

Precautionary Statement

Precautions for Use

● Handling

Take the following measures to avoid contacting and inhaling resin, glass or other dust from material, etc.

- ① Install a local ventilator above the workbench so as to sufficiently exhaust dust.
- ② Wear protection gear to cover hands, mouth, nose and eyes.
- ③ Control room temperature not to sweat and protect skin from dust.

If you come into contact with and/or inhale resin, glass or other dust from material, take the following measures:

- ① If dust has entered into eyes : Wash your eyes with clean running water.
- ② If dust has come in contact with skin : Wash it off with soap water.
- ③ If you have inhaled dust : Rinse out your mouth, or use tissues to clean if inhaled from nostrils.
- ④ If you have ingested dust : Induce vomiting, or if it remains in your mouth, spit it out and then gargle.

Make sure to install a local ventilator since gas is generated in the heating process.

● Storage

Since material characteristics may change depending on the storage conditions, pay attention to the following points:

- ① Protect the materials from direct sunlight; otherwise, discoloration may occur.
- ② Use ventilator or air conditioner to remove moist air in the storage area and circulate the air.
- ③ Keep the materials horizontally to prevent warpage or deflection and avoid piling materials on pallets.
Also, since condensation may occur on the surface of the walls, keep the materials away from walls to prevent them from becoming wet.
- ④ Place dry paper or polyethylene film between materials to prevent them from getting scratched.
- ⑤ Maintain constant room temperature to prevent from condensation into water on the materials.
- ⑥ As prepregs and films require low-temperature storage, take sufficient time to get them back to ordinary temperature in packed condition. Before use, confirm there is no condensation on the surface. (it takes about 12 hours to bring the temperature of materials stored at 5 °C to 22 °C)

● Storage Conditions

Classification		Part Number	Temperature	Humidity	Term	Precautions
Multilayer Material	MCL (Core Material)	MCL-E-700G • MCL-E-679FG MCL-E-705G • MCL-E-679FGB MCL-HS100 • MCL-E-770G MCL-HS200 • MCL-E-78G MCL-I-671 • MCL-LW-910G MCL-LW-900G • MCL-E-795G MCL-HE-679G • MCL-LW-990	max. 25 °C	50±15 %RH	Within 6 months after shipment	Store in packed state
	Prepreg	GEA-679FG • GEA-78G GEA-700G • GIA-671N GEA-705G • GHA-679G GEA-770G • GWA-900G GH-100 • GWA-910G GH-200 • GWA-990	20±5 °C	50±10 %RH	Within 3 months after shipment	
		TD-002		5±4 %	50±10 %RH	
Adhesive Film		AS-400HS/MCF-400HS MCF-200HS	20±5 °C	50±10 %RH	Within 3 months after shipment	
		MCF-770G(P)	20±5 °C	50±10 %RH	Within 2 months after shipment	

Precautions in Process

● Etching

Cupric chloride, ferric chloride or ammonium persulfate is generally used. After etching, wash the laminates carefully with clean running water. If washing is insufficient, residual ions (copper ions, iron ions, etc.) may degrade electric characteristics, lower copper foil adhesiveness and discolor laminates.

● Removing etching resist

To prevent boards from discoloration or other change, minimize processing time. After processing, wash the materials well with water and then dry them thoroughly.

● Punching

The following three principles are necessary for MCL punching.

- ① The minimum hole diameter shall be more than 1/2 of the board thickness.
- ② The minimum distance between holes shall be more than 2/3 of the board thickness.
- ③ The minimum distance between a hole and the nearest board edge shall be more than twice the board thickness.

● Drilling

Pay attention to the total stacked thickness (t) of the MCLs to be drilled and the effective length (L) of the drill: is 1.5 mm or more longer than (t). A spade type is suitable for glass fabric-based. Since hole quality varies with the type of drill used, the drilling machine and drilling conditions, examine these conditions carefully when setting or changing them.

● Plating

Carefully control the composition and temperature of the plating solution and plating time when plating MCLs. After taking them out of the plating bath, wash them carefully with running water immediately then dry them sufficiently.

● Use of UV Ink

The surface state of MCL influences adhesion and wettability of the UV ink, so pay attention to the following points:

- ① Polish the MCL surfaces sufficiently.
- ② After polishing, wash them sufficiently with running water.
- ③ Do not store them for a long time.
- ④ If stored for a long time, polish again, wash with water and dry them before use.

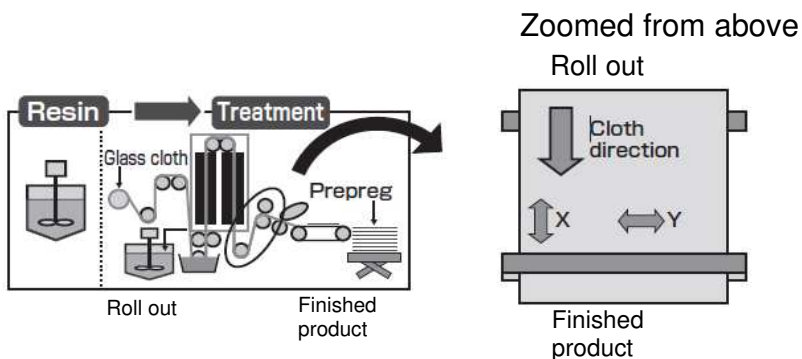
● Heating

Heat MCL uniformly, not partially, as much as possible. When heating them to temperature higher than the glass-transition temperature, warpage and deflection can be reduced by using a horizontal rack. When heating them at high temperature for more than 30 minutes, the laminates may become discolored. So, determine the optimum time in advance.

● Directionality of "MCL"

Since MCLs are directional (warp and fill), be careful with respect to pattern design and lay out.

Production Process : Direction of MCL



Glass cloth direction = X (warp) direction

Precautions for Use of Completed PWB

●Storage

Since printed wiring boards absorb moisture in the environment, pay attention to the following points when storing them:

- ①Keep in a moisture-proof package (polyethylene bag and silica gel) until using them.
- ②Store in an air-conditioned room (below 25 °C and below 60 %RH).
- ③Do not leave boards in a non-air-conditioned room (humidity: over 60 %RH) before mounting.
- ④When using only some of the boards, keep the remaining ones in the same moisture-proof package in which they were delivered.
- ⑤Even when kept in a moisture-proof package, these boards will gradually absorb moisture in the environment during humid seasons. When storing them for more than three months, take care to keep them dry.

●Drying

When boards are assumed to have absorbed moisture because of improper storage conditions or long-term storage of more than three months, be sure to dry them before use.

①Recommended drying conditions:

Drying temperature (°C)	Drying time (hrs.)
80	24
100	12
130	2

* In case boards are stacked at drying, extend the drying time by about 20 % because temperature of the boards rises slowly.

- ②Hold the boards horizontally during drying.
- ③Too high drying temperature (over 130 °C) may cause oxidization of copper foil and discoloration of boards.
- ④In case of devices are mounted on boards, dry the boards at temperature at which the heat resistance of the part is taken into account. This applies to boards with surface protection coating.
- ⑤After drying, component mounting as soon as possible. If the work does not proceed smoothly, protect these boards with a moisture- proof package.

●Heating

- ①Note that excessive force on the board during. Heating may cause bow,twist or measling.
- ②During high temperature heat treatment (such as fusing), rapid heating and cooling may result in interlayer cracks, board swellings, and/or other defects. Such heating or cooling should be done step-by-step.To improve reliability, be sure to dry the materials before heat treatment.

●Soldering

The solder heat resistance of MCL is greatly affected by the temperature of the solder bath. So, use an L-shaped thermometer to control carefully the temperature of the solder bath. When using a soldering iron, note that the actual temperature at the tip varies on its manufacturer and structure even though soldering irons are of the same capacity. You are recommended to measure the temperature with a surface thermometer in advance and to use the soldering iron below 300°C. After soldering, try not to move the substrates while the soldered portions remain hot.

Measling and blistering of the glass fabric epoxy MCLs are apt to occur on wet printed wiring boards. So dry them (at 130 °C for 1 to 2 hours) before soldering.Excessively hot solder may result in shorter heat-resistance time, leading to swellings in circuits and boards. Make sure to maintain the appropriate temperature.

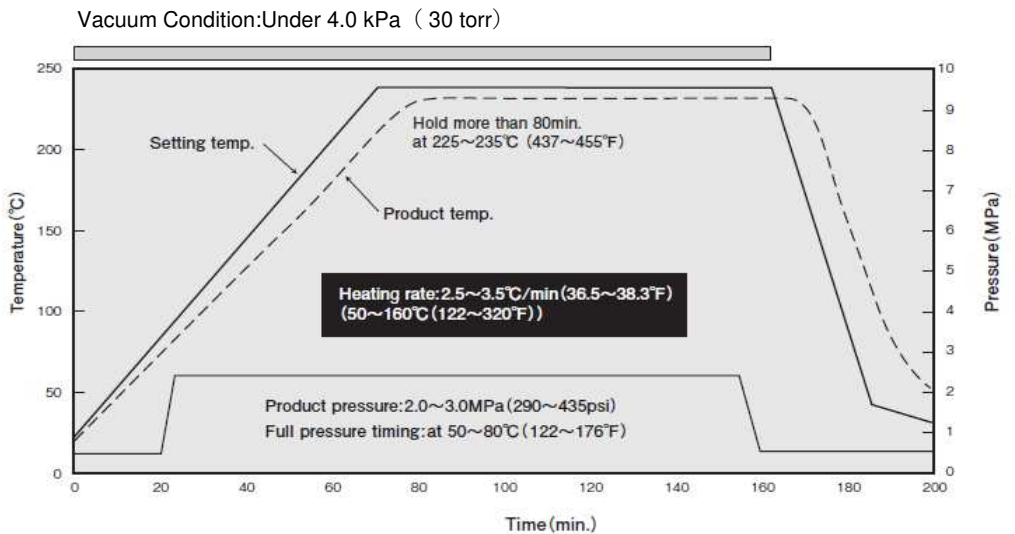
Recommended Press Condition for Multilayer Board Lamination

GH-200

■ Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 2.5~3.5 °C/min. within the melting temperature range of the prepreg resin (50~160 °C). Keep the product temperature at 225~235 °C for more than 80 min.
- ② The setting temperature of heating plates differs depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa(30 torr). Please start vacuuming before adding heat and pressure for lamination.
- ④ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.0~3.0 MPa.)
- ⑤ We recommend that pressure on material is low pressure of 0.5 MPa for resin of prepreg at the initial stage and set the full-pressure, before product temperature become 80 °C.
- ⑥ Inner pattern filling capability of prepreg may change according to inner pattern and thickness design.
- ⑦ By outgas from an inner substrate, the curing property of prepregs may be affected. Please use MCL-HS200 as an inner substrate.
- ⑧ When you will use FR-4 laminates as dummy products, it is possible that FR-4 laminates decompose because of high lamination temp. Please use MCL-HS200 or GH-200 for dummy laminates, too.

■ Recommended Press Conditions



※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

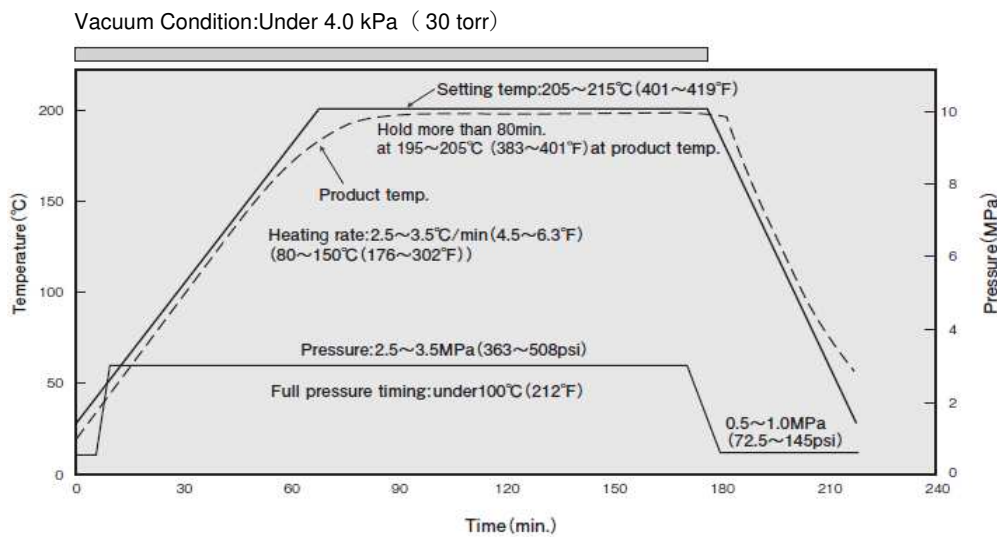
Recommended Press Condition for Multilayer Board Lamination

GH-100

■Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 2.5~3.5 °C/min. within the melting temperature range of the prepreg resin (80~150 °C). Keep the product temperature at 195~205 °C for more than 80 min.
- ② The setting temperature of heating plates differs depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa(30 torr). Please start vacuuming before adding heat and pressure for lamination.
- ④ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.5~3.5 MPa.)
- ⑤ We recommend that pressure on material is low pressure of 0.5 MPa for resin of prepreg at the initial stage and set the full-pressure, before product temperature become 100 °C.
- ⑥ Inner pattern filling capability of prepreg may change according to inner pattern and thickness design.
- ⑦ By outgas from an inner substrate, the curing property of prepregs may be affected. Please use MCL-HS100 as an inner substrate.
- ⑧ When you will use FR-4 laminates as dummy products, it is possible that FR-4 laminates decompose because of high lamination temp. Please use MCL-HS100 or GH-100 for dummy laminates, too.

■Recommended Press Conditions



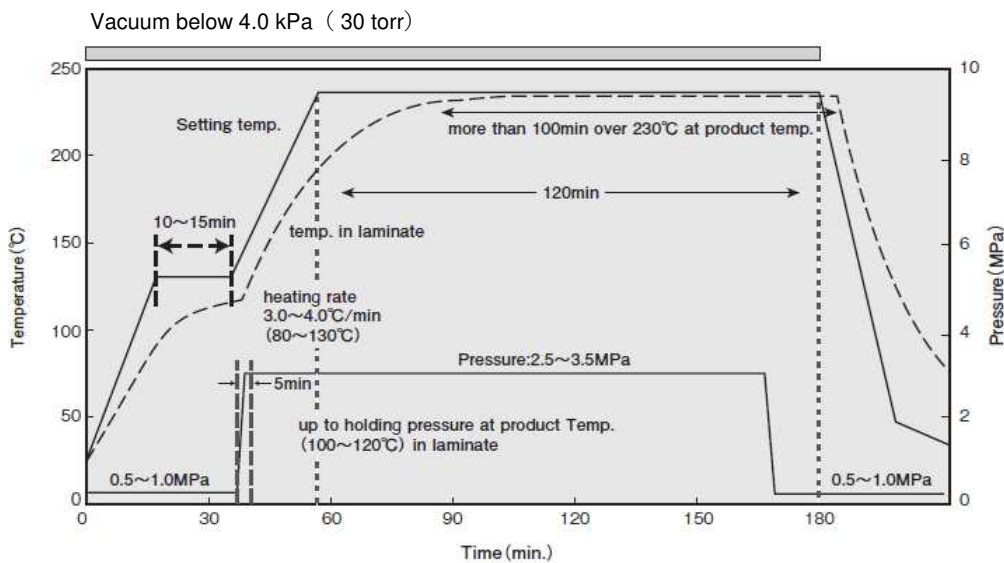
※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

GEA-795G

■Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 3.0~4.0 °C/min. within the melting temperature range of the prepreg resin (80~130 °C). Hold the product temperature above 230 °C for more than 100 min.
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa(30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ④ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.5~3.5 MPa.)
- ⑤ In order to reduce the pressure shock to each part of the laminate, low pressure shall be applied to the material at the initial stage and increase it at the material temperature 100~120 °C, when the resin becomes soft.
- ⑥ Inner pattern filling capability of prepreg may change according to inner pattern and thickness design.
- ⑦ By out gas from an inner substrate, the curing property of prepregs may be affected. Please use MCL-E-795G as an inner substrate.
- ⑧ When you will use FR-4 laminates as dummy products, it is possible that FR-4 laminates will decompose because of high lamination temp. Please use MCL-E-795G or GEA-795G for dummy laminates, too.

■Recommended Press Conditions



※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

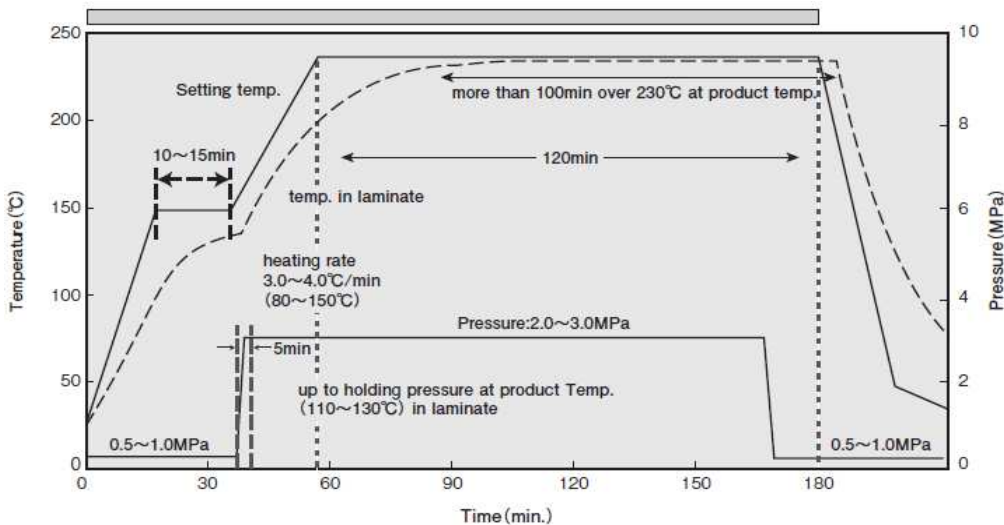
GEA-770G

■Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 3.0~4.0 °C/min. within the melting temperature range of the prepreg resin (80~150 °C). Hold the product temperature above 230 °C for more than 100 min.
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa(30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ④ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.0~3.0 MPa.)
- ⑤ In order to reduce the pressure shock to each part of the laminate, low pressure shall be applied to the material at the initial stage and increase it at the material temperature 110~130 °C, when the resin becomes soft.
- ⑥ Inner pattern filling capability of prepreg may change according to inner pattern and thickness design.
- ⑦ By out gas from an inner substrate, the curing property of prepreps may be affected. Please use MCL-E-770G as an inner substrate.
- ⑧ When you will use FR-4 laminates as dummy products, it is possible that FR-4 laminates will decompose because of high lamination temp. Please use MCL-E-770G or GEA-770G for dummy laminates, too.

■Recommended Press Conditions

Vacuum below 4.0 kPa (30 torr)



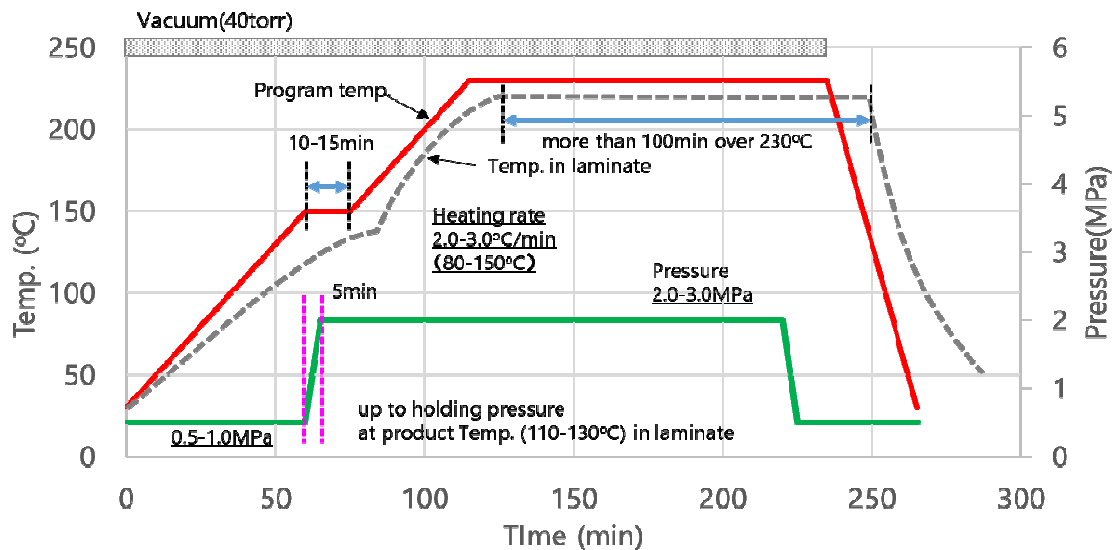
※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

MCF-770G(P)

■Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 2.0~3.0 °C/min. within the melting temperature range of the prepreg resin (80~150 °C). Hold the product temperature above 230 °C for more than 100 min.
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa(30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ④ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.0~3.0 MPa.)
- ⑤ In order to reduce the pressure shock to each part of the laminate, low pressure shall be applied to the material at the initial stage and increase it at the material temperature 110~130 °C, when the resin becomes soft.
- ⑥ Inner pattern filling capability of prepreg may change according to inner pattern and thickness design.
- ⑦ By out gas from an inner substrate, the curing property of prepreps may be affected. Please use MCL-E-770G as an inner substrate.
- ⑧ When you will use FR-4 laminates as dummy products, it is possible that FR-4 laminates will decompose because of high lamination temp. Please use MCL-E-770G or GEA-770G for dummy laminates, too.

■Recommended Press Conditions



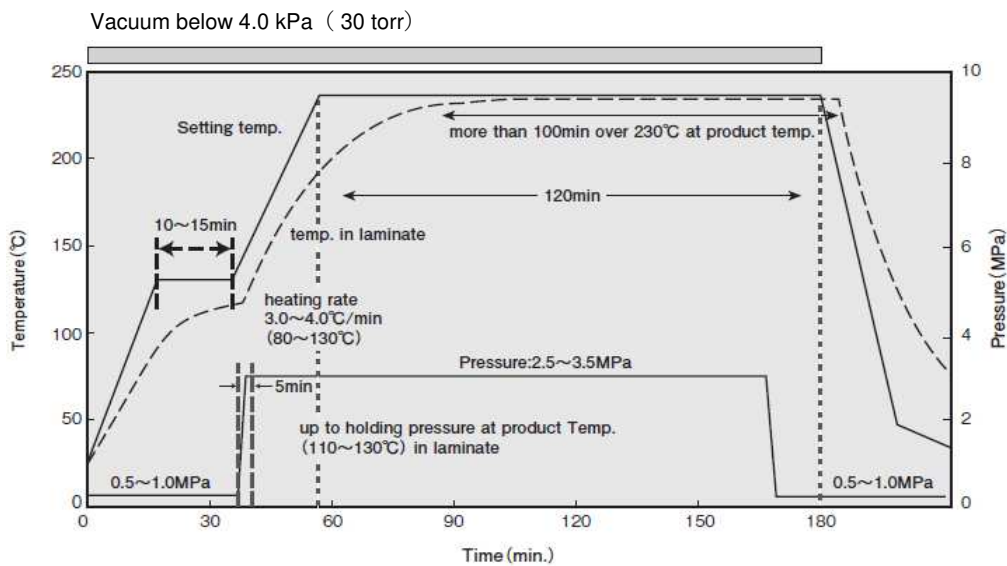
※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

GEA-705G

■Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 3.0~4.0 °C/min. within the melting temperature range of the prepreg resin (80~130 °C). Hold the product temperature above 230 °C for more than 100 min.
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa(30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ④ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.5~3.5 MPa.)
- ⑤ In order to reduce the pressure shock to each part of the laminate, low pressure shall be applied to the material at the initial stage and increase it at the material temperature 110~130 °C, when the resin becomes soft.
- ⑥ Inner pattern filling capability of prepreg may change according to inner pattern and thickness design.
- ⑦ By out gas from an inner substrate, the curing property of prepreps may be affected. Please use MCL-E-705G as an inner substrate.
- ⑧ When you will use FR-4 laminates as dummy products, it is possible that FR-4 laminates will decompose because of high lamination temp. Please use MCL-E-705G or GEA-705G for dummy laminates, too.

■Recommended Press Conditions



※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

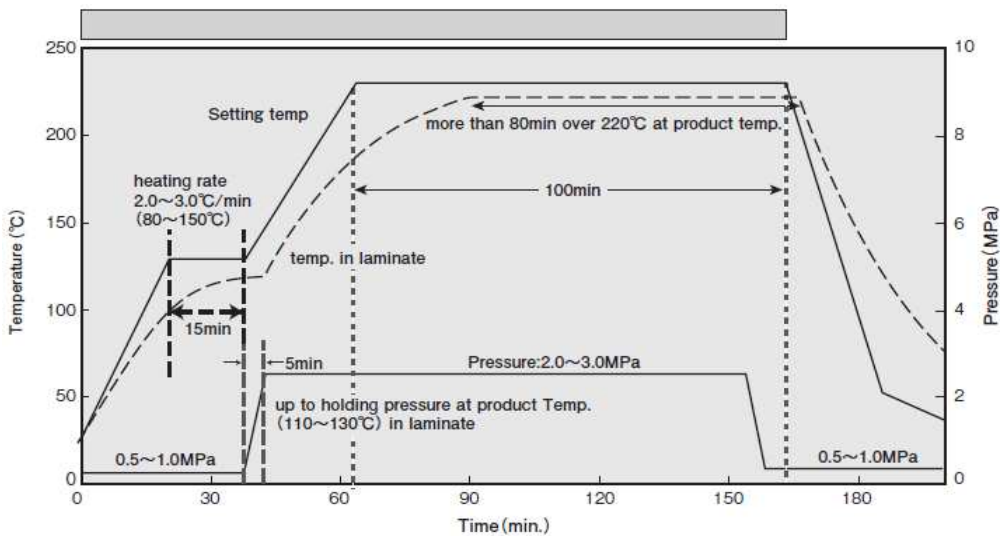
GEA-700G

■Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 2.0~3.0 °C/min. within the melting temperature range of the prepreg resin (80~150 °C). Hold the product temperature above 220 °C for more than 80 min.
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa(30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ④ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.0~3.0 MPa.)
- ⑤ In order to reduce the pressure shock to each part of the laminate, low pressure shall be applied to the material at the initial stage and increase it at the material temperature 110~130 °C, when the resin becomes soft.
- ⑥ Inner pattern filling capability of prepreg may change according to inner pattern and thickness design.
- ⑦ By out gas from an inner substrate, the curing property of prepreps may be affected. Please use MCL-E-700G(Type R) as an inner substrate.
- ⑧ When you will use FR-4 laminates as dummy products, it is possible that FR-4 laminates will decompose because of high lamination temp. Please use MCL-E-700G(Type R) or GEA-700G for dummy laminates, too.

■Recommended Press Conditions

Vacuum below 4.0 kPa (30 torr)



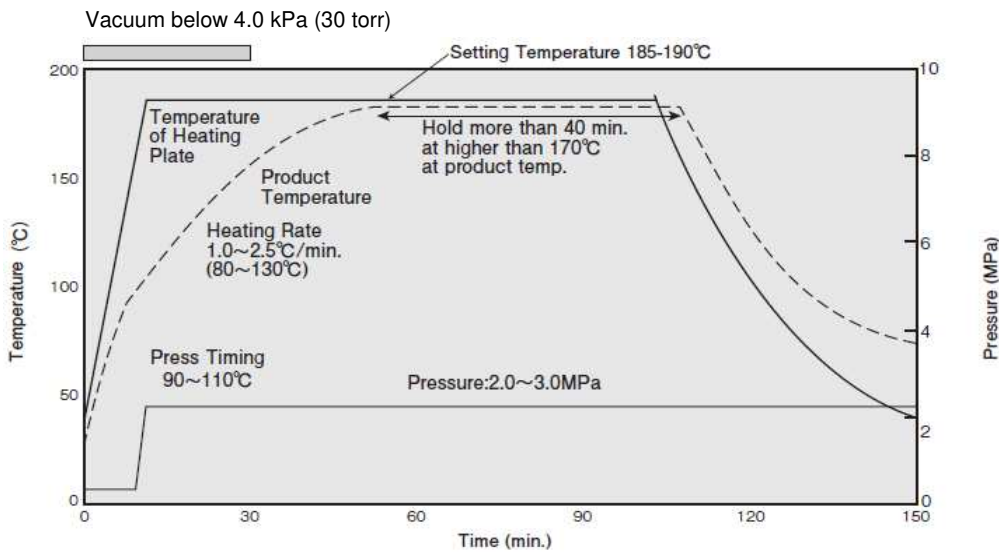
※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

GEA-679FG

■ Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be 1.0~2.5 °C/min. within the melting temperature range of the prepreg resin (80~130 °C). Hold the product temperature above 170 °C for more than 40 min.
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa (30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ④ The time for vacuuming shall not be longer than the end of molding process (When resin flow stops). If the vacuuming is continued until the end of the lamination process, flowed resin becomes fragile due to bubble remain. Fragments of it may become a cause of dent. Also small bubbles (blur) may occur in the edge of the product.
- ⑤ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.0~3.0 MPa.)
- ⑥ Inner pattern filling capability of prepreg may change according to inner pattern and thickness design.
- ⑦ In order to reduce the pressure shock to the product, it is recommended to set initial pressure low, 0.5 MPa with 90~110 °C product temperature at the initial stage.

■ Recommended Press Conditions



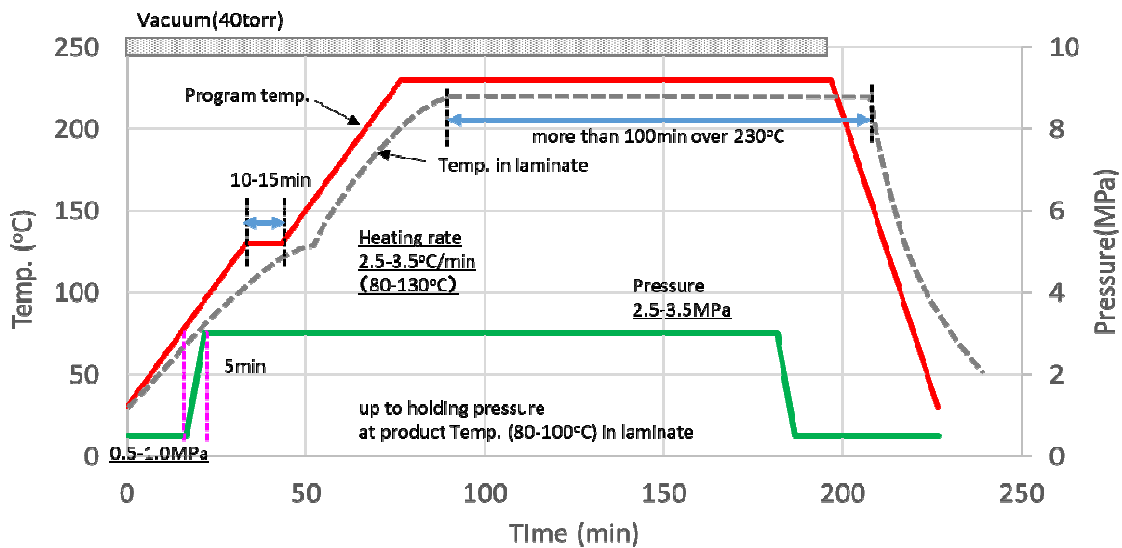
※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

MCF-200HS

■Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 2.5~3.5 °C/min. within the melting temperature range of the prepreg resin (80~150 °C). Hold the product temperature above 230 °C for more than 100 min.
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa(30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ④ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.5~3.5 MPa.)
- ⑤ In order to reduce the pressure shock to each part of the laminate, low pressure shall be applied to the material at the initial stage and increase it at the material temperature 80~100 °C, when the resin becomes soft.
- ⑥ Inner pattern filling capability of prepreg may change according to inner pattern and thickness design.
- ⑦ By out gas from an inner substrate, the curing property of prepreps may be affected. Please use MCL-HS200 as an inner substrate.
- ⑧ When you will use FR-4 laminates as dummy products, it is possible that FR-4 laminates will decompose because of high lamination temp. Please use MCL-HS200 or GH-200 for dummy laminates, too.

■Recommended Press Conditions



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GWA-900G/GWA-910G

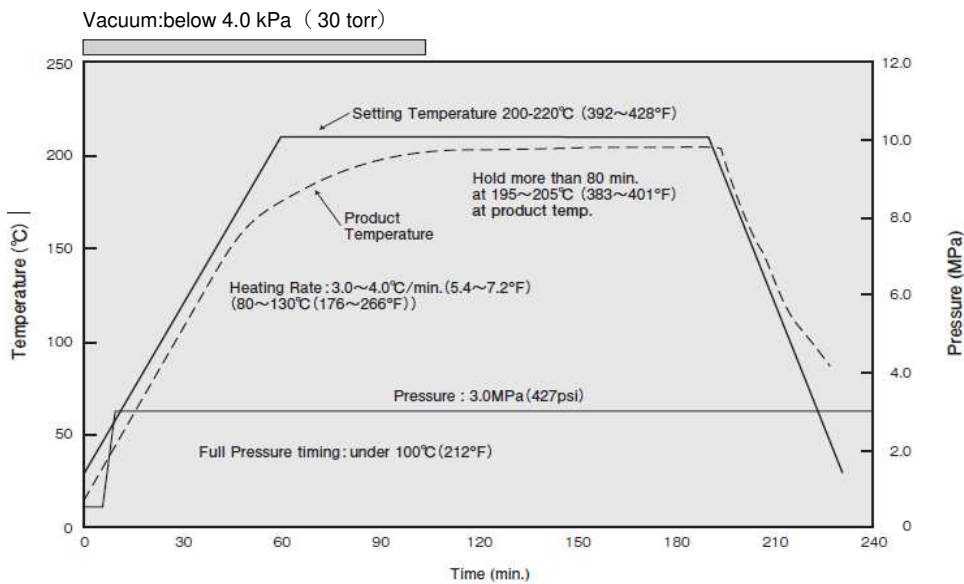
■ Precautions for Outer-layer Copper Foil

There is the case that Outer-layer peel strength lowers by a kind of the copper foil.
Copperfoil should be examined enough.

■ Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 3.0~4.0 °C/min. within the melting temperature range of the prepreg resin (80 °C~).
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa (30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ④ The time for vacuuming shall not be longer than the end of molding process. If the vacuuming is continued until the end of the lamination process, flowed resin becomes fragile due to bubble remain. Fragments of it may become a cause of dent. Also small bubbles (blur) may occur in the edge of the product.
- ⑤ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.5 ~4.0 MPa at vacuum pressing.)
- ⑥ We recommend that pressure on material is the low pressure of 0.5 MPa for resin of prepreg at the initial stage and material temperature pressurizes it before 80°C. The starting pressure is 0.5 MPa, and set the full-pressure, before product temperature become 100°C.

■ Recommended Press Conditions



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GWA-990(Type D)

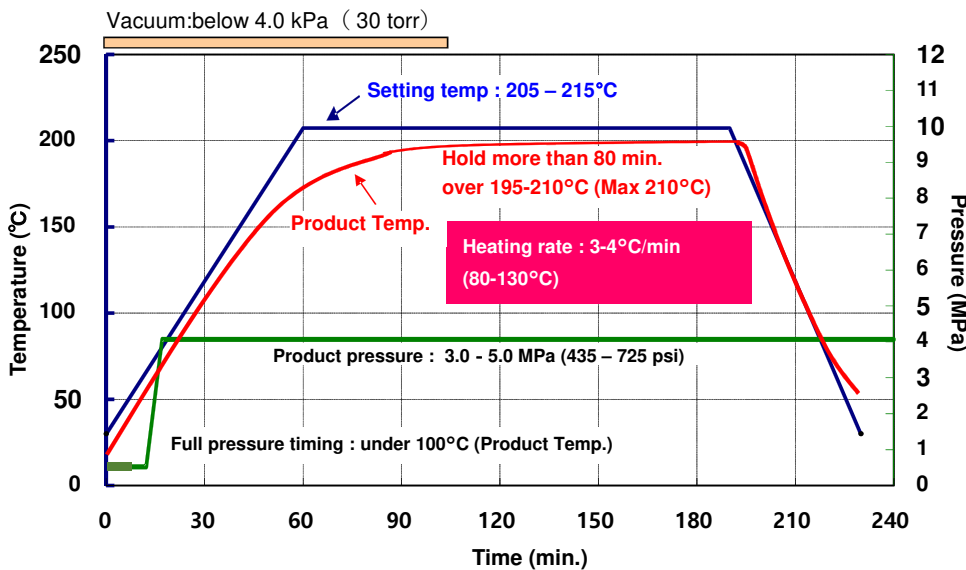
■Precautions for Outer-layer Copper Foil

There is the case that Outer-layer peel strength lowers by a kind of the copper foil.
Copperfoil should be examined enough.

■Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 3.0~4.0 °C/min. within the melting temperature range of the prepreg resin (80 °C~).
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa (30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ④ The time for vacuuming shall not be longer than the end of molding process. If the vacuuming is continued until the end of the lamination process, flowed resin becomes fragile due to bubble remain. Fragments of it may become a cause of dent. Also small bubbles (blur) may occur in the edge of the product.
- ⑤ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 3.0 ~5.0 MPa at vacuum pressing.)
- ⑥ We recommend that pressure on material is the low pressure of 0.5 MPa for resin of prepreg at the initial stage and material temperature pressurizes it before 80°C. The starting pressure is 0.5 MPa, and set the full-pressure, before product temperature become 100°C.

■Recommended Press Conditions



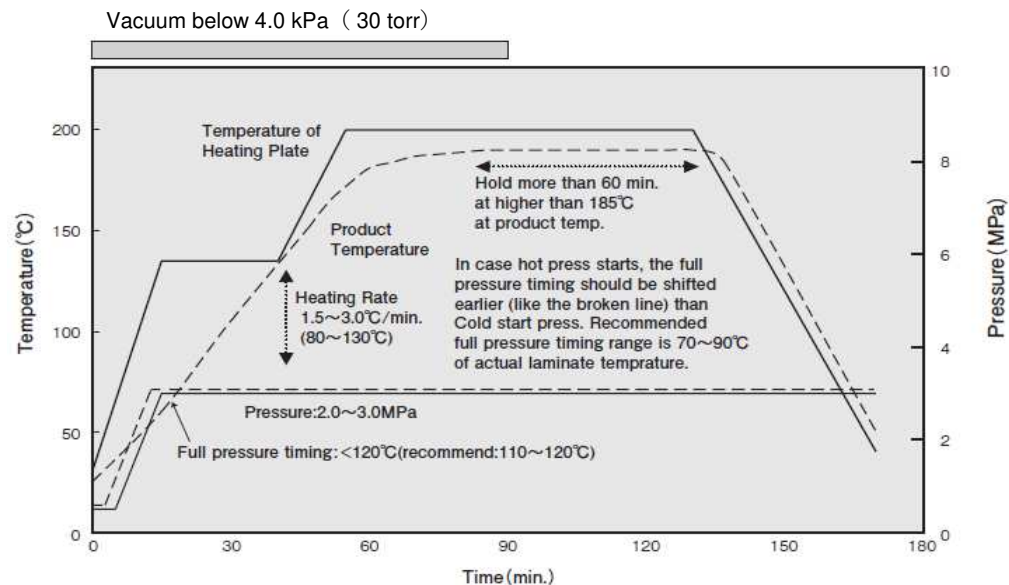
※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

GEA-78G

■ Precautions for Lamination of Multilayer Board

- ① Heating rate of the product measured from 80~130 °C should be between 1.5 and 3.0 °C/minutes. The heating time when the product temperature is 185 °C or higher should be 60 minutes or longer.
- ② Setting temperature of heating plates differs depending on the heating rate of the product and the type of cushions used, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ Vacuuming should be started before heating and pressing the product and degree of vacuum should be below 4.0 kPa(30 torr).
- ④ Vacuuming should not be continued until the end of molding process. If the vacuuming is continued until the end of the lamination process, bubbles might remain in the flowed prepreg resin. As a result, the flowed resin might become fragile and break into fragments. The fragments of resin scattered on the product might cause dents or defaults on the surface of the product. Also fine bubbles and blur might occur at the edge of the product, if the vacuuming is continued till the end.
- ⑤ Lamination pressure should be thoroughly examined, because it might influence the thickness of the product and the rate of dimensional change of the product.
(Standard pressure for vacuum pressing is 2.0~3.0 MPa.)
- ⑥ To lessen the pressure shock of the product, two-stage press is recommended. The lamination pressure at the first stage recommended is 0.5 MPa.
- ⑦ In case of Hot start press, the full pressure timing should be shifted earlier (like the broken line) than Cold start press. Recommended full pressure timing range is under 120 °C(recommend:110~120 °C) of actual laminate temperature.

■ Recommended Press Conditions



*The standard heating profile is for general reference only. Conditions may change according to metal plate thickness, number of cushion layers, number of MLB lay-ups, etc.

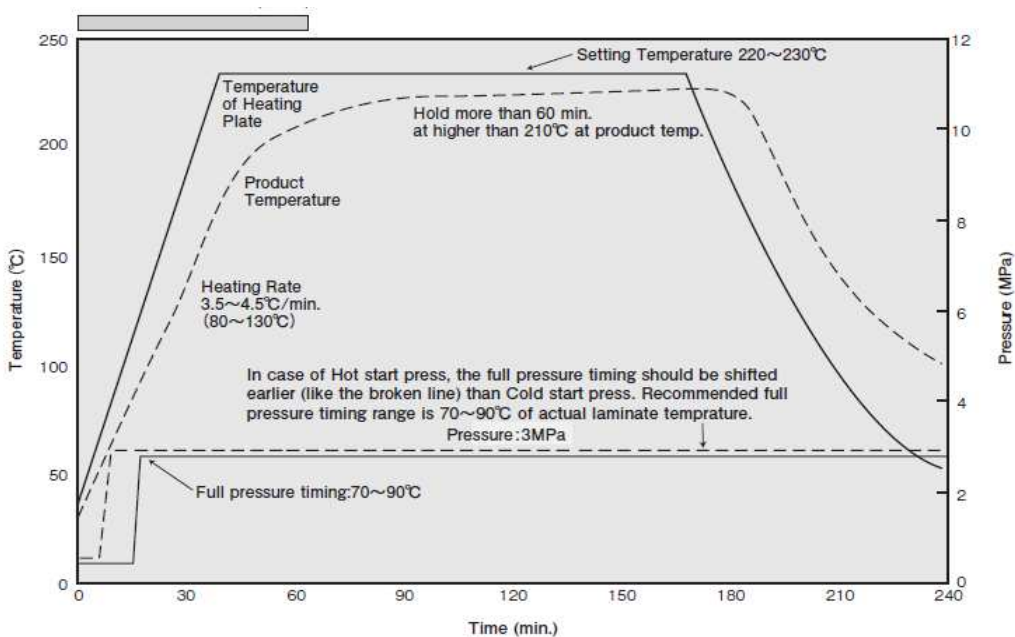
GHA-679G (Type S)

■ Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 3.5~4.5 °C/min. within the melting temperature range of the prepreg resin. Hold the product temperature above 210 °C for more than 60 min.
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ The degree of vacuum shall be below 4.0 kPa (30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ④ The time for vacuuming shall not be longer than the end of molding process. If the vacuuming is continued until the end of the lamination process, flowed resin becomes fragile due to bubble remain. Fragments of it may become a cause of dent. Also small bubbles (blur) may occur in the edge of the product.
- ⑤ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (Standard pressure is 2.5~3.5 MPa at vacuum pressing.)
- ⑥ In order to reduce pressure shock to the product, it is recommended to set initial pressure low, 0.5 MPa, although one-step pressure is basically no problem.
- ⑦ In case of Hot start press, the full pressure timing should be shifted earlier (like the broken line) than Cold start press. Recommended full pressure timing range is 70~90 °C of actual laminate temperature.

■ Recommended Press Conditions

Vacuum : below 4.0 kPa (30 torr)



※ The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

TD-002

■Precautions for Lamination of Multilayer Board

① Heating rate of the product measured from 80~130 °C should be between 2.0~3.0 °C/minutes.

The heating time when the product temperature is 175 °C or higher should be 60 minutes or longer.

② Setting temperature of heating plates differs depending on the heating rate of the product and the type of cushions used, so it is necessary to adjust the temperature in order to satisfy the above condition ①.

③ Vacuuming should be started before heating and pressing the product and degree of vacuum should be below 4.0 kPa (30 torr) .

④ Vacuuming should not be continued until the end of molding process. If the vacuuming is continued until the end of the lamination process, bubbles might remain in the flowed prepreg resin. As a result, the flowed resin might become fragile and break into fragments. The fragments of resin scattered on the product might cause dents or defaults on the surface of the product.

Also fine bubbles and blur might occur at the edge of the product, if the vacuuming is continued till the end.

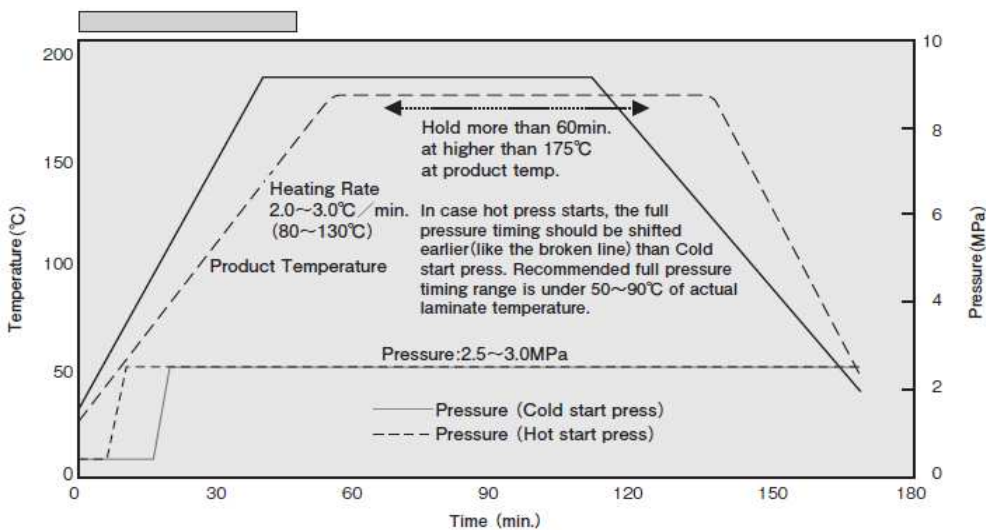
⑤ Lamination pressure should be thoroughly examined, because it might influence the thickness of the product and the rate of dimensional change of the product. (Standard pressure for vacuum pressing is 2.5~3.0 MPa.)

⑥ To lessen the pressure shock of the product, two-stage press is recommended. The lamination pressure at the first stage recommended is 0.5 MPa.

⑦ In case hot press starts, the full pressure timing should be shifted earlier (like the broken line) than cold start press. Recommended full pressure timing range is under 50~90 °C of actual laminate temperature.

■Recommended Press Conditions

Vacuum: below 4.0 kPa(30 torr)



※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.

GIA-671N

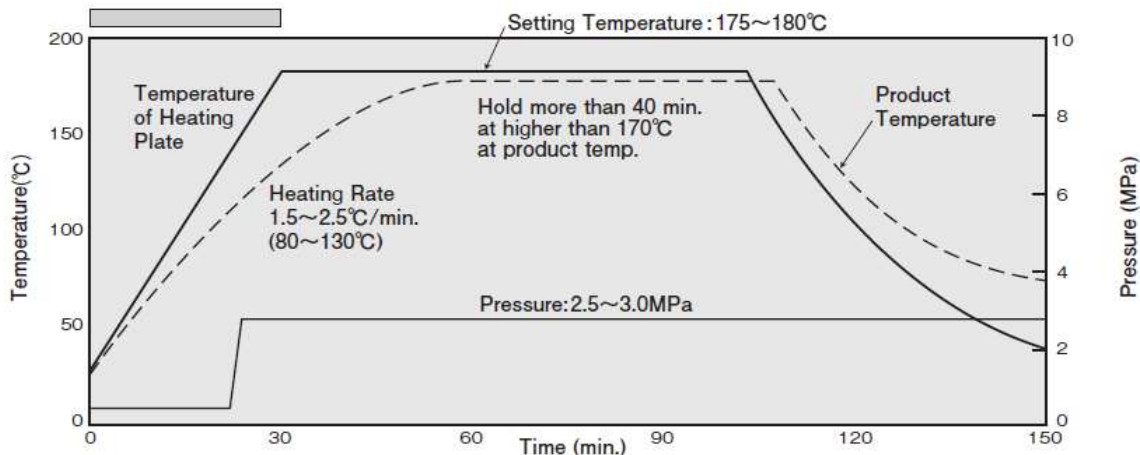
■Precautions for Lamination of Multilayer Board

- ① Heating rate of the product should be about 1.5~2.5 °C/min. within the melting temperature range of the prepreg resin (80~130 °C). Hold the product temperature above 170 °C for more than 40 min.
- ② The setting temperature of the heating plates differs, depending on the heating rate or cushions, so it is necessary to adjust the temperature in order to satisfy the above condition ①.
- ③ For high Tg (over 200 °C) MLB, please set the temperature of the heating plates higher than the standard temperature.
- ④ The degree of vacuum shall be below 4.0 kPa (30 torr). Please start the vacuuming before adding heat and pressure for lamination.
- ⑤ The time for vacuuming shall not be longer than the end of molding process. If the vacuuming is continued until the end of the lamination process, flowed resin becomes fragile due to bubble remain. Fragments of it may become a cause of dent. Also small bubbles (blur) may occur in the edge of the product.
- ⑥ The pressure of the product may influence molding property, thickness between layers or dimensional change, so it is necessary to examine sufficiently to decide the condition. (standard pressure is 2.5~3.0 MPa.)
- ⑦ In order to reduce pressure shock to the product, it is recommended to set initial pressure low, 0.5 MPa for 20~30 min., although one-step pressure is basically no problem.

■Recommended Press Conditions

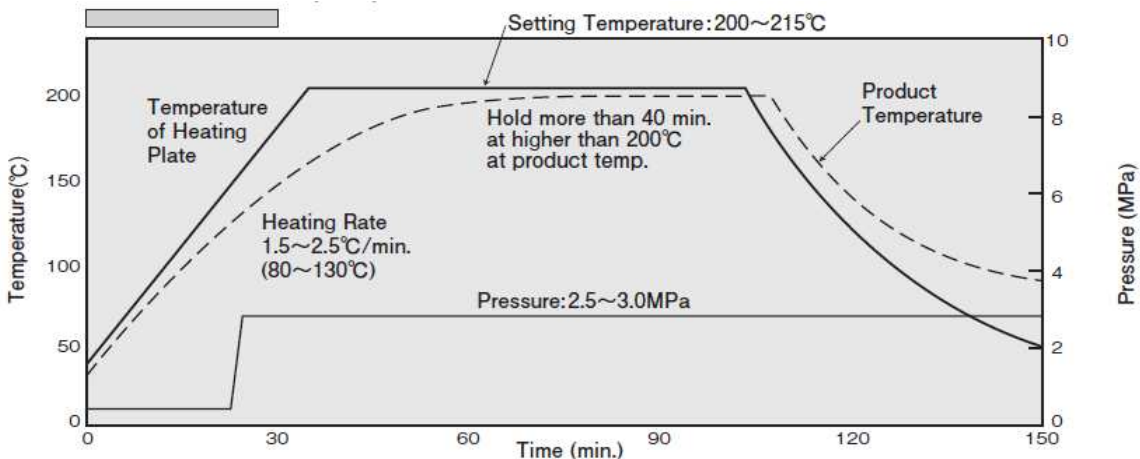
●For Standard Multilayer Application

Vacuum: below 4.0 kPa (30 torr)



●For Multilayer Application Requiring Tg of More than 200 °C

Vacuum: below 4.0 kPa (30 torr)



※The standard heating profile is for general reference only. Conditions may change depending on metal plate thickness, number of cushion layers, number of MLB lay-up, etc.