



ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES

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Resin Coated Metal Foil for Printed Boards

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September 1998

A standard developed by IPC

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- Just include spec information
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Resin Coated Metal Foil for Printed Boards

Developed by the IPC-CF-148 Task Group (3-12c) of the Base Materials Committee (3-10) of IPC

APPROVED OCTOBER 1, 1998 BY



AMERICAN NATIONAL STANDARDS INSTITUTE

Users of this standard are encouraged to participate in the development of future revisions.

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Acknowledgment

Any standard involving a complex technology draws material from a vast number of sources. While the principal members of the IPC-CF-148 Task Group (3-12c) of the Base Materials Committee (3-10) 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.

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Table of Contents

1 SCOPE	1	4.1 Visual Properties	6
1.1 Classification	1	4.1.1 Resin Coated Metal Foil Visual Properties.....	6
1.1.1 Specification Sheet Description.....	1	4.1.2 Surface Finish and Quality Class of Metal-Clad Surfaces	6
1.1.2 Foil Metal.....	1	4.1.3 Resin Finish	6
1.1.3 Foil Thickness	1	4.1.4 Surface and Subsurface Imperfections.....	6
1.1.4 Resin Types.....	2	4.2 Dimensional	7
1.1.5 First Resin Thickness.....	2	4.2.1 Thickness.....	7
1.1.6 Second Resin Thickness	2	4.2.2 Panel Width and Length.....	7
1.2 Quality/Performance Classification	2	4.2.3 Roll Width.....	7
1.3 Presentation	2	4.2.4 Roll Length	7
2 APPLICABLE DOCUMENTS	2	4.3 Processing Requirements	7
2.1 IPC.....	2	4.3.1 Etchability	7
2.2 National Conference of Standards Laboratories.....	3	4.3.2 Solderability	7
2.3 International Standards	3	4.4 Physical Requirements	7
3 REQUIREMENTS	3	4.4.1 Peel Strength.....	7
3.1 Terms and Definitions.....	3	4.4.2 Volatile Content	7
3.1.1 Qualification Assessment.....	3	4.4.3 Flow Percent	7
3.1.2 Quality Conformance Testing.....	3	4.5 Chemical Requirements	7
3.1.3 Manufacturer's Quality System.....	3	4.5.1 Flammability	7
3.1.4 Process Control Testing	3	4.5.2 Thermal Stress	7
3.1.5 Self Declaration	3	4.5.3 Chemical Resistance	7
3.1.6 Quality Assessment Data	3	4.5.4 Glass Transition Temperature (Optional).....	7
3.1.7 Sample Qualification.....	3	4.6 Electrical Requirements	7
3.1.8 Production Data	4	4.6.1 Permittivity.....	7
3.1.9 Customer Test Data	4	4.6.2 Loss Tangent	7
3.1.10 Internal Assessment	4	4.6.3 Volume Resistivity	8
3.1.11 Individual Customer Audit	4	4.6.4 Surface Resistance	8
3.1.12 Independent Third Party Assessment	4	4.7 Environmental Requirements	8
3.2 Specification Sheets	5	4.7.1 Moisture Absorption	8
3.3 Qualification Testing.....	5	4.7.2 Fungus Resistance.....	8
3.4 Verification of Manufacturer's Quality System.....	5	4.8 Workmanship	8
3.5 Precedence.....	5	4.9 Marking	8
3.6 Materials.....	5	4.9.1 Panel Marking.....	8
3.6.1 Copper Foil	5	4.9.2 Marking of Shipping Containers.....	8
3.6.2 Resin Systems	5	4.10 Material Safety.....	8
3.6.3 Release Materials	5	5 QUALITY ASSURANCE PROVISIONS	8
3.7 General Acceptability Requirements.....	5	5.1 Quality System.....	8
3.7.1 Fabricated Panels and Rolls	5	5.2 Responsibility for Inspection.....	8
3.7.2 Inspection Lot	5	5.2.1 Test Equipment and Inspection Facilities	8
4 GENERAL REQUIREMENTS	6	5.2.2 Standard Laboratory Conditions.....	8
		5.3 Qualification Testing.....	8
		5.3.1 Samples	8



5.3.2 Frequency 9

5.3.3 Retention of Qualification 9

5.4 Quality Conformance Inspection..... 9

5.4.1 Frequency 9

5.4.2 Acceptance Criteria..... 9

5.4.3 Rejected Lots 9

5.5 Statistical Process Control (SPC)..... 9

5.5.1 Methodology 9

6 PREPARATION FOR DELIVERY 9

6.1 Packaging Materials..... 9

6.2 Authorized Distributors 9

7 NOTES 10

7.1 Ordering Information for Resin
Coated Metal Foils 10

7.2 New Materials..... 10

Tables

Table 1-1 Metal Foil Types 1

Table 1-2 Copper Weight Equivalents..... 1

Table 3-1 Quality Conformance Inspection 4

Table 4-1 Dimensional Point Values 6

Table 5-1 Sampling Plan for One Month or More..... 9

Resin Coated Metal Foil for Printed Boards

1 SCOPE

This document establishes the requirements for metal foils coated with a resin or a composite of resins on one side, which are to be used for the fabrication of printed boards. Unless otherwise agreed upon between user and supplier, resin coated metal foils **shall** be considered acceptable if the requirements in this document are met.

1.1 Classification The following system identifies resin coated metal foil used in printed wiring applications only.

IPC-CF-148A Where S is specification sheet number

C Metal Foil Type (see 1.1.2)

17 Metal Foil Thickness (see 1.1.3.1)

A/E Resin Types (see 1.1.4)

25 First Resin Thickness (see 1.1.5)

25 Second Resin Thickness (see 1.1.6)

1 Classification (see 1.2)

1.1.1 Specification Sheet Description At the end of this document is a series of specification sheets. Each specification sheet outlines engineering and performance data for resin coated metal foil, indicating foil material type and resin type. The specification sheets are provided with numbers for ordering purposes. For example, if a user wishes to order from specification sheet number 1, the number “1” would be substituted for the “S” in the above designation example (IPC-CF-148/1).

Users and material developers are encouraged to supply information on new coated materials for review by the IPC-CF-148 Task Group (3-12c). Users who wish to invoke this specification for coated foil not listed **shall** list a zero for the specification sheet number (IPC-CF-148/0).

This specification provides quality classes (see 1.2) for requirements to reflect functional performance and testing properties. The reference of a single class does not preclude invoking specific requirements defined in other classes.

1.1.2 Foil Metal The metal foil **shall** be designated by a letter code from Table 1-1.

1.1.3 Foil Thickness The metal foil **shall** be specified to the nearest μm . See Table 1-2 for the equivalent copper weights.

Table 1-1 Metal Foil Types

A	Copper, wrought, rolled (IPC-MF-150, Grade 5)
B	Copper, rolled (treated)
C	Copper, electrodeposited (IPC-MF-150, Grade 1)
D	Copper, electrodeposited, double treat (IPC-MF-150, Grade 1)
G	Copper, electrodeposited, high ductility (IPC-MF-150, Grade 2)
H	Copper, electrodeposited, high temperature elongation (IPC-MF-150, Grade 3)
J	Copper, electrodeposited, annealed (IPC-MF-150, Grade 4)
K	Copper, wrought, light cold rolled (IPC-MF-150, Grade 6)
L	Copper, wrought, annealed (IPC-MF-150, Grade 7)
M	Copper, wrought, rolled, low temperature annealable (IPC-MF-150, Grade 8)
P	Copper, electrodeposited, high temperature elongation, double treat (IPC-MF-150, Grade 3)
R	Copper, reverse treated electrodeposited (IPC-MF-150, Grade 1)
S	Copper, reverse treated electrodeposited, high temperature elongation (IPC-MF-150)
T	Copper, copper foil parameters as dictated by contract or purchase order
U	Aluminum
Y	Copper/Invar/Copper
N	Nickel
X	Other, as agreed upon between user and supplier

Table 1-2 Copper Weight Equivalents

Nominal Thickness (μm)	Area Weight (g/m^2)
5	45.1
9	75.9
12	106.8
17	152.5
25	228.8
35	305.0
70	610.0
103	915.0
137	1220.0
172	1525.0
205	1830.0
240	2135.0
343	3050.0
480	4270.0

1.1.4 Resin Types Resin types are defined by a two letter designator separated by a slash. The first letter is the resin against the metal. Resin types are specified as follows:

- A. Epoxy (Difunctional)
- B. Epoxy (Multifunctional)
- C. Epoxy (Tetrafunctional)
- D. Acrylic
- E. Polyester
- F. Butyral phenolic
- G. Fluorinated Ethylene-Propylene Copolymer (FEP)
- H. Nitrile phenolic
- I. Polyimide
- J. Bismaleimide Triazene (BT)
- P. Polypropylene Epoxy (PPE)
- N. No resin
- X. Others (Specify)

1.1.5 First Resin Thickness The coated thickness is expressed in microns.

1.1.6 Second Resin Thickness The coated thickness is expressed in microns. When no resin is specified, the thickness is left blank.

1.2 Quality/Performance Classification Three general classes have been established to reflect progressive increases in inspection and testing frequency. It should also be recognized that there is typically an overlap between classes and that in many cases, the difference between classes is one of attribute assurance level, not attribute difference. The user has the responsibility to determine the class into which his product belongs. Testing and inspection requirements in this specification have been separated so that the metallic foils may be tested to any one of the three quality/performance classes. The three classes are:

Class 1 Material in this class is suitable for applications where mechanical properties and cosmetic defects are not important and the only requirement is functionality of the complete circuit. This material has no prescribed inspection and testing requirements and represents a low cost alternative due to the lack of required inspection and testing.

Class 2 Material in this class is suitable for use where circuit design, process yield, and specification conformance requirements allow localized areas of non-conformance. This material has moderate levels of assurance, demonstrated via the use of testing and/or SPC/SQC techniques.

Class 3 Material in this class is suitable for applications where high levels of assurance are required. These levels of assurance **shall** be demonstrated via the use of testing and/or SPC/SQC techniques.

Note: Unless otherwise specified, Class 3 material **shall** be used for military electronic equipment. If no quality classification is specified, Class 1 is assumed.

1.3 Presentation All dimensions and tolerances are expressed in microns. Users are cautioned to employ a single system and not intermix microns and mils. Reference information is shown in parentheses.

2 APPLICABLE DOCUMENTS

The following documents form a part of this document to the extent specified herein. If a conflict of requirements exists between IPC-CF-148A and those listed in 2.1 through 2.3, IPC-CF-148A takes precedence.

2.1 IPC¹ The Institute for Interconnecting and Packaging Electronic Circuits

J-STD-003 Solderability Tests for Printed Wiring Boards

IPC-T-50 Terms and Definitions for Interconnecting and Packaging Electronic Circuits

IPC-MF-150 Metal Foil for Printed Wiring Applications

IPC-TM-650 Test Methods Manual²

- 2.1.1 Microsectioning
- 2.1.5 Surface Examination, Unclad and Metal-Clad Material
- 2.1.9 Surface Scratch Examination Metal-Clad Foil
- 2.2.19.1 Length, Width, and Perpendicularity of Laminate and Prepreg Panels
- 2.3.4.2 Chemical Resistance of Laminates, Prepreg, and Coated Foil Products, by Solvent Exposure
- 2.3.4.3 Chemical Resistance of Core Materials to Methylene Chloride
- 2.3.6 Etching, Ammonium Persulfate Method
- 2.3.7 Etching, Ferric Chloride Method
- 2.3.7.1 Cupric Chloride Etching Method
- 2.3.8 Flammability, Flexible Insulating Materials
- 2.3.9 Flammability of Prepreg and Thin Laminate
- 2.3.10 Flammability of Laminate
- 2.3.19 Volatile Content of Prepreg
- 2.4.8 Peel Strength of Metallic Clad Laminates

1. IPC, 2215 Sanders Rd., Northbrook, IL 60062-6135

2. The test methods referenced in this specification represent the latest in effect at the time of standard publication. Methods may be updated independent of standard revision. Users should contact the IPC to make certain that they are using the current test method.

- 2.4.13 Solder Float Resistance, Flexible Printed Wiring Materials
- 2.4.13.1 Thermal Stress of Laminate
- 2.4.25 Glass Transition Temperature and Cure Factor by DSC
- 2.5.5.2 Dielectric Constant and Dissipation Factor of Printed Wiring Board Material - Clip Method
- 2.5.5.3 Permittivity (Dielectric Constant) and Loss Tangent (Dissipation Factor) of Materials (Two Fluid Cell Method)
- 2.5.6.2 Electric Strength of Printed Wiring Material
- 2.5.17 Volume Resistivity and Surface Resistance of Printed Wiring Materials
- 2.5.17.1 Volume and Surface Resistivity of Dielectric Materials
- 2.6.1 Fungus Resistance, Printed Wiring Materials
- 2.6.2.1 Water Absorption, Metal-Clad Plastic Laminates

IPC-QL-653 Qualification of Facilities that Inspect/Test Printed Boards, Components, and Materials

IPC-1730 Laminator Qualification Profile

IPC-PC-90 General Requirements for Implementation of Statistical Process Control

2.2 National Conference of Standards Laboratories³

ANSI/NCSL Z540-1-1994 General Requirements for Calibration Laboratories and Measuring and Test Equipment

2.3 International Standards⁴

ISO 10012-1 Quality Assurance Requirements for Measuring Equipment, Part 1 - Metrological Confirmation System for Measuring Equipment

3 REQUIREMENTS

3.1 Terms and Definitions The definitions of terms **shall** be in accordance with IPC-T-50.

3.1.1 Qualification Assessment Qualification assessment is a form of risk reduction between a buyer and a new source for resin coated foil. The supplier **shall** produce an assessment of its capabilities and sources of verification for the buyer to evaluate. The buyer must then review this assessment and determine whether the information and verification provided constitutes an acceptable level of risk. The more verification of self-declaration parameters provided, the lower the risk factor associated with utilizing a new supplier. There is no minimum level of qualification

assessment verification required by this standard, and it is between the buyer and supplier to determine the extent of verification applicable to their requirements. If the risk assessment is determined to be unacceptably high, increasing the verification requirements may reduce the risk. The cost associated with reducing this risk varies with the type of verification that is determined to be necessary.

3.1.2 Quality Conformance Testing Quality conformance testing is performed on a regular basis following qualification testing as determined by the manufacturer's quality system to demonstrate that the supplier is continually meeting the finished product requirements of this specification and the applicable specification sheet. In the absence of a documented manufacturer's quality system, the conformance testing **shall** be conducted in accordance with the frequency specified in Table 3-1.

1. Optional tests as agreed upon between user and supplier (AABUS)
2. Applicable to specific material only

3.1.3 Manufacturer's Quality System The manufacturer's quality system is an organized entity within the supplier's operation, which administers the documentation system, steering committee, lines of responsibilities, and the like as described in IPC-PC-90.

3.1.4 Process Control Testing Process control testing is performed for the purpose of nominalizing the critical steps of the manufacturer's internal process.

3.1.5 Self Declaration The first level of qualification assessment is self declaration. A completed qualification assessment contains a profile of a manufacturer's site capability, processing and test equipment, technology specifics, quality program, manufacturing history, company information, and data verification sources. Self declaration is the manufacturer's view of its products and process capabilities to meet the customer's requirements, the requirements of the standard, and the applicable associated specification sheet(s). A sample self declaration form can be found in IPC-1730.

3.1.6 Quality Assessment Data The data contained in the self assessment is compiled and analyzed performance characteristics of resin coated foils. The performance data may be based upon information from a variety of both internal and external sources.

3.1.7 Sample Qualification Verification by sample qualification signifies that a manufacturer was capable of producing a product with a given set of parameters at a point

3. NCSL, 1800 30th Street, Ste. 305B, Boulder, CO 80301-1032

4. ANSI, 11 West 42nd St., 13th Floor, NY, N.Y. 10036