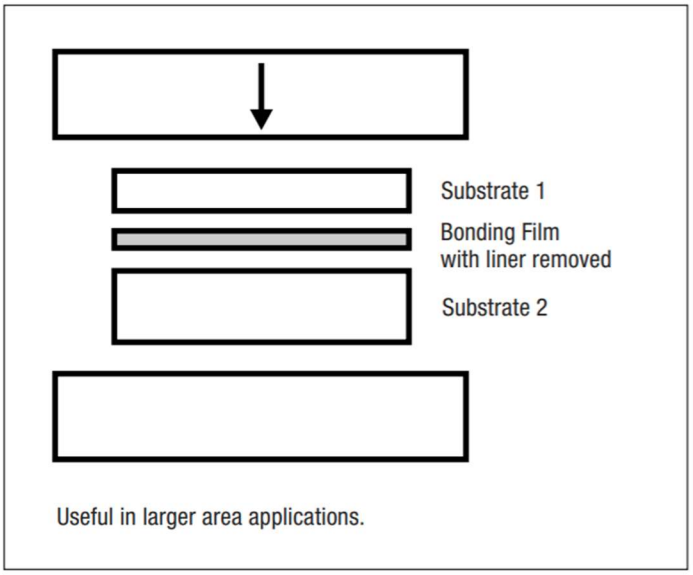
Generally used for small area bonding.

Oven (Static or Conveyorized) Bonding



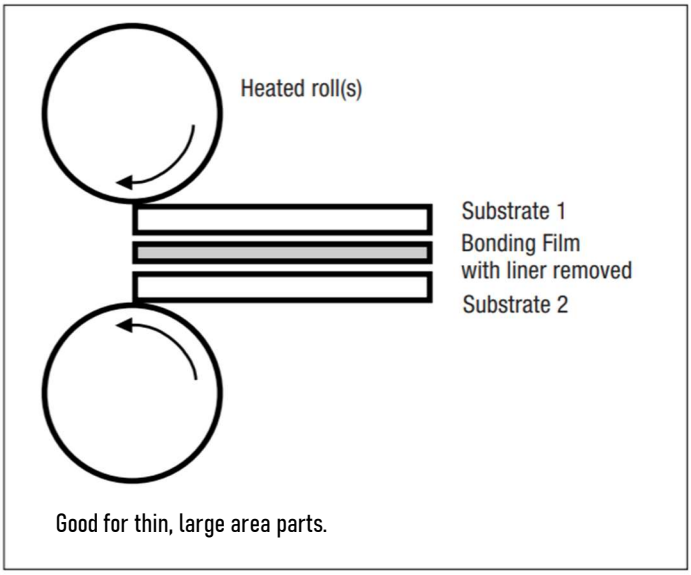
Good for small volume or startup bonding.

Hydraulic or Mechanical Press Bonding



Useful in larger area applications.

Lamination Bonding of Thin Substrates



Good for thin, large area parts.

Debonding

Since 3M™ Bonding Film 460 is a thermoplastic material, no curing during heating or aging occurs. To debond or open bonded parts, simply heat the bonded part to an adequate temperature (typically 210-230°F / 99-100°C) to soften the adhesive and then pry or peel the substrates apart. Solvents, such as acetone, methyl ethyl ketone (MEK), toluene and 3M™ Citrus Based Cleaner will soften this bonding film adhesive and can be used to remove excess adhesive in unwanted areas.* Soaking bonds in these solvents can also aid in debonding operations where appropriate.

***Note:** When using solvents, extinguish all ignition sources and follow the manufacturer's precautions and directions for use.

3M™ Thermal Bonding Film 406
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.

3M™ Thermal Bonding Film 406		
Substrate	**Overlap Shear Adhesion (psi)**	**90° Peel Adhesion (piw)**
Cold Rolled Steel	1160	17.0
Stainless Steel	740	4.4
Aluminum, Etched	1090	16.6
Polycarbonate	70	2.2
Acrylic	260	-
FR-4 PCB	1120	10.0
ABS	-	-
HDPE	-	-
Polypropylene	80	1.3
PVC	-	-
Nylon 6,6	140	3.5
Glass	-	1.9
SBR Rubber	-	12.1
Nitrile Rubber	-	11.7
Polyimide	-	9.2
Polyester	-	-

- Overlap shear made bonding 20 mil aluminum to test substrates using 320°F (160°C) bondline temperature, 2 seconds dwell, 14 lbs. gauge pressure.
- Peel bonds made bonding 4.5 mil aluminum foil to test substrates using 320°F (160°C) bondline temperature, 2 seconds dwell, 14 lbs. gauge pressure.
- Adhesion tests done @ 2 in/minute for peel, .2 in/minute for OLS.

Humidity Aging

3M™ Thermal Bonding Film 406		
Aging Conditions	**Time**	**90° Peel (piw)**
	0 (Control)	15.4
150°F / 95% RH	6 days	16.9
150°F / 95% RH	21 days	17.7
185°F / 95% RH	6 days	16.6
185°F / 95% RH	21 days	16.2

- Peel bonds made bonding 4 mil etched aluminum to 63 mil etched aluminum using 320°F (160°C) bondline temperature, 2 seconds dwell, 10 lbs. gauge pressure.
- Peel tests @ 2 in/minute.

3M™ Thermal Bonding Film 406
Typical Performance Characteristics

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Adhesion Strength TESTED at Various Temperatures

3M™ Thermal Bonding Film 406		
Aging Conditions	**Overlap Shear Adhesion (psi)**	**90° Peel (piw)**
75°F (24°C)	1160	16.5
100°F (38°C)	1090	17.5
125°F (52°C)	990	19.2
150°F (66°C)	910	18.0
175°F (79°C)	590	15.0

- Overlap shear made bonding 20 mil etched aluminum to 63 mil etched aluminum using 320°F (160°C) bondline temperature, 2 seconds dwell, 14 lbs. gauge pressure.
- Peel bonds made bonding 4.5 mil aluminum foil to test substrates using 320°F (160°C) bondline temperature, 2 seconds dwell, 14 lbs. gauge pressure.
- Adhesion tests done @ 2 in/minute for peel, .2 in/minute for OLS.

Electrical Performance

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

3M™ Thermal Bonding Film 406		
Test	**ASTM Method**	**Value**
Dielectric Constant	D150	2.4 @ 1 kHz 2.4 @ 10 kHz 2.4 @ 100 kHz 2.4 @ 1 MHz
Dissipation Factor	D150	.005 @ 1 kHz .001 @ 10 kHz .001 @ 100 kHz .006 @ 1 MHz
Dielectric Breakdown Strength	D149	2300 volts/mil
Volume Resistivity	D257	5.9 x 10^{17} ohm-cm

Storage and Shelf Life

The shelf life of 3M™ Thermal Bonding Film 406 is 24 months from the date of manufacture when stored in original packaging materials and stored at 2-27°C (35-80°F) and <50% relative humidity.

Certificate of Analysis (COA)

The 3M Certificate of Analysis (COA) for this product is established when the product is manufactured and deemed commercially available from 3M. The COA contains the 3M specifications, test methods, and test results for the product's performance attributes that the product will be supplied against. Contact your local 3M representative for this product's COA.

3M™ Thermal Bonding Film 406

Regulatory: For regulatory information about this product, contact your 3M representative.

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