2012 IEEE Standards Style Manual

Contents

IEEE Standards Style Manual

1. Overview

This manual establishes preferred style for the presentation and structure of proposed IEEE standards (drafts). For information on IEEE standards draft requirements, please refer to the *IEEE-SA Standards Board Operations Manual*. If there is a conflict between the *IEEE-SA Standards Board Operations Manual* and this manual, the *IEEE-SA Standards Board Operations Manual* takes precedence.

It is strongly recommended that working groups consult with IEEE Standards publishing staff before deviating from the style outlined in this manual. Failure to follow the recommendations of this manual may result in delayed approval of the draft standard by the IEEE Standards Association Standards Board or in delayed publication.

This 2012 edition of the IEEE Standards Style Manual is applicable to all drafts submitted for IEEE Sponsor ballot or to the IEEE-SA Standards Board after 1 January 2012. Any comments or queries concerning this document should be forwarded to stds-style@ieee.org or to a staff liaison. A clear description of the relevant text and the recommended changes, where applicable, must be provided.

This manual is not intended to be a guide to the procedural development of a standard.[1] For that, consult the *IEEE-SA Standards Board Bylaws* and the *IEEE-SA Standards Board Operations Manual*.[2]

2. Helpful documents

The following documents are helpful resources for writing an IEEE Standards draft. Consult the most recent version of undated sources.

ANSI Y32.9, American National Standard Graphic Symbols for Electrical Wiring and Layout Diagrams Used in Architecture and Building Construction.[3]

ANSI/IEEE Std 260.3™, American National Standard for Mathematical Signs and Symbols for Use in Physical Sciences and Technology.

ANSI/IEEE Std 260.4™, American National Standard Letter Symbols and Abbreviations for Quantities Used in Acoustics.

IEC 60050, IEC International Electrotechnical Vocabulary.

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[1] While this manual uses the term "standard," its rules apply generically to guides and recommended practices as well.

[2] IEEE Standards manuals are available on the IEEE Standards Website (http://standards.ieee.org/develop/policies). Users are encouraged to visit this site for the most up-to-date information.

[3] This publication, as well as the subsequent ANSI standards appearing in this clause, is available from The Institute of Electrical and Electronics Engineers, 445 Hoes Lane, Piscataway, NJ 08854, USA (http://standards.ieee.org/).

IEC Multilingual Dictionary—Electricity, Electronics, and Telecommunications, 2005, Edition 6.[4]

IEEE Std 91™, IEEE Standard Graphic Symbols for Logic Functions.[5, 6]

IEEE Std 260.1™, IEEE Standard Letter Symbols for Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units).

IEEE Std 270™, IEEE Standard Definitions for Selected Quantities, Units, and Related Terms, with Special Attention to the International System (SI).

IEEE Std 315™, IEEE Standard Graphic Symbols for Electrical and Electronics Diagrams (Including Reference Designation Letters).

IEEE Std 945™, IEEE Recommended Practice for Preferred Metric Units for Use in Electrical and Electronics Science and Technology.

IEEE Std 991™, IEEE Standard for Logic Circuit Diagrams.

IEEE-SA Standards Board Bylaws, New York: Institute of Electrical and Electronics Engineers, Inc., 2011.

IEEE-SA Standards Board Operations Manual, New York: Institute of Electrical and Electronics Engineers, Inc., 2010.

IEEE/ASTM SI 10, American National Standard for Use of the International System of Units (SI): The Modern Metric System.

ISO/IEC Directives, Sixth Edition, 2011, Part 2, Rules for the structure and drafting of International Standards.

ISO/IEC Guide 21: 2005, Regional or national adoption of International Standards and other International Deliverables.

The Chicago Manual of Style. Chicago: The University of Chicago Press.

Merriam-Webster's New Collegiate Dictionary. Springfield, MA: Merriam-Webster, Inc.

3. Using IEEE templates to write the draft

IEEE drafts should be developed using IEEE-SA templates, currently available in Microsoft® Word[7] and Adobe® FrameMaker®[8] IEEE-SA templates and supporting documentation are available from the IEEE Standards Website. Questions about using IEEE-SA templates can be sent to sa_templates@ieee.org.

In addition to expediting document creation, the MS Word template easily enables line numbering. If used, line numbers should appear in the margins of the first page and should restart in the margins of each subsequent page. If using a software program other than MS Word or Adobe FrameMaker, please contact the IEEE-SA editorial group as early as possible in the development process.

[4] Available on CD-ROM or via the Internet at http://www.electropedia.org.

[5] IEEE publications are available from The Institute of Electrical and Electronics Engineers, 445 Hoes Lane, Piscataway, NJ 08854, USA (http://standards.ieee.org/).

[6] The IEEE standards or products referred to in this clause are trademarks of The Institute of Electrical and Electronics Engineers, Inc.

[7] Microsoft is a registered trademark of Microsoft Corporation in the United States and/or other countries.

[8] Adobe and FrameMaker are registered trademarks of Adobe Systems Incorporated.

4. Editorial responsibilities and duties of the sponsor

The general responsibilities and duties of the sponsor of each project are delineated in 5.1.1 and 5.1.2 of the *IEEE-SA Standards Board Operations Manual*.

From an editorial perspective, the sponsor's main responsibilities are as follows:

- Preparing a draft that fulfills the requirements of this manual.
- Satisfying mandatory editorial coordination (MEC) requirements. MEC is initiated at the start of the ballot invitation period. The first MEC review shall be completed before the Sponsor ballot begins. The draft is reviewed mainly for editorial and structural issues that may impact approval, and for legal, safety, and intellectual property issues that should be resolved prior to distributing the draft in ballot.
- Liasioning with IEEE-SA editorial staff after the draft is approved.
- Answering editorial questions and reviewing the document when it is in its final stages of production to ensure that editorial changes have not affected the technical content of the standard.

5. Submission of IEEE drafts and source files to the IEEE-SA Standards Board

For the most current IEEE-SA Standard Board Review Committee (RevCom) submission guidelines, see http://standards.ieee.org/about/sasb/revcom/.

General requirements include submitting the following:

PDF of the last balloted draft.

Electronic source file(s) used to create the final PDF of the last balloted draft. Discrepancies among submitted files will cause serious delays in publication.

Unpublished draft references that are included as part of the normative references.

Ancillary files developed by the working group for use with the standard, *if* these files were not provided to the staff editor at MEC stage.

Electronic graphics files. For information on creating graphics, see 15.1.

Written permission for any copyrighted material [text, figures, or tables obtained from a previously published source (see 7.1 of the *IEEE-SA Standards Board Bylaws*)] used in a project (see 5.2) that were not already submitted.

Although it is discouraged, corrections or changes to the final balloted draft that do not affect the technical content of the standard (e.g., grammatical changes and changes to style) may be submitted to RevCom with the final balloted draft. These corrections or changes should be listed in a separate file, and a description should be provided to indicate where they are to be made in the text. During the publication process, the IEEE-SA editor will determine whether the corrections or changes are acceptable, i.e., corrections may or may not be implemented based on the judgment of the editor. *If changes are* ***required,*** *another recirculation of the draft should be conducted, and the corrections should be included in the recirculated draft.*

6. Copyright and permissions

6.1 General copyright policy

Contributions by participants to IEEE Standards projects are subject to the IEEE-SA Copyright Policy found in Clause 7 of the *IEEE-SA Standards Board Bylaws* and 6.1 of the *IEEE-SA Standards Board Operations Manual*.

Please refer to http://standards.ieee.org/ipr/copyright.html for additional information on IEEE-SA copyright policy.

6.2 Excerpting material published by other organizations

Any participant who submits contributions from previously published sources shall comply with 7.2.1 of the *IEEE-SA Standards Board Bylaws*.

It is strongly recommended that copyrighted material be referenced rather than reprinted. However, when using excerpts of published text, tables, or figures and possibly modifying or adapting the material is unavoidable, permission to do so shall be requested from the copyright owner. The sponsor is responsible for obtaining this permission.

Standards developers are encouraged to request permission from copyright owners as soon as deciding to include copyrighted material in a draft. Standards developers should initiate the permission-seeking process prior to the start of initial IEEE-SA Sponsor ballot. Permission letters shall be submitted as part of MEC, along with the draft at the start of ballot invitation or, separately prior to initial Sponsor ballot, to the staff liaison prior to a recirculation if the information is included during the ballot. If excerpted material is inserted during ballot resolution, receipt of permission letters will be required before the recirculation ballot of the draft. All permission letters will be reviewed during MEC and again when the draft is submitted to the IEEE-SA Standards Board for approval. If there are difficulties with obtaining permission responses, the working group should consider citing the information normatively rather than including an excerpt.

It is preferred that the IEEE Permission Form Letters (Annex C) be used when seeking permission. Note that IEEE requests the following:

> [N]on-exclusive, irrevocable, royalty-free permission, and requires world rights for distribution and permission to modify and reprint in future revisions and editions of the resulting draft and approved IEEE standard and in derivative works based on the standard, in all media known or hereinafter known.

In addition, no limitations on the right of the IEEE to determine appropriate business arrangements for its standards shall be included as a stipulation for use of material. Contact the IEEE Standards Activities Department by e-mail, stds.ipr@ieee.org, with any questions regarding material that might not meet the requirement.

The following credit line shall be used if specific language from the copyright holder is not available:

> <Indicate material> reprinted from <copyright owner, title of publication, year of publication.>

The sponsor is responsible for alerting the IEEE-SA, stds.ipr@ieee.org, in instances where legal agreements or licenses are required. This includes the adoption of independently-developed documents as potential IEEE standards. Working groups shall not negotiate agreements with outside entities with regard to IEEE standards. Please contact the IEEE-SA, stds.ipr@ieee.org, with any questions about licensing agreements, copyright, and permission.

7. Patents

Working groups concerned about or interested in the relationship of patents and patent-related requirements to IEEE standards should consult the IEEE-SASB Patent Committee Website. Please note that any reference to patents or patent applications shall be made only in the frontmatter of the standard. The IEEE-SA templates contain the patent statement that is to be included in the frontmatter.

8. Trademarks

WGs shall research the proper use guidelines for any trademarks appropriate for their drafts and ensure that no fees are required, limitations imposed, etc. This information is usually stated on the Websites of the trademark owners. If used, any trademarked items shall be identified in the standard and marked as such (with either ® or ™), as appropriate, upon first reference. All trademarked items cited in standards shall be credited to the trademark owner in the frontmatter of the standard.

IEEE designations are trademarks of the IEEE and shall be identified as trademarks (® or ™, as appropriate) at first citation of each designation in the frontmatter and in the body of the draft.

9. Commercial terms and conditions

The IEEE-SA policy on commercial terms and conditions is set forth in 6.2 of the *IEEE-SA Standards Board Operations Manual* and reads as follows:

> Provisions involving business relations between buyer and seller such as guarantees, warranties, and other commercial terms and conditions shall not be included in an IEEE standard. The appearance that a standard endorses any particular products, services, or companies shall be avoided. Therefore, it generally is not acceptable to include manufacturer lists, service provider lists, or similar material in the text of an IEEE standard. Where a sole source exists for essential equipment, materials, or services necessary to comply with or to determine compliance with the standard, it is permissible to supply the name and address of the source in a footnote as long as the words "or the equivalent" are added to the reference.

Citation of a product, service or company shall be avoided. In those cases where a sole source exists, the product, service or company shall be described generically in text and the product, service or company supplied in a footnote accompanying the text, as follows:

> At the time of this publication [product, service or company] was an example of [name of generic product, etc.]. This information is given for the convenience of users of this standard and does not constitute an endorsement by the IEEE of these products. Equivalent products may be used if they can be shown to lead to the same results.

If every effort has been made to substitute a generic word or phrase in text for the product, service or company, but no suitable substitute can be found, add the following footnote to accompany the citation:

> This information is given for the convenience of users of this standard and does not constitute an endorsement by the IEEE of these products. Equivalent products may be used if they can be shown to lead to the same results.

In addition to the above footnote, within the text add "or the equivalent" after the name of the product, service or company. For example,

> "…use an ABC, or the equivalent, to monitor…"

10. The frontmatter of an IEEE draft standard

10.1 Required frontmatter elements

The frontmatter of an IEEE standard is informative, meaning it is not officially part of the standard

Drafts should contain a frontmatter and main text, and follow the style outlined in this manual. The frontmatter is paginated separately from the body of the draft. The frontmatter is paginated using Roman numerals, e.g., i, ii, iii, etc. The body of the draft is paginated with Arabic numerals, e.g., 1, 2, 3, etc. Frontmatter elements *required* in the draft prior to going to ballot are the designation, the title of the standard, the introduction, and draft copyright statements. A notice to users (laws and regulations, copyrights, updating of IEEE documents, errata, interpretations), and a patent statement are also required. These are included in the IEEE-SA templates or can be obtained by contacting the IEEE SA editorial group. ***These shall not be altered.*** See Annex A for an example.

10.1.1 Draft labeling and designations

All drafts shall be clearly labeled to reflect their status as unapproved. The title of the document shall start with the word *Draft*. The term *IEEE* shall not be used in a title until a standard is approved by the IEEE-SA Standards Board. The draft designation and the date of the draft shall appear in the upper right corner of each page of the draft. The designation and date shall not be combined. (See Annex A for examples of appropriate draft labeling.)

The IEEE standards designation shall be structured as IEEE Pxxx/DXX, where xxx represents the specific designation and XX represents the specific draft version of that document. Draft versions shall be maintained, and are most important during a ballot; the draft number should be updated as least as often as the document is modified and/or recirculated.

Refer to https://development.standards.ieee.org/myproject/Public/mytools/init/parnum.pdf for information on obtaining a designation.

10.1.2 Draft copyright statements

All IEEE drafts are obligated to carry statements of copyright. The following information shall appear on the first page of every IEEE Standards draft (please note that <201X> shall be replaced with the current year of distribution):

> Copyright © 201X by The Institute of Electrical and Electronics Engineers, Inc.
> Three Park Avenue
> New York, New York 10016-5997, USA
>
> All rights reserved.
>
> This document is an unapproved draft of a proposed IEEE Standard. As such, this document is subject to change. USE AT YOUR OWN RISK! Because this is an unapproved draft, this document must not be utilized for any conformance/compliance purposes. Permission is hereby granted for IEEE Standards Committee participants to reproduce this document for purposes of international standardization consideration. Prior to adoption of this document, in whole or in part, by another standards development organization, permission must first be obtained from the IEEE Standards Association Department (stds.ipr@ieee.org). Other entities seeking permission to reproduce this document, in whole or in part, must also obtain permission from the IEEE Standards Association Department.
>
> IEEE Standards Association Department
> 445 Hoes Lane
> Piscataway, NJ 08854, USA

The following information shall appear on every page of the draft, at the bottom of the page:

> Copyright © <201X> IEEE. All rights reserved.
> This is an unapproved IEEE Standards Draft, subject to change.

10.2 Title

Per 4.2.3.2 of the *IEEE-SA Standards Board Operations Manual*, the title on the draft document shall be within the scope as stated on the most recently approved PAR.

All titles of IEEE drafts shall start with the word *Draft*, followed by

a) "Standard [for]" when the standard specifies mandatory requirements
b) "Recommended Practice [for]" when the standard provides recommendations
c) "Guide [for]" when the standard furnishes information
d) "Trial-Use (Standard, Recommended Practice, or Guide) [for]" for when the document will be published for a limited period of time.

The initial letter of each word (except short prepositions) should be capitalized.

Example:

Draft Standard for the Application and Testing of…

When an IEEE standard covers a limited range of quantities, such as voltage, current, power, and size, the numerical limits of the ranges covered shall be included in the title. The use of nonquantitative terms (such as high and low, large and small, wide and narrow) should be avoided. Abbreviations should be avoided in titles of standards, except in the case of units of measurement (kV, mm, etc.). However, if such use is warranted, the procedure stated in 11.7 shall be followed.

10.3 Abstract and keywords

The inclusion of abstracts and keywords in IEEE standards allows the documents to be referenced in a wide range of bibliographic environments, thereby increasing their utility, visibility, and availability to the public. Abstracts and keywords shall be included on the title page of each standard. Abstracts should be based on the scope and purpose of the standard as indicated on the PAR and should specify what the designation number of the project is. Abstracts should be no longer than 15 lines. Keywords should highlight key terms and phrases from the text of the draft standard.

10.4 Committee lists

At a minimum, a roster of the officers and members of the working group that developed the document shall be provided by the working group. Individuals or entities that also contributed to the preparation of the document may be included in addition to the working group list (permission from entities shall be received prior to including the names in the draft).

In the working group roster, full first names are preferred over initials. Titles (Dr., Ms., P.E.) shall not be included with proper names.

The list of voting members of the balloting group is added by the IEEE-SA editorial group during the publication process. Only the balloters (individuals or entities) who vote (approval, disapproval, or abstention) are listed in the standard. The following paragraph shall be placed in the frontmatter of all IEEE drafts, above the list of voting members of the balloting group, and shall reflect the type of ballot that was conducted (individual or entity):

> The following members of the <individual/entity> balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

10.5 The introduction

An introduction should give the history of the standard, a description of its purpose, and, if the standard is a revision, an explanation of the principal changes from the previous edition. The introduction should also explain the document structure for multipart standards or for documents within a family of standards. An introduction is not a part of the proposed standard and shall not contain requirements or recommendations; therefore, the following statement shall appear in a box rule above the text:

[This introduction is not part of IEEE Pxxx, title of draft.]

If footnotes are necessary in an introduction, they shall be noted with lowercase letters (a, b, c, d, etc.).

10.6 Acknowledgments

Permission to include special acknowledgements shall be requested from the Manager, Standards Publishing.

10.7 Table of contents

A table of contents listing the main clauses (identified by one digit) and the first series of subclauses under each clause (identified by two digits) should be supplied. The next series of subclauses (identified by three digits) may be included when deemed appropriate by the IEEE-SA editorial group and the working group. The table of contents shall be generated automatically and should be frequently updated as the draft evolves. Lists of tables and figures are normally not included in the table of contents, although particularly lengthy documents might warrant their inclusion. Only the appropriate clauses, subclauses, and normative and/or informative annexes should be listed. (See Annex A for a sample table of contents.)

11. The body of an IEEE draft standard

11.1 Normative and informative clauses

Subclause 6.4.1 of the *IEEE-SA Standards Board Operations Manual* defines which parts of a standard are normative and which parts of a standard are informative.

Normative text is information that is required to implement the standard and is therefore officially part of the standard. Informative text is provided for information only and is therefore not officially part of the standard.

Normative text (information *required* to implement the standard) includes the following:

- The main clauses of the documents including figures and tables
- Footnotes to tables
- Footnotes to figures
- Annexes marked “(normative)”

Informative text (text provided for information only) includes the following:

- Frontmatter
- Notes to text, tables, and figures
- Footnotes within text
- Annexes marked “(informative)”, (e.g., Bibliography)

Interspersed normative and informative text is not allowed. As such, neither clauses nor subclauses shall be labeled as informative. Contact an IEEE-SA editor early in the process if there are questions as to whether material in the draft should be labeled as normative or informative.

11.2 Word usage

11.2.1 Homogeneity

Uniformity of structure, of style, and of terminology should be maintained not only within each standard, but also within a series of associated standards. The structure of associated standards and the numbering of their clauses should be identical, as far as possible. Analogous wording should be used to express analogous provisions; identical wording should be used to express identical provisions.

The same term should be used throughout each standard or series of standards to designate a given concept. The use of an alternative term (synonym) for a concept already defined should be avoided. As far as possible, only one meaning should be attributed to each term used.

11.2.2 Shall, should, may, and can

Shall, should, may, and *can* are defined in 6.4.7 of the *IEEE-SA Standards Board Operations Manual*.

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).

NOTE—The use of the word *must* is deprecated and shall not be used when stating mandatory requirements; *must* is used only to describe unavoidable situations. The use of the word *will* is deprecated and shall not be used when stating mandatory requirements; *will* is only used in statements of fact.

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (*can* equals *is able to*).

A WG may choose to include the definitions of these terms within a draft standard. If so, the following text may be reproduced (under an early subclause entitled "Word usage") for the benefit of users of the standard:

> "In this document, the word *shall* is used to indicate a mandatory requirement. The word *should* is used to indicate a recommendation. The word *may* is used to indicate a permissible action. The word *can* is used for statements of possibility and capability."

11.2.3 That and which

The words *that* and *which* are commonly misused; they are not interchangeable. *That* is best reserved in essential (or restrictive) clauses; *which* is appropriate in nonessential (or nonrestrictive), parenthetical clauses. Simply stated, if a comma can be inserted before the word *that* or *which*, the word should be *which*. If a comma would not be used, the word to use is *that*.

Example:

a) Defining the inputs and outputs provides a better understanding of the steps *that* are necessary to complete the process.

b) Defining the inputs and outputs provides a better understanding of these steps, *which* are explained in later in this standard.

11.2.4 Gender-neutral language

The IEEE-SA uses generic titles (e.g., *chair* rather than *chairman*) in the standard. The following practices shall apply:

a) When writing in the third person, the phrase *he or she* should be used. The male or female pronoun alone or the variations *he/she* or *s/he* should not be used. Also, the pronoun *they* should not be used as a singular pronoun.
b) If a particular sentence becomes cumbersome when *he or she* is used, the sentence should be rewritten in the plural or completely rewritten to avoid using pronouns. The indefinite pronoun *one* should be avoided. In references to a company, the pronoun *it*, not *we* or *they*, should be used.

11.2.5 "Absolute" verbiage

Avoid making guarantees if there is a possibility of unforeseen situations or circumstances altering an outcome. Review the text for any explicit or implicit guarantees made within the document, especially those that are safety-related.

For example, words such as "ensure," "guarantee," "always," etc., should be modified, if they are inaccurate. Substitutions might include "maximize" or "minimize" or "often."

11.2.6 Use of the terms *safe* or *safety*

Avoid the use of the word *safe* in a standard unless the condition or practice referenced by the word safe has been tested under all cases as being, in fact, safe. Typically, this is not the case. Thus, unless it can be demonstrated that such condition or practice is safe, it should not be used. Words such as *safer* or *safest* can be used in a relative context if it can be demonstrated to be the case. For example, it is proper to say that one set of conditions or practices is safer than another, if in fact true, or that it is safer to employ a certain practice than not in a given situation. However, the term *safest* implies an absolute condition, which, in certain contexts, has the same implication as *safe* and, thus, should not be used. For example, *this is the safest set of conditions for using waveguide* is an improper usage.

The word *safety* should be avoided if it is being used to address a set of conditions or practices that have not been established for the purpose of promoting safety under all situations in which such conditions or practices will be employed. For example, *the following 10 safety considerations should be reviewed before implementing this practice* should not be used.

11.2.7 Use of the first- or second-person forms of address

The first-person form of address (*I, we*) or the second-person form of address (*you*) should not be used or implied in standards, e.g., "*You should avoid working on lines from which a shock or slip will tend to bring your body toward exposed wires.*" This sentence should be rewritten to identify the addressee, as follows: "*Employees should avoid working on lines from which a shock or slip will tend to bring their bodies toward exposed wires."*

11.3 Order of clauses

The first clause of a standard, Clause 1, shall always be an overview (except for amendments and corrigenda, which do not usually have an overview, scope, or purpose). If the standard contains normative references and definitions, they shall be Clause 2 and Clause 3, respectively. The clauses that follow Clause

2 and Clause 3 can be ordered in any way by the working group. If clause and subclause titles begin with numbers, they should be spelled out, unless unavoidable (e.g., 10BASE-T).

11.4 The overview of the draft

11.4.1 General

The overview includes the scope of the standard as written on the PAR. The overview may also include a purpose, applications, and other areas that the working group considers relevant. These optional topics should be presented as separate subclauses of the overview; they should not be lumped in with the scope.

This clause shall be entitled *Overview* unless it contains only the scope; in this case, the clause shall be entitled *Scope* without any further subdivision. The overview shall not contain detailed discussions of the general technical content of the standard nor shall it list the contents of the standard (since this is the purpose of the table of contents). If the standard contains annexes, the application of these annexes should be described in the overview.

11.4.2 Scope

The scope of the standard shall explain in statements of fact what is covered in the standard and, if necessary, what is not covered in the standard—in other words, the technical boundaries of the document. The scope should be succinct so that it can be abstracted for bibliographic purposes.

For new and revision projects, the scope of the draft shall be within the scope of that given on the PAR, as determined by the balloting group voting on the draft.

For amendments and corrigenda, there is normally no scope in the draft. Therefore, on the PAR form, the scope shall state what the amendment/corrigendum is changing.

Regardless of project type, the scope of the draft has to be within the scope of the project given on the PAR form.

Please note the distinction of the scope from the purpose of the standard discussed in 11.4.3.

11.4.3 Purpose

A paragraph describing the purpose of the standard is not mandatory in the draft. However, if included, the purpose of the standard and its intended application shall be included in a separate subclause (1.2). The purpose shall explain why the standards project is needed.

For new and revision projects, the purpose (if included) of the draft shall be within the parameters of the purpose given on the PAR, as determined by the balloting group voting on the draft.

For amendments and corrigenda, there is normally no purpose in the draft standard. Therefore, on the PAR form, the purpose shall state why the changes are being made.

Please note the distinction of the purpose from the scope of the standard discussed in 11.4.2.

11.5 Normative references

11.5.1 Citation as a normative reference

Normative references are those documents that contain material that must be understood and used to implement the standard. Thus, normative references are indispensable when applying the standard. ***Each***

normative reference shall be cited in normative text and the role and relationship of each referenced document shall be explained in the body of the standard. If a reference is not specifically cited in the normative text of the document, then it shall not be listed in the normative references clause. In such cases, it shall be listed in the first or final informative annex, entitled Bibliography [see item g) below].

The following guidelines shall be followed when creating the normative references clause:

a) In an amendment, when inserting an introductory paragraph into the normative references clause, developers should take special care in determining whether the intent of the base standard is maintained in the amendment.

b) IEEE and other nationally or internationally recognized standards developing organizations (SDOs) are the preferred source of normative references. Documents published by other organizations may be cited provided that the following is true:

   1) The document is judged by the balloting group to have wide acceptance and authoritative status.

   2) The document is publicly available at reasonable cost.

c) Dated and/or undated references are allowed in standards. Using undated references helps eliminate the burden of continuous updates to align standards as they are revised, while ensuring that the most up-to-date information on technologies and statutes is referenced (when appropriate). Dated references can be used in certain circumstances, such as when a high degree of specificity is needed. Note that in-text reference to a specific clause, subclause, table, or figure of another document shall be dated even if the undated version of the document is listed in the normative references.

d) The responsibility of determining whether a reference should be dated or undated lies with the working and balloting groups, who shall determine what is best during implementation of a given standard, and therefore what is best for the standard's users.

e) Using documents that are not standards presents the problem that they might be revised without notice in a manner that might adversely affect any standard that lists them as normative references. Documents that are cited as normative references, but that are developed by organizations that are not nationally or internationally recognized SDOs, shall include the edition or date of publication in the citation.

f) If the standard is intended for international adoption, the working group should consider requirements for normative references by international organizations, such as the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). These requirements may include procedures for justification of normative references that are not international standards. Please contact an IEEE-SA editor for information about specific requirements.

g) Documents to which reference is made only for information or background, and documents that served merely as references in the preparation of the standard are not normative references. Such documents may, however, be included in a bibliography. (See Clause 18.)

h) Reference to withdrawn standards may be made; however, Sponsors are cautioned that withdrawn standards may contain obsolete or erroneous information and may be difficult to retrieve.

i) Sponsors shall not use unpublished draft standards as normative references unless they are dated, readily available, and retrievable. A copy shall be submitted to the IEEE-SA. If an IEEE draft is cited, the sponsor shall provide a copy of the draft to be placed on file at the IEEE-SA. Please consult with an IEEE Standards project editor if such inclusion is necessary. If the IEEE draft that is referenced is approved prior to the publication of the document, the draft reference will be updated to reflect this change by the IEEE Standards project editor as part of the publication process. If the working group prefers that the draft reference remain as is, the citation shall be followed by "(this version)."

11.5.2 Structure of the normative references clause

The following guidelines shall be followed when structuring the normative references clause:

a) The normative reference clause is introduced with the following paragraph:
b) The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.
c) The IEEE-SA editor will list the information (i.e., title) for the most current edition of the undated material cited. In some cases, the most current edition is not the one required. It is also important for the sponsor to remember that the dated edition listed in the balloted document will be the one that appears in the published document. Therefore, it is the responsibility of the sponsor to determine not only which edition of a document is applicable in each case, but also to ensure that the balloted document lists the correct edition.
d) The sponsor shall endeavor to supply complete and current information for normative references. Note that IEEE Standards project editors cannot verify that normative references to updated editions of documents (i.e., undated references) are accurate; therefore, it is up to the sponsor to consult the latest editions to see if they still apply.

11.5.3 Style for standards reference entries

Normative references shall be listed in alphanumeric order by designation, including the full title. Documents that are not standards, and that are cited as normative references, shall include the edition or date of publication in the citation. A footnote should be inserted in the text after the first cited normative reference in order to tell the reader where the references can be obtained.

For an example of a properly formatted normative references clause, see the sample draft in Annex A.

References should be cited by designation (e.g., IEEE Std 1226.6™ or IEEE Std 1625™-2004) in the text, in tables, in figures, or in notes at the point where the reference applies. Note that IEEE designations shall be identified as trademarks (® or ™, as appropriate) at first citation of each designation in the frontmatter and in the body of the draft.

11.5.4 Non-standards citations

Refer to *The Chicago Manual Style* for rules on citing sources other than standards.

For citing Internet sources, the following format should be used where <entity> is replaced with the name of the organization and <URL> is replaced by the Internet location:

"... is available from the <entity> Website <URL>."

"(see the information at the following Internet location: <URL>)."

The URL should be the most stable location whenever possible to avoid inadvertent or intentional changes that would affect the site name, i.e., use the index to the page rather than the page itself.

The working group shall obtain permission where needed. The IEEE Standards Activities Department should be contacted, stds.ipr@ieee.org, in instances where legal agreements are required (see Clause 6).

If a document listed in a bibliography or normative references is accessed from the Internet, the document title, date, version, and other pertinent information should be listed, followed by a footnote that gives the

Internet location. If the document needs to be on the IEEE Standards Website, the working group can insert the following placeholder until the site location is assigned:

"This document is available from the IEEE Standards Website <insert IEEE Internet location>."

Contact an IEEE-SA editor with any questions about documents that should be placed on the IEEE Standards Website.

11.6 Definitions

11.6.1 Guidelines and best practices

For the creation and maintenance of IEEE standards terms and definitions see Annex D.

11.6.2 General terminology usage

English words should be used in accordance with their definitions in the latest edition of *Merriam-Webster's New Collegiate Dictionary*. Electrical and electronics terms not defined in *Merriam-Webster's New Collegiate Dictionary* should be used in accordance with their definitions in the IEEE-SA Standards Definitions Database. The Definitions Database is a continuously updated electronic version of the former IEEE 100, *The Authoritative Dictionary of IEEE Standards Terms.* Working groups are strongly encouraged to use definitions that already exist instead of creating new definitions or slightly modifying existing definitions. During MEC and during Sponsor ballot, working groups may be asked to validate the use and presentation of terms. For assistance, IEEE draft developers may also find useful the *IEC Multilingual Dictionary of Electricity, Electronics, and Telecommunications* and the IEC International Electrotechnical Vocabulary (IEV).

11.6.3 Construction of the definitions clause

A definitions clause is typically Clause 3 (unless the standard does not contain normative references, in which case the definitions clause would be Clause 2). Definitions should appear in alphabetical order and the term defined should be written out completely and should not be inverted (e.g., "*drift rate*" rather than "*rate, drift*"). Each definition should be a brief, self-contained description of the term in question and shall not contain any other information, such as requirements or elaborative text. The term should not be used in its own definition.

All terms defined in IEEE standards are incorporated into the IEEE-SA Standards Definitions Database. For this reason, it is important that terms and definitions have as general an application as possible. Definitions should not include references to other parts of the standard. An informative note may be provided to refer the user to another part of the standard. Terms defined in other standards may be used in IEEE standards as long as they are properly cited. After the definition, the source shall be cited in parentheses. It is the sponsor's responsibility to obtain the appropriate permissions if a standard uses a term from another source (see 6.2).

The definition should follow the defined term as a sentence preceded by a colon. Subdefinitions of a term should be marked as **(A)**, **(B)**, etc. Cross-references should occur after the definition and may consist of the following classes, in the order shown: *Contrast:, Syn:, See:,* and *See also:*. *Contrast:* refers to a term with an opposite or substantially different meaning. *Syn:* refers to a synonymous term. *See:* refers to a term where the desired definition can be found. *See also:* refers to a related term. The cross-references listed under these headings should be in alphabetical order, in bold type, and separated by semicolons when there are more than one.

Below is an example of a correctly styled definitions clause.

X. Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary: Glossary of Terms & Definitions* should be referenced for terms not defined in this clause.

acceleration-insensitive drift rate: The component of systematic drift rate that has no correlation with acceleration. *See also:* **drift rate; systematic drift rate**.

code set: *See:* **coded character set**.

coded character set: A set of characters for which coded representation exist. *Syn:* **code set**.

drift rate: The slope at a stated time of the smoothed curve of tube voltage drop with time at constant operating conditions. (Adapted from ISO/IEC 9945-1:2003)

input reference axis (IRA): The direction of an axis as defined by the case mounting surfaces, external case markings, or both. *Contrast:* **output reference axis**.

NOTE—See 6.7.

output: (A) Data that has been processed. **(B)** The process of transferring data from an internal storage device to an external storage device.

systematic drift rate: That component of drift rate that is correlated with specific operating conditions.

11.7 Acronyms and abbreviations

Acronyms and abbreviations can be used to save time and space in the document. If the draft makes extensive use of acronyms or abbreviations, a subclause within the definitions clause entitled "Acronyms and abbreviations" may be provided. If acronyms and abbreviations are included in the definitions clause, Clause 3 should be titled "Definitions, acronyms, and abbreviations" and 3.1 and 3.2 titled "Definitions" and "Acronyms and abbreviations," respectively.

Acronyms and abbreviations, followed by the full term only, should be listed in alphanumeric order. For an example of an acronyms and abbreviations subclause, see the sample draft in Annex A.

Within text, the acronym or abbreviation should follow the first use of the full term (the first time in the introduction, then the first time in the body of the document, and then the first time in any annexes in which the acronym appears). The abbreviation or acronym should be placed in parentheses when following the full term.

Exceptions to the convention listed above are approved SI units. SI unit symbols are not abbreviations and shall not be included in a list of abbreviations and acronyms. The treatment of letter symbols for units (e.g., mm for millimeter), letter symbols for quantities (e.g., R for resistance), and mathematical symbols (e.g., log for logarithm) is covered in IEEE Std 260.1 and IEEE Std 280 (see also Clause 16).

11.8 Annexes

11.8.1 Ordering annexes

Normative and informative annexes shall be referred to as such [e.g., Annex A (normative), Annex B (informative)] in their titles and in the table of contents. Annexes should be referenced in the text by the word *Annex* and its letter only (e.g., "see Annex A"). Annexes should appear in the order in which they are referenced in the body of the standard (e.g., the first annex mentioned should be Annex A, the second

Annex B, and so on). This means that normative and informative annexes might be intermixed. An exception to this rule is the bibliography. The bibliography should be either the first or last annex of the standard. If a glossary exists, it should either be the last annex or it should immediately precede the bibliography (if the bibliography is the last annex).

11.8.2 Normative annexes

Normative annexes are official parts of the standard that are placed after the body of the standard for reasons of convenience or to create a hierarchical distinction. In many cases, normative annexes are used for conformance test procedures, tables, or printed source code. Normative annexes may also be used for context-specific applications of the standard.

11.8.3 Informative annexes

Informative annexes are included in a standard for information only. Standards writers should carefully consider the nature of the material placed in informative annexes. Informative annex material is considered part of the balloted document and copyrighted to the IEEE. As such, it shall be submitted to the IEEE-SA Standards Board and is not subject to change after approval.

An example of an informative annex is a bibliography (see Clause 18 for information about bibliographic style).

11.9 Indexes

As most standards are now published in PDF format, the ability to electronically search for terms makes an index largely unnecessary. However, the working group may include an index in a draft standard when it is deemed necessary or helpful to the reader. The IEEE-SA editorial group cannot guarantee that an index created for a draft standard will be published when the standard is approved; the quality of the index, its usefulness, and whether it can be properly updated or not will be factors in the decision of whether or not to include it. Working groups interested in including an index should consult *The Chicago Manual of Style* and speak to an IEEE-SA editor.

12. Numbering the clauses and subclauses of a standard

12.1 Body clauses

The body of a standard is usually divided into several major clauses that are further divided into subclauses. The IEEE Standards system for numbering clauses uses Arabic numerals in sequence. A subclause should be numbered by adding a decimal point and number to the clause number (e.g., 5.1). Subclauses may be divided into further subclauses by adding a second decimal point and number (e.g., 5.1.1). Five numbers separated by decimal points is the maximum acceptable subdivision (e.g., 5.1.1.1.1). If necessary, the material should be reorganized to avoid subdivisions beyond this point. An exception to this numbering is allowed for amendments (see 19.2.1 for information on numbering in amendments and corrigenda).

Clauses and subclauses should be divided into further subclauses only when there is to be more than one subclause. In other words, clauses and subclauses should not be broken down into further subclauses if another subclause of the same level does not exist. For example, Clause 1 should not have a 1.1 unless there is also a 1.2.

All clause and subclause headings should consist of a number and a concise, but meaningful, title. Text immediately follows the subclause title, but on a new line. Hanging paragraphs (i.e., unnumbered paragraphs following a main clause head or main subhead) should not be used since reference to the text

would be ambiguous. It may be necessary to include a subhead with the title “General” to avoid instances of hanging paragraphs, as shown in Figure 1.

4. Example of hanging paragraph

A hanging paragraph would follow the main clause head. All text following this head is a part of the clause, including all the text within subclauses, so reference to this paragraph would be ambiguous.

4.1 Subclause head

Subclause text.

5. Hanging paragraph corrected

5.1 General

Text that is no longer a hanging paragraph.

5.2 Subclause head

Subclause text.

Figure 1—Hanging paragraphs

The terms *clause* should be used when referring to major clause headings (e.g., “see Clause 5”) or at the beginning of a sentence. All other cross-references should be made by simply referring to the number (e.g., “see 5.1” not “see subclause 5.1”).

Standards are not published with line numbers (although numbers should be included in balloted drafts). Therefore, the working group should use only clause or subclause numbers in cross-references.

12.2 Numbering annexes

Consecutive capital letters and a title should be used to identify each annex. Text should be organized and numbered as described in 11.1, with the following exception: clause and subclause numbers should be prefaced with the identifying letter of the annex, followed by a period (see the example annex in Annex A). For standards containing only one annex, the letter A should appear in its title and should preface the clause and subclause numbers in the text. Figures and tables included in annexes should also carry the identifying letter of the annex in which they appear, followed by a period. For example, the first figure in Annex A should be identified as Figure A.1.

12.3 Lists

Lists in a subclause may be ordered or unordered. An ordered list of items within a subclause should be presented in outline form, with items lettered a), b), c), etc. If a subdivision of the items is necessary, 1), 2), 3); i), ii), iii); dashed subdivision items, etc., should be used to form a tiered list. Only one occurrence of any level of an ordered list may be presented in any subclause to avoid confusing cross-references [e.g., it is OK to have an a) level list followed by a 1) level list , etc., but there should not be more than one a) level list in the same clause or subclause]. As an alternate solution, authors may want to consider adding an additional subclause. Dashed lists can also be used instead of an ordered list if the list consists of short, unordered items. Annex A contains some examples of dashed lists. Closing punctuation should be omitted in lists of short items or phrases. Punctuation should be used for sentences. Figure 2 provides examples of the different levels in an ordered list.

a) Name of the manufacturer
b) Rated frequency, if other than 60 Hz
c) Connection chart showing
    1) Full winding development
    2) Taps
    3) Pole and pocket location
d) Instruction book number
e) Mutual reactance (for linear coupler transformers)
f) Self-impedance (for linear coupler transformers)
    1) Resistance
    2) Reactance
    3) Impedance
        i) For volts
        ii) For amperes

Figure 2—Example of a tiered list

13. Quantities, units, and letter symbols

13.1 Quantity

The word *quantity* has many meanings; in this subclause the word refers to physical quantities, which are described in units of measure such as length, mass, time, and temperature. A unit is a particular sample of a quantity, chosen so that an appropriate value may be specified. Meter, kilogram, hour, and degree Celsius are some of the units used for the four quantities noted previously.

The value of a quantity is generally expressed as the product of a number and a unit. Quantities and units may be represented in text by letter symbols, and are always so represented in equations. If a number and unit cannot be identified for a quantity, the discussion may concern an amount rather than a quantity, in which case the term *amount* should be used.

13.2 Numbers

The following rules should be observed:

a) The decimal marker should be a dot on the line (decimal point). This applies even when the standard in question is intended for international adoption (e.g., adoption by ISO/IEC); see Clause 20.
b) For numbers of magnitude less than one, a zero should be placed in front of the decimal point (e.g., 0.5).
c) In general text, isolated numbers less than 10 should be spelled out. However, in equations, tables, figures, and other display elements, Arabic numerals should be used. Numbers applicable to the same category should be treated alike throughout a paragraph; numerals should not be used in some cases and words in others.
d) The value of a quantity shall be expressed by an Arabic numeral followed by a space and the appropriate unit name or symbol. An upright (Roman) type font should be used for the unit symbol even if the surrounding text uses a sloping (italic) font.

e) If tolerances are provided, the unit shall be given with both the basic value and the tolerance (150 m ± 5 mm). Ranges should repeat the unit (e.g., 115 V to 125 V). Dashes should never be used because they can be misconstrued as subtraction signs.

13.3 Metric system

IEEE Policy 9.18 calls for measured and calculated values of quantities to be expressed in metric units [SI (Système International d'Unités)] in IEEE publications.[9] (See IEEE/ASTM SI 10 for guidance on metric practice.) Proposed new standards and revised standards submitted for approval should use metric units exclusively in the normative portions of the standard. Inch- pound data may be included in parentheses after the metric unit if the sponsor believes that the audience for this document would benefit from the inclusion of inch-pound data, based on concerns for safety or clarity. Metric units shall always be the primary unit of measurement.

IEEE Policy 9.18 recognizes the need for some exceptions and contains the following statement: "Necessary exceptions to this policy, such as where a conflicting world industry practice exists, must be evaluated on an individual basis and approved by the responsible major board of the Institute for a specific period of time." Standards Coordinating Committee 14, as part of the coordination process, shall review requests for individual exceptions, including those noted below, and shall report its recommendations to the IEEE-SA Standards Board.

Exceptions:

a) A specific exception is given for trade sizes, such as the AWG wire series and inch-based standards for fasteners. Such data need not be translated into metric terms.
b) Also excepted are those cases, such as plugs and sockets, where a mechanical fit to an inch-based product is required.
c) The metric policy does not require metric products to be substituted for inch-based products. For further information, see IEEE/ASTM SI 10, IEEE Std 260.1, and IEEE Std 270.

13.4 Letter symbols

In IEEE standards, letter symbols should be used rather than abbreviations. Letter symbols include symbols for physical quantities (quantity symbols) and symbols for the units in which those quantities are measured (unit symbols). Unlike common abbreviations, letter symbols are invariant in singular and plural, they are not followed by a period, and case is maintained independent of the surrounding text (see IEEE Std 260.1).

For example, standard quantity symbols for length, mass, and time are *l*, *m*, *t*. They are set in *italic* letters. Unit symbols for the same three quantities are m, kg, and s, set in Roman (upright) letters. Note especially that V is the symbol for the unit "volt," and *V* (italic) is the symbol for the quantity "voltage." Unit symbols may not be used to stand for the quantity being measured; that is, do not write:

— "The km between the substations is 20," but write instead, "The distance between the substations is 20 km."
— "The amperes that flow into the ground," but write instead, "The current that flows into the ground."
— "Polarity shall be additive for all kVA transformers rated at 200," but write instead, "Polarity shall be additive for all transformers with an apparent power rating of 200 kVA."

[9]For more information on IEEE Policy see http://www.ieee.org/about/corporate/governance/index.html and http://standards.ieee.org/announcements/metric.html.

14. Tables

14.1 Labeling and presentation of tables

Tables provide a clear and concise way of presenting large amounts of data in a small space. The sample draft in Annex A shows examples of properly formatted tables.

Working groups shall obtain permission to use any table from another source, including from a manufacturer, prior to using it in a draft standard (see Clause 6).

Formal tables should be given a number and a concise title and should be cited in the text with the word *Table* followed by the number. (See 14.2 for information on the numbering of tables.) Tables should be boxed and ruled and should be organized to fit on a single page. If a table must carry over for more than one page, complete column headings should be repeated at the top of successive pages. The table number and title should be repeated at the top of the page as follows: "Table 1—Title *(continued)*."

14.2 Numbering and capitalization in tables

Tables should be consecutively numbered in a separate series and in the order of their reference in the text (e.g., Table 1, Table 2, Table 3). Hyphenated numbers should not be used except in standards of considerable length. In the latter case, it is appropriate to label the first table in a clause with the number 1, preceded by the clause number (e.g., Table 6-1, Table 6-2).

Tables included in annexes should also carry the identifying letter of the annex in which they appear, followed by a period. For example, the first table in Annex A should be identified as Table A.1.

Tables should be referenced in the text by the word Table and their number only (e.g., "see Table 1"). If referring to two or more tables in the same sentence, each should be named separately. For example, use "see Table 1, Table 2, and Table 3," instead of "see Tables 1 through 3."

Only the initial letter of the first word and proper nouns should be capitalized in

- Table titles
- Column and line headings in tables (see Table 1)

14.3 Presentation of data and table format

14.3.1 Units of measure

Units of measure shall always be provided either in the title, in parentheses, or preceded by a solidus in the column headings [e.g., for volts either *E* (V) or *E*/*V* would be acceptable], or in a NOTE. The same units of measure shall be used throughout each column; ohms shall not be combined with megohms, millimeters with centimeters, or seconds with minutes. To save space, abbreviations and letter symbols should be used in column and line headings wherever possible. (See IEEE Std 260.1 and other standards referenced in Clause 2 for the appropriate abbreviations and symbols for use in standards.)

14.3.2 Numerical values

Digits should be separated into groups of three, counting from the decimal point toward the left and right. The groups should be separated by a space, not a comma, period, or dash. If the magnitude of the number is less than one, the decimal point should be preceded by a zero. In numbers of four digits, the space is not necessary, unless four-digit numbers are grouped in a column with numbers of five digits or more.

Examples:

73 722 7372 0.133 47

All numbers should be aligned at the decimal point. Only as many significant digits should be used as the precision of data justifies. Decimal fractions should be used in tabulations unless fractions are commonly used in the field.

Common fractions and decimal fractions shall not be combined in the same table. An em dash (—) should be used to indicate the lack of data for a particular cell in a table.

14.4 Notes and footnotes to tables

Subclause 6.4.1 of the *IEEE-SA Standards Board Operations Manual* defines which parts of a standard are normative and which parts of a standard are informative.

A table note (a note to a table) is informative. A table footnote is normative. This distinction should be kept in mind when determining whether information should go in a table note or a table footnote.

A table note should immediately follow the table to which it belongs. The text in the table note shall not contain mandatory requirements. Important information on safety, health, or the environment shall not be included in table notes.

Table notes should appear before any table footnotes in the following order:

a) *General notes and specific notes.* General notes apply to the entire table and should be introduced by "NOTE—" set in upright capital letters. Specific notes should detail specific material or parts of the table and should also be introduced by "NOTE—" set in upright capital letters. Multiple notes in sequence should be numbered "NOTE 1—", "NOTE 2—", etc.

b) Crediting *source.* Use either of the following credit lines:

   1) Reprinted with permission from... (Use when data is derived from another source from which permission to reproduce has been obtained.)

   2) Source: (Use when data is derived from another IEEE standard.)

Footnotes to a table contain normative information. They should be marked with lowercase letters starting with "a" for each table.

14.5 Informal tables

Simple tabulations that are not referred to outside of the subclause in which they appear may be organized into short informal tables that do not exceed five lines in depth. However, it is recommended that all tables be numbered and titled, if possible. See the sample draft in Annex A for an example of an informal table.

15. Figures

15.1 Requirements for creating figures

Figures should be created using any of a number of graphics programs. For specific requirements concerning the preparation of figures see Table 1.

WGs should create their figures using programs that create vector output. Figures created in programs that do not support vector illustrations may result in bitmapped graphics or graphics that do not translate well

into other applications, that may not scale appropriately, or that may not retain their quality. If it is unavoidable, however, a TIFF version of the file should be submitted.

When working with FrameMaker files, the FrameMaker graphics editor can be used for simple line drawings and TIFF versions do not need to be submitted.

Table 1—Figure preparation and requirements

Resolution	— Black and white: 300 DPI — Grayscale: 150 DPI — Line art: 600 DPI — Black and white photograph: 300 DPI
Size	— Maximum width: 7.5" — Maximum length: 10"
Color	Color in figures shall not be required for proper interpretation of the information.
Line drawings	Save line art as black and white.
Line drawings with shaded areas	Save line drawings with shaded areas as grayscale.
Line weight	Lines should be of an adequate thickness, at least 0.5 points to 1.0 points. Hairline rules may appear broken up in printed document, or not show up at all.
Photographs	Save photographs as grayscale.
Fonts in graphics	— All fonts shall be embedded into the figure. — Uncommon fonts shall be avoided or, at a minimum, provided to the IEEE-SA editorial group. — Times New Roman and Arial fonts are preferred. — Letter symbols not normally capitalized should always be lowercase.
Text point size	IEEE-SA uses 8-point type size. All capital letters or mixed uppercase and lowercase letters may be used, depending on the amount of text, as long as the presentation is consistent throughout the document.
Cropping	— There should be no borders around the graphic. — Remove any excess white space around the image edges.
Original art	Original source files (from the graphics programs used) should also be submitted to IEEE. The original art files should be grouped separately from those saved in the formats listed previously. All original art files will be archived for the working group.
Naming graphic files	A figure should be labeled *Figure,* followed by a number (e.g., FIG1.tif). Multiple figures under a single figure number [e.g., Figure 2(a) and Figure 2(b)] should be saved as separate files with corresponding names (e.g., FIG2A.tif, FIG2B.tif). All figures should be submitted to the IEEE-SA on a single disk or CD-ROM.

See the sample draft in Annex A for an example of a properly formatted figure.

15.2 Figure numbering and titles

Figures should be numbered consecutively in a separate series and in the order of their reference in the text (e.g., Figure 1, Figure 2, Figure 3). Hyphenated numbers should not be used except in standards of exceptionable length. In the latter case, it is appropriate to label the first figure in a clause with the number 1, preceded by the clause number (e.g., Figure 6-1, Figure 6-2, Figure 6-3).

Figures included in annexes should carry the identifying letter of the annex in which they appear, followed by a period. For example, the first figure in Annex A should be identified as Figure A.1.

A figure should be referenced in the text by the word Figure and its number only (e.g., "see Figure 1"). If referring to two or more figures in the same sentence, each should be named separately. For example, use "see Figure 1, Figure 2, and Figure 3," instead of "see Figures 1 through 3."

Only the initial letter of the first word and proper nouns should be capitalized in figure titles.

15.3 Notes and footnotes to figures

As described in 6.4 of the *IEEE-SA Standards Board Operations Manual*, a note to a figure is informative; a footnote to a figure is normative. This distinction should be kept in mind when determining whether information should go in a figure note or a footnote.

Important information on safety, health, or the environment shall not be included in notes to figures. Notes to a figure should appear in the following order:

a) *General notes and specific notes.* General notes apply to the entire figure and should be introduced by "NOTE—" set in upright capital letters. Specific notes should detail specific material or parts of the figure and should also be introduced by "NOTE—" set in upright capital letters. Multiple notes in sequence should be numbered "NOTE 1—", "NOTE 2—", etc.

b) *Crediting source.* Use either of the following credit lines:

   1) Reprinted with permission from... (Use when the figure is derived from another source from which permission to reproduce has been obtained.)

   2) Source: (Use when figure is derived from another IEEE standard.)

Footnotes to figures may contain normative information. They should be marked with lowercase letters starting with "a" for each figure. (See Figure A.1 in Annex A.)

Both figure notes and figure footnotes should be placed under the figure, but above the caption.

16. Mathematical expressions

16.1 Letter symbols and units

Letter symbols defined in applicable IEEE standards (see Clause 2) should be used in preparing mathematical expressions. (See 13.4 for a discussion of letter symbols.)

All terms shall be defined, including both quantities and units, in a tabulation following the equation [see Equation (1)]. The list should be preceded by the word *where*, followed by the list of variables and corresponding definitions. See 4.5 in Annex A for an example.

16.2 Numbering of equations

If the standard contains more than one equation, then equations of key importance should be numbered consecutively in parentheses at the right margin. Derivations of equations or examples where values are substituted for variables need not be numbered.

An equation should be cited in the text by the word Equation and its number only [e.g., "see Equation (1)"]. If referring to two or more equations in the same sentence, each should be named separately. For example, use "see Equation (1), Equation (2), and Equation (3)," instead of "see Equations (1) through (3)."

Equations in annexes should be numbered beginning with the letter of the annex where they are found. For example, the first equation in Annex A would be numbered "(A.1)" and the reference to it would be to "see Equation (A.1)."

16.3 Presentation of equations

Certain types of material in displayed equations is automatically italic. Some simple general rules apply. All variables are italic. (e.g., *x, y, n*). Function names and abbreviations are Roman (sin, cos, sinc, sinh), as are units or unit abbreviations (e.g., deg, Hz,) complete words (e.g., in, out), and abbreviations of words (e.g., max, min), or acronyms (e.g., SNR). Single letter superscripts and subscripts may be italic even if they are abbreviations, unless this leads to inconsistency between italic and roman characters for similar types of subscripts.

A multiplication sign (×), not the letter "x" or a multidot (·), should be used to indicate multiplication of numbers and numerical values, including those values with units (e.g., 3 cm × 4 cm).

Although the stacked style of fractions is preferred, exceptions should be made in text to avoid printing more than two lines of type. For example, in text *a/b* is preferable to $\frac{a}{b}$.

The general rules regarding the use of upright (Roman) and italic text in equations [see Equation (1)] are as follows:

— Quantity symbols (including the symbols for physical constants), subscripts or superscripts representing symbols for quantities, mathematical variables, and indexes are set in italic text.

— Unit symbols, mathematical constants, mathematical functions, abbreviations, and numerals are set in upright (Roman) text.

Example:

$$x = r\sin\theta\cos\varphi \tag{1}$$

where

x is the x-coordinate on a Cartesian plane
r is the length of the position vector
θ is the angle between the position vector and a coordinate axis
φ is the angle from the plane in which both the axis and the position vector lie to either of the coordinate planes including that axis

Table 2 lists a number of functions and operators that are set in upright (Roman) text.

Table 2—Examples of functions and operators set in upright (Roman) text

arg (argument)	hom (homology)	min (minimum)
cos (cosine)	Im (Imaginary)	mod (modulus)
cot (cotangent)	inf (inferior)	Re (Real)
det (determinant)	ker (kernal)	sin (sine)
diag (diagonal)	lim (limit)	sup (superior)
dim (dimension)	log (logarithm)	tan (tangent)
exp (exponential)	max (maximum)	var (variance)

Further examples of the presentation of equations are given in the sample draft in Annex A.

16.4 Quantity and numerical value equations

Equations shall be dimensionally correct. Equations may be in either quantity equation form or in numerical value equation form. Stipulation of units for substituted values in the variable list below the equation does not suffice to meet this requirement.

A quantity equation is valid regardless of the units used with the substituted values, once any unit conversions and prefix scaling factors have been taken into account. For example, $F = ma$ is always correct.

A numerical value equation depends on the use of particular units and prefixes. Such equations may be presented in one of two forms. One form represents a numerical relationship among quantities whose dimensions have been reduced to 1 due to division by the appropriate (prefixed) units. For example,

$$t/°\mathrm{C} = T/\mathrm{K} - 273.15$$

The other form annotates the quantities with the units to be used. For example,

$$\{t\}_{°\mathrm{C}} = T\}_{\mathrm{K}} - 273.15$$

17. Notes, footnotes, examples, warnings, and cautions

17.1 Notes

Subclause 6.4 of the *IEEE-SA Standards Board Operations Manual* states that notes are informative. Notes are explanatory statements used in the text for emphasis or to offer informative suggestions about the technical content of the standard. Notes provide additional information to assist the reader with a particular passage and shall not include mandatory requirements. Because a note in the text is an informative part of the approved standard, important information on safety, health, or the environment shall not be included. A note should follow that paragraph to which it belongs, and shall be set apart from the text by introducing the statement with the capitalized word "NOTE—." Within each subclause, notes should be numbered sequentially, i.e., "NOTE 1—", "NOTE 2—", etc. The one exception is when notes appear in the definitions clause. Notes in the definitions clause should only be numbered if there are multiple notes that apply to a single definition. That is, each definition acts as if it were its own subclause.

"Note that" is normative and is translated to mean "pay special attention to." "Note that" is usually part of a paragraph while "NOTE—" is set apart as its own paragraph.

17.2 Footnotes

Subclause 6.4 of the *IEEE-SA Standards Board Operations Manual* states that footnotes are informative. Footnotes in text may be included in a standard only for information, clarification, and/or aid applicable to the use of the standard. Mandatory requirements shall not be included in text footnotes because these footnotes are not officially part of the standard. Note that footnotes to tables and figures follow different rules (see 14.4 and 15.3) and may contain normative information.

Footnotes in the frontmatter should be indicated separately from the body footnotes. Frontmatter footnotes should be indicated with lowercase letters.

Footnotes in the body and annexes should be numbered consecutively using Arabic numerals. When there are footnotes within tables and figures, they should be lettered. If a footnote is cited more than once, each additional citation should refer back to its first mention as follows:

[2] See Footnote 1.

17.3 Examples

Examples may be used as illustrations to aid understanding of the standard. Examples are not a normative part of the standard; therefore, requirements shall not be included in the text of the example. (See 18.2 for illustrations of examples.)

17.4 Warnings and cautions

Warnings call attention to the use of materials, processes, methods, procedures, or limits that have to be followed precisely to avoid injury or death.

Cautions call attention to methods and procedures that have to be followed to avoid damage to equipment. A warning is more important than a caution. If both are to be included in the same clause or subclause, the warning shall precede the caution.

Warnings and cautions should start with a clear instruction, followed with a short explanation (if necessary). If the warning or caution is of a general nature (and is applicable throughout the text), it should be placed at the start of the text. This avoids the necessity of repeating the same warning or caution frequently throughout the text. Warnings and cautions shall not be placed in informative text or notes.

WARNING
Serious injury may result if the following parameters are not followed exactly.

18. Bibliography

18.1 General

Complete and current information for bibliographic entries shall be supplied by the working group (including publication dates, etc.). The bibliography shall always be an informative lettered annex that appears as either the first or last annex of the standard. (See Annex A for an example bibliography.)

If bibliographic items are cited in text, tables, figures, or notes, the citation should be placed at the point where reference is made to them. If the item is a standard, the designation (e.g., IEEE Std 1226.6-1996) and bibliographic reference number (e.g., [B4]) should be cited. If the reference is to an article, book, or other type of publication included in the bibliography, the title or author of the publication and the bibliographic reference number should be cited.

The bibliography should be ordered alphanumerically, without respect to the type of publication being cited.

18.2 Citing standards in a bibliography

Standards listed shall include designation and title. They can be either dated or undated, whichever is appropriate to a particular entry.

Example:

[B1] ASME BPVC-I-2004, Boiler and Pressure Vessel Code, Section 1—Power Boilers.

[B2] Code of Federal Regulations Title 29 Part 1210 Section 354 (29CFR1210.354), Health and Safety Standards—Head injury.

[B3] ISO/IEC 7498-4, Information processing systems—Open Systems Interconnection—Basic Reference Model—Part 4: Management framework.

18.3 Articles in periodicals

Consult *The Chicago Manual of Style* for detailed information on how to list periodicals.

Articles listed shall include the following information in the order shown:

a) Last name of author or authors and first name or initials, or name of organization
b) Title of article in quotation marks
c) Title of periodical in full and set in italics
d) Volume, number, and, if available, part
e) First and last pages of article
f) Date of issue

Example:

[B1] Boggs, S. A., and N. Fujimoto, "Techniques and instrumentation for measurement of transients in gas-insulated switchgear," *IEEE Transactions on Electrical Installation*, vol. ET-19, no. 2, pp. 87–92, Apr. 1984.

18.4 Books

Consult *The Chicago Manual of Style* for detailed information on how to list books.

Books listed shall include the following information in the order shown:

a) Last name of author or authors and first name or initials, or name of organization. Note that for a book with two or more authors, only the first-listed name is inverted in the bibliography entry.
b) Title of book (in italics)
c) Edition number (if applicable)
d) Place of publication (city)
e) Name of publisher
f) Year of publication
g) First and last page of reference

Example:

[B26] Peck, R. B., W. E. Hanson, and T. H. Thornburn, *Foundation Engineering*, 2d ed. New York: McGraw-Hill, 1972, pp. 230–292.

18.4.1 Other types of bibliographies

For instructions on citing sources other than those listed in this subclause refer to *The Chicago Manual of Style*.

18.4.2 Annotated bibliography

[B10] Henry, S., and Selig, C., "Predicting source-code complexity at the design stage," *IEEE Software*, vol. 7, no. 2, pp. 36–44, Mar. 1990.

This paper states that the use of design metrics allows for determination of the quality of source code by evaluating design specifications before coding, causing a shortened development life cycle.

18.4.3 Articles in corporate reports

[B6] Dale, S. J., "Performance of a technical and economic feasibility study of an HVDC compressed gas-insulated transmission line," Westinghouse Electric Corporation, Trafford, PA, Final Report, Dec. 1983.

18.4.4 Articles presented at conferences

[B3] Cookson, A. H., and B. O. Pedersen, "Thermal measurements in a 1200 kV compressed gas insulated transmission line," *Seventh IEEE Power Engineering Society Transmission and Distribution Conference and Exposition*, Atlanta, GA, pp. 163–167, Apr. 1979.

18.4.5 Government publications

[B2] Cookson, A. H., "Particle Trap for Compressed Gas Insulated Transmission Systems," U.S. Patent no. 4554399, Nov.1985.

[B3] EPRI EL-2040, *Project 1352-1, Probability-Based Design of Wood Transmission Structures—Volume 3: User's Manual, POLEDA-80—POLE Design and Analysis*, Final Report, Goodman, J., Vanderbilt, M., Criswell, M., and Bodig, J.

18.4.6 Uniform resource locators (URLs)

For articles or sources that were consulted online, the URL should be listed along with the source's title and date accessed to create a more stable reference.

Example:

[B18] Moore, James W., *IEEE/EIA 12207 as the Foundation for Enterprise Software Processes*, 2d ed. Virginia: The MITRE Corporation, http://www.techwell.com/sites/default/files/articles/XML0181_0.PDF.

18.4.7 Theses, dissertations, and other unpublished works

[B5] Diessner, A., "Studies on Compressed Gas Insulation." Master's thesis, Stanford University, 1969.

[B6] Hazel, R. L., "DC Breakdown and Anode Corona Characteristics of Sphere and Rod-Plane Gaps Insulated With Compressed Sulphur Hexa fluoride." Ph.D. diss., University of Windsor, 1974.

19. Amendments, corrigenda, and errata

19.1 General

There are several ways of changing a published standard:

a) *Amendment.* A document that adds to, removes from, or alters material in a portion of an existing IEEE standard and may make editorial or technical corrections to that standard.

b) *Corrigendum*. A document that only corrects editorial errors, technical errors, or ambiguities in an existing IEEE standard.

c) *Erratum*. A document that contains only grammatical corrections to, or corrections of errors introduced during the publishing process of, an existing IEEE standard. Errata are not balloted documents and are always available for free on the IEEE-SA Website: http://standards.ieee.org/findstds/errata/index.html. For information on issuing an errata contact an IEEE-SA editor.

IEEE Standards Project Editors can assist Sponsors in determining whether an amendment or revision is appropriate.

19.2 Amendments and corrigenda

Amendments and corrigenda are independent projects and are processed with separate PARs and balloted independently in accordance with the requirements of these procedures, including submission to the IEEE-SA Standards Board.

Amendments and corrigenda give explicit instructions on how to change the text in an existing base standard or an existing amendment. The editing instructions are important because the user should understand how the changes affect the base standard and because these documents are incorporated into the base standard sometime in the future.

Both types of documents have the same format. The following text shall appear at the beginning of either an amendment or a corrigendum:

> NOTE—The editing instructions contained in this <amendment/corrigendum> define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.
>
> The editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~strikethrough~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Deletions and insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.

Editing instructions and text indicating the changes to the base document follow the NOTE. Change bars shall not be included. (See Annex B for an example of an amendment/corrigendum.) Only material being affected by the changes of the amendment/corrigendum shall be included with the appropriate clause/ subclause headings.

19.2.1 Numbering in amendments and corrigenda

Amendments and corrigenda shall follow the clause numbering outlined in Clause 12. However, if text is inserted between existing consecutive clauses or subclauses, an additional letter may be included in the heads (e.g., if clauses are inserted between Clause 4 and Clause 5, the new clauses would be labeled Clause 4A, Clause 4B, Clause 4C). This would also apply to subclauses (e.g., subclauses inserted between 4.1.3 and 4.1.4 would be labeled 4.1.3a, 4.1.3b, 4.1.3c). Subdivisions of inserted subclauses would follow the numbering outlined in Clause 12 (e.g., 4.1.3a.1, 4.1.3a.2, 4.1.3a.3). This numbering may be more appropriate for amendments with extensive changes that would affect numbering throughout the base standard (so it would be difficult to outline all the numbering changes that would occur), or for amendments to standards where exact references to clauses, figures, equations, and tables are required.

Additional amendments to a base standard may insert text between already amended clauses or subclauses. In these cases, numbering of clauses may become very complex. An IEEE-SA editor can assist with complex numbering formats. Working groups should consider a revision of the document in these instances. For tables and figures in amendments and corrigenda, clause or subclause numbering should follow the numbering outlined in 14.2 and 15.2. However, if an amendment or corrigenda inserts a table between consecutive tables, or a figure between consecutive figures, the addition of a letter may be used.

Exceptions may be made for numbering established in previously published amendments. Exceptions shall only be valid until a revision occurs, after which the numbering described in Clause 12 will be implemented. Table 3 shows appropriate numbering formats that may be used for amendments and corrigenda. (See Annex B for examples of amendment numbering.)

19.2.2 Editorial instructions in amendments and corrigenda

Amendments submitted for ballot shall clearly indicate the changes to the existing standard. Editorial instructions shall clearly outline how the changes should be implemented in the base standard, as modified by all previously approved amendments or corrigenda. The instructions shall not require interpretation by the IEEE-SA editor, by the balloter, or by any user. Therefore, the placement of the changes, as well as any required renumbering, shall be delineated in an unambiguous manner.

Editorial instructions shall precede all changes, and should begin with one of the four types of editing instructions, which are formatted in bold italic: ***change***, ***insert***, ***delete***, and for figures or equations, ***replace***.

Change shall be used when text or tables are being modified; therefore, strikethrough (for deletions) and underscore (for insertions) should be indicated.

Insert shall be used to add new text, equations, tables, or figures in the standard.

Delete shall be used to remove existing text, equations, tables, or figures without exchanging the information (i.e., it is not permissible to delete a paragraph and insert a new one rather than showing the changes in the paragraph using the change instruction).

Replace shall be used only for figures and equations by removing the existing figure or equation and replacing it with a new one. (See Annex B for examples of editorial instructions in amendments or corrigenda.)

IEEE-SA editors are available for questions that arise while preparing these documents.

19.2.3 Amendment versus revision

The greater the number of amendments or corrigenda associated with a standard, the more complex the editing instructions become for all subsequent amendments and corrigenda. If three amendments to a standard exist however, working groups are encouraged to revise the standard rather than develop an additional amendment. Refer to 8.1.2 and 9.2 of the *IEEE-SA Standards Board Operations Manual* for additional information on amendments, corrigenda, and revisions.

Table 3—Numbering of amended material

Location of inserted material	Original order	Revised order
Clause heads First level	Clause 1 Clause 2	Clause 1 Clause 1A 1A.1 Clause 1B Clause 2
Second level	1.1 1.2	1.1 1.1a 1.1a.1 1.1b 1.2
Figures	Figure 1 Figure 2	Figure 1 Figure 1a Figure 1b Figure 2
Tables	Table 1 Table 2	Table 1 Table 1a Table 1b Table 2
Equations	Equation (1) Equation (2)	Equation (1) Equation (1a) Equation (1b) Equation (2)
Annexes Annex heads	Annex A Annex B	Annex A Annex A1 Annex A2 Annex B
First level	A.1 A.2	A.1 A1.a A.1a.1 A.1b A.2
Second level	A.1.1 A.1.2	A.1.1 A.1.1a A.1.1a.1 A.1.1b A.1.2

20. Global standardization activities

20.1 General

Working groups preparing IEEE standards may wish to develop their standard for global use. If there is an interest in such development/submissions, working group chairs should consult the IEEE-SA International

Programs Website and also contact the Senior Program Manager International Standards Programs early in the development cycle of their standards. Issues involving coordination and/or cooperation should be directed to an IEEE Standards staff liaison.

20.2 Style for IEEE documents to be specifically adopted by ISO or IEC

The IEEE Standards Activities Department has harmonized many of its style conventions with the principles of ISO/IEC style, as stated in the *ISO/IEC Directives Part 2*. However, the IEEE has made some exceptions to the ISO/IEC directives, which should be followed when developing IEEE documents intended for adoption by ISO or IEC.

a) IEEE will continue to designate and to title standards according to 10.1.1. If a working group intends that its standard should one day be an ISO/IEC standard, the chair should consult with IEEE staff when preparing the PAR so that the designation and title incorporates ISO/IEC considerations.

b) IEEE will continue to use the period as a decimal sign rather than the comma.

c) Since American English is acceptable internationally, the IEEE will continue to use American English grammar and spelling in its standards.

d) Working groups that intend to submit their drafts for review by JTC1 should ensure that any included normative references meet the JTC1 requirements for references. ISO/IEC requires that referenced standards that are not ISO or IEC standards be accompanied by appropriate documentation.

e) ISO and IEC use lowercase letters and periods in abbreviated terms consisting of the initial letters of words (e.g., “a.c.” for “alternating current”); however, the IEEE style of not using periods in abbreviations and acronyms is acceptable.

f) Stylistic changes may be considered technical changes by ISO or IEC (e.g., capitalization of “standard” to “Standard” when self-referencing the document). These stylistic requirements should be determined and then communicated to IEEE project editors as a part of the submission of the draft standard to RevCom for final approval by the IEEE-SA Standards Board.

g) The foreword should contain any mention of closely related standards, changes from any previous editions of the standard, and the structure of the normative and informative parts of the standard. Historical or specific technical commentary about the preparation of the standard should be included in the introduction.

h) The bibliography shall be the last annex (i.e., there is no option to place the bibliography as the first annex).

20.3 IEEE documents developed jointly with other organizations

IEEE standards may be developed jointly with other organizations with the appropriate agreements in place. IEEE already has specific agreements for the joint development of new and existing standards with ISO and IEC.

An IEEE Standards staff liaison shall be notified at the beginning of the standards development process if there is an intention to jointly develop a standard with another organization.

Annex A

(informative)

Example draft standard

This annex contains an example draft standard that points out common style issues. This example is meant to be used as a quick and easy reference to issues discussed in this manual. In most instances, a clause or subclause has been provided for easy reference.

IEEE P987.6™/D2
Draft Recommended Practice for Preparing an IEEE Standards Draft

Sponsor

Standards Staff Engineering Committee
of the
IEEE Template Society

Approved <Date Approved>

IEEE-SA Standards Board

Figure 2 reprinted with permission from ABC Company.

Abstract: Key discussion points covered in the draft are stated here in a few complete sentences, using passive rather than active voice. The more specific the better since the abstract often populates search engines and catalog databases.
Keywords: designation, document development, draft, equation, figure, guide, IEEE 987.6, introduction, list, purpose, recommended practice, scope, standard

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Comments on standards should be submitted to the following address:

Secretary, IEEE-SA Standards Board
445 Hoes Lane
Piscataway, NJ 08854
USA

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Errata

Errata, if any, for this and all other standards can be accessed at the following URL: http://standards.ieee.org/findstds/errata/index.html. Users are encouraged to check this URL for errata periodically.

Patents

Attention is called to the possibility that implementation of this standard may require use of subject matter covered by patent rights. By publication of this standard, no position is taken by the IEEE with respect to the existence or validity of any patent rights in connection therewith. If a patent holder or patent applicant has filed a statement of assurance via an Accepted Letter of Assurance, then the statement is listed on the IEEE-SA Website http://standards.ieee.org/about/sasb/patcom/patents.html. Letters of Assurance may indicate whether the Submitter is willing or unwilling to grant licenses under patent rights without compensation or under reasonable rates, with reasonable terms and conditions that are demonstrably free of any unfair discrimination to applicants desiring to obtain such licenses.

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Participants

At the time this draft recommended practice was completed, the 987.6 Working Group had the following membership:

Arthur C. Clark, *Chair*
Volta, *Vice Chair*

Thomas A. Edison	Grace Hopper	Ada Lovelace
Michael Faraday	Jack Kilby	Robert Noyce
Joseph Henry		Charles Steinmetz

The following members of the <individual/entity> balloting committee voted on this recommended practice. Balloters may have voted for approval, disapproval, or abstention.

[To be supplied by IEEE]

Balloter1	Balloter4	Balloter7
Balloter2	Balloter5	Balloter8
Balloter3	Balloter6	Balloter9

When the IEEE-SA Standards Board approved this recommended practice on <Date Approved>, it had the following membership:

[To be supplied by IEEE]

<Name>, *Chair*
<Name>, *Vice Chair*
<Name>, *Past President*
<Name>, *Secretary*

SBMember1	SBMember4	SBMember7
SBMember2	SBMember5	SBMember8
SBMember3	SBMember6	SBMember9

*Member Emeritus

Also included are the following nonvoting IEEE-SA Standards Board liaisons:

<Name>, *DOE Representative*
<Name>, *NIST Representative*
<Name>, *NRC Representative*

<Name>
IEEE Standards Program Manager, Document Development

<Name>
IEEE Standards Program Manager, Technical Program Development

Introduction

This introduction is not part of IEEE P987.6/D2, Draft Recommended Practice for Preparing an IEEE Standards Draft.

The introduction of the front matter is informative. It serves to give readers context, including background, key themes, history, etc.

Contents

Draft Recommended Practice for Preparing an IEEE Standards Draft

1. Overview

1.1 Scope

The scope shall be within the technical boundaries, as determined by the balloting group, of the scope submitted on the PAR.

1.2 Purpose

The purpose shall be within the technical boundaries, as determined by the balloting group, of the purpose submitted on the PAR.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

Accredited Standards Committee C2-2012, National Electrical Safety Code® (NESC®).[1, 2]

[1] National Electrical Safety Code and NESC are both registered trademarks and service marks of The Institute of Electrical and Electronics Engineers, Inc.

[2] The NESC is available from The Institute of Electrical and Electronics Engineers at http://standards.ieee.org/.

IEEE Std 260.1™-2004, IEEE Standard Letter Symbols for Units of Measurement (SI Units, Customary Inch-Pound Units, and Certain Other Units).[3, 4]

IEEE/ASTM SI 10™, American National Standard for Metric Practice.

IEEE P802.21™ (Draft 14, November 2003), Draft Standard for Local and Metropolitan Area Networks—Media Independent Handover Services.[5]

ISO/IEC 9945-1:2003, Information technology—Portable Operating System Interface® (POSIX®)—Part 1: Base Definitions.[6]

NFPA 70, 2011 Edition, National Electrical Code® (NEC®).[7, 8]

3. Definitions, acronyms, and abbreviations

3.1 Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary: Glossary of Terms & Definitions* [B2] should be referenced for terms not defined in this clause.[9, 10]

acceleration-insensitive drift rate: The component of … *See also:* **drift rate; systematic drift rate**.

code set: *See:* **coded character set**.

coded character set: A set of characters … *Syn:* **code set**.

drift rate: The slope at a stated time of ... (adapted from ISO/IEC 9945-1:2003)

input reference axis (IRA): The direction of an axis ... *Contrast:* **output reference axis**.

NOTE—See 6.7.[11]

output: (A) Data that ... **(B)** The process of ...

systematic drift rate: That component of drift rate that ...(IEEE Std 260.1-2004)

[3] IEEE publications are available from The Institute of Electrical and Electronics Engineers at http://standards.ieee.org/.
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[9] The *IEEE Standards Dictionary: Glossary of Terms & Definitions* is available at http://shop.ieee.org/.
[10] The numbers in brackets correspond to those of the bibliography in Annex A.
[11] Notes in text, tables, and figures of a standard are given for information only and do not contain requirements needed to implement this standard.

3.2 Acronyms and abbreviations

DER	distributed emission regeneration
DIS	distributed interactive simulation
ISDN	integrated services digital network
ISO	International Organization for Standardization
LAN	local area network
PDU	protocol data unit

4. Important elements of IEEE standards drafts

4.1 General

IEEE drafts should be built using one of the approved IEEE-SA templates. The templates have macro features that allow for easy tagging of each of the elements of IEEE drafts.[12]

Sources listed in the normative references clause shall also be cited in text. Explain the role and significance of each normative reference. Note that drafts may be included in the normative references clause as long as they are properly cited. See reference to IEEE P802.21 (Draft 14, November 2003).

NOTE 1—A normative reference is a document that users of the standard must have and understand in order to correctly implement the material contained in an IEEE draft.

NOTE 2—Documents that serve as supplemental information that authors of the standard found useful when researching the material but that do not carry the same weight as the normative references are usually informative and therefore would belong in a bibliography (informative annex).

All IEEE standards shall use metric units as the primary units of measure. Customary equivalents may be included in the text after the metric units in parentheses. In the case of tables, separate tables for metric and customary units may be included. See National Electrical Safety Code® (NESC®) (Accredited Standards Committee C2-2012) and National Electrical Code® (NEC®) (NFPA 70, 2011 Edition) for examples. For more information on the use of metric in IEEE standards, see IEEE/ANSI SI 10. For guidance on the use of letter symbols for units of measurement, refer to IEEE Std 260.1-2004.

4.2 Lists

Lists in a clause or subclause may be ordered or unordered.

The following is an example of a properly formatted ordered list:

a) Name of the manufacturer
b) Connection chart showing
    1) Full winding development
    2) Taps

[12] IEEE-SA approved templates can be found online at http://standards.ieee.org/resources/development/writing/writinginfo.html.

c) Self-impedance (for linear coupler transformers)
    1) Reactance
    2) Impedance
        i) For volts
        ii) For amperes

The following is an example of a properly formatted dashed list:

— Begin with a capital letter.
— Include ending punctuation if is a complete sentence but no ending punctuation if there is not at least one complete sentence in the list.
— If at least one of the items in the dashed list is a complete sentence then add ending punctuation to all of the items in the list.

4.3 Tables

Tables should be cited in text and the significance of the tables explained. Table titles are positioned above the tables themselves. Table 1 shows the nomenclature of a properly formatted table that can be built using one of the IEEE-SA templates or any basic word processing or design program.

Table 1—Table formatting

Column heading	Column heading	Column heading	
		Column heading	Column heading
Line heading Subheading Subheading	Tabulated data (individual positions within the body of the table are called *cells*)		
Line heading			

Table 2 shows an example of table format. Note that column headings are in bold and centered. If a table must be split to cover more than one page, carry the title of the table over to each subsequent page with "*(continued)*" after the title itself.

Table 2—An example of a continued table

Type of source(s)	Type of calculation					
	First cycle		Interrupting		Multiple-voltage circuit breaker closer and latch[a]	
	Rate multiplier	Winding multiplier (see NOTE 2)	Rate multiplier	Winding multiplier (see NOTE 2)	Rate multiplier	Winding multiplier (see NOTE 2)
Induction motors Above 75kW at 1800 r/min	1.0	1.0	0.667	1.5	1.000	1.0

Table 2—An example of table format *(continued)*

Type of source(s)	Type of calculation					
	First cycle		Interrupting		Multiple-voltage circuit breaker closer and latch[a]	
	Rate multiplier	Winding multiplier (see NOTE 2)	Rate multiplier	Winding multiplier (see NOTE 2)	Rate multiplier	Winding multiplier (see NOTE 2)
Above 190 kW at 3600 r/min	1.0	1.0	0.667	1.6	1.000	1.0
All others 37 kW and above	1.0	1.0	0.333	3.0	0.833	1.2
All smaller than 37 kW	1.0	1.0	NEGLECT	NEGLECT	—	—
NOTE 1—This table is provided as an example. The structure of actual tables may vary depending on the data being displayed. NOTE 2—Use 0.75 X*d* for hydrogenerators without amortisseur windings.						

[a] Refers to calculations for medium-voltage circuit breakers.

The following is an example of an informal table. Note that there is no title or table number.

Cable type	Rated voltage (kV)
High pressure	69–161
Low pressure	10–29
gas-filled	30–46
Low and medium pressure	15–161
liquid-filled	230

4.4 Figures

Figures should be cited in text and the significance of the figures explained. Figure titles are positioned below the figures themselves. Figures can be created using a word processing or design program. Figure 1 and Figure 2 show properly formatted figures.

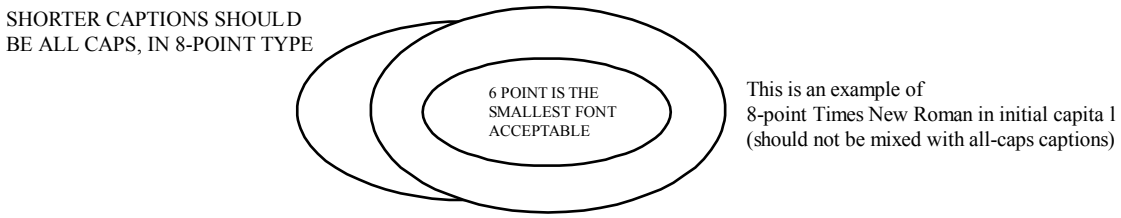
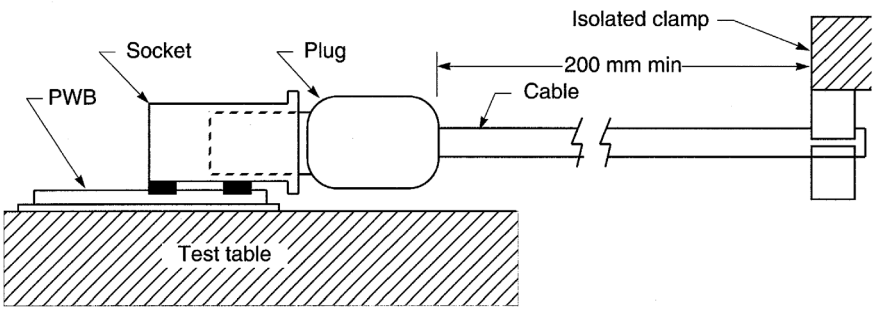
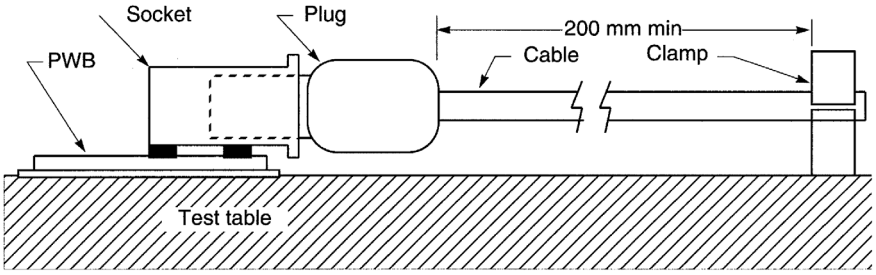


Figure 1—Typographical specifications for figure captions



a) vibration test



b) shock test

NOTE—Notes to figures are formatted between the graphic and the figure caption.

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Figure 2—A sample of figure presentation

4.5 Equations

Equations should be cited in text and the significance of the equations explained. Equations can be created using one of the IEEE-SA templates or any basic word processing or design program. Equations should be numbered to the edge of the right-hand margin. See Equation (1).

$$Y(x) = Y_0 \exp[-(x - x_0)^2 / (2f^2)] \quad (1)$$

where

$Y(x)$ is the amplitude of the Gaussian function at channel x
Y_0 is the height of the Gaussian at the centroid channel
x is the channel number
x_0 is the centroid of the Gaussian
f is the width of the Gaussian

Annex A

(informative)

Sample bibliography

Bibliographical references are resources that provide additional or helpful material but do not need to be understood or used to implement this standard. Reference to these resources is made for informational use only.

[B1] *Name of Book Title in Italics*. City of Publication, State: Name of Publisher, Year of Publication. First and Last Page of Reference.

[B2] *IEEE Standards Dictionary: Glossary of Terms & Definitions.*

[B3] IEEE Std XXX-YEAR, IEEE Standard for Something Industry Needs.

Annex B

(normative)

Structure of a sample annex

B.1 Overview

B.1.1 Title

Every annex shall be given a title and shall be designated either a normative or an informative annex. See Equation (B.1):

$$Y(x) = Y_0 \exp[-(x - x_0)^2 / (2f^2)] \quad \text{(B.1)}$$

where

$Y(x)$ is the amplitude of the Gaussian function at channel x
Y_0 is the height of the Gaussian at the centroid channel
x is the channel number
x_0 is the centroid of the Gaussian
f is the width of the Gaussian

B.1.2 Clause and subclause organization

The material in an annex should be organized into clauses and subclauses just like the body text. There should be at least two items in any subdivision so that if there is one second-level header, there should be at a minimum one other one.

B.2 Material in annexes

Tables, figures, equations, lists, etc. are all permitted in an annex and are formatted like they would be in the body of the text except that:

— Tables are numbered according to the annex letter (see Table B.1).

— Figures are labeled according to the annex letter (see Figure B.1).

Table B.1—Sample table in an annex

Column heading	Column heading	Column heading	
		Column heading	Column heading
Line heading Subheading Subheading	Tabulated data (individual positions within the body of the table are called *cells*)		
Line heading			

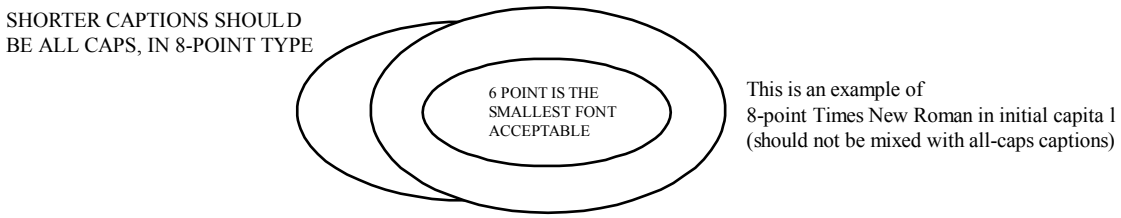


Figure B.1—Sample figure in an annex

Annex B

(informative)

Example amendment

This annex contains an example amendment. It contains the body of the amendment only. Please follow the instructions in Annex A for the title page, copyright information, and introduction.

Draft Recommended Practice for How to Present an IEEE Standards Draft

Amendment 1: Updates

IMPORTANT NOTICE: This standard is not intended to ensure safety, security, health, or environmental protection. Implementers of the standard are responsible for determining appropriate safety, security, environmental, and health practices or regulatory requirements.

This IEEE document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading "Important Notice" or "Important Notices and Disclaimers Concerning IEEE Documents." They can also be obtained on request from IEEE or viewed at http://standards.ieee.org/IPR/disclaimers.html.

NOTE—The editing instructions contained in this amendment define how to merge the material contained therein into the existing base standard and its amendments to form the comprehensive standard.

The editing instructions are shown in ***bold italic***. Four editing instructions are used: change, delete, insert, and replace. ***Change*** is used to make corrections in existing text or tables. The editing instruction specifies the location of the change and describes what is being changed by using ~~strikethrough~~ (to remove old material) and underscore (to add new material). ***Delete*** removes existing material. ***Insert*** adds new material without disturbing the existing material. Insertions may require renumbering. If so, renumbering instructions are given in the editing instruction. ***Replace*** is used to make changes in figures or equations by removing the existing figure or equation and replacing it with a new one. Editing instructions, change markings, and this NOTE will not be carried over into future editions because the changes will be incorporated into the base standard.

2. Normative references

Change the following reference in Clause 2:

IEEE Std ~~P~~802.21™ ~~(Draft 14, 21 November 2003)~~, ~~Draft~~ IEEE Standard for Local and Metropolitan Area Networks— Part 21: Media Independent Handover Services.

Insert the following references in Clause 2 in alphanumeric order:

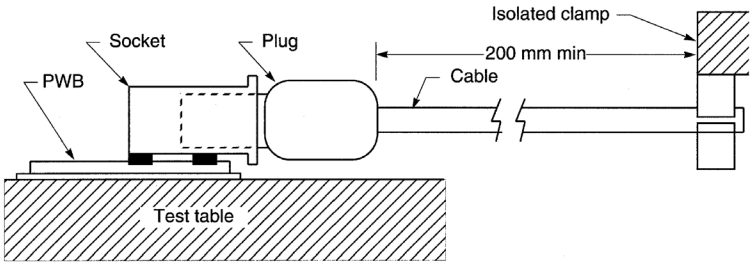
IEEE P802.21a™ (D06, November 2011), Draft Standard for Local and Metropolitan Area Networks—Part 21: Media Independent Handover Services—Amendment 2: Security Extensions to Media Independent Handover Services and Protocol.

IEEE P802.21b™ (D06, November 2011), Draft Standard for Local and Metropolitan Area Networks—Part 21: Media Independent Handover Services—Amendment 1: Extension for Supporting Handover with Downlink Only Technologies.

4. Important elements of IEEE standards drafts

4.4 Figures

Replace Figure 2 with the following:



NOTE—Notes to figures are formatted between the graphic and the figure caption.

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Figure 2—A sample of figure presentation

Annex C

(informative)

Glossary

Insert Annex C to follow Annex B. Add the following terms in alphabetical order to Annex B as shown:

circuit breaker: A device designed to open and close a circuit by nonautomatic means, and to open the circuit automatically on a predetermined overload of current, without injury to itself when properly applied within its rating.

continuous current: The maximum constant rms power frequency current that can be carried continuously without causing further measurable increase in temperature rise underprescribed conditions of test, and within the limitations of established standards.

loading: The modification of a basic antenna such as a dipole or monopole caused by the addition of conductors or circuit elements that change the input impedance or current distribution or both.

Annex C

(informative)

Sample IEEE Permission Form Request and Response Letters for working groups

When previously Published material is to be reprinted or modified for use in an IEEE standard, permission to use that material is required. The working group shall obtain clear, written permission from the copyright holder as early as possible in the process, but in no event later than submittal of the document for approval by the IEEE-SA Standards Board.

Copies of these letters may be found at:

http://standards.ieee.org/develop/stdsreview.html

These Permission Form Request and Response letters are only samples. Agreements that do not conform to the IEEE Permission Form Letters are possible, but such requests shall be in writing and shall be approved by IEEE-SA staff.

- Non-exclusive, irrevocable
- Royalty-free permission
- World rights for distribution
- Permission to modify and reprint in future revisions and all media known or hereinafter known

Copies of any correspondence regarding copyrights shall be sent to the IEEE Standards Activities Department (stds.ipr@ieee.org).

If the working group plans on using a previously copyrighted document in its entirety or as a base document in a proposed IEEE standard, these sample letters may not be sufficient. It may be necessary for the IEEE Standards Activities Department staff to negotiate a license agreement with the copyright owner, so it is advisable that the staff be notified as early in the process as possible. Contact stds.ipr@ieee.org. Working groups shall not negotiate agreements with outside entities with regard to IEEE standards.

Annex D

(informative)

Guidelines and best practices for the creation and maintenance of IEEE standards terms and definitions

D.1 Creation of new terms and definitions

The following guidelines should be followed when creating new terms and definitions:

a) New terms and definitions included in IEEE standards should be written in plain English using clear and concise descriptions. Terms themselves should not be used in their own definitions.
b) Needless customization should be avoided so that definitions have as broad an application as appropriate. Definitions that are too specific should be avoided.
c) New definitions that serve to add a new definition to an existing term(s) of the same name should be different enough from the other term(s) so as to justify the addition. Having more than two or three acceptable definitions for any term is discouraged.
d) Terms and definitions that are included in IEEE standards but that are taken from other sources must be accompanied by an appropriate permission acknowledgement. The sources should be identified in a parenthetical statement that immediately follows the term/definition.
e) Supplemental material that accompanies a term for clarification but that is not an official part of the actual definition should be included either in the body of the document or in a note that immediately follows the term/definition. Definitions should not include references to other clauses/subclauses in the standard.
f) Definitions should have no commercial connotations and should be completely non-proprietary.
g) Symbols should be defined as appropriate.
h) Acronyms and abbreviations should be included in a separate subclause.

Suggestions for oversight (at WG, committee, or society/sponsor level):

— It is recommended that every standards-developing society/sponsor have a definitions group of some kind. If a society has multiple groups (whether at the committee or WG levels), there should be one ruling group responsible for making ultimate decisions and concluding any differences.
— WGs should be educated to ask themselves to technically justify new terms and their definitions before proposing them.
— New terms and definitions should be examined in consideration of: subject matter; existing terms in the IEEE-SA definitions database and general-usage dictionaries[10]; usage within other IEEE-SA societies/committees; comparable international terms; usage in relevant literature; etc.
— The creation of new terms can be time consuming and may take place either before or after WG meetings.

D.2 Revision of existing terms and definitions

The following guidelines should be followed when revising existing terms and definitions:

[10] The *IEEE Standards Style Manual* uses and recommends the latest edition of *Webster's New Collegiate Dictionary*.

a) Because all terms, including revised terms, must be seen and approved by balloters, all existing terms that require revision should be included in revision drafts. A note indicating that the term is being revised may be appropriate.
b) Groups are encouraged to revise terms only if necessary. Needless revision for minor or editorial changes is discouraged.

Suggestions for oversight (at WG, committee, or society/sponsor level):

— Societies may appoint the task of revising terms to the same group responsible for the general oversight of the creation of terms and definitions.
— If the revision of an existing term is being done to include requirements of other societies, etc., communication should take place first with members of the definitions-review teams within those other groups so as to consider relevant factors.

D.3 The IEEE-SA Definitions Database

All terms defined in IEEE-SA approved standards are automatically included in the IEEE-SA Definitions Database, which is updated on a regular basis.

Any terms that WGs, committees, or societies use within their group that are intended for inclusion in the IEEE-SA Definitions Database must be written into drafts that go for ballot and SASB approval.

The IEEE-SA Definitions Database is a complimentary tool made available to WG chairs and technical editors.[11] Other standards developers can purchase the 2009 *IEEE Standards Dictionary: Glossary of Terms & Definitions* CD-ROM via IEEE Shop (http://standards.ieee.org/findstds/prod/bk).

D.4 International harmonization

For IEEE standards that are, might be, or will be used in the international arena, it is suggested that the text of the definitions also be included in the text of the standards themselves.

In some cases, if a particular IEEE definition is preferred over a definition used elsewhere in the international arena, this should be indicated.

Special attention should be given to definitions intended as dual logo documents.

Suggestion for oversight (at WG, committee, or sponsor level):

— When creating terms/definitions for international projects, it is appropriate to research any international requirements/differences.
— Questions regarding style for international projects should be directed to IEEE-SA editorial staff.

[11] IEEE-SA standards developers should contact their IEEE-SA staff liaisons for assistance with this.