



**IPC-4562A-WAM1  
with Amendment 1**

# **Metal Foil for Printed Board Applications**

Developed by the Metallic Foil Task Group (3-12a) of the Printed Board Base Materials Committee (3-10) of IPC

***Supersedes:***

IPC-4562A - April 2008  
IPC-4562 with Amendment 1 -  
May 2005  
IPC-4562 - May 2000  
IPC-MF-150F - October 1991

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

Contact:

IPC

# Table of Contents

<b>1 SCOPE</b> .....	1	3.4.4 Area Weight .....	6
1.1 Purpose .....	1	3.4.4.1 Copper Foil .....	6
1.2 Foil Designation .....	1	3.4.4.2 Other Metallic Foil .....	6
1.2.1 Specification Sheet Description .....	1	3.4.5 Foil Profile .....	6
1.2.2 Foil Metal .....	1	3.5 Physical Requirements .....	6
1.2.3 Foil Type .....	1	3.5.1 Tensile Strength .....	6
1.2.4 Foil Grade .....	2	3.5.2 Fatigue Ductility .....	6
1.2.4.1 Foil Grades .....	2	3.5.3 Elongation .....	6
1.2.4.2 Other Metal Foil Grades .....	2	3.5.4 Peel Strength .....	7
1.2.5 Foil Weight and Thickness .....	2	3.5.5 Carrier Release Strength .....	7
1.2.5.1 Copper Foil Area Weight .....	2	3.5.6 Surface Finish .....	7
1.2.5.2 Thickness of Foils Other than Copper .....	3	3.6 Processing Requirements .....	7
1.2.6 Bond Enhancement Treatment .....	3	3.6.1 Etchability .....	7
1.2.7 Foil Profile .....	3	3.6.2 Chemical Cleaning .....	7
1.3 Quality/Performance Classification .....	3	3.6.3 Solderability .....	7
1.4 Presentation .....	3	3.6.4 Treatment Integrity .....	7
<b>2 APPLICABLE DOCUMENTS</b> .....	4	3.7 Workmanship .....	7
2.1 IPC .....	4	3.8 Requirements for Specific Metal Foil .....	7
2.3 ISO Standards .....	4	3.8.1 Copper Foil .....	7
<b>3 REQUIREMENTS</b> .....	5	3.8.1.1 Purity .....	7
3.1 Terms and Definitions .....	5	3.8.1.2 Resistivity .....	7
3.1.1 AABUS (As Agreed Upon Between User and Supplier) .....	5	3.8.2 Nickel Foil .....	8
3.1.2 Profile Factor .....	5	<b>4 QUALITY ASSURANCE PROVISIONS</b> .....	8
3.2 General Requirements Acceptability .....	5	4.1 Statistical Process Control (SPC) .....	8
3.2.1 Sheet Material .....	5	4.2 Responsibility for Inspection .....	8
3.2.2 Roll Material .....	5	4.2.1 Test Equipment and Inspection Facilities .....	8
3.3 Visual .....	5	4.2.2 Preparation of Samples .....	8
3.3.1 Pits and Dents .....	5	4.2.3 Standard Laboratory Conditions .....	8
3.3.2 Wrinkles .....	5	4.2.3.1 Permissible Temperature Variation in Environmental Chambers .....	8
3.3.3 Scratches .....	5	4.2.3.2 Reference Conditions .....	8
3.3.4 Holes and Tears .....	5	4.2.4 Tolerances .....	9
3.3.5 Cleanliness .....	5	4.3 Classification of Inspections .....	9
3.3.6 Pinholes and Porosity .....	5	4.4 Qualification Inspection .....	9
3.4 Dimensional .....	5	4.4.1 Frequency .....	9
3.4.1 Sheet Length and Width .....	6	4.4.2 Inspection of Product for Delivery .....	9
3.4.2 Roll Width .....	6	4.4.3 Extent of Qualification .....	9
3.4.3 Thickness .....	6	4.5 Quality Conformance Inspection .....	9
3.4.3.1 Copper Foil .....	6	4.5.1 Quality Conformance Inspection .....	9
3.4.3.1.1 Electrodeposited Foil .....	6	4.5.1.1 Inspection Frequencies .....	9
3.4.3.1.2 Wrought Foil .....	6	4.5.1.2 Lot .....	9
3.4.3.2 Other Metallic Foils .....	6	4.5.1.3 Lot Size .....	9
		4.5.1.4 Unit Size .....	9

4.5.2	Sampling Plan .....	9	4.6.11	Chemical Cleaning .....	13
4.5.3	Sample Unit .....	9	4.6.12	Solderability .....	13
4.5.4	Group A Inspection .....	9	4.6.13	Treatment Integrity .....	13
4.5.4.1	Sampling Plans for Class 3 Material .....	9	4.6.14	Purity .....	13
4.5.4.2	Sampling Plans for Class 2 Material .....	9	4.6.15	Resistivity .....	13
4.5.4.3	Sampling Plan for Class 1 Material .....	11	4.7	Statistical Process Control (SPC) .....	13
4.5.4.4	Rejected Lots .....	11	<b>5</b>	<b>PREPARATION FOR DELIVERY</b> .....	14
4.5.5	Group B Inspection .....	11	5.1	Splices .....	14
4.5.5.1	Noncompliance Group B .....	11	5.2	Wrapping .....	14
4.5.6	Group C Inspection .....	11	5.3	Marking .....	14
4.5.6.1	Noncompliance Group C .....	11	<b>6</b>	<b>NOTES</b> .....	14
4.6	Test Methods .....	11	6.1	Ordering Data .....	14
4.6.1	Visual .....	11	<b>APPENDIX A</b>	<b>Copper Foil Application</b>	
4.6.1.1	Pinhole Evaluation of Foils with Carriers .....	11		<b>Guidelines</b> .....	15
4.6.1.2	Pinhole and Porosity Evaluation .....	11			
4.6.2	Dimensions .....	11		<b>Tables</b>	
4.6.3	Thickness .....	11	Table 1-1	Copper Foil Weights and Thickness .....	2
4.6.3.1	Thickness of Foil .....	11	Table 3-1	Maximum Foil Profile .....	6
4.6.3.2	Area Weight of Foils .....	11	Table 3-2	Maximum Resistivity of Deposited Foil (All Types) .....	7
4.6.3.2.1	Foil with Releasable Carrier .....	12	Table 3-3	Maximum Resistivity for Wrought Foil (All Weights) .....	8
4.6.3.2.2	Foil with Etchable Carrier .....	12	Table 4-1	Quality Conformance Inspection .....	10
4.6.3.3	Foil Profile .....	12	Table 4-2	IPC-4562 Sampling Plans .....	10
4.6.4	Tensile Strength .....	12	Table 4-3	Lot Inspection Plan .....	10
4.6.5	Fatigue Ductility .....	12	Table A1	Application Guide for Copper Foil .....	15
4.6.6	Elongation .....	12	Table A2	Application Guide—Hot Rupture Strength for Copper Foil .....	16
4.6.7	Peel Strength .....	12	Table A3	Application Guide—Rupture Bulge Height for Copper Foil .....	17
4.6.7.1	Peel Strength of Thin Foil with Carrier .....	12	Table A4	Engineering Data—Fatigue Ductility* (CIT)** ...	17
4.6.8	Release Between Carrier and Foil .....	12			
4.6.9	Surface Finish .....	12			
4.6.10	Etchability .....	13			

# Metal Foil for Printed Board Applications

## 1 SCOPE

This specification covers metal foils supported by carrier films and unsupported foils suitable for subsequent use in printed boards. Unless otherwise agreed upon between user and supplier (AABUS), metal foils **shall** be considered acceptable, so long as the requirements in this specification are met.

**1.1 Purpose** This specification addresses the requirements for procurement of metal foils used only in printed wiring applications.

**1.2 Foil Designation** The foil designation **shall** be in the following forms:

IPC-4562/X Where X is the specification sheet number (See 1.2.1)	CU Foil Metal (See 1.2.2)	E Foil Type (See 1.2.3)	3 Foil Grade (See 1.2.4)
2 Foil Thickness (See 1.2.5)	S Bond Enhancement Treatment (See 1.2.6)	XS Foil Profile (See 1.2.7)	3 Quality Classification (See 1.3)

**1.2.1 Specification Sheet Description** At the end of this document is a series of specification sheets. Each sheet outlines engineering and performance data for a metal foil. The sheets are provided with a number for ordering purposes. For example, if a user wishes to order from specification sheet 1, the number “1” would be substituted for the “X” in the above designation example (e.g., IPC-4562/1).

The metal foils contained in this standard represent known materials. As new foils become available, they will be added to future revisions. Users and material developers are encouraged to supply information on new materials for review by the Metallic Foils Task Group (3-12a). Users who wish to invoke this specification for metal foils not listed **shall** list a 0 (zero) for the specification sheet number (e.g., IPC-4562/0).

This specification provides quality classes (see 1.2.3 through 1.2.7) for requirements to reflect functional performance (see Appendix A) and testing properties. The reference of a single class does not preclude invoking specific requirements defined in other classes.

**1.2.2 Foil Metal** The metal foil **shall** be designated by a suitable two- or three-letter code:

CU – Copper

NI – Nickel

XX – Other

**1.2.3 Foil Type** Metal foil types **shall** be distinguished by their process of manufacture and **shall** be designated as:

E – Electrodeposited

W – Wrought (rolled)

O – Other