Recommendations/Comments for "IPC 1601"
(Implementation subject to customer/supplier agreement)

ZVEI: Die Elektroindustrie

Objective: Feasible implementation of the directive in line with requirements

IPC chap.	Requirement	Comment / Remark
3.1.1	a. Store materials in moisture-proof packaging in a controlled environment (humidity- and temperature-controlled). b. Handle PP + resin-coated films with gloves only at the edges. c. Reseal opened PP bags/as shown in Figures 3-1. d. Store PP + and resin-coated films at < 23^{0}C and < 50% of humidity. e. Acclimate PP + resin-coated films if storage temp. is less than room temperature. f. Process control (storage, place of use, transport route) via temperature and moisture indicators.	a. Make sure that the storage conditions do not adversely affect the functionality of the finished products. b. Handle such that adverse effects on product quality and functionality are prevented. c. Only if climate of storage room is not controlled. The resealing mechanism may vary. d. Storage conditions must be agreed or qualified with the manufacturer of the material. e. Any existing temperature differences should taken into account in qualification. f. Monitor room climate via temperature and moisture indicators.
3.1.2	Do not mix different resin types	Material storage should be organized accordingly.
3.2.3	Brief period between drying and pressing (moisture absorption). Before packaging/equipping, remove moisture.	Any residual moisture that may be present should be evaluated during qualification.
3.2.3.2	Determine the degree of moisture of the etched cores according to IPC TM 650, Method 2.6.28. Insert cores separately, dry at 105^{0}C – for 30 min. Drying of stacked cores: Max. height: 25.4 mm Temp. stack center: 105^0-120^{0}C, Time: 2 hours.	In interim storage, ensure low absorption of moisture.

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3.2.3.3	Item 3.2.3.2 also valid for multiply pressed PCBs. Drying: 180^0 C - 2 hours or 150^0 C - 8 hours or 120^0 C - 24 hours	In interim storage, low absorption of moisture should be ensured.
3.3.2	Handle pressed panels/PCBs with gloves.	Avoid fingerprints by using suitable methods.
3.3.3	Monitoring of temperature and moisture during the processes. Drying prior to plating and LSL.	The process parameters should be defined such that adverse effects are prevented.
3.3.6	Moisture 0.1 to 0.5 %, based on the resin weight.	Drying of the PCBs by the manufacturer: -> Artificial aging of the soldering surface -> Impairment of solderability/storage time. It is recommended to carry out the drying process immediately prior to the soldering process.
3.4.1	Finished PCBs should be packed in Dry Packs if they are to be temporarily stored before shipping.	If necessary, the manufacturer should consult the customer with regard to the type of packaging required for interim storage
3.4.4	Drying temperatures according to Table 3-1	Note: Drying chemical tin sufaces has an adverse effect on the coating thickness of the residual pure tin. See the drying recommendations issued by the Working Group 'Quality Management' at http://www.zvei.org/Verband/Fachverbaende/PCBandElectronicSystems/Seiten/Schlau-entwickelt-clever-produziert-Leiterplatten-aus-Europa.aspx

Table 3-1 Recommendations for Printed Board Baking Profiles

Final Finish	Temperature	Time	Comments
Tin	105 – 125 °C	4-6 Hours	Baking may reduce solderability. See 3.4.1.5
Silver	105 – 125 °C	4-6 Hours	Silver may tarnish. See 3.4.1.4
Nickel/Gold	105 – 125 °C	4-6 Hours	See 3.4.1.2
ENEPIG	105 – 125 °C	4-6 Hours	
Organic Coating	See 3.4.1.1		
HASL/HAL	105 – 125 °C	1-6 Hours	Final surface thickness below 0.77 µm [30.0 µin] may turn into pure intermetallics and render the printed board unsolderable

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IPC chap.	Requirement	Comment / Remark
4.1.1.	Dry polyamide material prior to packaging. For packaging, use: - Vacuum-sealed moisture barrier bags - Moisture indicators - Desiccants.	Drying of the PCBs by the manufacturer results in: -> Artificial aging of the soldering surface -> Impairment of solderability/storage time. It is recommended drying them immediately prior to equipping.
4.1.2	Include rigid reinforcement sheet when packaging: - Thin PCBs (< 1.40 mm) - Flexible PCBs - PCBs with complex milling pattern.	To avoid mechanical impact, a suitable packaging should be selected.
4.1.5	Packing material ESD-compliant.	Which packaging material is used, should be agreed between user and supplier. ESD-compliant packaging for bare PCBs is price-relevant.
4.2.1	Water vapor penetration rate of the packaging: ≤ 0.002 mg / 100 inches^2 / 24 hours	Which packaging material is used, must be agreed between customer and PCB manufacturer.
4.2.2	Use a packaging material with metallic interlayer, in particular for lead-free PCBs (moisture).	Which packaging material is used, must be agreed between customer and PCB manufacturer.
4.2.3 and 4.2.4	Desiccant and moisture indicators according to IPC-J-STD-033.	Qualification must be agreed between customer and supplier.

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IPC chap.	Requirement	Comment / Remark
4.2.5	Determination of moisture by "laminate test coupons".	Who provides the coupons must be agreed between supplier and customer.
4.3.1.2	Use sulfur-free and pH-neutral packaging material for chem. Ag.	Use a packaging material that does not have any adverse effects on solderability / storage time.
4.3.1.3	When vacuum sealing, do not remove air completely. The function of the desiccant will be impaired.	The degree of vacuum must have been optimized by the PCB manufacturer: - To achieve mechanical stability of the packaging - To achieve good functionality of the desiccant.
4.3.1.4	Include a desiccant in the moisture barrier bag next to the PCBs.	No adverse effects caused by the positioning of the desiccant on: - Solderability - Effectiveness of the desiccant - Mechanical impact on the PCBs. The addition of desiccant should be agreed between supplier and customer.
4.3.1.5	For PCBs ≤ 144 inches^2 (0,09 m²) = 25 PCBs / delivery unit per package. For PCBs > 144 inches^2 (0.09 mm²) = 10 PCBs / delivery unit per package. Use sulphur and chloride-free release paper	The number of PCBs in a packaging unit depends on the PCB size, PCB thickness and the structure of the circuit. The supplier should establish a suitable package size. If necessary, the manufacturer should consult the customer with regard to the use of release paper.

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IPC chap.	Requirement	Comment / Remark
4.4.2	The package of ESD-sensitive printed circuit boards should be labeled according to ANSI, including ESD protection symbol.	Which packaging label is used, must be agreed between customer and PCB manufacturer.
4.4.3	PCBs contained in dry packaging should bear a label referring to moisture or the s  shown below.	Which packaging label is used, must be agreed between customer and PCB manufacturer.
5.	Goods receipt, storage and equipping of printed circuit boards 	Does not affect manufacturers of bare printed circuit boards