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60300-3-14

First edition
2004-03

Dependability management –

Part 3-14:

Application guide –

Maintenance and maintenance support

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

DEPENDABILITY MANAGEMENT –

**Part 3-14: Application guide –
Maintenance and maintenance support**

FOREWORD

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International Standard IEC 60300-3-14 has been prepared by IEC technical committee 56: Dependability.

This first edition of IEC 60300-3-14 cancels and replaces IEC 60706-4, and provides a more general approach to maintenance and maintenance support.

The text of this standard is based on the following documents:

FDIS	Report on voting
56/929/FDIS	56/940/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until 2009. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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INTRODUCTION

The provision of maintenance and maintenance support is a key element in ensuring the dependability of items (products, equipment and systems) throughout their life cycle. Proper functionality, capability and dependability performance are achieved by providing the necessary maintenance and maintenance support in conjunction with appropriate design, quality manufacturing, and sound operating practices.

The amount and type of maintenance and maintenance support depends on customer needs, the nature of the item, its condition, required availability and other factors. As these factors change, especially during the operation and maintenance phase, maintenance and maintenance support may need to be adjusted.

A number of different functions, such as maintenance management and asset management, include maintenance and maintenance support. This standard does not preclude their use, but does indicate what should be addressed under these headings.

Inadequate, excessive or incorrect maintenance can cause failures, which may significantly reduce the availability of items and result in greatly increased cost due to loss of performance and possible secondary damage. The reduced availability often produces operational penalties and a consequent loss of revenue, which can be significantly greater than the cost of maintenance or even the cost of the original failure. Safety may also be affected and in some industries this may be the most important consideration.

This standard provides a more general approach to maintenance and maintenance support than used in integrated logistic support (ILS). ILS is a method by which all logistic support services are considered and provided for customers as an integral part of product development. This standard addresses the case for complex systems where maintenance and maintenance support need to be adjusted to specific situations during both the design phase and the operation and maintenance phase.

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DEPENDABILITY MANAGEMENT –

Part 3-14: Application guide – Maintenance and maintenance support

1 Scope

This part of IEC 60300 describes a framework for maintenance and maintenance support and the various minimal common practices that should be undertaken. The purpose of this standard is to outline, in a generic manner, management, processes and techniques related to maintenance and maintenance support that are necessary to achieve adequate dependability to meet the operational needs of the customer.

NOTE 1 Maintenance and maintenance support are a major element of dependability as described in IEC 60300-1 and IEC 60300-2.

In some cases, regulatory and other mandatory requirements need to be considered. Maintenance and maintenance support requirements and obligations may therefore need to be specified in a contract, which cites this standard.

This standard is intended for use by a wide range of suppliers, maintenance support organizations and users and can be applied to all items.

This standard is applicable to items, which include all types of products, equipment and systems (hardware and associated software). Most of these require a certain level of maintenance to ensure that their required functionality, dependability, capability, economic, safety and regulatory requirements are achieved.

NOTE 2 For consistency, this standard will use the term “item” as defined in 3.1.5, except where the context requires otherwise.

2 Normative references

The following referenced documents are indispensable for the application 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 60300-1:2003, *Dependability management – Part 1: Dependability management systems*

IEC 60300-2:2004, *Dependability management – Part 2: Guidelines for dependability management*

IEC 60300-3-2, *Dependability management – Part 3: Application guide – Section 2: Collection of dependability data from the field*

IEC 60300-3-3, *Dependability management – Part 3: Application guide – Section 3: Life cycle costing*

IEC 60300-3-10, *Dependability management – Part 3-10: Application guide – Maintainability*

IEC 60300-3-11, *Dependability management – Part 3-11: Application guide – Reliability centred maintenance*

IEC 60300-3-12, *Dependability management – Part 3-12: Application guide – Integrated logistic support*

IEC 60706-3, *Guide on maintainability of equipment – Part 3: Sections Six and Seven – Verification and collection, analysis and presentation of data*

IEC 60706-5, *Guide on maintainability of equipment – Part 5: Section 4: Diagnostic testing*

IEC 60812, *Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA)*

IEC 61025, *Fault tree analysis (FTA)*

IEC 61649, *Goodness-of-fit tests, confidence intervals and lower confidence limits for Weibull distributed data*

3 Terms, definitions and acronyms

3.1 Terms and definitions

For the purposes of this document the following definitions apply.

3.1.1

corrective maintenance

maintenance carried out after fault recognition and intended to put an item into a state in which it can perform a required function

NOTE In French, the term “dépannage” sometimes implies a provisional restoration.

[IEV 191-07-08:1990]

3.1.2

dependability

collective term used to describe the availability performance and its influencing factors: reliability performance, maintainability performance and maintenance support performance

NOTE Dependability is used only for general descriptions in non-quantitative terms.

[IEV 191-02-03:1990]

3.1.3

indenture level

level of subdivision of an item from the point of view of a maintenance action

NOTE 1 Examples of indenture levels could be a subsystem, a circuit board, a component.

NOTE 2 The indenture level depends on the complexity of the item's construction, the accessibility to subitems, skill level of maintenance personnel, test equipment facilities, safety considerations, etc.

[IEV 191-07-05:1990]

3.1.4

integrated logistic support

ILS

management method by which all the logistic support services required by a customer can be brought together in a structured way and in harmony with a product

3.1.5**item**

any part, component, device, subsystem, functional unit, equipment or system that can be individually considered

NOTE 1 An item may consist of hardware, software or both, and may also, in particular cases, include people.

NOTE 2 In French the term “entité” is preferred to the term “dispositif” due to its more general meaning. The term “dispositif” is also the common equivalent to the English term “device”.

NOTE 3 In French the term “individu” is used mainly in statistics.

NOTE 4 A number of items, e.g. a population of items or a sample, may itself be considered as an item.

[IEV 191-01-01:1990]

3.1.6**level of maintenance**

set of maintenance actions to be carried out at a specified indenture level

NOTE Examples of a maintenance action are replacing a component, a printed circuit board, a subsystem, etc.

[IEV 191-07-06:1990]

3.1.7**maintainability (performance)**

ability of an item under given conditions of use, to be retained in, or restored to, a state in which it can perform a required function, when maintenance is performed under given conditions and using stated procedures and resources

NOTE The term “maintainability” is also used as a measure of maintainability performance (see 191-13-01).

[IEV 191-02-07:1990]

3.1.8**maintenance**

combination of all technical and administrative actions, including supervision actions, intended to retain an item in, or restore it to, a state in which it can perform a required function

[IEV 191-07-01:1990]

3.1.9**maintenance action**

maintenance task

sequence of elementary maintenance activities carried out for a given purpose

NOTE Examples are fault diagnosis, fault localization, function check-out, or combinations thereof.

[IEV 191-07-18:1990]

3.1.10**maintenance concept**

interrelationship between the maintenance echelons, the indenture levels and the levels of maintenance to be applied for the maintenance of an item

3.1.11**maintenance echelon**

position in an organization where specified levels of maintenance are to be carried out on an item

NOTE 1 Examples of maintenance echelons are: field, repair shop, manufacturer.

NOTE 2 The maintenance echelon is characterized by the level of skill of the personnel, the facilities available, the location, etc.

[IEV 191-07-04:1990]

3.1.12

maintenance policy

general approach to the provision of maintenance and maintenance support based on the objectives and policies of owners, users and customers

3.1.13

maintenance support

resources required to maintain an item under a given maintenance concept and guided by a maintenance policy

NOTE Resources include human resources, support equipment, materials and spare parts, maintenance facilities, documentation, information and maintenance information systems.

3.1.14

maintenance support performance

ability of a maintenance organization, under given conditions, to provide upon demand, the resources required to maintain an item, under a given maintenance concept and guided by a maintenance policy

NOTE The given conditions are related to the item itself and to the conditions under which the item is used and maintained.

[IEV 191-02-08:1990, modified]

3.1.15

preventive maintenance

maintenance carried out at predetermined intervals or according to prescribed criteria and intended to reduce the probability of failure or the degradation of the functioning of an item

[IEV 191-07-07:1990]

NOTE 1 Preventive maintenance includes condition-based tasks that consist of condition monitoring, inspection and functional testing.

NOTE 2 Predetermined intervals apply to repair or replacement that are carried out at specific intervals such as elapsed time, operating hours, distance, number of cycles or other relevant measures.

3.1.16

product

any specified deliverable goods or service

NOTE 1 In the context of dependability, a product may be simple (e.g. a device, a software algorithm) or complex (e.g. a system or an integrated network comprising of hardware, software and human elements and support facilities and activities).

NOTE 2 A product has its own life cycle phases.

3.1.17

scheduled maintenance

preventive maintenance carried out in accordance with an established time schedule

[IEV 191-07-10:1990]

3.1.18

system

set of interrelated or interacting elements

[ISO 9000:2000, 3.2.1]

NOTE 1 In the context of dependability, a system will have

- a) a defined purpose expressed in terms of required functions;
- b) stated conditions of operation/use (191-01-12);
- c) defined boundaries.

NOTE 2 The structure of a system may be hierarchical.