ASSOCIATION CONNECTING
ELECTRONICS INDUSTRIES ®

IPC-A-610D

Acceptability of Electronic Assemblies

Developed by the IPC Task Group (7-31b) of the Product Assurance Subcommittee (7-30) of IPC

Supersedes:

IPC-A-610C - January 2000
IPC-A-610B - December 1994
IPC-A-610A - March 1990
IPC-A-610 - August 1983

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

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Foreword

The following topics are addressed in this section:

1.1 Scope

1.2 Purpose

1.3 Specialized Designs

1.4 Terms & Definitions

1.4.1 Classification
Class 1 – General Electronic Products
Class 2 – Dedicated Service Electronic Products
Class 3 – High Performance Electronic Products
1.4.2 Acceptance Criteria
1.4.2.1 Target Condition
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1.4.8 *Leaching
1.4.9 Meniscus (Component)
1.4.10 Pin-in-Paste
1.4.11 Wire Diameter

1.5 Examples and Illustrations

1.6 Inspection Methodology

1.7 Verification of Dimensions

1.8 Magnification Aids and Lighting

Foreword

If a conflict occurs between the English and translated versions of this document, the English version will take precedence.

1.1 Scope

This standard is a collection of visual quality acceptability requirements for electronic assemblies.

This document presents acceptance requirements for the manufacture of electrical and electronic assemblies. Historically, electronic assembly standards contained a more comprehensive tutorial addressing principles and techniques. For a more complete understanding of this document's recommendations and requirements, one may use this document in conjunction with IPC-HDBK-001, IPC-HDBK-610, and IPC J-STD-001.

The criteria in this standard are not intended to define processes to accomplish assembly operations nor is it intended to authorize repair/modification or change of the customer's product. For instance, the presence of criteria for adhesive bonding of components does not imply/authorize/require the use of adhesive bonding, and the depiction of a lead wrapped clockwise around a terminal does not imply/authorize/require that all leads/wires be wrapped in the clockwise direction.

IPC-A-610 has criteria outside the scope of IPC J-STD-001 defining handling, mechanical and other workmanship requirements. Table 1-1 is a summary of related documents.

Table 1-1 Summary of Related Documents

Document Purpose	Spec.#	Definition
Design Standard	IPC-2220 (Series) IPC-SM-782 IPC-CM-770	Design requirements reflecting three levels of complexity (Levels A, B, and C) indicating finer geometries, greater densities, more process steps to produce the product. Component and Assembly Process Guidelines to assist in the design of the bare board and the assembly where the bare board processes concentrate on land patterns for surface mount and the assembly concentrates on surface mount and through-hole principles which are usually incorporated into the design process and the documentation.
End Item Documentation	IPC-D-325	Documentation depicting bare board specific end product requirements designed by the customer or end item assembly requirements. Details may or may not reference industry specifications or workmanship standards as well as customer's own preferences or internal standard requirements.
End Item Standards	IPC J-STD-001	Requirements for soldered electrical and electronic assemblies depicting minimum end product acceptable characteristics as well as methods for evaluation (test methods), frequency of testing and applicable ability of process control requirements.
Acceptability Standard	IPC-A-610	Pictorial interpretive document indicating various characteristics of the board and/or assembly as appropriate relating to desirable conditions that exceed the minimum acceptable characteristics indicated by the end item performance standard and reflect various out-of-control (process indicator or defect) conditions to assist the shop process evaluators in judging need for corrective action.
Training Programs (Optional)		Documented training requirements for teaching and learning process procedures and techniques for implementing acceptance requirements of either end item standards, acceptability standards, or requirements detailed on the customer documentation.
Rework and Repair	IPC-7711A/ IPC-7721A	Documentation providing the procedures to accomplish conformal coating and component removal and replacement, solder resist repair, and modification/repair of laminate material, conductors, and plated-through holes.

Foreword (cont.)

IPC-HDBK-610 is a supporting document that provides information regarding the intent of this specification content and explains or amplifies the technical rationale for transition of limits through Target to Defect condition criteria. In addition, supporting information is provided to give a broader understanding of the process considerations that are related to performance but not commonly distinguishable through visual assessment methods.

The explanations provided in this companion resource should be useful in determining disposition of conditions identified as Defect, processes associated with Process Indicators, as well as answering questions regarding clarification in use and application for defined content of this specification. Contractual reference to this standard does not additionally impose the content of IPC-HDBK-610 unless specifically referenced in contractual documentation.

1.2 Purpose

The visual standards in this document reflect the requirements of existing IPC and other applicable specifications. In order for the user to apply and use the content of this document, the assembly/product should comply with other existing IPC requirements, such as IPC-SM-782, IPC-2220 (Series), IPC-6010 (Series) and IPC-A-600. If the assembly does not comply with these or with equivalent requirements, the acceptance criteria needs to be defined between the customer and supplier.

The illustrations in this document portray specific points noted in the title of each page. A brief description follows each illustration. It is not the intent of this document to exclude any acceptable procedure for component placement or for applying flux and solder used to make the electrical connection; however, the methods used must produce completed solder joints conforming to the acceptability requirements described in this document.

In the case of a discrepancy, the description or written criteria always takes precedence over the illustrations.

1.3 Specialized Designs

IPC-A-610, as an industry consensus document, cannot address all of the possible components and product design combinations. Where uncommon or specialized technologies are used, it may be necessary to develop unique acceptance criteria. However, where similar characteristics exist, this document may provide guidance for product acceptance criteria. Often, unique definition is necessary to consider the specialized characteristics while considering product performance criteria. The development should include customer involvement and, for Class 3, needs to have customer consent, and the criteria should include agreed definition of product acceptance.

Whenever possible these criteria should be submitted to the IPC Technical Committee to be considered for inclusion in upcoming revisions of this standard.

1.4 Terms & Definitions

Items noted with an * are quoted from IPC-T-50.

1.4.1 Classification

The customer (user) has the ultimate responsibility for identifying the class to which the assembly is evaluated.

Documentation that specifies the applicable class for the assembly under inspection needs to be provided to the inspector.

Accept and/or reject decisions need to be based on applicable documentation such as contracts, drawings, specifications, standards and reference documents. Criteria defined in this document reflect three classes, which are as follows:

Class 1 — General Electronic Products

Includes products suitable for applications where the major requirement is function of the completed assembly.

Class 2 — Dedicated Service Electronic Products

Includes products where continued performance and extended life is required, and for which uninterrupted service is desired but not critical. Typically the end-use environment would not cause failures.

Class 3 — High Performance Electronic Products

Includes products where continued high performance or performance-on-demand is critical, equipment downtime cannot be tolerated, end-use environment may be uncommonly harsh, and the equipment must function when required, such as life support or other critical systems.

1.4.2 Acceptance Criteria

When IPC-A-610 is cited or required by contract as a standalone document for inspection and/or acceptance, the requirements of IPC J-STD-001 ''Requirements for Soldered Electrical and Electronic Assemblies'' do not apply unless separately and specifically required.

In the event of conflict, the following order of precedence applies:

1. Procurement as agreed and documented between customer and supplier.
2. Master drawing or master assembly drawing reflecting the customer's detailed requirements.