



UL 796

STANDARD FOR SAFETY

Printed Wiring Boards

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UL Standard for Safety for Printed Wiring Boards, UL 796

Twelfth Edition, Dated October 13, 2020

SUMMARY OF TOPICS:

This revision of ANSI/UL 796 dated September 8, 2022 includes the following changes in requirements:

- ***Update Definitions for Edge and Midboard Conductors to Match Figure 10.1; [2.49](#), [2.98](#), [28.2.1](#)***
- ***Clarify Sections 12.1 and 12.2 Manufacturing Process Temperatures at 100°C; [2.136](#), [12.1.6](#), [12.2.1](#), [17.3.3](#), [Table 22.3](#)***
- ***Clarify Section 23 Test Sample Pattern Description; [23.2](#), [23.6](#)***
- ***Update Figure 24.1 to Align with UL 796F; [17.5.1](#), [24.1](#), [24.2](#), [Figure 24.1](#) – [Figure 24.3](#)***
- ***Editorial Update; [Section 6](#)***

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin.

The new and revised requirements are substantially in accordance with Proposal(s) on this subject dated May 6, 2022 and August 5, 2022.

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The most recent designation of ANSI/UL 796 as an American National Standard (ANSI) occurred on September 7, 2022. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page. Any other portions of this ANSI/UL standard that were not processed in accordance with ANSI/UL requirements are noted at the beginning of the impacted sections.

The Department of Defense (DoD) has adopted UL 796 on January 20, 1995. The publication of revised pages or a new edition of this Standard will not invalidate the DoD adoption.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

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ANNEX A (Informative) – CONSTRUCTION CONFIGURATIONS

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INTRODUCTION

1 Scope

1.1 These requirements apply to rigid printed wiring boards and flexible printed wiring board for use as components in devices or appliances. Compliance with these requirements does not indicate that the product is acceptable for use as a component of an end product without further investigation.

1.2 The flexible printed wiring boards covered by these requirements consist of conductors affixed to insulating base film, with or without a cover-lay film, with midboard connections.

1.3 These requirements do not cover flexible printed wiring boards of laminated-film construction in which the conductors are parallel to each other and are completely covered by the base film with only point-to-point end connections.

1.4 Flexible material constructions and multilayer rigid flex composite interconnect constructions with and without stiffener and adhesive materials shall be investigated in accordance with the Standard for Flexible Materials Interconnect Constructions, UL 796F.

2 Glossary

2.1 For the purpose of this Standard the following definitions apply.

2.2 ADDITIVE PROCESS – A selective or non-selective process used to deposit a pattern of conductor material(s) on clad or unclad base material.

2.3 ADHESIVE – A substance such as glue or cement used to join, bond, or fasten materials or objects together.

2.4 AS RECEIVED – Samples in an unconditioned state, prior to being subject to conditioning, or without a history of conditioning.

2.5 BASE MATERIAL – An organic or inorganic material used to support a pattern of conductor material. The base material may be rigid or flexible.

2.6 BASE MATERIAL THICKNESS – The thickness of the base dielectric material excluding conductive foil or material deposited on the surface of the base material. If an adhesive is used to adhere the conductor material to the base material, the adhesive thickness and application surfaces (base material sides) is indicated separately.

2.7 BLIND VIA – A via extending to only one surface of the board construction.

2.8 BLISTERING – Localized area of delamination. See [2.45](#), Delamination.

2.9 BONDING LAYER – An adhesive layer used to bond discrete layers of multilayer board constructions. Also known as Prepreg.

2.10 BUILD-UP THICKNESS – Overall thickness of a combination of materials. Unless otherwise indicated, the build-up thickness will refer to the overall thickness of a board construction where no internal or external conductor material resides.

2.11 BUILT-UP MULTILAYER (BUM) – Multiple layers of HDI materials.

- 2.12 BURIED VIA – A via that does not extend to the surface of the board construction.
- 2.13 CAP LAYER – A single sided copper clad laminate bonded to the external surface of the multilayer board with bonding layer material [prepreg (b-stage)].
- 2.14 CIRCUIT – Electrical devices and elements interconnected to perform a desired electrical function.
- 2.15 CIRCUITRY LAYER – Conductor layer or plane in or on a printed wiring board.
- 2.16 CLADDING – A deposited or plated metallic layer or laminated foil used for its protective and/or electrical properties. See Conductive Foil.
- 2.17 CLAD MATERIAL – See Metal Clad Base Material.
- 2.18 COATING – A nonmetallic substance applied by some process, such as dipping, screening, spraying, or melt-flow.
- 2.19 COMPONENT – An individual part or combination of parts intended to perform a desired function.
- 2.20 CONDITIONING – Exposure of test samples to an environment for a period of time, prior to or after testing and prior to evaluation.
- 2.21 CONDUCTIVE (ELECTRICAL) – The ability of a substance or material to conduct electricity.
- 2.22 CONDUCTIVE COIN – A piece of metal on the surface or in the printed wiring board construction that allows the flow of thermal energy. See Heatsink.
- 2.23 CONDUCTIVE FOIL – A thin metal sheet intended for forming a conductor pattern on a base material.
- 2.24 CONDUCTIVE PASTE – An organic or inorganic paste substance capable of transmitting electricity, used for circuit conductors, including but not limited to carbon, copper, and silver.
- 2.25 CONDUCTOR – A trace or path for electricity to transmit in a conductor pattern.
- 2.26 CONDUCTOR ADHESIVE – Adhesive material used to attach conductor material to a base material.
- 2.27 CONDUCTOR AVERAGE TRACE WIDTH – The average width of a length of conductor trace.
- 2.28 CONDUCTOR BASE WIDTH – The width of a conductor at the interface of the base material as determined by microsection analysis. This width is used to determine bond strength/peel strength values.
- 2.29 CONDUCTOR LAYER – A single plane of a conductor material or pattern on a base material.
- 2.30 CONDUCTOR MATERIAL – An organic or inorganic substance capable of transmitting electricity, used for circuit conductors, including but not limited to copper, tin, nickel, gold, carbon paste, copper paste, silver paste, ruthenium oxide paste, etc.
- 2.31 CONDUCTOR PATTERN – The path, design, or configuration of conductor material on the base material, including but not limited to conductor traces, lands, through-holes, and vias.

- 2.32 CONDUCTOR SPACING – The minimum distance between adjacent conductors.
- 2.33 CONDUCTOR THICKNESS – The thickness of the conductor and additional metallic platings or coatings, excluding non-conductive coatings.
- 2.34 CONDUCTOR TRACE – A linear conductor path of a conductor circuit.
- 2.35 CONDUCTOR WIDTH – The width of the conductor as viewed from a top view or at the plane of the surface of a base material, whichever is less. See Conductor Base Width.
- 2.36 CONFORMAL COATING – A protective covering applied on a printed wiring board capable of conforming to the configuration of objects coated, used to increase the dielectric voltage-withstand capability between conductors, and/or to protect against environmental conditions.
- 2.37 CONSTRUCTION – A variation in laminate materials, including but not limited to base material, laminate, prepreg, dielectric materials, or other insulation materials. Variations include singlelayer, multilayer, and composite constructions.
- 2.38 CONTACT FINGER – A conductive surface usually located at an edge of a printed wiring board used to provide electrical connection by pressure contact.
- 2.39 CONTINUITY – An uninterrupted path for the flow of electrical current in a circuit.
- 2.40 CORE MATERIAL – The innermost material of printed wiring board which may be used to support a subsequent layer or layers of dielectric material and conductor pattern. Core material may be an organic or inorganic material, with or without integral dielectric material. Core material may be referred to as substrate material.
- 2.41 COUPON – A test vehicle constructed to represent a production printed wiring board to be used for testing. See Sample.
- 2.42 CRITICAL OPERATION – Production process or fabrication step considered potentially detrimental to the materials subject to the operation.
- 2.43 CURRENT – The movement or flow of electrons in a conductor due to a voltage potential difference to the materials subject to the operation.
- 2.44 DECLAD – A dielectric material from which the foil or conductive material has been removed by etching or other means.
- 2.45 DELAMINATION – A planar separation of materials (i.e. separation between conductor and base material, prepreg, dielectric material, etc.).
- 2.46 DESICCATOR – A desiccator containing anhydrous calcium chloride, or other drying agent, maintained at a relative humidity not exceeding 20 percent at $23 \pm 2^{\circ}\text{C}$ ($73.4 \pm 3.6^{\circ}\text{F}$).
- 2.47 DIELECTRIC – A material capable of high resistance to the flow of electrical current and capable of being polarized by an electric field.
- 2.48 DOUBLESIDED – A singlelayer board construction with conductor pattern on the two external sides of the base material only. Sometimes referred to as di-clad.

- 2.49 **EDGE CONDUCTOR** – A conductor parallel with and spaced not more than 0.40 mm (0.015 inch) from the edge of a printed wiring board.
- 2.50 **ELECTRODEPOSITION** – The depositing of conductor material from a plating solution by the application of electrical current.
- 2.51 **ELECTROLESS DEPOSITION** – The depositing of conductor material from an autocatalytic plating solution without the application of electrical current.
- 2.52 **ELECTROPLATING** – See "Electrodeposition", [2.50](#).
- 2.53 **EMBEDDED COMPONENT** – A discrete component integrated into the board construction during fabrication.
- 2.54 **END PRODUCT** – An individual part or assembly in its final completed state. See End-Use Product.
- 2.55 **END-USE PRODUCT** – A device or appliance in which a printed wiring board is installed as a component.
- 2.56 **ETCHANT** – A chemically reactive solution used to remove portions or all material from a base material construction.
- 2.57 **ETCHED** – A laminate material in which the conductive layer has been removed by a chemical process.
- 2.58 **ETCHING** – The action of chemical, or chemical and electrolytic, removal of conductive or resistive material.
- 2.59 **EUTECTIC** – An isothermal reversible reaction in which on cooling a liquid solution is converted into two or more intimately mixed solids, with the number of solids formed being the same as the number of components in the system.
- 2.60 **EUTECTIC SOLDER** – The alloy composition at which a solder alloy melts/freezes completely without going through a partially solid (pasty) phase.
- 2.61 **EXTERNAL LAYER** – The conductor pattern on the external surface of the board construction.
- 2.62 **FABRICATOR** – The manufacturer who forms the pattern of conductive material on the base.
- 2.63 **FAMILY** – Multiple grades of materials that have identical IR spectra and performance characteristics and are UL Recognized for the manufacturer as a material family (alternate grades separated by a comma) of which one grade is representative of others in the family.
- 2.64 **FILM** – A thin coating or membrane material, usually 0.25 mm (0.010 inches) or less in thickness.
- 2.65 **FLAMMABILITY RATED ONLY** – A printed wiring board intended for use where the construction shall be evaluated for a flammability classification only, and the thermal, mechanical, and electrical capacity of the board is not of concern and only the flammability classification of the resulting printed wiring board is of concern in the end-use product.
- 2.66 **FLAT (PANEL)** – Any number of boards assembled together in a sheet, usually with a frame around the side, when shipped from the board factory.

2.67 FLEXIBLE CONSTRUCTION – A sub-category board construction intended for use where some portion of the board construction shall be subject to flexing in the end-use product application. See Standard for Flexible Materials Interconnect Constructions, UL 796F.

2.68 FLEXIBLE PRINTED CIRCUIT BOARD – Printed board produced from flexible base material with or without flexible coverlay and/or electrically nonfunctional stiffeners.

2.69 FLUSH-PRESS METAL CONDUCTOR – A metal conductor, such as copper, positioned and secured in a base material by a heat and pressure process.

2.70 FLUX – A surface oxidation removing and protecting compound, used to promote wetting of the base metal surface during soldering operations. Flux shall include, but not be limited to acid flux, inorganic flux, organic flux, and water soluble organic flux.

2.71 FOIL LAMINATION – A fabrication process for multilayer category board constructions, where the board construction and conductor foil are bonded to the external surface during one operation.

2.72 GRADE – A designation arbitrarily assigned to a base material by the base-material manufacturer.

2.73 GROUND – A common reference point for conductor circuits.

2.74 GROUND PLANE – A conductor plane used as a common reference point for conductor circuits.

2.75 HAND SOLDERING – Hand-held operator controlled soldering, usually with a soldering iron.

2.76 HEATSINK – A device made of high thermal conductivity and low specific heat material capable of dissipating heat generated by a component or assembly.

2.77 HIGH DENSITY INTERCONNECT MATERIALS (HDI) – Thin insulating materials used to support conductor materials requiring mechanical strength from a separate core material and are intended for the production of microvias using sequential build-up and related multilayer interconnect technologies. Some examples of HDI materials: resin coated copper (RCC), liquid photoimageable (LPI) dielectric coating materials, photoimageable film dielectric coating materials, and other thin insulating materials when used to support conductor material shall be considered HDI material.

2.78 HYBRID PRINTED WIRING BOARD – A multilayer board comprised of various combinations of dissimilar base materials and/or bonding layers with different UL/ANSI grades and/or Non-ANSI material.

2.79 IDENTICAL PROCESSING – Production or fabrication processes with the same manufacturing steps required to fabricate a board.

2.80 IMMERSION SILVER – Consists of a very thin coating typically less than 0.55 microns (0.0217 mils) of nearly pure silver created by galvanic displacement and may contain a slight amount of organic material deposited with the silver.

2.81 INDUSTRIAL LAMINATE – Insulating material consisting of reinforcement impregnated or coated with a resin and laminated under pressure and high temperature with or without vacuum assist. The resin may contain filler and additives. The reinforcement may be fibrous material such as cellulose paper, cotton, woven aramid, nonwoven aramid, woven glass, random laid glass mat or other fibers and films. See Base Material.

2.82 INFRARED REFLOW (IR) – Melting of tin/lead or remelting of solder using infrared heat as the primary source of energy.

- 2.83 INTERNAL LAYER – A conductor pattern contained entirely within a multilayer board construction.
- 2.84 LAMINATE – The product of bonding two or more layers of material.
- 2.85 LAMINATE THICKNESS – The thickness of the dielectric material in a singlesided or doublesided singlelayer metal-clad base material.
- 2.86 LAYER-TO-LAYER SPACING – The thickness of dielectric material between adjacent conductor planes (i.e., the physical distance between adjacent conductor planes).
- 2.87 LEGEND INK – See Marking Ink.
- 2.88 MARKING INK – A non-conductive permanent coating, resistant to solvents and chemicals, used to provide a means of identification in the form of letters, numbers, symbols and patterns to identify component locations and orientation to aid in printed wiring board assembly.
- 2.89 MASS LAMINATING – An assembly of base material layers and bonding layers laminated together, and which is performed by a base material manufacturer or any other source outside the printed wiring board fabricator's facility. Mass laminating is performed in several ways. Two examples are:
- a) The manufacturer of the base material receives the inner layers etched by the printed wiring board fabricator and, with a bonding layer supplied by the printed wiring board fabricator or from his own stock, laminates the boards with a solid metal sheet on the external surfaces.
 - b) The manufacturer of the base material receives art work from the printed wiring board fabricator or generates his own art work to prepare the inner layers, etches the inner layers of his own in-house base material, and with a bonding layer laminates the boards with a solid metal sheet on the external surfaces.
- After either of the above procedures, the laminator returns to the printed wiring board fabricator a composite of internal layers and solid metal external layers for final etching of external surfaces and/or plating operations.
- 2.90 MAXIMUM OPERATING TEMPERATURE (MOT) – The maximum operating temperature is the maximum continuous use temperature that the board may be exposed to under normal operating conditions.
- 2.91 METAL BASE LAMINATE – A metal core used as the support for a dielectric insulating material or base material applied to one or both sides of the metal core surface.
- 2.92 METAL BASE PRINTED WIRING BOARD – A printed board having a metal core as the support for the dielectric structure.
- 2.93 METAL-CLAD BASE MATERIAL – Base material with integral metal conductor material, on one or both sides.
- 2.94 METAL CLAD LAMINATE – See Metal Clad Base Material.
- 2.95 METAL CORE BOARDS – See Metal Base Printed Wiring Boards.
- 2.96 METAL CORE LAMINATE – See Metal Base Laminate.
- 2.97 METAL WEIGHT – See Conductor Weight.

- 2.98 MIDBOARD CONDUCTOR – A conductor spaced more than 0.40 mm (0.015 inch) from the edge of a printed wiring board.
- 2.99 MINIMUM CONDUCTOR WIDTH – The minimum width conductor present on the sample or production printed wiring board. See Conductor Base Width.
- 2.100 MULTILAYER – Consists of alternate layers of conductors and base materials bonded together, including at least one internal conductive layer.
- 2.101 MULTISITE PROCESSOR – An outside contractor performing defined non-critical board manufacturing steps, including, but not limited to, process steps with temperatures below 100°C or MOT. The multisite processor shall return the boards to the original board manufacturer and may not ship boards directly to the end product manufacturer. See Subcontractor.
- 2.102 PATTERN – An arrangement of conductive material on a printed wiring board.
- 2.103 PEELABLE RESIST – A temporary resist applied to a limited area of the printed wiring board to protect certain holes or features such as contact fingers from accepting solder, and is removed from the printed wiring board before installation in the end product.
- 2.104 PERFORMANCE LEVEL CATEGORIES (PLC) – An integer defining a range of test values for a given electrical or mechanical property test.
- 2.105 PERMANENT COATING – See Permanent Materials.
- 2.106 PERMANENT MATERIALS – Materials intended to be a part of the board, for the life of the product.
- 2.107 PERMANENT RESIST – A solder resist or mask material intended to be a part of the board, for the life of the product.
- 2.108 PLATED-THROUGH HOLE – A connection by means of a plating process that deposits a conductive material on the side of a hole to connect conductor patterns on or in a two-sided or multilayer printed wiring board.
- 2.109 PLATING – A chemically or electrochemically deposited metallic coating.
- 2.110 PLATING-UP – The addition of plating material onto existing conductor or plating material.
- 2.111 PLUGGED-HOLE MATERIAL – A nonmetallic substance used to plug through holes, buried or blind vias, etc., and applied by some process, such as dipping, curtain coating, film laminating, screening, spraying, or melt-flow.
- 2.112 PREPREG – Fibrous reinforcement material impregnated or coated with a thermosetting resin binder, and consolidated and cured to an intermediate stage semi-solid product (B-stage resin).
- 2.113 PRINTED BOARD – See Printed Circuit Board and Printed Wiring Board.
- 2.114 PRINTED CIRCUIT BOARD – A printed board produced from rigid industrial laminate material that provides point-to-point connections and printed components in a predetermined arrangement. See Printed Wiring Board and Printed Board.

- 2.115 PRINTED CONDUCTOR – A conductor applied to a base material, or to an existing conductor on base material, by means of a printing process.
- 2.116 PRINTED WIRING – A pattern of conductive material formed on the surface of a base material primarily for point-to-point electrical connections or shielding.
- 2.117 PRINTED WIRING BOARD – A completely processed combination of a printed-wiring pattern, including printed components, and the base material. See Printed Circuit Board and Printed Board.
- 2.118 PRINTING – Reproducing a pattern on a surface by any process.
- 2.119 PRODUCTION BOARD – A complete fabricated board, intended for shipment.
- 2.120 PRODUCTION PROCESS – Fabrication process used to produce boards intended for end-use products.
- 2.121 REINFORCEMENT MATERIAL – Any material (i.e. fibrous, continuous, sheet, etc.) capable of enhancing the base material mechanical or physical performance.
- 2.122 RELATIVE THERMAL INDEX (RTI) – Maximum service temperature for a material, where a class of critical properties will not be unacceptably compromised through chemical thermal degradation, over the reasonable life of an electrical product, relative to a reference material having a confirmed, acceptable corresponding performance-defined RTI.
- 2.123 RESIN COATED COPPER FOIL (RCF) – Metal foil coated with unreinforced resin using a single- (one pass) or double- (two pass) coated system. Single-coated foils are usually coated with one layer of B-stage resin. Double-coated foils are usually coated with two layers of resin; C-stage resin adjacent to the foil and B-stage resin on the surface of the C-stage resin.
- 2.124 RESIST COATING – A material supplied in liquid or film form to mask or protect selected areas of a pattern from the effects of an etchant, solder, or plating and which remains on the printed wiring board after processing.
- 2.125 RIGID INDUSTRIAL LAMINATE – Fibrous reinforcement material impregnated or coated with a thermosetting resin binder, and consolidated under high temperature and pressure into a dense solid product.
- 2.126 RIGID PRINTED WIRING BOARD – A printed wiring board produced using rigid base dielectric materials.
- 2.127 SAMPLE – A test vehicle made from a complete or portion of production board, or a coupon formed using all steps of the board production process and incorporating specific construction features.
- 2.128 SILVER MIGRATION – The ionic movement of silver due to migration inducing affects.
- 2.129 SINGLELAYER – Singlelayer board constructions are doublesided constructions with one layer of dielectric materials(s) separating the conductor planes, and singlesided constructions with a single conductor plane on one side of a dielectric materials(s).
- 2.130 SINGLESIDED – A board with conductor pattern on one side of the dielectric material(s).
- 2.131 SOLDER – A metal alloy with a melting temperature below 427°C (800°F).

2.132 SOLDER MASK – See Solder Resist.

2.133 SOLDER RESIST – A coating material used to mask or to protect selected areas of the printed wiring board from solder deposition or plating.

2.134 SOLDERING – ASSEMBLY SOLDERING PROCESS – The process used for soldering components to a printed wiring board during the assembly process. The soldering process may include but is not limited to reflow, wave, selective soldering or other equivalent soldering techniques.

2.135 SOLDERING – SELECTIVE SOLDERING – An automated process used for soldering components to a printed wiring board during the assembly process. The process targets only selected components on a printed wiring board. The complete printed wiring board may not be subject to the same thermal profile during these soldering processes. Selective Soldering encompasses different techniques but excludes Surface Mount Technology (SMT) reflow soldering and traditional wave soldering. Examples of Selective Soldering are – Laser Soldering, Miniature Wave Select Solder Fountains, and Point-to-Point Robotic Soldering.

2.136 SUBCONTRACTOR – An outside contractor performing defined critical board manufacturing steps, including, but not limited to, process steps with temperatures equal to or above 100°C or above the MOT, whichever is greater. The subcontractor shall return the boards to the original board manufacturer and may not ship boards directly to the end product manufacturer. See Multisite Processor.

2.137 SUBSTRATE – See Core Material.

2.138 SURFACE FINISH – See Surface Plating/Coating.

2.139 SURFACE MOUNTING – Electrical connection of components on the surface of the conductor pattern.

2.140 SURFACE MOUNT COMPONENT – A leaded or leadless component capable of being attached to an interconnect construction by surface mounting.

2.141 SURFACE PLATING/COATING – The surface plating/coating shall be on the top surface of patterned conductors and shall not create an interface with the dielectric surface.

2.142 TEMPERATURE PROFILE – The temperatures a select point traverses as it passes through a process involving multiple temperatures and dwell times.

2.143 TEMPORARY RESIST – A solder resist or mask material intended to be removed from the printed wiring board before installation into the end-product.

2.144 TEST PATTERN – The conductor pattern intended for test and inspection purposes.

2.145 TYPE – A unique model or product designation arbitrarily assigned to a board by the fabricator. See Markings, Section [36](#).

2.146 UL/ANSI TYPE MATERIAL – A specific type designation for materials defined in the Standard for Polymeric Materials – Industrial Laminates, Filament Wound Tubing, Vulcanized Fibre, and Materials Used in Printed Wiring Boards, UL 746E, as having certain base material, resin, thermal index and profiles of minimum performance.

2.147 UNCLAD – A dielectric or laminate material without foil or conductive material (never copper clad).

2.148 VIA – A conductor plated through-hole, in which there is no intent to insert a component lead or other reinforcement material, for interlayer connection of conductor planes. See also "Blind Via" and "Buried Via".

2.149 VOID – A defect that leaves an area on an element of a printed wiring board without a metallic or nonmetallic coating.

2.150 X-AXIS – A reference axis, usually horizontal or left-to-right direction in a two dimension coordinate system.

2.151 Y-AXIS – A reference axis, usually vertical or bottom-to-top direction in a two dimension coordinate system. The x and y axis are usually perpendicular to one another, in a two or three dimension coordinate system.

2.152 Z-AXIS – The axis perpendicular to the plane created by the x and y reference axis. This axis usually refers to the thickness of a board construction.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Measurement Accuracy and Testing Conditions

4.1 A measuring device used to perform the tests in this standard shall be capable of measuring the specified parameter with an accuracy within 10 percent of the measured parameter.

4.2 Prior to all tests, subject all samples to a stabilization period in accordance with the Standard Practice for Conditioning Plastics for Testing, ASTM D618, and the Standard for Plastics – Standard Atmospheres for Conditioning and Testing, ISO 291, for a minimum of 40 hours at $23 \pm 2^{\circ}\text{C}$ ($73.4 \pm 3.6^{\circ}\text{F}$) and 50 ± 10 percent RH, unless specified otherwise in the individual test method.

4.3 During the test, the standard atmospheric conditions surrounding the sample shall be $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ ($77^{\circ}\text{F} \pm 18^{\circ}\text{F}$) and 50 ± 10 percent relative humidity, unless otherwise specified in the individual test method.

5 Supplementary Test Procedures

5.1 These requirements are intended to be used in conjunction with the following requirements or standards:

a) The Standard for Polymeric Materials – Short Term Property Evaluations, UL 746A, the Standard for Polymeric Materials – Long Term Property Evaluations, UL 746B, the Standard for Polymeric Materials – Industrial Laminates, Filament Wound Tubing, Vulcanized Fibre, and Materials Used in Printed Wiring Boards, UL 746E, and the Standard for Polymeric Materials – Flexible Dielectric Film Materials Used in Printed Wiring Boards and Flexible Materials Interconnect Constructions, UL 746F, contain programs for investigating polymeric materials and industrial laminates.

b) The Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94, contains methods for evaluating the flammability of polymeric materials that are intended to be used in electrical equipment.