IPC-HDBK-610 with Amendment 1

Handbook and Guide to Supplement IPC-A-610 (Includes IPC-A-610 B-C-D Comparisons)

Developed by the IPC-HDBK-610 Task Group (7-31g) of the Product Assurance Committee (7-30) of IPC

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

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Handbook and Guide to Supplement IPC-A-610

The following is referenced to IPC-A-610C Clause numbers and includes IPC-A-610B to C comparison. See Table 1 for a cross reference by topic for IPC-A-610 Revisions B-C-D and Table 2 for IPC-A-610C to D comparison.

1 ACCEPTABILITY OF ELECTRONIC ASSEMBLIES

1.0.1 Preamble/Foreword This handbook is a companion reference to and was prepared using IPC-A-610C and IPC-A-610C Amendment 1. The amendment provides additional criteria and clarification statements. The amendment is included with this handbook following Appendix C and can be downloaded at no cost from the IPC website at the following link:

www.ipc.org/html/610C%2BAmendment.pdf

Electrical Conductor Spacing that is provided in IPC-A-610C Appendix A has been incorporated into the text of this handbook and is also included as Appendix A to this handbook.

Information on metric conversion is provided as Appendix B.

An expanded subject matter based cross-reference of the two versions is provided in Appendix C.

A copy of the IPC-A-610 Department of Defense Adoption Notice is provided as Appendix D.

The intent of this handbook is to explain the technical rationale for selected Acceptability, Process Indicator and Defect criteria and to provide information regarding assembly technology. Additional information is provided to give a broader understanding of the process considerations needed for the production of acceptable hardware.

Note: Not all information provided in IPC-A-610C is addressed in this handbook.

While IPC-T-50 establishes unique definitions for the acronyms PCB, PWB, PCA and PWA, the term PCB (printed circuit board) is used generically in this handbook.

1.0.2 Format of this Handbook The section and paragraph numbers in this handbook refer and correspond to the section and paragraph numbers in Revision C of IPC-A-610. Where used verbatim, text of IPC-A-610C is identified by being boxed.

For the purposes of the handbook, a capitalized ''Standard'' in the handbook text refers to IPC-A-610C. It should also be noted that any references in the handbook text (not text taken from the Standard) refer to sections, tables, and figures in the handbook; see Example 1. References in the handbook text to sections, tables, and figures in the Standard will be followed by ''of the Standard''; see Example 2.

Example 1:

4.4.2 For more information on adhesive on areas to be soldered see 12.1 on page 12-3 of the Standard.

Example 2:

9.1.2 For more information on magnification power for inspection see Table 1-2 of the Standard.

Text excerpted from documents other than IPC-A-610 is shown in **BOLD SMALL CAPS** to assist with clarity.

1.0.3 Supplemental Definitions These supplemental definitions are provided to assist the reader in understanding the intent of portions of the text of the Standard. Terms used in the Standard or this Handbook and not otherwise defined are defined as follows. Definitions from IPC-T-50 are identified with *.

Barely/slight – By a very little, almost not discernable/measurable/perceptible.

Clearly – Free from anything that dims, obscures or inhibits observation. Easily discernable to the eye.

Coefficient of Thermal Expansion – The CTE is the amount that a material (component, PWB laminate, etc.) changes dimension as a result of temperature change. The CTE is expressed in parts per million per degree Celsius (p/m/C°). The CTE differential that exists between the component and the PWB is a factor in determining the reliability of the assembly. If a ceramic surface mount component that has a CTE of 6p/m/C° is placed on a laminate material such as FR-4 that has a CTE of 14 - 16 p/m/C°, the designer needs to assure that compliance of the component leads is sufficient to accommodate the differential in CTE. The coefficient of thermal expansion (CTE) is sometimes also referred to as the Thermal Coefficient of Expansion (TCE). In this Handbook the term CTE is used.

Disposition – A final settlement. The act of identifying the action to be taken on a Defect.

Minimum Electrical Clearance (Minimum Electrical Spacing)* – The minimum allowable distance between adjacent conductors, at a given voltage and altitude, that is sufficient to prevent dielectric breakdown, corona, or both from occurring between the conductors. Minimum electrical clearance is a value determined by the designer and is based on multiple factors.

Pitch – The nominal center-to-center distance of adjacent conductors. When the conductors are of equal size and their spacing is uniform, the pitch is usually measured from