APPLICATION NOTE

Bond-Ply™ 100/660B

Introduction

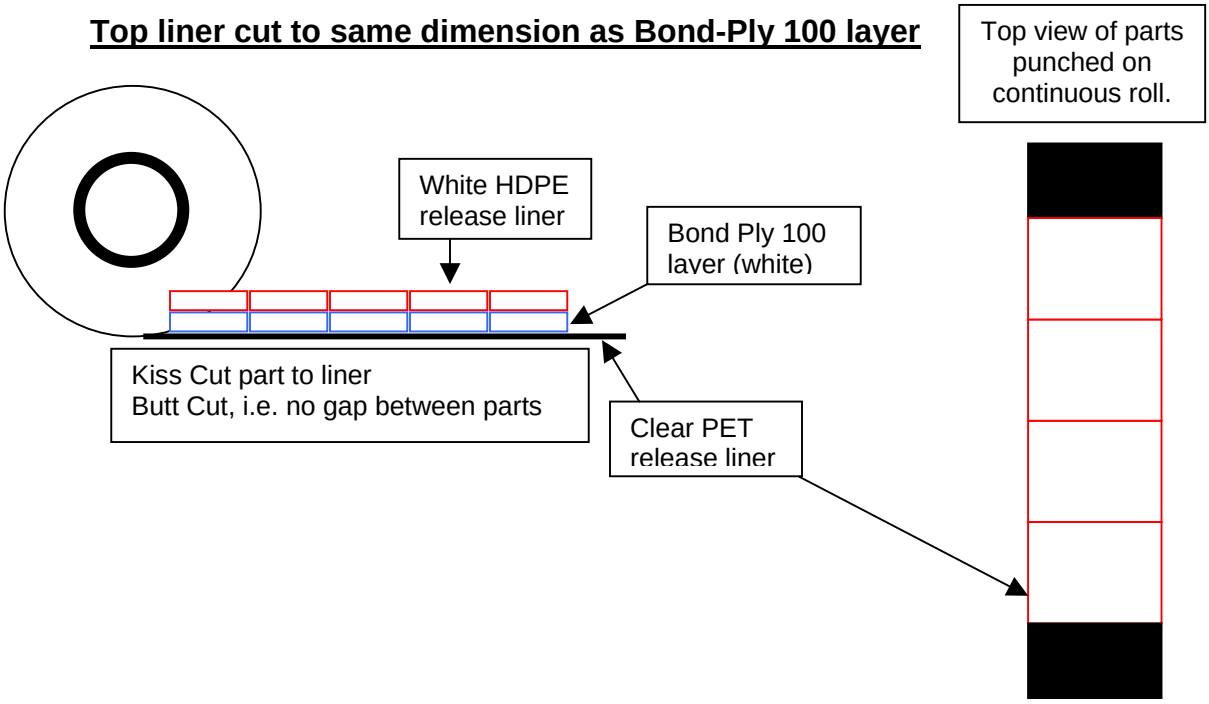
Bond-Ply 100 material is a thermally conductive acrylic-based pressure sensitive tape. The Bond-Ply 100 was designed to replace liquid adhesive and mechanical fasteners. The Bond-Ply 100 adhesive has a high temperature bond strength and excellent humidity and temperature characteristics. The Bond-Ply 100 adhesive is a solid at room temperature and can be punched into most configurations. The Bond-Ply 100 product is a reinforced adhesive tape that is protected on both sides with release liners.

Bond-Ply 100 Material Forms

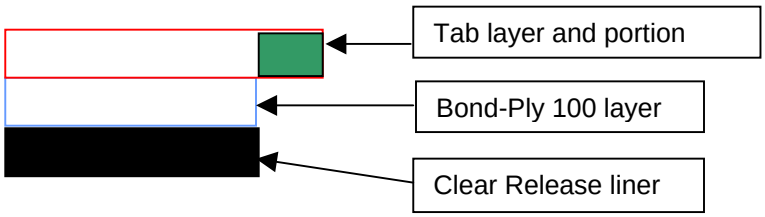
Bond-Ply 100 is a reinforced double-sided pressure sensitive tape. The color of the material is white and is supplied with two protective liners. One release liner is a white HDPE (typically the top-side) and the other liner is a clear PET (typically the bottom-side). These liners protect the Bond-Ply 100 adhesive from collecting debris in transportation and handling.

Bond-Ply 100 is available in roll stock, individual punch parts, punch part on continuous rolls kiss cut or gap between parts, punched parts with tabs kiss cut on continuous roll. Continuous rolls are provided on 3 inch core. The color red is used to designate the white HDPE release liner layer, and the color blue is used to designate the Bond-Ply 100 adhesive layer. Both layers are actually white.

Top liner cut to same dimension as Bond-Ply 100 layer



Cross Section view of Tabulated Part



The tab portion can be 0.250 to 1 inch in width. The pull-tab makes it easier to remove the part from the continuous liner and then to remove the top release liner from the Bond-Ply has been applied to the appropriate surface.

Bond-Ply 100 Application Method

1. **Clean the Surfaces**
   The two surfaces to be bonded must be clean of oil (fingerprints, processing oil, etc.), dust and or debris from packaging or work area. Use your company's procedure for proper handling of industrial solvents. Apply a small amount of industrial solvent to the cloth and wipe one or both surfaces depending on the processing being completed at one time. The cloth should be replaced occasionally to prevent the contamination of the next surface.
2. **Allow the surface to dry**
   Depending on the time available, the surface will dry within 5 minutes at room temperature or faster at elevated temperature.
3. **Apply precut tape pad to the surface**
   Remove the precut pad from the continuous liner. Avoid contact with the exposed adhesive, and apply precut pad to the surface of the device or heat sink with a rolling action. Rolling action can be accomplished with a rubber roller or thumb. The objective is to remove all air from the interface. Bergquist suggests the application of the pad to a plastic package first to achieve optimum adhesion. For other surface combinations, the assembly process can go either way.
4. **Apply to second surface**
   Use Step #1 to assure cleanliness of the surface. Remove the second liner from the adhesive pad. Center the heat sink or device in a "V" or ">" angle approach. Rotate the device or heat sink to close the "V" and make complete contact. The objective is to eliminate the air from the interface.

Application pressure, temperature and time

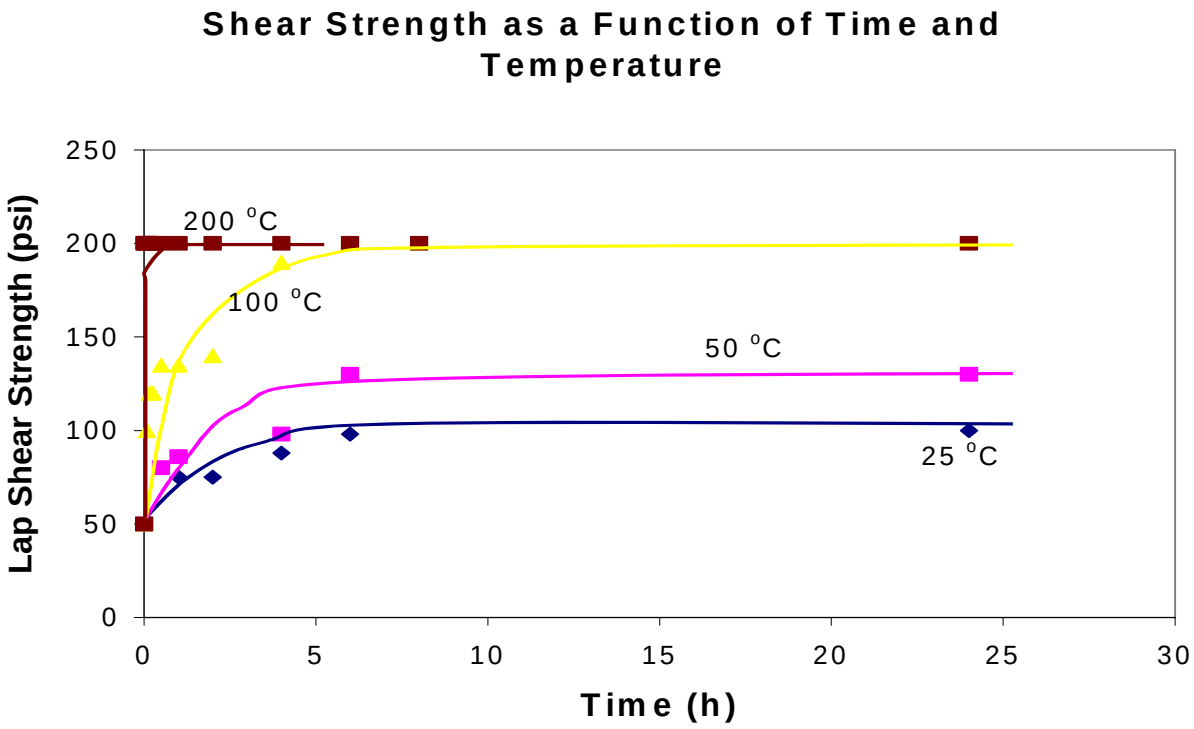
Pressure, psi	Temperature, °C	Time, sec.
5	25	48
10	25	24
20	25	12
40	25	6
80	25	3
5	35	24
10	35	12
20	35	6
40	35	3
80	35	1.5

As the table above indicates, the doubling of pressure applied to the assembly will decrease the dwell time required by 50 %. The increase of every 10 °C in temperature decreases the time by 50%. These values are targets for bonding metal-to-metal surfaces.

Affect of temperature exposure after lamination on lap shear values

Test Method:

Lap shear joints were made using Bond-Ply 100, 8 mil on anodized aluminum. The sample specimens were conditioned in an air-circulating oven at 25, 50, 100 and 200 °C. The graph attached shows the lap shear strength increase with time at the various conditioning temperatures. All pulls were completed at room temperature.



Note: The continuous lines in the graph above are meant as a visual aid and are not a result of curve fit analysis.

Rework Instructions

1. Insert the razor or knife into the bond line. This process is to create a void to insert the thin metal blade. Do not try to pry the components apart at this point.
2. Insert the blade and slowly pry or twist the blade to separate the components. It may be necessary to insert the blade and repeat the twisting action to get the components apart. These types of adhesives do not response to snapping action. A slow consistent pressure is a better method to separate the components
3. After the two components are separated, the Bond-Ply 100 adhesive can be removed by pulling on an edge. The razor blade can be to start an edge. Again, slow separation of the adhesive is better than fast stripping removal. Fast removal may cause the adhesive to cohesively fail to the surface that will cause additional clean up procedure.
4. If some of the adhesive remains on the a surface, then it must be removed chemically. Lightly soak an area of a soft cloth with IPA and apply to the adhesive. These solvents will soften the adhesive so that they can be rubbed off with the cloth. Continue applying the solvent and rubbing until the adhesive is completely removed.
5. If solvent is used the cleaning process, then allow the components to air dry for 10-15 minutes prior to reassembly.

Solder Reflow Conditioning

The process of HASL or solder reflow requires that the material be processed in a 10 +/- 5°C dew point environment or the assembly needs to be conditioned to prevent blisters from the moisture absorbed into the adhesive or substrate (mostly Kapton) layers.

The process of conditioning is used to remove volatiles. The volatiles will cause the assembly to blister during the solder reflow process. The conditioning step will remove the volatiles and allow the assembly to withstand the solder reflow step.

The process control will be affected by the humidity control in the work area. The assembly area should be controlled to a dew point of 30°C +/- 10°C. A lower dew point room condition will increase the working time from the conditioning oven to the reflow process. Removing the assemblies from the conditioning oven and placing them directly into the solder reflow station achieves best results.

The suggested conditioning step prior to solder reflow is:

1. Place assembly of metal plate, Bond-Ply adhesive and circuit in an oven at one of the temperatures and dwell times noted below. The dwell times are an average starting points. The design of the circuit will affect the actual time required to completely all volatiles from the assembly.

Oven Temperature	Dwell Time
70 °C	8 hours
100 °C	4 hours
130 °C	2 hours

2. Process evaluation should be completed to optimize the actual oven times required. Room humidity will affect the time required to completely remove all the volatiles from the assembly.

3. The conditioning step will also increase the adhesion of the Bond-Ply adhesive to both the metal plate and the flexible circuit.

Material Storage and Shipping

Bond-Ply 100 is a pressure sensitive tape that can be degraded by excessive exposure to heat in storage and shipping. It is recommended that the Bond-Ply 100 material not be exposed to shipping temperature of 50°C for more than one week. The storage temperature should be below 30°C to achieve one year shelf life from date of shipment from Bergquist factory. If stored at 40°C or 50°C the shelf life will be reduce to 6 and 3 months respectively.

Bond-Ply 100 rolls should be stored on the roll edge (flat cylinder) in storage. The Bond-Ply 100 rolls should be packaged with side supports and core plugs. The rolls should be individually wrapped with shrink-wrap or bagged in polyethylene bag or the like to keep out debris.

THE BERGQUIST COMPANY