

STYLE MANUAL FOR UL and ULC STANDARDS FOR SAFETY

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The purpose of this manual is to promote uniformity in the composition, structure, and style of UL and ULC standards. This manual is for internal and external use by persons or groups who are authoring draft standards or requirements intended for proposal and publication by UL/ULC. This information may also be applied in the development of other documents such as an outline of investigation.

Overview

This manual applies to all non-harmonized UL and ULC standards. References to UL or ULC are referred to as SDO (Standards Development Organization) throughout this manual.

Harmonized standards are addressed in the [Procedures for Harmonizing ANCE/CSA/UL Standards](#) and [Guidelines for Numbering National Differences to IEC Based ANCE/CSA/UL Standards](#).

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Requirements developed in accordance with this manual are intended to facilitate processing by UL and ULC. Deviations from the style requirements may result in substantial rework on the part of the author(s) in order to bring the draft into compliance.

Proposals to revise the requirements of existing standards or to request the development of a new standard shall be submitted via UL's [Collaborative Standards Development System \(CSDS\)](#). Documents for ballot are processed by UL and ULC through its Collaborative Standards Development System, and standards are published through an electronic publishing system.

The manner in which requirements of the standards are applied in conducting certifications is determined by the responsible certification organization.

Responsibility for the content and maintenance of the Style Manual for UL and ULC Standards is vested in the UL Standards Division. Revisions to the content of this manual may be recommended at any time. Recommendations for revisions to content will be reviewed and acted upon by the Standards Director. Suggestions for revision of this manual may be forwarded to Jonette Herman at Jonette.A.Herman@ul.org.

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PART I - ELEMENTS OF A UL or ULC STANDARD

A UL or ULC standard shall have the following elements that are not subject to the STP/TC process. UL/ULC establishes layout, text, and content of these elements of the standard during the final publication of adopted requirements.

1 Cover

1.1 Each published standard shall have a cover page. The front cover layout and content shall be determined by the SDO.

2 Title of a Standard

2.1 The title of a Standard shall be an SDO decision, using stakeholder input as applicable. In the case of an IEC-based standard, the title of the IEC standard shall be adopted for the IEC-based SDO standard.

2.2 The title of a standard shall be sufficiently broad so that it does not need revision due to developments expected to occur in the affected industry. Limitations in product or system sizes, voltages, or similar parameters shall be addressed in the Scope of the standard and not in the title.

2.3 The title of a standard for a product used in many fields and where the requirements are directed toward a single use, shall include the end use to avoid conflict with industry or commercial standards. For example, a standard for pipe unions or a standard for gate valves would include in the title such references as ".....for Fire-Protection Service" or ".....for Flammable Liquids".

2.4 When the purpose of a standard is to cover tests for determining guidelines for use in building or other codes, or by inspection or other authorities, the title shall include the following words:

"Tests for...followed by the kind of test (such as Fire Resistance, Flammability, Combustibility, Spark Ignition, Surface Burning Characteristics, etc.)"

The categories involved shall be expressed in terms as broad as possible. For example, one standard covers a test method applied universally to building construction and materials (broad scope) while another standard is limited to prepared roof-covering materials (limited scope).

2.5 The title of a standard shall not include words such as "Classification", "Listing", "Recognition" or other terms that are potentially restricted to UL/ULC practice and lacking meaning to other third-party certifiers using the standard.

2.6 The title shall be as short as possible while remaining consistent with the above. The SDO reserves the right to shorten a title when necessary.

3 Standard Number

3.1 Each standard has a unique number that is used in conjunction with the title of the document. The standard number is assigned by the SDO.

4 Transmittal Notice

4.1 Each standard includes a transmittal notice following the cover and preceding the title page, which includes information about the origin of the material being issued.

5 Title Page

5.1 Each standard shall include a title page. The title page of the standard shall be the first page after the transmittal notice and includes the standard number, title of the standard, record of editions, and latest edition date. The title page additionally includes any historical notes approved by the SDO, ANSI approval information, SCC approval information, guidance on how to submit proposals, most recent copyright information, and Department of Defense (DoD) approval information, if appropriate.

6 Table of Contents

6.1 Each standard shall have a table of contents, listing the parts, major subdivisions, sections and subsections, along with the page numbers on which they appear. The SDO reserves the right to establish the format and layout of the table of contents.

7 Preface

7.1 Non-harmonized UL standards do not typically have preface statements.

PART II - ORGANIZATIONAL STRUCTURE OF A STANDARD

The requirements of a Standard are organized under Major Subdivisions. The following information addresses the most commonly used organizational structures.

8 Major Subdivisions

8.1 Requirements of a standard are typically presented within the applicable major subdivisions in the sequence shown below; some subdivisions may not be applicable. These subdivisions are not numbered.

INTRODUCTION
CONSTRUCTION
PERFORMANCE
MANUFACTURING AND PRODUCTION TESTS
RATINGS
MARKINGS
INSTRUCTIONS
ANNEX A
ANNEX B

8.2 When a standard includes requirements for a variety of products that differ from the basic requirements, the requirements may be organized by using "Parts". The following examples show how "Parts" are used to separate the requirements into groups based on product type. The "Parts" title headings are not numbered.

NOTE: Major Subdivisions and Parts are not numbered in order to reduce the numbering hierarchy throughout a standard and enable readability. These heading levels are intended to provide a visual organization to the requirements in the standard while maintaining a minimized and less cumbersome numbering scheme and enabling easier readability of cross-references.

EXAMPLE 1 - "Parts" Structure:

PART 1 - ALL FANS

INTRODUCTION
CONSTRUCTION
PERFORMANCE - ALL APPLIANCES
PERFORMANCE - PORTABLE APPLIANCES
PERFORMANCE - PERMANENTLY CONNECTED APPLIANCES
MANUFACTURING AND PRODUCTION TESTS
RATINGS
MARKINGS
INSTRUCTIONS

PART 2 - SPECIFIC FAN TYPES

FANS FOR USE WITH SOLID STATE SPEED CONTROLS
CEILING-SUSPENDED FANS
DAMP LOCATION CEILING-SUSPENDED FANS

EXAMPLE 2 - "Parts" Structure:**PART 1 - ALL APPLIANCES**

**INTRODUCTION
CONSTRUCTION
PERFORMANCE
MANUFACTURING AND PRODUCTION TESTS
RATINGS
MARKINGS**

PART 2 - COMMERCIAL ELECTRIC COOKING APPLIANCES WITH SEMICONDUCTOR HEATING ELEMENTS

**INTRODUCTION
CONSTRUCTION
PERFORMANCE
RATINGS**

PART 3 - COMMERCIAL ELECTRIC DRIP-TYPE COFFEE MAKERS AND SIMILAR DRIP-TYPE BREWING APPLIANCES

**INTRODUCTION
CONSTRUCTION
PERFORMANCE
MARKINGS**

8.3 Contained within the major Subdivisions are numbered Sections and Subsections. An example of this structure is shown below. Contained within the Sections and Subsections are paragraphs, Tables, and Figures, which contain the requirements of the standard.

INTRODUCTION

**1 Scope
2 Components
3 Units of Measurement
4 Referenced Publications
5 Glossary**

CONSTRUCTION

**6 General
7 Mechanical Assembly
 7.1 General
 7.2 Mounting of components
 7.3 Shipping
8 Electrical Enclosures
 8.1 Metallic enclosures
 8.2 Nonmetallic enclosures**

PART III - CONTENT OF A STANDARD

INTRODUCTION

The INTRODUCTION subdivision contains information that pertains to the entire standard and its intended application and interpretation. The INTRODUCTION typically contains the Scope, Components, Units of Measurement, Referenced Publications, and Glossary sections.

9 Scope

9.1 The Scope shall be the first section in the standard in the **INTRODUCTION** subdivision. It includes what products or systems the standard covers and any pertinent information on products or systems the standard does not cover.

9.2 The Scope of a standard shall be as open-ended as possible and should not include limitations on products except when necessary (such as installation or code issues, type of product, or application of product).

9.3 A standard covers reasonably foreseeable risks associated with a product.

9.4 A standard does not contain requirements specific to any conformity assessment program and does not contain language that establishes requirements that apply beyond the scope of the standard.

9.5 When the product or system classification for the standard is broad in regard to form, type, or end-use application of the product, the requirements should be limited to those products actually submitted for third-party investigation and the scope should reflect such limitations. Scope limitations to other areas, such as sizes, voltage and pressures are not required unless established by a referenced installation standard, federal regulation, or similar document, or by the technical aspects that are likely to affect the requirements for the product classification.

9.6 When a standard does not relate to all common risks associated with safeguarding property and its occupancy, or the users of the products covered, the scope shall clearly indicate the limitations to only certain risks. In addition, the following or an equivalent statement shall be included:

"These requirements do not cover other risk aspects of such equipment."

9.7 When a standard covers products intended solely as factory-installed components of other equipment, reference to UL or another third-party certifier evaluating the end combination shall be avoided. A statement similar to the following shall be used:

"These requirements cover (name of category) intended for use in (name of basic equipment or area of use) which conform with the requirements applicable to such equipment."

9.8 If applicable, the scope shall refer to nationally recognized installation standards, as in many cases UL's requirements for a product are based on the proper end use intended by a code or standard sponsored by others. The National Electrical Code and other standards of the National Fire Protection Association are examples.

10 Components

10.1 A Component section shall be included in a standard for any product or component standard that utilizes additional component requirements during an evaluation, regardless of whether those requirements are contained in the body of the standard, directly referenced, or without reference.

10.2 A Component section is not typically used in a standard if the product covered by the standard is considered to be a discrete component.

10.3 As applicable, a standard is to contain a general statement that a component of a product covered by a particular standard shall comply with the requirements for that component.

The following text is recommended in the section titled "Components" in the **INTRODUCTION** subdivision:

INTRODUCTION

2 Components

2.1 A component of a product covered by this Standard shall:

- a) Comply with the requirements for that component as specified in this Standard;
- b) Be used in accordance with its rating(s) established for the intended conditions of use; and
- c) Be used within its established use limitations or conditions of acceptability.

2.2 A component of a product covered by this Standard is not required to comply with a specific component requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product;
- b) Is superseded by a requirement in this Standard; or
- c) Is separately investigated when forming part of another component, provided the component is used within its established ratings and limitations.

2.3 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain

temperatures not exceeding specified limits, and shall be used only under those specific conditions.

2.4 A component that is also intended to perform other functions such as overcurrent protection, ground-fault circuit-interruption, surge suppression, any other similar functions, or any combination thereof, shall comply additionally with the requirements of the applicable UL standard(s) that cover devices that provide those functions.

10.4 The specific component requirements should be included throughout the end product standard where applicable. The component requirements may be written into the end product standard or may be included by reference only to the component standard. If the component requirements are provided by reference only, then the standard should be included in the list of Referenced Publications in the **INTRODUCTION** subdivision.

11 Units of Measurement

11.1 A section titled “Units of Measurement” shall be included in the **INTRODUCTION** subdivision. Typically both SI and US units of measurement are used in a standard.

11.2 A standard shall include a statement of how units of measurement will be applied in the document. The following statement is recommended:

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

Other wording may be appropriate - see [UL's Metric Policy Manual](#) for detailed information regarding establishing the appropriate measurement system for the standard.

11.3 For detailed information on converting between SI and US units of measurement, see the [Metric Policy Manual](#).

11.4 Symbols and abbreviations for units of measurement shall be used in their established forms. See the [Metric Policy Manual](#) for detailed information on the proper use, spelling, and presentation of symbols and units.

12 Referenced Publications

12.1 The standard designations and titles of the standards referenced in a UL or ULC Standard shall be listed in a separate section titled “Referenced Publications” in the **INTRODUCTION** subdivision.

12.2 The “Referenced Publications” section shall include a statement addressing the use of undated references to other publications. The following statement is recommended:

"Any undated reference to a code or standard appearing in the requirements of this Standard shall be interpreted as referring to the latest edition of that code or standard."

12.3 The referenced publications shall be organized so that the references are listed in alphabetical order by SDO and each SDO's standards are listed in numerical order. See the example below:

4 Referenced Publications

4.1 Any undated reference to a code or standard appearing in the requirements of this Standard shall be interpreted as referring to the latest edition of that code or standard.

4.2 The following publications are referenced in this Standard:

ASTM D792, Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement

ASTM G152, Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

IEC 60335-1, Household And Similar Electrical Appliances – Safety – Part 1: General Requirements

IEC 60384-14, Fixed Capacitors For Use In Electronic Equipment - Part 14: Sectional Specification - Fixed Capacitors For Electromagnetic Interference Suppression And Connection To The Supply Mains

IEC 60417, Graphical Symbols For Use On Equipment

NFPA 70, National Electrical Code

UL 6, Electrical Rigid Metal Conduit - Steel

UL 6A, Electrical Rigid Metal Conduit - Aluminum, Red Brass and Stainless Steel

UL 50, Enclosures for Electrical Equipment, Non-Environmental Considerations

UL 83, Thermoplastic-Insulated Wires and Cables

13 Glossary

13.1 A section titled "Glossary" shall be included in the **INTRODUCTION** subdivision. Terminology used within a standard shall be included in a Glossary as follows:

- a) The content of the Glossary shall be limited to terms used within the standard;
- b) Do not include requirements within a definition; and

- c) Do not create a definition for a term which is better off being described in the actual requirement (e.g., such as describing a test enclosure within the requirement versus defining it as a glossary term).

13.2 The following wording is recommended as the first paragraph of a glossary section:

"For the purpose of this standard the following definitions apply."

13.3 Glossary entries shall be separate, numbered paragraphs arranged alphabetically.

13.4 A glossary item shall be in all uppercase letters followed by a dash. The glossary definition shall follow in sentence form. The following example illustrates the format for a glossary item:

5.6 INSULATION SYSTEM - An assembly of insulating materials used to isolate the live parts from ground and from parts of opposite polarity. All materials in contact with windings are considered part of the system.

13.5 If a glossary item contains sub-items, the glossary item shall be followed by a colon with the sub-items following in an ordered list. The following example illustrates the format for a glossary item containing sub-items:

5.3 ELECTRICAL CIRCUITS:

- a) High-Voltage - A circuit involving a potential of not more than 600 volts and having circuit characteristics in excess of those of a low-voltage circuit.
- b) Low-Voltage - A circuit involving a potential of not more than 30 volts ac, 42.4 volts peak or direct current (dc), and supplied by a primary battery, a standard Class 2 transformer, or a combination of a transformer and fixed impedance which, as a unit, complies with all performance requirements for a Class 2 transformer.

CONSTRUCTION

14 General

14.1 As a general practice, requirements in the **CONSTRUCTION** subdivision should be listed in the order that the product or system is disassembled, with requirements for the exterior of the product near the start of the requirements and the requirements for the internal components near the end.

14.2 References can be made to other standards for materials and construction requirements which have been standardized over an extended period of time, such as those for pipe, pipe threads, flanges and unfired pressure vessels, where the materials are not likely to be subject to major alterations. In such cases, the standard shall be referenced as specified in Sections 12 and 31.

PERFORMANCE

15 General

15.1 As a general practice, testing requirements in the **PERFORMANCE** subdivision should be presented in the order they will be conducted. Performance requirements shall be specific and well defined.

15.2 When constructing a test section of a standard, the acceptance criteria should be included in the first numbered paragraph, including the specific measurable result that is required of the sample under test in order for it to be considered as complying with the requirement. Test acceptance criteria shall be followed by, or referenced to, the test method. The test method shall include the required number of samples, description of test apparatus, installation details, instrumentation, and similar parameters.

15.3 Descriptions of the testing parameters should not be used as a substitute for a complete statement of all the required conditions of performance of the product under test. For example, when the length of time that a product is to be subjected to a hydrostatic test is part of the requirement for passing the test, it is to be included as part of the statement of requirements even though it is repeated in the description of the test method.

15.4 The details of a test method, test equipment, instrumentation, and similar parameters are not required to be included in a standard when the needed information is published in a nationally recognized standard. In such cases, a reference to the standard may be made in accordance with Sections 12 and 31.

15.5 Consideration should be given to the repeatability and reproducibility of test requirements. Repeatability refers to the closeness of the results of successive tests of the same sample, conducted using the same test procedure, the same tester, the same measurement instruments, under the same conditions, at the same location. Reproducibility refers to the closeness of the results where the same (type) sample is tested using the same test procedure, the same (type) measurement instruments, under the same conditions, but conducted by different testers, at different locations.)

15.6 When it is required that a specific instrument, material, or product be used in a test to provide for a high degree of reproducibility, a footnote is to be included immediately following the paragraph in which the reference to the instrument, material, or product appears. For example, for a test that calls for use of a particular electric meter, the reference would be "....an electric meter^a is to be used, rated 120 V, 60 Hz." At the end of the paragraph, on a separate line, would be the footnote, formatted as shown below.

^a XYZ Company meter, model 123, or equivalent shall be used.

MANUFACTURING AND PRODUCTION TESTS

16 General

16.1 Any test required to be conducted on 100 percent of the products produced by a manufacturer at the production facility in order to establish compliance with a requirement shall be included in the standard under the major subdivision **MANUFACTURING AND PRODUCTION TESTS**.

16.2 For a product standard covering multiple products, the requirements shall clearly specify those products requiring production line testing.

PACKING FOR SHIPMENT

17 General

17.1 Packaging requirements are generally not safety related and shall not be included in a standard, except in the following situations:

- a) When certain products present a safety risk because of damage occurring in shipment and handling, requirements for packing and shipment shall be a part of the standard.
- b) When it is anticipated that important parts of a product or system will be shipped disassembled, both shipping and assembly on the part of the end user shall be addressed in the standard. Requirements shall be covered under the **PACKING FOR SHIPMENT** subdivision or under such headings as "Assembly" or "Markings."

RATINGS

18 General

18.1 Requirements for electrical and other ratings shall be included in the standard in the **RATINGS** subdivision when they are pertinent to the safe installation or operation of the product or system.

MARKINGS

19 General

19.1 Any requirements for product markings shall be included in the standard under the **MARKINGS** subdivision.

19.2 In general, the product shall be legibly and permanently marked with the manufacturer's name, identifying symbol, or a distinctive marking by means of which the organization responsible for the product can be identified. The product shall also be marked with the date of

manufacture, a distinctive catalog/model number or the equivalent, and the required ratings. More specific information on markings may be included in the standard (for example, location of the marking when it is a factor that is to be considered, etc.).

19.3 Marking requirements shall cover the location or locations, types of tags or labels, methods for attachment or securement, and types or sizes of lettering, when required. Examples of type, sizes, background and font color, and styles are to be included when required.

19.4 When certain instructions for installation, operation, and maintenance are required to appear on the product, or on a tag securely attached to the product, they are to either be included under the **MARKINGS** subdivision or be referenced to a separate section in the **INSTRUCTIONS** subdivision.

20 Factory Identification

20.1 A requirement for identification of products produced at more than one factory shall be included in the standard. The following or equivalent statement is recommended:

"When a manufacturer produces _____ at more than one factory, each _____ shall have a distinctive marking to identify it as the product of a particular factory."

20.2 When the product markings are not required to appear on the product (e.g. markings on the smallest carton or box in which the product is furnished meet the marking requirements) the requirement for location of factory identification marking is the same as for other product markings.

21 Warning Notices and Cautionary Markings

21.1 Warning notices and cautionary markings shall be used to identify potential risks for persons using, operating, servicing, or in close proximity to products covered by the standard. Such markings are to be used as a secondary means in addition to product designs or features to reduce the risk of injury to persons.

21.2 A warning or cautionary statement shall consist of a three-part marking which includes the following:

- a) The *signal word* CAUTION, WARNING, or DANGER, shown in uppercase letters;
- b) The *risk identification*, such as "Risk of Electric Shock", shown with first letter of significant words in uppercase letters; and
- c) The *risk avoidance*, such as "Disconnect the product from the outlet before replacing the fuse", with only the first letter of the first word capitalized (sentence form).

An example of a cautionary marking is as follows:

CAUTION: Risk of Electric Shock. Disconnect the product from the outlet before replacing the fuse.

21.3 The signal word is to be selected as follows based on an assessment of the degree of potential injury or damage (severe or minor) and the occurrence of injury (definitely occurs or has the potential to occur) when the warning is ignored:

- a) **DANGER** - indicates a situation which, when not avoided, results in death or severe injury;
- b) **WARNING** - indicates a situation which, when not avoided, has the potential to result in death or severe injury;
- c) **CAUTION** - indicates a situation which, when not avoided, results or has the potential to result in minor injury.

21.4 Warning notices and cautionary markings may be alternatively formatted as specified in ANSI Z535.4, Product Safety Signs and Labels. The ANSI Z535 series of standards contain information on the design and application of cautionary markings. These requirements and guidelines shall be considered when developing new requirements or revising existing requirements.

21.5 Any statements or notices to be used verbatim or by example shall be included in the standard and enclosed within quotation marks. When equivalent text is appropriate, a statement to that affect shall be made.

21.6 Examples or descriptions of sizes and types of lettering, colors, and styles to be used in the markings may be included as needed.

INSTRUCTIONS

22 General

22.1 Instructions for installation, use, and maintenance shall be provided in the **INSTRUCTIONS** subdivision of the standard.

23 Installation Instructions

23.1 A standard that covers a product required to be installed in accordance with recognized installation standards or operating procedures shall include installation instructions. Installation instructions that are combined with instructions for use, maintenance, operation, or any combination of these factors, meet the intent of this requirement.

23.2 When appropriate, the standard is to state that instructions intended to accompany the product shall be evaluated in conjunction with the product. The instructions shall include

directions and information required by the standard and deemed necessary by the organization responsible for the product to cover the intended installation of the product.

23.3 In cases where installation codes or safety considerations require specific practices, such as use of special or high-temperature wiring connections, clearances to combustible enclosures or supports, and similar practices, the standard is to state that this information be provided in the instructions.

24 User and Maintenance Instructions

24.1 Instructions pertaining to the use, maintenance, operation, or any combination thereof, of a product or system shall be covered under the **INSTRUCTIONS** subdivision of the standard. User and maintenance instructions that are combined with installation instructions meet the intent of this requirement.

24.2 When appropriate, the standard is to state that instructions intended to accompany the product shall be evaluated in conjunction with the product. The instructions shall include directions and information required by the standard and deemed necessary by the organization responsible for the product to cover the intended use, maintenance, operation, or any combination of these aspects of the product.

ANNEXES

25 General

25.1 An Annex may be used for supplemental informative or normative requirements, supplementary data, illustration, and information relating to and consistent with the scope of the standard. This includes any information that clarifies the content of the standard and is not part of the requirements of the standard (for example, explanation of the derivation or application of a formula used in a standard).

25.2 An Annex shall be identified as either normative or informative and is subject to the STP/TC process. The Annex title heading shall include the word “normative” or “informative”.

For example:

ANNEX A (Normative) – OUTDOOR USE POWER PACKS

PART IV - COMPOSITION

The information in PART IV pertains to composition, language, formatting, and numbering of requirements, tables, and figures and reflects optimum use of the electronic publishing system. To facilitate and expedite processing of a document by the SDO, draft standards should be submitted using the following conventions.

26 Copyright Policy

26.1 UL and ULC standards are protected by copyright and require permission to reproduce in other publications.

26.2 Underwriters Laboratories Inc. and its affiliates (collectively, "UL") recognize and respect intellectual property rights. As part of our mission to maintain the highest standards for ethical conduct, UL is committed to fulfilling our moral and legal obligations with respect to our use of copyright-protected works.

26.3 In some instances, it is useful or desirable to include material taken verbatim from a standard of another organization in a UL or ULC standard. Whether or not the document of the other organization is copyrighted, a written approval, specifying that the organization grants permission to reproduce the specific material in the UL or ULC standard, is to be obtained. A credit statement shall be included in the standard, preferably as a footnote, referencing the reproduced material. This statement shall be given in the form dictated by the organization involved if their permission is so qualified.

26.4 When proposals include copyrighted material from other organizations, the proposal submitter is responsible for obtaining the copyright permission and should provide this information when submitting the proposal. The proposal submitter needs to identify:

- a) The source document and organization;
- b) The exact content (text, tables, graphics, etc) being used;
- c) The context in which the material will be used (how the content will be presented in the proposal/standard;
- d) The copyright permission from the organization; and
- e) The credit statement to be included in the standard, if so specified by the organization.

26.5 Written permission from the document source to reproduce the material shall be obtained before the proposal is sent out for comment. When written approval is available at the time of submission of the proposal request, it should be included with the CSDS Proposal Request as an attachment.

26.6 Contact the [Project Manager](#) for guidance in using published material and obtaining permissions for reproduction. Early communication between the proposal submitter and the Project Manager will help in expediting the processing of the proposal.

27 Patent Policy

27.1 [UL's Patent Policy](#) shall be followed. When a proposal author is aware that a patent exists, or has been applied for, that pertains to the proposal they are submitting, the author is to notify UL. Further, if an STP/TC member or individual or entity commenting on a standards proposal believes that a proposal contains an essential patented claim, that STP/TC member, individual or entity, is to notify UL of the possible existence of the essential patented claim.

28 Informational Material and NOTES

28.1 Requirements in a standard shall be normative and contain specific, measurable criteria. Annexes may be either normative or informative. A "recommended" construction or practice is not to be included in a standard.

28.2 Informational and explanatory information that is not a requirement and is included to aid the reader in the application of the requirement may be included as a NOTE located directly below the paragraph to which it refers and shall be identified as a NOTE. The NOTE shall be flush left with the requirement and be in a smaller text than the requirement.

28.3 Requirements should first and foremost be clearly written so that additional clarification in the form of a NOTE is not necessary. Therefore, NOTES should be used sparingly throughout a standard.

28.4 A NOTE shall be placed subsequent to the paragraph to which it refers. A single note shall be preceded by the word "NOTE:". Multiple NOTES shall be designated "NOTE 1:", "NOTE 2:", "NOTE 3:", etc.

28.5 Examples of a NOTE are as follows:

6.2 A grounding screw shall be used in conjunction with upturned lugs, a cupped washer, or an equivalent means capable of laterally retaining a 10 AWG (5.267 mm²) conductor under the head of the screw. The retention means may be an integral feature of the box.

NOTE: Retention means are intended to ensure that the grounding conductor will not escape from under the head of the ground screw as the ground screw is being tightened.

8.3 For other than a painted coating, as a result of the exposure, the sample shall not show evidence of red rust.

NOTE: For the purpose of this Standard, red rust is determined as base metal corrosion in accordance with ASTM F1137.

29 Numbers

29.1 The following conventions shall be used:

- 1) Use numerals when defining or describing properties.

Example: 2-inch (50-mm) spacing, 1-1/2-inch (38.1-mm) diameter

- 2) Spell out numbers less than ten when indicating quantities.

Example: two relays, four devices

- 3) Use numerals for quantities greater than nine, except where in combination with units.

Example: 16 support bars, or sixteen 20-inch support bars

- 4) Do not begin a sentence with a numeral.

30 Symbols for Specific Applications

30.1 Avoid using a dash mark to indicate a minus quantity to avoid confusion with a "dash". Write out the word "minus".

30.2 Table 30.1 specifies the required use of various symbols in a standard:

Table 30.1
Symbols with Required Applications

Symbol	Use
Degree "°"	Used whenever a number of degrees of temperature are specified. Not preceded or followed by a space (e.g., 25°C). Not used to identify angles.
En-dash "–"	Used to denote a range, preceded and followed by a space (e.g., Sections 10 – 15).
Hyphen "-"	Used in hyphenated words (e.g., outdoor-use appliance) and to denote mixed numbers (e.g., 15-3/4).
Plus-or-minus "±"	Used to denote tolerances. Preceded by one space, followed by no spaces (e.g., 10 ±2 mm).
Slash "x/y"	Used to denote fractions (e.g., 1/2).

31 References to Standards

31.1 When referencing a standard, apply the following format:

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- a) The name of the organization shall not be spelled out. Reference to a standard shall identify the organization and include the number of the standard involved. (e.g., UL 1310, NFPA 70, ASTM D792).
- b) Do not reference Section or paragraph numbers of other standards, as the numbering may change. Instead, reference the title of the applicable section or requirements.
- c) The ANSI designation for an ANSI approved non-UL standard may be included. The ANSI designation for a UL ANSI approved standard shall be excluded.
- d) A date or edition shall not be included unless there are compelling reasons to do so (e.g., a change in a referenced external standard contains technical errors introduced in that version). Reference to requirements for installation as provided by the National Fire Protection Association and similar installation standards within the Scope section of the standard shall not be dated. A reference shall not be dated to accommodate commercial motivations, by either conformity assessment bodies or their customers, associated with the expense of evaluating products or services to the latest edition of the referenced document.
- e) When reference is made to a UL Standard, a date or edition shall not be included in the reference, as references to UL's requirements are assumed to be to the current requirements. Under special circumstances, the edition number may be included when there are multiple editions in effect and active for a period of time.

31.2 The word "standard" is only capitalized when referring to the standard itself and is otherwise lowercase. (e.g., The requirements in this Standard apply to chargers for indoor use only.)

31.3 A requirement included in a UL standard that is required by the Code of Federal Regulations (CFR) for the particular product involved shall be identified as such. For example:

".... in accordance with the Code of Federal Regulations, (CFR) 47, Part 15."

Revisions of these requirements shall take into consideration the fact that they are Federal Regulations and not subject to change by other than federal authorities.

31.4 References to a UL standard or a standard of another organization shall be included in the "Referenced Publications" Section of a standard in accordance with Section 12, Referenced Publications.

31.5 Because the standard numbers and titles are listed in the "Referenced Publications" Section, only the standard numbers are required to be included in the body of the standard and inclusion of the standard titles are optional. The decision to include the standard titles should be based on whether it would aid in the readability and application of the requirements.

31.6 References to Standards in the “Scope” shall include both the Standards Numbers and Titles.

32 Self-Sufficiency of Standards

32.1 Typically, a standard should be complete and not require reference to other standards to cover the subject, except in the cases of components covered by other specific requirements and published test methods of other organizations. Requirements for wiring methods, motor protection, and electrical enclosures, for example, should be included in each standard to which they apply, although the text is virtually identical to that included in closely related standards.

32.2 The statement in 32.1 does not preclude the referencing of other standards. For instance, when the standards are of the same general family, and when there would be excessive repetition of very detailed requirements, a reference meets the intent of the requirement (e.g., the Standard for Thermoset-Insulated Wires and Cables, UL 44, is referenced in the Standard for Service-Entrance Cables, UL 854). Another example is where the classification, rating, and fire testing of several classes of fire extinguishers and extinguishing agents are covered by the Standard for Rating and Fire Testing of Fire Extinguishers, UL 711, and separate standards are provided for the construction and operation of each class of extinguisher.

32.3 The statement in 32.1 does not apply to standards that utilize a part structure, where a part is required to be used with the base standard (e.g., an IEC based UL standard).

33 Similar Requirements in Different Standards

33.1 To the degree practical, requirements should be consistent with similar requirements for other products providing similar service or subject to similar limitations of use.

33.2 When a requirement is used for identical purposes in more than one standard, an effort should be made to make the wording consistent between standards.

34 Language

34.1 Standards shall be written to provide clear direction to the users of the standard and promote consistent application of requirements in the standard.

34.2 Mandatory writing style is preferred in the development and revision of all standards because the use of non-mandatory language does not provide specific direction to users of the standard. Non-mandatory language can lead to requirements that are unclear and have varying interpretations. Examples of non-mandatory expressions are as follows and are discouraged as they do not indicate the factors to be investigated.

Examples of expressions which could be considered non-mandatory:

acceptable to all concerned
as applicable

comply with the appropriate requirements
good condition
reasonably secure
should
sufficiently

Examples of expressions in the mandatory style:

shall comply with Section 5, Grounding
the connection shall be secure
shall be no deformation or charring
is not required to comply with

Determination of whether language is mandatory or non-mandatory should be judged based on the context of the sentence.

34.3 Text should be kept as simple as possible, using everyday language. Rules of proper grammar and punctuation should be followed. In disputes, consult a recognized style manual. The preferred reference document is 'The Elements of Style' by Strunk and White.

34.4 Sentences should be kept short and to the point. Avoid using long sentences combining multiple ideas.

34.5 The active voice should be used whenever necessary to avoid use of language that does not comply with the mandatory language guidance or to clarify the meaning of a requirement.

34.6 In general, a product should be referred to in the singular form in the text of a standard.

34.7 The expressions "special investigation" or "appropriate investigation," shall not be used in the text of a standard. When an investigation is required to establish equivalency, the factors to be investigated shall be indicated.

34.8 The word "Domestic" is not to be used in connection with the designation of a product covered by or scope of a standard because it has more than one meaning. One meaning relates to residential, household, and similar applications. The other meaning indicates that the product is not of foreign manufacture. Terms such as "Household", "Commercial", and "Industrial", are alternatives for designating areas of broad use.

34.9 Proprietary references to UL services or UL terms (such as "Listing" or "Listing Mark") shall not be used in the requirements section of a standard, since these terms are not meaningful to other third-party certifiers.

34.10 Requirements for specific materials used in the construction of a product shall be as generic as possible. Reference to specific brand or trade names, such as Teflon®, should not be used unless there is no other generic description for the material. A correct designation or description of a product shall be given rather than a trade name or brand name (e.g., use of "polytetrafluoroethylene (PTFE)"; instead of "Teflon®"). When use of a trade name is

unavoidable, the nature of the name shall be indicated (e.g., use of the symbol ® for a registered trade mark) with the words "or equivalent."

34.11 Trade jargon or terms not known to the average reader shall not be used in a UL standard unless defined in the Glossary.

34.12 The word "hazard" shall be avoided in warning notices and cautionary markings and elsewhere in requirements for a standard. The generic definition of the word implies or warrants greater safety than intended or determined by the requirements for a product.

34.13 The word "shall" is to be used only for required product or system attributes in a standard. For example:

"the product shall be constructed of..." or
"maximum temperature rise shall not exceed..."

34.14 The phrase "is to be" or "are to be" shall be used for all situations other than required product or system attributes. For example:

"During this test, the unit is to be mounted..." or
"Spacings are to be measured...."

34.15 The terms "paragraph", "clause", and "subsection" should not be used in a standard when referencing paragraph and subsection numbers. For example:

instead of "in accordance with paragraph 2.1" use "in accordance with 2.1"

34.16 Acronyms and abbreviations that are not in common use shall be spelled out with the acronym or abbreviation following in parentheses for the first use of the term in the standard. Alternatively, an acronym or abbreviation may be defined in the Glossary.

34.17 A period should generally be placed outside quotation marks. For example:

These devices may also be referred to as "Fuel Tanks".

35 Sections, Subsections, and Paragraphs

35.1 Sections of a standard shall be numbered sequentially (e.g., the first three sections are 1, 2, and 3) using the numbering guidelines provided in this Section. Sections or parts of a standard shall not be reserved for future use.

35.2 In an Annex, the numbers shall be preceded by the Annex identifier (e.g., Annex A, Section A1, Section A2)

For Example:

ANNEX A (Informative) – OUTDOOR USE APPLIANCES

A1 Scope

A1.1 Text of scope

35.3 When there are subsections under a section, the subsections shall be numbered X.n, where "X" is the Section number and "n" is the order of the subsection (e.g., the first three subsections in Section 3 are 3.1, 3.2, and 3.3). For Annexes, the subsection number shall be preceded by the appropriate identifier (e.g., Section A1 for Annex A, subsection A1.1).

35.4 Each paragraph in a standard shall be numbered. The numbered paragraphs in a Section are numbered X.n, where "X" is the Section number and "n" is the order of the paragraph in the Section (e.g., the first three paragraphs in Section 3 are 3.1, 3.2, and 3.3). Paragraphs under a subsection heading are numbered X.Y.n, where "X.Y" is the subsection number and "n" is the order of the paragraph in the subsection (e.g., the first three paragraphs in subsection 3.2 are 3.2.1, 3.2.2, and 3.2.3). For Annexes, the paragraph and subsection numbers are preceded by the appropriate identifier (e.g., paragraphs in Section A1 would be A1.1, A1.2, A1.3).

35.5 The following example illustrates the numbering of paragraphs when both a subsection heading is employed and when such a heading is not employed:

4 Title of Section (Using Subsection Headings)

4.1 Title of first heading

4.1.1 Text of paragraph...

4.1.2 Text of paragraph...

4.2 Title of second heading

4.2.1 Text of paragraph...

4.2.2 Text of paragraph...

4.2.3 Text of paragraph...

5 Title of Section (Not Using Subsection Headings)

5.1 Text of paragraph...

5.2 Text of paragraph...

5.3 Text of paragraph...

6 Title of Section (Using Two Levels of Subsection Headings)

6.1 Title of first heading

6.1.1 Title of first sub-heading

6.1.1.1 Text of paragraph...

6.1.1.2 Text of paragraph...

6.1.2 Title of second sub-heading

6.1.2.1 Text of paragraph...

6.1.2.2 Text of paragraph...

35.6 Numbers shall not exceed 6 places (five periods). When a situation arises where the numbering system does not work, the Section shall be reorganized and renumbered.

35.7 The format of headings for a standard are shown in Table 35.1.

Table 35.1
Format for Headings

Type of heading	Example of format	Description
Major subdivision headings	INTRODUCTION CONSTRUCTION PERFORMANCE	Uppercase; flush left; bold
Major heading within a subdivision	ALL PRODUCTS DECORATIVE OUTFITS	Uppercase; flush left; bold
Section headings	35 Leakage Current Test	Uppercase and lowercase with the first letter of each word in uppercase; flush left; bold
Subsection headings	35.2 Preparation of test samples	Uppercase and lowercase with only the first letter of the first word uppercase; flush left; bold
Subsection heading within a subsection	35.2.1 Selection of samples	Uppercase and lowercase with only the first letter of the first word uppercase; flush left; bold. Use this heading level only when necessary.
Annexes	ANNEX A (Informative) - TITLE	Uppercase; flush left; bold

35.8 The following is an example illustrating the use of headings, numbering style, exceptions, and items:

CONSTRUCTION

ALL PRODUCTS

2 Corrosion Protection

2.1 All ferrous sheet-metal parts shall be plated, galvanized, enameled, painted, varnished, lacquered, or the equivalent.

Exception No. 1: Parts are not required to be provided with corrosion protection when they are intended only for decoration.

Exception No. 2: A coating is not required to be applied to the cut edges of pre-coated stock; to steel nuts, bolts, and screws; and to the inside surface of a pipe stem.

3 Mounting Means

3.1 General

3.1.1 An appliance, other than as noted in 11.2 - 11.4, shall be mounted in accordance with the mounting requirements specified by the manufacturer's installation instructions.

3.2 Cord-connected wall-mounted appliances

3.2.1 Mounting brackets and any necessary hardware required to install a cord-connected, wall surface-mounted appliance shall be provided with the appliance or shall be available from the appliance manufacturer.

Exception: Small parts commonly available for mounting of the appliance are not required to be provided when the instructions for intended mounting that refer to such parts are furnished in accordance with the requirements in the Installation Instructions, Section 58.

3.2.2 An opening provided for hanging or mounting an appliance shall be located or guarded so that a nail, hook, or the like does not displace a part that could create a risk of fire, electric shock, or injury to persons and does not contact one of the following:

- a) An uninsulated live part; or
- b) Moving parts:
 - 1) Slow moving; or
 - 2) Fast moving.

36 Inserting Sections, Paragraphs, Figures, or Tables

36.1 When revising a standard by inserting a section between existing sections or a paragraph between existing paragraphs, the following system shall be used:

- a) To insert a new Section, an uppercase letter suffix is added to the number of the preceding section (e.g., Section 3A is inserted between Sections 3 and 4).
- b) To insert a new paragraph, an uppercase letter suffix is added to the number of the preceding paragraph (e.g., 3.1, 3.1A, 3.1B, 3.1C, 3.2).

36.2 To insert a Figure or Table between existing Figures or Tables, an uppercase letter suffix shall be added to the number of the preceding Figure or Table number (e.g., Table 3.1A is inserted between Table 3.1 and Table 3.2).

37 Deleting Sections, Paragraphs, Figures, or Tables

37.1 When a section, paragraph, figure, or table is deleted from a published standard, the number shall be retained with a note that the content has been deleted. The number shall not be reused during the life of the edition.

38 Items in Ordered Lists

38.1 Numbered items shall not be contained within the body of a paragraph. Such items shall be presented as ordered lists.

38.2 Each individual item or subitem shall be assigned an alphabetical or numerical character as indicated below. Each item or sub-item shall be double-spaced. There shall be an end parenthesis ")" after each letter or number identifying an item or subitem. The formatting and indenting shall be as follows:

- a) An item is identified by a lowercase letter [e.g., a), b), c), etc.] and has one indent preceding the identifying letter; and
- b) There should always be at least two items shown:
 - 1) A sub-item is identified by an Arabic numeral [e.g., 1), 2), 3), etc.]; and
 - 2) Has a double indent preceding the subitem number:
 - i) A sub-subitem is identified by a Roman numeral in lowercase letters representing the sub-subitem number [e.g., i), ii), iii), iv), etc.]; and
 - ii) Has a triple indent preceding the identifying number.

38.3 References to items and subitems shall be made as shown in the following examples:

- a) To reference item (a) of 3.1.2: "in accordance with 3.1.2(a)";
- b) To reference sub-item 4 of item (b) of 7.8: "as specified in 7.8(b)(4)";
- c) To reference items (a) and (b) of 12.4.5: "as specified in 12.4.5 (a) and (b)"; and
- d) To reference item (a) of the same paragraph: "as specified in (a)".

39 Exceptions

39.1 An exception is a condition that is different from the basic requirement and that describes a variation that meets the intent of the basic requirement. An exception should not require a higher level of safety than the basic requirement.

39.2 An exception to a requirement shall be written as a complete sentence. An exception is a separate, unnumbered paragraph immediately following the requirement and separated by a blank line. An exception is italicized and flush left with the numbered paragraph. The text of the exception is preceded by the word "Exception", followed by a colon.

39.3 When there is more than one exception to a requirement, each exception shall be designated "Exception No. n" where "n" is the number of the exception (e.g., Exception No. 1, Exception No. 2, etc.). For example:

2.1 All ferrous sheet-metal parts shall be plated, galvanized, enameled, painted, varnished, lacquered, or the equivalent.

Exception No. 1: Parts are not required to be provided with corrosion protection when they are intended only for decoration.

Exception No. 2: A coating is not required to be applied to the cut edges of precoated stock; to steel nuts, bolts, and screws; and to the inside surface of a pipe stem.

39.4 When an exception is to an item in an ordered list, the exception is a separate, unnumbered paragraph immediately following the item. The exception is flush left with the item. The text of the exception is preceded by the word "Exception", followed by a colon.

39.5 References to an exception should be as follows:

"in accordance with the Exception to 3.1"

"as specified in Exception No. 3 to 5.4.2"

40 Tables

40.1 All tables in a standard shall have a unique numbered identifier. Tables shall be numbered X.n, where X is the number of the Section where the table is located and "n" is the order of the table within the Section (e.g., the first three tables in Section 3 are Table 3.1, Table 3.2, and Table 3.3). For an Annex, the table number is preceded by the appropriate identifier (e.g., Table A3.1 in Annex A).

40.2 A table shall be referenced in a paragraph, figure, or another table.

40.3 A table shall be located as close as possible to the first paragraph, table, or figure that references it.

40.4 The body of a table shall be surrounded by lines forming a box. There is a vertical line between each column and a horizontal line separating the column headings from the table text and the table text from any notes.

40.5 A table shall be provided with a table number and title. The word "Table" shall have an initial capital letter, and the title shall be in Title Case. Paragraph references shall not be included in the table title. The table number and title shall be stacked, as shown below:

Table 40.1
Minimum Spacings

40.6 Table column headings for all tables shall be bolded and have an initial capital letter only for the first word of each heading (e.g., Column 1: "Through air"; Column 2: "Over surface").

40.7 General notes that apply to an entire table shall be entered flush left in individual rows at the bottom of the table and precede any footnotes. A single table note shall be preceded by the word "NOTE"; followed by a dash and the text of the note. Multiple table notes shall be preceded by the word "NOTES"; on a line by itself, followed by the sequentially numbered notes (e.g., 1, 2, 3, etc.) as shown below:

NOTES

1 – Text of note

2 – Text of note

40.8 A footnote that applies to a specific entry in a table shall be marked by a sequential lowercase letter in superscript immediately following the entry to which it pertains. Footnotes shall follow any general notes at the bottom of a table. A footnote is not typically assigned to the title of a table, and it is recommended that a NOTE be used instead. Where the footnote is referenced, the superscript letter shall immediately follow the last word of the word or phrase to which the footnote applies (e.g., Type 1^a). Where the referenced footnote appears at the bottom of the table, there is a single space between the identifying superscript letter and the text of the note (e.g., ^a Applies to all enclosures).

40.9 Text within a table, including notes and footnotes, shall be in roman text (no italics).

40.10 Units stated in a column heading in a table apply to all entries under the column unless otherwise noted. Therefore, units are not repeated for each entry in the column. Primary units shall be shown first, and secondary units shall be shown in parentheses. The parentheses for secondary units shall be included around the unit and each data entry (entire column) in the table.

40.11 The following example illustrates the format of a table:

Table 40.2
Minimum Acceptable Thicknesses of Enclosure Metal

Metal	At small, flat, unreinforced surfaces and at surfaces of a shape or size to provide adequate mechanical strength		At surfaces to which a wiring system is to be connected in the field		At large, unreinforced, flat surfaces	
	mm	(inch)	mm ^a	(inch) ^a	mm	(inch)
Die-cast metal	1.19	(3/64)	–	–	1.98	(5/64)
Cast malleable iron	1.59	(1/16)	–	–	2.38	(3/32)
Other cast metal	2.38	(3/32)	–	–	3.18	(1/8)
Uncoated sheet steel	0.66	(0.026)	0.81	(0.032)	0.66	(0.026)
Galvanized sheet steel	0.74	(0.029)	0.86	(0.034)	0.74	(0.029)
Nonferrous sheet metal	0.91	(0.036)	1.14	(0.045)	0.91	(0.036)

NOTE – Other types of metal may be allowed if determined equivalent to one of the types shown.

^a A sheet-steel wall of thickness less than that specified is acceptable if the areas surrounding the knockout has a thickness not less than 0.81 mm (0.032 inch).

41 Figures

41.1 Figures, such as drawings and diagrams, may be used to supplement or facilitate the application of a requirement or to describe test installations or instrumentation when text alone is inadequate. Any drawings or diagrams that are proprietary in nature are not to be used without copyright authorization. The use of figures that tend to restrict product design is to be avoided.

41.2 Any drawing for inclusion in a Standard will be processed by the SDO to accommodate various electronic outputs.

41.3 All figures in a standard shall have a unique numbered identifier. Figures shall be numbered X.n, where X is the number of the section where the figure is located and "n" is the order of the figure within the section (e.g., the first three figures in Section 3 are Figure 3.1, Figure 3.2, and Figure 3.3). For an Annex, the figure number is preceded by the appropriate identifier, as described in 41.2, (e.g., Figure A3.1 in Annex A).

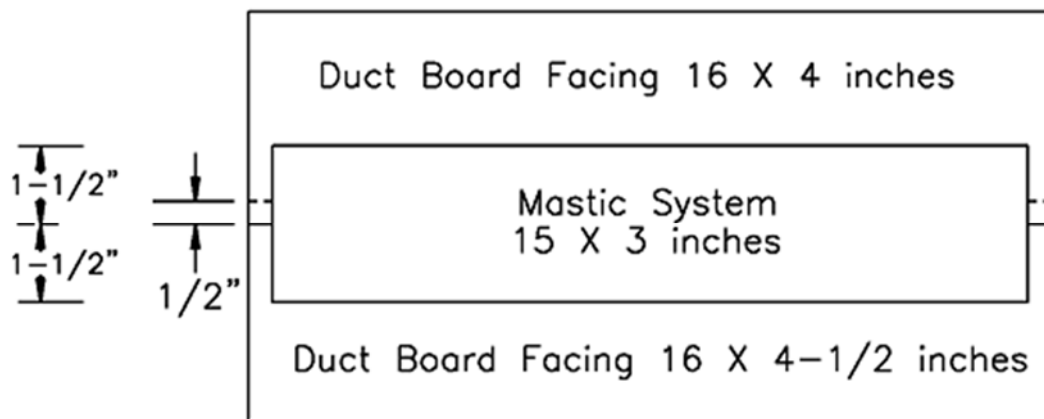
41.4 A figure shall be referenced in a paragraph, a table, or another figure.

41.5 A figure shall be located as close as possible to the first paragraph, table, or figure that references it.

41.6 The appearance, content, and legibility of the figure shall determine the size to be used for publication. The figure size includes the combination of the figure number and title, the graphic, and any notes below the figure.

41.7 A figure shall be provided with a Figure number and title, in stacked format, where the title is in Title Case. Paragraph references shall not be included in the Figure title. Any notes required for a figure shall be positioned flush left below the figure. See examples below:

Figure 41.1
Tensile Joint Strength Test



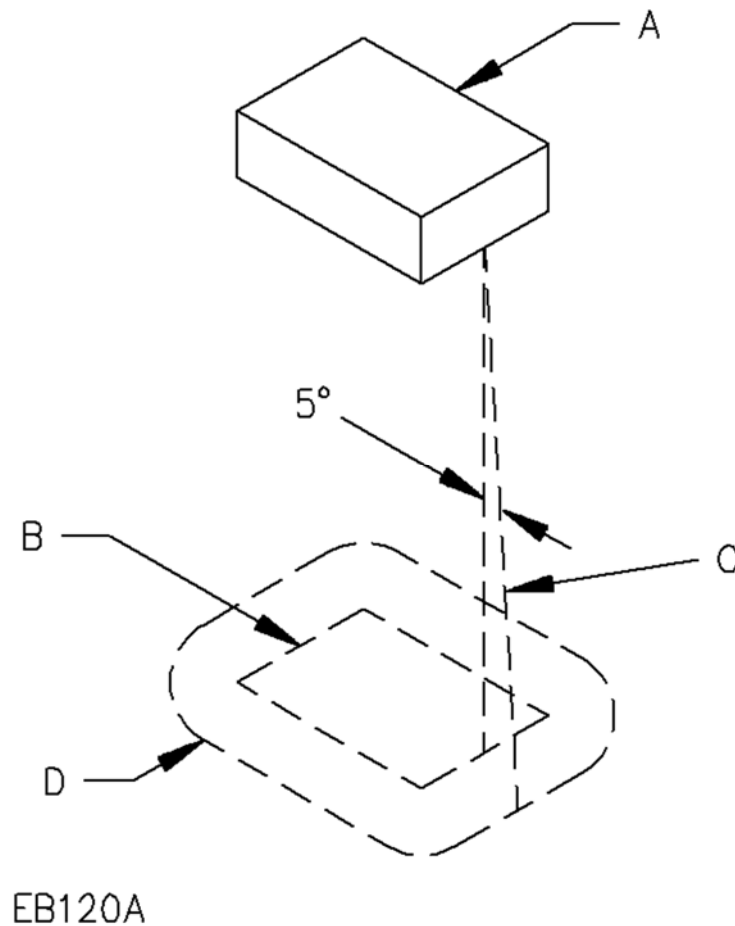
SM494A

NOTES:

The mastic is to be applied to the foil side of the facing.

The 1/2 inch (12.7 mm) overlap indicated in the figure is the facing overlap.

Figure 41.2
Location and Extent of Barrier



A - Region to be shielded by barrier. This will consist of the entire component if it is not otherwise shielded and will consist of the unshielded portion of a component that is partially shielded by the component enclosure or equivalent.

B - Projection of outline of component on horizontal plane.

C - Inclined line that traces out minimum area of barrier. The line is always:

- 1) Tangent to the component;
- 2) 5 degrees from the vertical; and
- 3) So oriented that the area traced out on a horizontal plane is maximum.

D - Location (horizontal) and minimum area for barrier. The area is that included inside the line of intersection traced out by the inclined line C and the horizontal plane of the barrier.

42 Equations

42.1 Equations shall not be assigned unique identifiers.

42.2 An equation should follow the text referencing it and should be contained in the same numbered paragraph. The equation should begin on a separate line and appear centered on the page. The equation should be followed by a blank line, then the words "in which" or "where"; then another blank line. Each variable of the equation should be listed, in order of appearance, below the equation followed by the word "is" or an equal sign and the definition of the variable. The variables shall be italicized.

Acceptable formatting styles for equations:

Example 1:

$$T = \frac{R}{r} (234.5 + t) - 235.5$$

where:

T = the temperature to be determined in °C

t = the known temperature in °C

R = the resistance in ohms at the temperature to be determined

r = the resistance in ohms at the known temperature

Example 2:

... in accordance with the following formula:

$$R = 33.3 \left[\left(\frac{1}{PF} \pm PF \right) \left(\frac{E}{I} \right) \right]$$

in which:

PF is the power factor

E is the closed-circuit phase voltage

I is the phase current