



IPC-6013E

2021 - September

Qualification and Performance Specification for Flexible/Rigid-Flexible Printed Boards

*Supersedes IPC-6013D Amendment 1
April 2018*

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Developed by the Flexible Circuits Specifications Subcommittee
(D-12) of the Flexible Circuits Committee (D-10) of IPC

Supersedes:

IPC-6013D September 2017

IPC-6013D Amendment 1

April 2018

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development of future revisions.

Contact:

IPC
3000 Lakeside Drive, Suite 105N
Bannockburn, Illinois
60015-1249
Tel 847 615.7100
Fax 847 615.7105

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Acknowledgment

Any document involving a complex technology draws material from a vast number of sources across many continents. While the principal members of the Flexible Circuits Performance Specifications Subcommittee (D-12) of the Flexible Circuits Committee (D-10) are shown below, it is not possible to include all of those who assisted in the evolution of this standard. To each of them, the members of the IPC extend their gratitude.

Flexible Circuits Committee	Flexible Circuits Specifications Subcommittee	Technical Liaison of the IPC Board of Directors
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Steven Bowles Lockheed Martin Corporation	Gary Ferrari EPTAC Corporation	John Leschisin Minco Products, Inc.
Mark Buechner BAE Systems	William Fox Lockheed Martin Missile & Fire Control	Derek Linder Innovative Circuits
Donald Cardoza Cirexx International, Inc.	Mahendra Gandhi Northrop Grumman Space Systems	Hannah Locken Boeing Company
Denise Charest Amphenol Printed Circuits, Inc.	Timothy Glaze Hughes Circuits, Inc.	Dan Loew L3Harris
Thomas Clark Lockheed Martin Missiles & Fire Control	Ty Gragg Unicircuit Inc.	Gary Long TTM Technologies
Michael Collier Teledyne Leeman Labs	Vicka Hammill Honeywell Inc. Air Transport Systems	Jennifer Ly BAE Systems
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Peter Menuez L3Harris Technologies, Inc.	William Pfingston Miraco, Inc.	Russell Shepherd NTS - Anaheim
Roger Miedico Raytheon Company	Owen Reid Lockheed Martin Missiles & Fire Control	Bhanu Sood NASA Goddard Space Flight Center
James Monarchio TTM Technologies	Nef Rios Summit Interconnect - Anaheim	Rebecca Steinbauer ALL Flex LLC
Kristopher Moyer California State University Sacramento	Thomas Romont IFTEC	Brian Stevens Collins Aerospace
Steven Murray Northrop Grumman Corporation	Enrique Sanchez Cirexx International, Inc.	Paul Van Dang Innovative Circuits
Robert Neves Microtek Laboratories China	Edward Sandor AGC Nelco America, Inc.	Crystal Vanderpan UL LLC
Thi Nguyen Lockheed Martin Missile & Fire Control	Gilbert Shelby Raytheon Systems Company	Adeodato Vigano Compunetics Inc.
Jan Pedersen Elmatica AS	Robert Sheldon Pioneer Circuits Inc.	Al Wasserzug Cirexx International, Inc.
		Richard Wessel DuPont Electronics & Imaging

Table of Contents

1 SCOPE	1	3.2.1 Laminates and Bonding Materials	7
1.1 Statement of Scope	1	3.2.2 External Bonding Materials	7
1.2 Purpose	1	3.2.3 Other Dielectric Materials	7
1.3 Performance Classification, Board Type, and Installation Usage	1	3.2.4 Metal Foils	7
1.3.1 Classification	1	3.2.5 Metal Planes/Cores	8
1.3.2 Printed Board Type	1	3.2.6 Base Metallic Plating Depositions and Conductive Coatings	8
1.3.3 Installation Uses	1	3.2.7 Final Finish Depositions and Coatings - Metallic and Non-Metallic	8
1.3.4 Selection for Procurement	1	3.2.8 Polymer Coating (Solder Mask)	12
1.3.5 Material, Plating Process and Final Finish	2	3.2.9 Fusing Fluids and Fluxes	12
1.4 Terms and Definitions	3	3.2.10 Marking Inks	12
1.4.1 As Agreed Upon Between User and Supplier (AABUS)	3	3.2.11 Hole Fill Insulation Material	12
1.4.2 Button Plating	3	3.2.12 Heatsink Planes, External	12
1.4.3 Cover Material	3	3.2.13 Via Protection	12
1.4.4 Target Land (Via Bottom Land)	4	3.2.14 Embedded Passive Materials	13
1.4.5 Capture Land (Via Top Land)	4	3.3 Visual Examination	13
1.4.6 Microvia	4	3.3.1 Profile	13
1.4.7 Core	4	3.3.2 Construction Imperfections	14
1.4.8 Design Data	4	3.3.3 Plating and Coating Voids in the Hole	18
1.5 Interpretation	4	3.3.4 Lifted Lands	18
1.6 Presentation	4	3.3.5 Marking	18
1.7 Design Data Protection	4	3.3.6 Solderability	19
1.8 Revision Level Changes	5	3.3.7 Plating Adhesion	20
2 APPLICABLE DOCUMENTS	5	3.3.8 Edge Board Contact, Junction of Gold Plate to Solder Finish	20
2.1 IPC	5	3.3.9 Strain Relief (Rigid to Flex Transition)	20
2.2 Joint Industry Standards	6	3.3.10 Workmanship	20
2.3 Other Publications	6	3.4 Dimensional Requirements	20
2.3.1 American Society for Testing and Materials	6	3.4.1 Hole Size, Hole Pattern Accuracy and Pattern Feature Accuracy	20
2.3.2 Underwriters Lab	6	3.4.2 Annular Ring and Breakout (External)	21
2.3.3 National Electrical Manufacturers Association	6	3.4.3 Bow and Twist (Individual Rigid or Stiffener Portions Only)	24
2.3.4 American Society for Quality	7	3.4.4 Array Sub-Pallets	25
2.3.5 AMS	7	3.5 Conductor Definition	25
2.3.6 American Society of Mechanical Engineers	7	3.5.1 Conductor Width and Thickness	25
2.3.7 Federal	7	3.5.2 Conductor Spacing	25
3 REQUIREMENTS	7	3.5.3 Conductor Imperfections	25
3.1 General	7		
3.2 Materials Used in this Specification	7		

Figure 3-17 Separation at External Foil 32

Figure 3-18 Copper Crack Definition. 32

Figure 3-19 Examples of Thermal Zones for Microsection Evaluation of Laminate Attributes 33

Figure 3-20 Measurement for Etchback. 33

Figure 3-21 Measurement for Dielectric Removal. 34

Figure 3-22 Smear Removal Allowance. 34

Figure 3-23 Measurement Locations for Fluoropolymer Resin Smear 35

Figure 3-24 Negative Etchback 36

Figure 3-25 Plating Folds/Inclusions – Minimum Measurement Points 36

Figure 3-26 Annular Ring Measurement (Internal) 37

Figure 3-27 Microsection Rotations for Breakout Detection 37

Figure 3-28 Comparison of Microsection Rotations 38

Figure 3-29 Example of Non-Conforming Dielectric Spacing Reduction Due to Breakout at Microvia Target Land 38

Figure 3-30 Surface Copper Wrap Measurement for Filled Holes (Over Foil) 39

Figure 3-31 Surface Copper Wrap Measurement for Filled Holes (Over Laminate). 39

Figure 3-32 Wrap Copper (Acceptable). 39

Figure 3-33 Wrap Copper Removed by Excessive Processing, e.g. Sanding/Planarization/ Etching (Not Acceptable). 40

Figure 3-34 Copper Cap Thickness 41

Figure 3-35 Copper Cap Filled Via Height (Bump). 41

Figure 3-36 Copper Cap Depression (Dimple) 41

Figure 3-37 Copper Cap Plating Voids. 41

Figure 3-38 Nonconforming Via fill Between Copper Cap Plating Layers 41

Figure 3-39 Acceptable Via Fill Between Copper Cap Plating Layers 41

Figure 3-40 Example of Acceptable Voiding in a Cap Plated, Copper Filled Via 42

Figure 3-41 Example of Acceptable Voiding in a Copper Filled Microvia without Cap Plating 42

Figure 3-42 Example of Nonconforming Void in a Cap Plated, Copper Filled Microvia. 42

Figure 3-43 Example of Nonconforming Void in a Copper Filled Microvia. 42

Figure 3-44 Microvia Contact Dimension 43

Figure 3-45 Exclusion of Separations in Microvia Target Land Contact Dimension 43

Figure 3-46 Unintended Piercing of Microvia Target Land (Laser Drilled). 43

Figure 3-47 Intentional Piercing of Microvia Target Land (Mechanically Drilled2) 43

Figure 3-48 Measurement of Total Copper Thickness When Selective Hole Plating is Specified 44

Figure 3-49 Metal Core to PTH 45

Figure 3-50 Measurement of Minimum Dielectric Spacing. 46

Figure 3-51 Fill Material in Blind/Through Vias When Cap Plating Not Specified 46

Figure 3-52 Void in Fill Material at Hole Wall Interface. 46

Figure 3-53 Bending Test. 50

Tables

Table 1-1 Default Requirements 2

Table 3-1 Internal or External Metal Planes 8

Table 3-2 Final Finish, Plating and Coating Requirements 10

Table 3-3 Surface7 and Hole Copper Plating Minimum Requirements for Through-Holes. 11

Table 3-4 Hole Copper Plating Minimum Requirements for Buried Vias > 2 Layers, and Blind Vias. 11

Table 3-5 Hole Copper Plating Minimum Requirements for Microvias (Blind and Buried) 12

Table 3-6 Hole Copper Plating Minimum Requirements for Buried via cores (2 layers) 12

Table 3-7 Covercoat Adhesion 17

Table 3-8 Solder Wicking / Plating Penetration Limits. 18

Table 3-9 Plating and Coating Voids Visual Examination. 18

Table 3-10 Edge Board Contact Gap 20

Table 3-11 Minimum Etch Annular Ring 22

Table 3-12 Allowable Squeeze-Out of Coverlay Adhesive and Ooze-Out of Covercoat 24

Table 3-13 Minimum Solderable Annular Ring on Land Area 24

Table 3-14 Conductor Spacing Requirements 25

Table 3-15 PTH Integrity After Stress 31

Table 3-16	Cap Plating Requirements	40
Table 3-17	Microvia Contact Dimension (Laser Drilled)	42
Table 3-18	Microvia Contact Dimension (Mechanically Drilled)	43
Table 3-19	Internal Layer Foil Thickness after Processing.	44
Table 3-20	Thickness of External Conductor of the Finished Printed Board after Plating.	45
Table 3-21	Solder Mask Adhesion	47
Table 3-22	Dielectric Withstanding Test Voltages	48
Table 3-23	Insulation Resistance	48
Table 4-1	Qualification Testing.	53
Table 4-2	C=0 Sampling Plan per Lot Size	55
Table 4-3	Acceptance Testing and Frequency	55
Table 4-4	Quality Conformance Testing.	59

Qualification and Performance Specification for Flexible/Rigid-Flexible Printed Boards

1 SCOPE

1.1 Statement of Scope This specification covers qualification and performance requirements of flexible printed boards. The flexible printed board may be single-sided, double-sided, multilayer, or rigid-flex multilayer. All of these constructions may or may not include stiffeners, plated-through holes (PTHs), and blind/buried vias.

The flexible or rigid-flex printed board may contain build up High Density Interconnect (HDI) layers. The printed board may contain embedded active or passive circuitry with distributive capacitive planes, capacitive or resistive components conforming to IPC-6017.

The rigid section of the printed board may contain a metal core or external metal heat frame, which may be active or nonactive. Revision level changes are described in 1.7.

1.2 Purpose The purpose of this specification is to provide requirements for qualification and performance of flexible printed boards designed to IPC-2221 and IPC-2223.

1.3 Performance Classification, Board Type, and Installation Usage

1.3.1 Classification This specification recognizes that flexible printed boards will be subject to variations in performance requirements based on end-use. These performance classes (Class 1, Class 2, and Class 3) are defined in IPC-6011.

1.3.2 Printed Board Type Performance requirements are established for the different types of flexible printed boards, classified as follows:

Type 1 - Single-sided flexible printed boards containing one conductive layer, with or without stiffeners.

Type 2 - Double-sided flexible printed boards containing two conductive layers with PTHs, with or without stiffeners.

Type 3 - Multilayer flexible printed boards containing three or more conductive layers with PTHs, with or without stiffeners.

Type 4 - Multilayer rigid and flexible material combinations containing three or more conductive layers with PTHs.

Type 5 - Flexible or rigid-flex printed boards containing two or more conductive layers without PTHs.

1.3.3 Installation Uses

Use A - Capable of withstanding flex during installation.

Use B - Capable of withstanding continuous flexing for the number of cycles as specified on the procurement documentation.

Use C - High temperature environment (over 105 °C [221 °F]).

Use D - UL Recognition. See UL 94 and UL 796F.

1.3.4 Selection for Procurement For procurement purposes, performance class and installation usage **shall** be specified in the procurement documentation.

The documentation **shall** provide sufficient information to the supplier so that the supplier can fabricate the flexible printed boards and ensure that the user receives the desired product. Information that should be included in the procurement documentation is to be in accordance with IPC-2611 and IPC-2614.

Note: If the drawing specifies the requirement in words, designators are not required.

The procurement documentation **shall** specify the thermal stress test method and the number of cycles (in relation to reflow profiles in IPC-TM-650, Method 2.6.27) to be used to meet the requirement of 3.6.1. Selection **shall** be from those depicted in 3.6.1.1, 3.6.1.2, 3.6.1.3 and 3.6.1.4. If not specified (see 5.1), the default **shall** be per Table 1-1.

During the selection process, the user should take into consideration the following when determining the appropriate thermal stress test method:

- Wave solder, selective solder, hand solder assembly processes (see 3.6.1.1)
- Conventional SnPb reflow processes (see 3.6.1.2)
- Lead-free reflow processes (see 3.6.1.3 and 3.6.1.4)