IEEE STANDARDS ASSOCIATION

IEEE Standard Reliability Program for the Development and Production of Electronic Products

IEEE Reliability Society

Sponsored by the
Standards Committee

IEEE
3 Park Avenue
New York, NY 10016-5997
USA

16 January 2013

IEEE Std 1332™-2012
(Revision of
IEEE Std 1332-1998)

IEEE Std 1332™-2012
(Revision of
IEEE Std 1332-1998)

IEEE Standard Reliability Program for the Development and Production of Electronic Products

Sponsor

Standards Committee
of the
IEEE Reliability Society

Approved 5 December 2012

IEEE-SA Standards Board

Abstract: A standard set of reliability program objectives for use between customers and producers, or within product development teams, to express reliability program requirements early in the development phase of electronic products and systems is provided in this document.

Keywords: electronic equipment, electronic systems, electronics, IEEE 1332, reliability, reliability program, reliability program standard

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

PDF: ISBN 978-0-7381-8126-4 STD98084
Print: ISBN 978-0-7381-8127-1 STDPD98084

Notice and Disclaimer of Liability Concerning the Use of IEEE Documents: IEEE Standards documents are developed within the IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board. IEEE develops its standards through a consensus development process, approved by the American National Standards Institute, which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of the Institute and serve without compensation. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, IEEE does not independently evaluate, test, or verify the accuracy of any of the information or the soundness of any judgments contained in its standards.

Use of an IEEE Standard is wholly voluntary. IEEE disclaims liability for any personal injury, property or other damage, of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance upon any IEEE Standard document.

IEEE does not warrant or represent the accuracy or content of the material contained in its standards, and expressly disclaims any express or implied warranty, including any implied warranty of merchantability or fitness for a specific purpose, or that the use of the material contained in its standards is free from patent infringement. IEEE Standards documents are supplied "**AS IS**."

The existence of an IEEE Standard does not imply that there are no other ways to produce, test, measure, purchase, market, or provide other goods and services related to the scope of the IEEE standard. Furthermore, the viewpoint expressed at the time a standard is approved and issued is subject to change brought about through developments in the state of the art and comments received from users of the standard. Every IEEE standard is subjected to review at least every ten years. When a document is more than ten years old and has not undergone a revision process, it is reasonable to conclude that its contents, although still of some value, do not wholly reflect the present state of the art. Users are cautioned to check to determine that they have the latest edition of any IEEE standard.

In publishing and making its standards available, IEEE is not suggesting or rendering professional or other services for, or on behalf of, any person or entity. Nor is IEEE undertaking to perform any duty owed by any other person or entity to another. Any person utilizing any IEEE Standards document, should rely upon his or her own independent judgment in the exercise of reasonable care in any given circumstances or, as appropriate, seek the advice of a competent professional in determining the appropriateness of a given IEEE standard.

Translations: The IEEE consensus development process involves the review of documents in English only. In the event that an IEEE standard is translated, only the English version published by IEEE should be considered the approved IEEE standard.

Official Statements: A statement, written or oral, that is not processed in accordance with the IEEE-SA Standards Board Operations Manual shall not be considered the official position of IEEE or any of its committees and shall not be considered to be, nor be relied upon as, a formal position of IEEE. At lectures, symposia, seminars, or educational courses, an individual presenting information on IEEE standards shall make it clear that his or her views should be considered the personal views of that individual rather than the formal position of IEEE.

Comments on Standards: Comments for revision of IEEE Standards documents are welcome from any interested party, regardless of membership affiliation with IEEE. However, IEEE does not provide consulting information or advice pertaining to IEEE Standards documents. Suggestions for changes in documents should be in the form of a proposed change of text, together with appropriate supporting comments. Since IEEE standards represent a consensus of concerned interests, it is important to ensure that any responses to comments and questions also receive the concurrence of a balance of interests. For this reason, IEEE and the members of its societies and Standards Coordinating Committees are not able to provide an instant response to comments or questions except in those cases where the matter has previously been addressed. Any person who would like to participate in evaluating comments or revisions to an IEEE standard is welcome to join the relevant IEEE working group at http://standards.ieee.org/develop/wg/.

Comments on standards should be submitted to the following address:

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

Notice to users

Laws and regulations

Users of IEEE Standards documents should consult all applicable laws and regulations. Compliance with the provisions of any IEEE Standards document does not imply compliance to any applicable regulatory requirements. Implementers of the standard are responsible for observing or referring to the applicable regulatory requirements. IEEE does not, by the publication of its standards, intend to urge action that is not in compliance with applicable laws, and these documents may not be construed as doing so.

Copyrights

This document is copyrighted by the IEEE. It is made available for a wide variety of both public and private uses. These include both use, by reference, in laws and regulations, and use in private self-regulation, standardization, and the promotion of engineering practices and methods. By making this document available for use and adoption by public authorities and private users, the IEEE does not waive any rights in copyright to this document.

Updating of IEEE documents

Users of IEEE Standards documents should be aware that these documents may be superseded at any time by the issuance of new editions or may be amended from time to time through the issuance of amendments, corrigenda, or errata. An official IEEE document at any point in time consists of the current edition of the document together with any amendments, corrigenda, or errata then in effect. In order to determine whether a given document is the current edition and whether it has been amended through the issuance of amendments, corrigenda, or errata, visit the IEEE-SA Website at http://standards.ieee.org/index.html or contact the IEEE at the address listed previously. For more information about the IEEE Standards Association or the IEEE standards development process, visit IEEE-SA Website at http://standards.ieee.org/index.html.

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 at 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.

Essential Patent Claims may exist for which a Letter of Assurance has not been received. The IEEE is not responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patents Claims, or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility. Further information may be obtained from the IEEE Standards Association.

Participants

At the time this IEEE standard was completed, the Reliability Assessment Working Group had the following membership:

Michael Pecht, Ph. D., *Chair*
Michael H. Azarian, Ph. D., *Vice Chair*
Louis J. Gullo, *Sponsor Committee Chair and SA Liaison*

Lori Bechtold
Joseph Childs
Michael Cushing, Ph. D.
Diganta Das, Ph. D.
Carla Head
Tyrone Jackson
Jason Mackinlay
Keith Moore
Timothy Pohland
Fred Schenkelberg
Benjamin Werner

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

Satish Aggarwal
James Arnold
Michael H. Azarian, Ph. D.
Hugh Barrass
Michael Basler
Thomas Basso
Lori Bechtold
Wallace Binder
Pieter Botman
Bill Brown
Malcom Brown
Gustavo Brunello
William Byrd
Paul Cardinal
Juan Carreon
Joseph Childs
Keith Chow
Michael Cushing, Ph. D.
Diganta Das, Ph. D.
Ratan Das
Matthew Davis
Ray Davis
Patrick Diamond
Thomas Dineen
Neal Dowling
Gary Engmann
David Fuschi
David Gilmer
James Gleason
Chris Gorringe
Lowell Goudge
Randall Groves
Louis J. Gullo
Michael Gundlach
Werner Hoelzl
D. Hoffman
Gary Hoffman
Akio Iso
Atsushi Ito
Kenneth Karg
Stuart Kerry
Yuri Khersonsky
Yongbum Kim
Joseph L. Koepfinger
Jim Kulchisky
Saumen Kundu
Greg Luri
Ahmad Mahinfallah
Edward McCall
Georges Montillet
Jeffrey Moore
R. Murphy
Ryan Musgrove
Michael S. Newman
Ted Olsen
William Petit
Annette Reilly
Ted Riccio
Michael Roberts
Sergio Santos
Bartien Sayogo
Robert Schaaf
Fred Schenkelberg
Stephen Schwarm
Alexander Sinyak
Jeremy Smith
Jerry Smith
Joseph Stanco
Walter Struppler
William Taylor
Eric Udren
Srinivasa Vemuru
John Vergis
Hung-Yu Wei
Matthew Wilkowski
Forrest Wright
Oren Yuen
Daidi Zhong

When the IEEE-SA Standards Board approved this standard on 5 December 2012, it had the following membership:

Richard H. Hulett, *Chair*
John Kulick, *Vice Chair*
Robert M. Grow, *Past Chair*
Konstantinos Karachalios, *Secretary*

Satish Aggarwal	Alexander Gelman	Ted Olsen
Masayuki Ariyoshi	Paul Houzé	Gary Robinson
Peter Balma	Jim Hughes	Jon Walter Rosdahl
William Bartley	Joseph L. Koepfinger*	Sam Sciacca
Ted Burse	David J. Law	Mike Seavey
Clint Chaplin	Thomas Lee	Yatin Trivedi
Wael Diab	Hung Ling	Phil Winston
Jean-Philippe Faure	Oleg Logvinov	Don Wright

*Member Emeritus

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

Richard DeBlasio, *DOE Representative*
Michael Janezic, *NIST Representative*

Patrick Gibbons
IEEE Standards Program Manager, Document Development

Michael Kipness
IEEE Standards Program Manager, Technical Program Development

Introduction

This introduction is not part of IEEE Std 1332-2012, IEEE Standard Reliability Program for the Development and Production of Electronic Products.

The original version of IEEE Std 1332™ was developed in 1998 in response to the impending cancellation of MIL-STD-785, "Reliability Program for Systems and Equipment Development and Production." The intent was to create a reliability program standard that would be equally useful to both the commercial and military sectors of industry. Initial recommendations from industry, government, and academia were solicited through a questionnaire published in the April 1994 *IEEE Reliability Society Newsletter*. The recommendations formed the basis for the document's philosophy.

The current revision of IEEE Std 1332 incorporates concepts and practices introduced in the two recently issued reliability program-related standards, IEEE Std 1624 ™ [B6][a] and ANSI/GEIA-STD-0009 [B3]. IEEE Std 1624 defines the term, "organizational reliability capability," and provides specific criteria for assessing the capability of organizations to design and produce systems and products that consistently meet reliability requirements. These criteria were structured around three reliability program objectives defined in the original version of IEEE Std 1332 and were elaborated through the identification of eight key practices with associated activities.

ANSI/GEIA-STD-0009 provides additional requirements for reliability management practices, design, and testing activities that make up an effective reliability program, without being prescriptive with regards to the specific methods used to accomplish those requirements.

This document recognizes the reliability program structures described in IEEE Std 1624 [B6] and ANSI/GEIA-STD-0009 [B3] and incorporates these into the compliance requirements for an effective reliability program. It has been written to address the needs of both military program managers, where products are typically developed on the basis of contractual specifications, and the commercial sector, where products may be designed and manufactured without the prior receipt of an order.

[a] The numbers in brackets correspond to those of the bibliography in Annex A

Contents

IEEE Standard Reliability Program for the Development and Production of Electronic Products

1. Overview

1.1 Scope

This document provides a standard set of reliability program objectives for use between customers and producers, or within product development teams, to express reliability program requirements early in the development phase of electronic products and systems.

1.2 Purpose

The purpose of this document is to establish a standard set of objectives which provide an effective structure for the life-cycle activities needed to design, manufacture and utilize reliable electronic products and systems across the supply chain.