

# 3M™ Thermal Bonding Film 690

## Product Description

3M™ Thermal Bonding Film 690 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 carrier.

## Key Features

- Suitable for kiss or through die cutting
- Consistent, uniform adhesive thickness
- Quick fixturing/holding strength
- 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 690
Base Resin	Polyester Thermoplastic (non-curing)
Adhesive Thickness	8.0 mil (0.20 mm)
Liner Thickness	3.0 mil (0.08 mm) [nomina]
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	450 psi
Elongation @ Break	~300%
Two Lb. Dead Load Heat Resistance	102°C (215°F)

## 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) 690 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 690, remove the liner and place the adhesive film between the two substrates. The bond is then made through heat and pressure using a heated press, a hot roll laminator, a hot shoe thermode method or similar equipment.

Alternatively, the adhesive can be first tacked (lightly bonded) to one of the substrates using low heat, then removing the liner and placing the second substrate to the exposed adhesive surface, making the bond using heat and pressure.

### **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

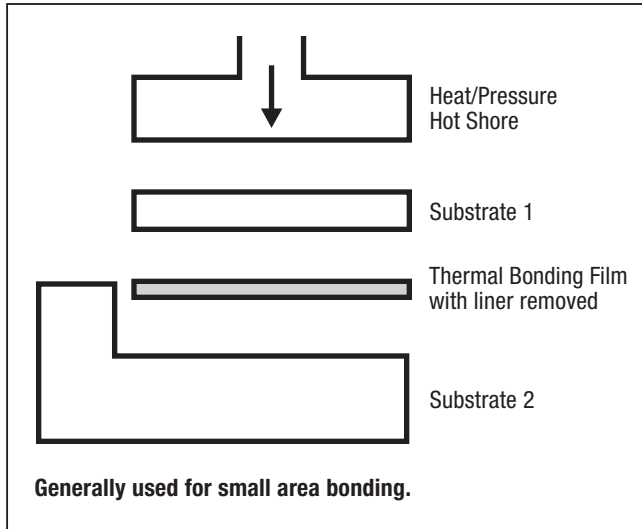
One approach to establishing the correct/optimum bonding conditions for a user's application is to evaluate a series of bonding temperatures, for example 121, 135, 149, 163 and 177°C (250, 275, 300, 325 and even 350°F). Time and pressure will be dictated by the thickness of the substrate and the type 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.

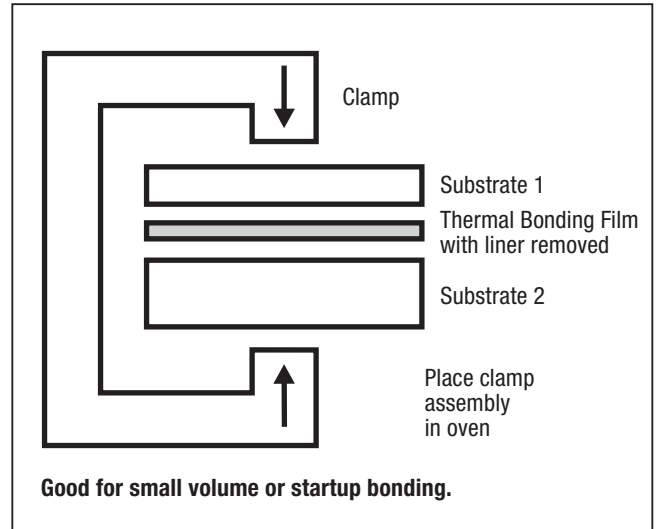
### Typical Methods For Bonding 3M™ Thermal Bonding Film Adhesives

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.

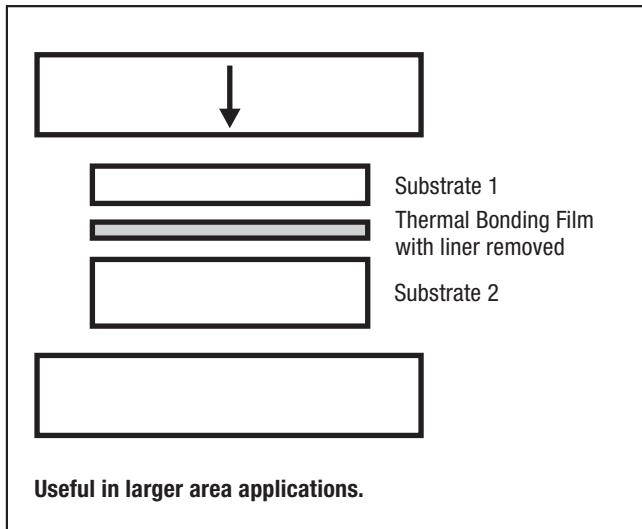
**Hot Shoe or Thermode Bonding**



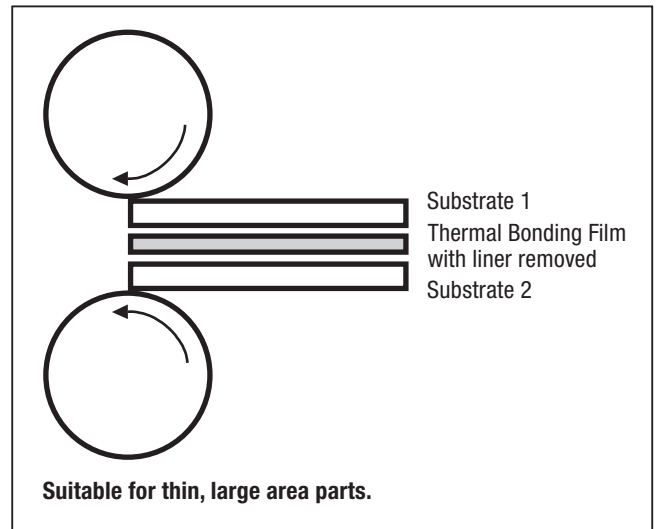
**Oven (Static or Conveyorized) Bonding**



**Hydraulic or Mechanical Press Bonding**



**Lamination Bonding of Thin Substrates**



**Debonding** – Since 3M™ Thermal Bonding Film (TBF) 690 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 3M TBF 690 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 690 (8.0 mil)	90° Peel 3M™ Thermal Bonding Film 690 (8.0 mil)
Stainless Steel	825 psi	16.0 piw
Aluminum	810 psi	15.5 piw
Polycarbonate	890 psi	11.5 piw
Acrylic	905 psi	13.0 piw
ABS	805 psi	10.5 piw

- Overlap shear made bonding 20 mil aluminum to test substrates using 138°C (280°F) bondline temperature, 5 seconds dwell, 5 lbs gauge pressure.
- Peel bonds made bonding 4.5 mil aluminum foil to test substrates using 138°C (280°F) bondline temperature, 5 seconds dwell, 5 lbs gauge pressure.
- Adhesion tests done using Intron @ 2 in/minute for peel, .2 in/minute for OLS.

## 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.

## Product Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Given the variety of factors that can affect the use and performance of a 3M product, user is solely responsible for evaluating the 3M product and determining whether it is fit for a particular purpose and suitable for user's method of application.

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