

Recommendation for baking of Flex and Rigid-Flex PCB

Since nearly all Flex and Rigid-Flex boards are constructed with polyimide, a material which is highly hygroscopic in nature, it is strongly recommended to bake the boards to reduce the amount of moisture inside the boards prior to any type of soldering operation. Without such baking there is risk of delaminating, inner-layer separation or cracking of the hole walls.

Below is a recommendation for different surface treatments.

HASL, Lead-free HASL and ENIG

Flexible boards:

Temperature and dwell time depends on FPC technology / stack-up. See below for guidance.

1. When FPC thickness $\leq 0.2\text{mm}$ (without stiffener/PSA), FPC should be pre-baked within 2-4 hours at 120 °C before assembly process.
2. When FPC thickness $\geq 0.2\text{mm}$ (without stiffener/PSA), FPC should be pre-baked within 4-8hours at 150°C before assembly process.
3. When FPC has stiffener with thermal adhesive, FPC should be pre-baked within 2-6 hours at 150 °C before assembly process.
4. When FPC has stiffener with PSA (Pressure Sensitive Adhesive), FPC should be pre-baked within 3-4 hours at 120°C before assembly.

FPC must be assembled within 60 minutes after pre-baking, otherwise it should be stored in $60\pm 10^\circ\text{C}$, humidity $\leq 15\%$ in oven (dry chamber can be an alternative) to prevent it from reabsorbing moisture again. If FPC is exposed to air >60 minutes after pre-baking without storing into oven, it MUST be pre-baked again. Repeated pre-baking will jeopardize the reliability of the FPC. If the SMT assembly is conducted after 6 months of manufactured date, we propose to top up 50% additional pre-baking duration.

Disclaimer:

Above are the pre-baking suggestions. The bake out time will vary depending on the FPC size, track density, number of layers, seasonal factor affecting humidity, baking fixture, oven air ventilation etc. For each new assembly the time should be set at midway between minimum and maximum. If no problem is encountered the time may be reduced for the next batch. This process should continue until an acceptable bake out time is achieved. The pre-baking process control parameter should be fixed at where assembly performed, it is the assembler company's responsibility to test prove a suitable pre-baking criteria to prevent delamination.

Rigid-Flex PCB's with FR-4 part and Polyimide core

PCB's up to 1.0 mm thickness: minimum **2 hours at 120° C**

PCB's up to 1.8 mm thickness: minimum **4 hours at 120° C**

PCB's up to 4.0 mm thickness: minimum **6 hours at 120° C**

Dwell or hold time between baking and soldering is maximum **24 hours**, if subsequent exposure times exceed the 24 hour period once more, then re-baking is necessary.

Rigid and Rigid/Flex PCBs with Polyimide / Thermount®:

All PCB thicknesses: minimum **6 hours at 135° C**

Dwell or hold time between baking and soldering is dependent upon the storage conditions. At 50 % relative humidity the recommended hold time is maximum **8 hours**, yet if the boards can be stored in vacuum or within oven at 35°C, then this 8-hour limit can be prolonged. If subsequent exposure times exceed the 24-hour period once more, then re-baking is necessary.

Oven conditions

Baking should take place in clean oven to prevent any form of contamination during the baking process. The boards should be placed on multi-layered, air ventilated fixture with air gap between each panel.

Solderability concerns

All baking can be considered as advanced ageing and therefore may affect the solderability. Therefore, the given temperature above must be seen only as recommendations, and the customer shall take responsibility to approve the process

Immersion Tin, Immersion Silver and OSP

Since all these surface treatments are very sensitive finishes, normal baking is not recommended.

Baking in vacuum oven (below 50 mbar) may be performed at lowered temperatures and reduced times. In all such cases the customer has the responsibility to approve their own baking process.

For further reading on surface finishes please visit www.ncabgroup.com/pcb-surface-finishes/