



INTERNATIONAL STANDARD

**Dependability management -
Part 3-10: Application guide - Maintainability and maintenance**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2025 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search -

webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

This is a preview of IEC 60300-3-10 Ed. 2.0 en:2025. [Click here to purchase the full version from the ANSI store.](#)

FOREWORD	4
INTRODUCTION	6
1 Scope	7
2 Normative references	7
3 Terms, definitions and abbreviated terms	7
3.1 Terms and definitions	7
3.2 Abbreviated terms	9
4 Maintainability and maintenance overview	10
4.1 Description of maintainability	10
4.2 Description of maintenance	10
4.3 Principles	10
4.4 Benefits	11
4.5 Interfaces	11
4.5.1 General	11
4.5.2 Effect of maintainability and maintenance on reliability	12
4.5.3 Effect of maintainability and maintenance on supportability and support	12
4.5.4 Effect of maintainability and maintenance on availability	13
4.5.5 Effect of maintainability and maintenance on life cycle cost	13
5 Manager responsibility	13
5.1 Overview	13
5.2 Maintenance policy	14
6 Specifying for maintainability and maintenance	15
6.1 Defining requirements	15
6.2 Characteristics of maintainable items	16
6.3 Measures of maintainability	17
6.3.1 Overview	17
6.3.2 Quantitative measures of maintainability	17
6.3.3 Qualitative measures of maintainability	20
6.3.4 Measures of testability	22
6.4 Measures of maintenance effectiveness	23
7 Maintainability programme	24
7.1 Overview	24
7.2 Plan the maintainability programme	24
7.2.1 Establishing the context	24
7.2.2 Define the objectives and scope	25
7.2.3 Plan maintainability activities and associated resources	25
7.3 Maintainability activities	26
7.3.1 Modelling	26
7.3.2 Allocation	26
7.3.3 Analysis	27
7.3.4 Prediction	28
7.3.5 Trade-off studies	29
7.3.6 Measurement	30
7.4 Perform maintainability activities	31
7.5 Review of maintainability activities	31
8 Maintenance programme	32

This is a preview of IEC 60300-3-10 Ed. 2.0 en:2025. [Click here to purchase the full version from the ANSI store.](#)

8.2	Planning the maintenance programme	33
8.2.1	Establish the context	33
8.2.2	Maintenance concept.....	33
8.2.3	Establish management arrangements and resources	34
8.3	Establishing the maintenance tasks	35
8.3.1	Maintenance analysis	35
8.3.2	Task packaging	38
8.3.3	Scheduling	38
8.4	Maintenance procedures.....	39
8.5	Performing maintenance	40
8.6	Data collection and maintenance improvement	42
9	Managing maintainability and maintenance over the life cycle	43
9.1	General.....	43
9.2	Concept stage.....	43
9.2.1	Overview	43
9.3	Development stage	44
9.3.1	Maintainability design	44
9.3.2	Maintenance and support design	46
9.3.3	Design reviews	47
9.4	Realization stage	47
9.4.1	Manufacturing.....	47
9.4.2	Installation.....	47
9.5	Utilization stage	48
9.5.1	Operations and maintenance	48
9.5.2	Software maintenance help desk	48
9.5.3	Enhancement stage	49
9.6	Retirement stage	49
10	Assurance	50
10.1	Assurance objectives	50
10.2	Methods of assurance.....	50
10.2.1	Overview	50
10.2.2	Methods of verification.....	50
10.2.3	Verification process	51
10.2.4	Conditions and constraints.....	52
10.2.5	Dependability case	52
11	Contractor management	53
12	Maintainability and maintenance information	54
12.1	General.....	54
12.2	Information types	54
12.3	Data and information control	55
12.3.1	General	55
12.3.2	Configuration management.....	56
Annex A (informative)	Maintainability analysis	57
A.1	General.....	57
A.2	Design support.....	60
A.2.1	Design criteria and checklists	60
A.2.2	Design reviews	60

This is a preview of IEC 60300-3-10 Ed. 2.0 en:2025. [Click here to purchase the full version from the ANSI store.](#)

A.3.1	Block diagrams	61
A.3.2	Failure mode and effects analysis (FMEA)	63
A.3.3	Fault tree analysis (FTA)	63
A.3.4	Reliability centred maintenance (RCM)	63
A.3.5	Task analysis.....	64
A.3.6	Level of repair analysis (LORA)	64
A.3.7	Testability analysis	64
A.3.8	Human factors analysis	65
A.3.9	Maintainability index analysis	65
A.3.10	Maintainability demonstration	65
A.3.11	Root cause analysis	66
Annex B (informative)	Maintenance execution.....	67
B.1	General.....	67
B.2	Interrelationship of maintenance terms	67
B.3	Maintenance model.....	68
B.3.1	General	68
B.3.2	Process model sub-elements	68
Bibliography	70
Figure 1	– Basic steps in maintainability prediction	29
Figure 2	– Maintenance and maintenance support planning process	37
Figure 3	– Types of maintenance tasks	40
Figure 4	– Maintainability and maintenance planning process	46
Figure A.1	– Maintainability analysis in the design process	59
Figure A.2	– Hardware level maintainability block diagram.....	62
Figure B.1	– Interrelationship of maintenance terms	67
Figure B.2	– Maintenance management model.....	68
Table 1	– Examples of quantitative maintainability measures (hardware)	18
Table 2	– Examples of quantitative maintainability measures (software)	20
Table 3	– Examples of qualitative maintainability measures	21
Table 4	– Examples of testability measures	22
Table 5	– Qualitative and quantitative maintainability verification procedures.....	51
Table A.1	– Detailed tasks in maintainability analysis	57

Dependability management - Part 3-10: Application guide - Maintainability and maintenance

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60300-3-10 has been prepared by IEC technical committee 56: Dependability. It is an International Standard.

This second edition cancels and replaces the first edition published in 2001. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) more guidance is included on establishing a maintenance programme;
- b) some guidance on support and supportability has been removed and has been moved to IEC 60300-3-14.

This is a preview of IEC 60300-3-10 Ed. 2.0 en:2025. Click here to purchase the full version from the ANSI store.

Draft	Report on voting
56/2059/FDIS	56/2097/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60300 series, published under the general title *Dependability management*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

This is a preview of IEC 60300-3-10 Ed. 2.0 en:2025. [Click here to purchase the full version from the ANSI store.](#)

This document provides guidance on how to identify and apply appropriate analysis and assurance techniques for maintainability and maintenance.

Maintainability relates to the ease and speed with which an item can be retained in, or restored to, a state to perform as required. Maintainability relates to the time and resources to undertake maintenance in a defined context.

For software, maintainability is the ease with which the software can be modified without major reverse engineering or redesign to address faults and changing needs. The purpose of software maintenance is to retain the functionality of software over time.

Maintenance actions are those necessary to retain or restore an item to a state to perform as required. The relative ease and economy of maintenance actions relates to the total impact resulting from the actions' frequency, timing, and duration. The impact can include economic, availability and performance impacts.

An important part of the cost of an item over its life is the total resources spent on the tasks necessary to maintain it in a satisfactory condition. This is influenced by the number of required tasks, their complexity, and duration. An item that can be maintained easily and is supported by a competent and efficient maintenance organization generally has a greater availability and a reduced life cycle cost compared to one that does not have these attributes.

This document provides managers and technical professionals involved in specification, design, development, manufacture, acceptance and use of products and services with guidance on how to achieve, analyse and ensure maintainability and maintenance effectiveness.

Guidance in this document can be used at any time during the life cycle of an item or project for the planning and implementation of a maintainability or maintenance programme.

The activities described within this document can form part of an organization's asset management or quality management strategy and can therefore be aligned to, and consistent with, the organizational objectives.

The maintainability and maintenance programme content described in this document can be tailored to suit the needs of the application. Maintainability and maintenance programmes can be conducted independently or as one integrated programme.

This document is one of the 'top level' interrelated dependability standards that provides managers and technical personnel with guidance on how to effectively plan and implement dependability activities. Other documents in the suite are:

- IEC 60300-1 which highlights the importance and benefits of managing dependability. It gives guidance on dependability activities and how to integrate them into an existing management system and life cycle processes;
- IEC 60300-3-4 which provides guidance for writing dependability requirements in specifications together with a means of assuring the achievement of those requirements;
- IEC 60300-3-14 which provides guidance on how to identify and apply appropriate analysis and assurance techniques for supportability (and support);
- Standards to cover reliability and availability, which are planned.

This is a preview of IEC 60300-3-10 Ed. 2.0 en:2025. [Click here to purchase the full version from the ANSI store.](#)

This part of IEC 60300 gives guidance to managers and technical and financial personnel on the basic principles of maintainability and maintenance activities that are applicable to any organization.

This document describes:

- the value and nature of maintainability and maintenance characteristics;
- the interfaces between maintainability and related dependability attributes of reliability, availability and supportability, as well as potential trade-offs that can be made through the interfaces during the life cycle of an item;
- the elements of maintainability and maintenance programmes;
- the application of maintainability and maintenance programmes throughout the life cycle;
- techniques to ensure maintainability and maintenance requirements are met;
- maintainability and maintenance data and information management.

This document is applicable to equipment, software, services, or structures, and gives guidance on matters of common interest to any business supplying, purchasing or sustaining products, services, or structures.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-192, *International Electrotechnical Vocabulary (IEV) - Part 192: Dependability*, available at <https://www.electropedia.org/>