

3M™ Thermal Bonding Film 615S

Product Description

3M™ Thermal Bonding Film 615S is a flexible, light colored, thermoplastic adhesive bonding film which exhibits good adhesion to a variety of substrates. The bonding film is supplied on a release coated paper liner. 3M TBF 615S contains a non-woven scrim reinforcing web that improves handling of the film, and reduces flow of the adhesive during bonding.

Key Features

- Can be die-cut
- Consistent, uniform adhesive thickness
- Quick fixturing/holding strength
- 100% solids
- Excellent adhesion to many substrates

Typical Physical Properties

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

Product	3M™ Thermal Bonding Film 615S
Base Resin	Polyester Thermoplastic (non-curing)
Adhesive Thickness	6.0 mil (0.15 mm) (nominal) 9.0 mil (0.22 mm)
Liner Thickness	3.0 mil (0.08 mm) [nominal]
Color	Translucent / Tan
Specific Gravity	1.00
Solids	100%
Ball and Ring Softening Range	116 to 123°C (240 to 250°F)
Tensile Strength @ Break	900 psi
Elongation @ Break	~300%
Two Lb. Dead Load Heat Resistance	102°C (215°F)

Note 1: The data reported in this data sheet was determined using 9.0 mil film thickness 3M™ Thermal Bonding Film 615S.

Note 2: Other thicknesses may be available upon request. Contact your local 3M sales representative for details.



Application Equipment Suggestions

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

The type of equipment used to bond 3M™ Thermal Bonding Film (TBF) 615S will depend on the application 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 TBF 615S, the adhesive, with the liner in place, can be first tacked (lightly bonded) to one of the substrates using low heat. The liner can then be removed, and placing the second substrate to the exposed adhesive surface, make the final bond using heat and pressure.

Alternatively, remove the liner and 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

60°C to 80°C bondline temperature

1-2 seconds dwell time

5-10 psi (35-70 kPa) 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 is to use a method which will result in an adhesive bondline temperature of 135°C (275°F) for 2-5 seconds using 10-20 psi pressure.

Suggested BEGINNING Bonding Conditions

130°C to 150°C bondline temperature

2-5 seconds dwell time

10-20 psi (70-140 kPa) pressure

Directions For Use (continued)

One approach to establishing the correct/optimum bonding conditions for a user's application is to evaluate a series of bonding temperatures, for example 121, 135, 149, 163 and 177°C (250, 275, 300, 325 and even 350°F). 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 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 93°C (200°F) is adequate to allow the bonded parts to be unfixtured/unclamped and handled.

For reference, the following tables show typical bond strengths for bonds made at various temperatures. **Such tables 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.**

Note: Temperatures shown are bondline temperatures and not heat block or roll settings.

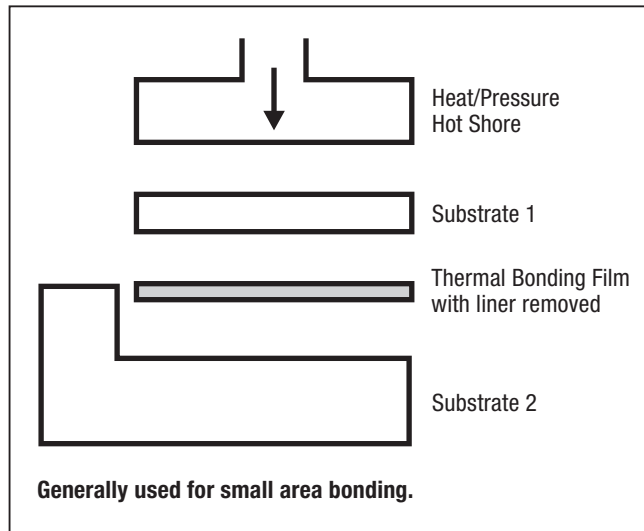
Overlap Shear Adhesive vs Bonding Temperature SS/SS Overlap Shear	
Bondline Temperature	3M™ Thermal Bonding Film 615S (9.0 mil)
110°C (230°F)	450 psi (3.1 MPa)
121°C (250°F)	690 psi (4.8 MPa)
132°C (270°F)	880 psi (6.0 MPa)
143°C (290°F)	860 psi (5.9 MPa)
154°C (310°F)	770 psi (5.3 MPa)
166°C (330°F)	770 psi (5.3 MPa)

- Bond strength determined using Instron tester at 0.2 in/minute (0.5 cm/min).
- Oven bonding method 20 minutes, 4.4 psi (30 kPa) pressure.
- SS is Stainless Steel.

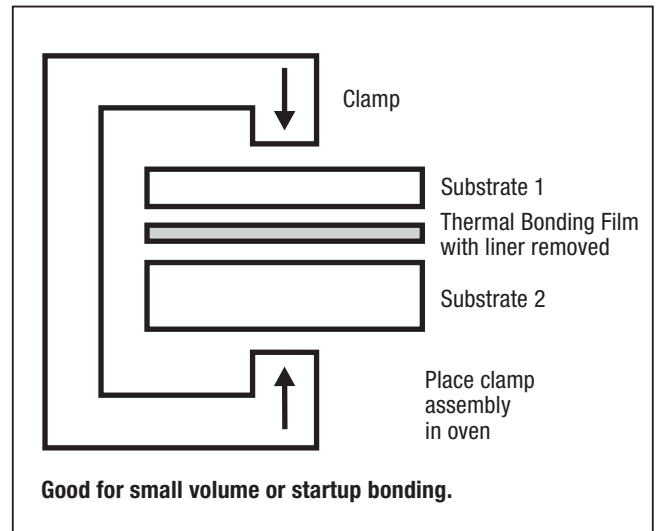
Typical Methods For Bonding 3M™ Thermal Bonding Film Adhesives

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

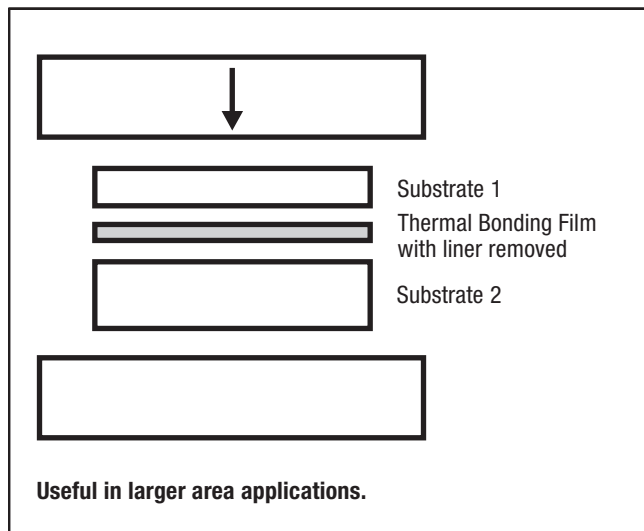
Hot Shoe or Thermode Bonding



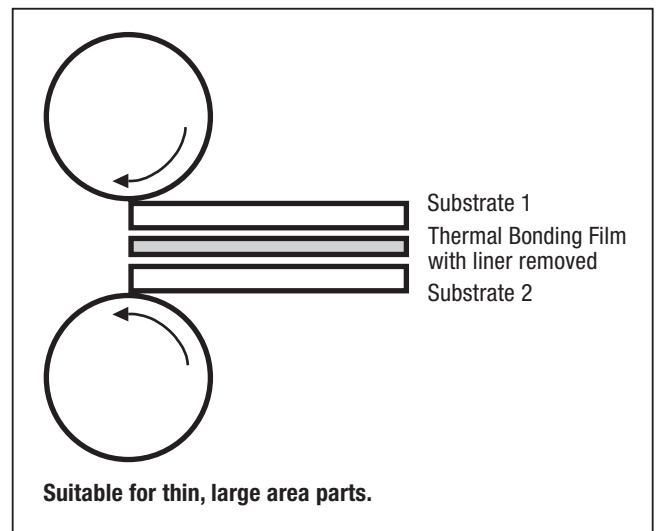
Oven (Static or Conveyorized) Bonding



Hydraulic or Mechanical Press Bonding



Lamination Bonding of Thin Substrates



Debonding – Since 3M™ Thermal Bonding Film (TBF) 615S 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 135-149°C / 275-300°F) to soften the adhesive and then pry or peel the substrates apart.

Solvents, such as acetone, MEK, toluene and 3M™ Citrus Base Cleaner will soften this 3M TBF 615S 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.

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.

Adhesion to Various Substrates

Test Substrate	Overlap Shear 3M™ Thermal Bonding Film 615S (9.0 mil)
Stainless Steel / Stainless Steel	930 psi (6.4 MPa)
Aluminum / Aluminum	900 psi (6.2 MPa)
Stainless Steel / Polycarbonate	890 psi (6.1 MPa)
Stainless Steel / PC-ABS	900 psi (6.2 MPa)
Aluminum / PC-ABS	740 psi (5.1 MPa)

Notes:

- Overlap shear tests measured with MTS Tensile Tester @ 2 inches/minute pull rate.
- Aluminum / aluminum and stainless steel / stainless steel samples made with oven bond method, 150°C, 20 minutes dwell time.
- Aluminum / PC-ABS, stainless steel / PC-ABS and stainless steel / polycarbonate samples made with thermode bond method, 150°C bondline temperature, 10 seconds dwell time.
- PC-ABS = Polycarbonate – Acrylonitrile Butadiene Styrene polymer blend.

Storage and Shelf Life

Storage: Store in a dry (preferably <50% RH) location at 2°C (35°F) to 27°C (80°F).

Shelf Life: Shelf life is 2 years from the date of shipment under storage conditions mentioned above.

Safety Data Sheet

Please consult Safety Data Sheet prior to use.

Important Note

Please consult Federal, State, and Local Regulations. State Volatile Organic Compound (VOC) regulations may prohibit the use of certain alcohol solutions or solvents. You should check with your state environmental authorities to determine whether use of a solution or solvent is restricted or prohibited.

Regulatory

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

Technical Information

The technical information, recommendations and other statements contained in this document are based upon tests or experience that 3M believes are reliable, but the accuracy or completeness of such information is not guaranteed.

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