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I.S. EN 60300-3-11:2009

# Dependability management -- Part 3 -11: Application guide - Reliability centred maintenance (IEC 60300-3 -11:2009 (EQV))

## I.S. EN 60300-3-11:2009

*Incorporating amendments/corrigenda issued since publication:*

<i>This document replaces:</i>	<i>This document is based on:</i> EN 60300-3-11:2009	<i>Published:</i> 25 November, 2009
This document was published under the authority of the NSAI and comes into effect on:  2 February, 2010		ICS number: 03.100.40 03.120.01
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**EUROPEAN STANDARD**

**EN 60300-3-11**

**NORME EUROPÉENNE**

**EUROPÄISCHE NORM**

November 2009

ICS 03.100.40; 03.120.01

English version

**Dependability management -  
Part 3-11: Application guide -  
Reliability centred maintenance  
(IEC 60300-3-11:2009)**

Gestion de la sûreté de fonctionnement -  
Partie 3-11: Guide d'application -  
Maintenance basée sur la fiabilité  
(CEI 60300-3-11:2009)

Zuverlässigkeitsmanagement -  
Teil 3-11: Anwendungsleitfaden -  
Auf die Funktionsfähigkeit bezogene  
Instandhaltung  
(IEC 60300-3-11:2009)

This European Standard was approved by CENELEC on 2009-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: Avenue Marnix 17, B - 1000 Brussels**

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## **Foreword**

The text of document 56/1312/FDIS, future edition 2 of IEC 60300-3-11, prepared by IEC TC 56, Dependability, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60300-3-11 on 2009-09-01.

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 2010-06-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2012-09-01

Annex ZA has been added by CENELEC.

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## **Endorsement notice**

The text of the International Standard IEC 60300-3-11:2009 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 61164	NOTE Harmonized as EN 61164:2004 (not modified).
IEC 61649	NOTE Harmonized as EN 61649:2008 (not modified).
IEC 61709	NOTE Harmonized as EN 61709:1998 (not modified).
IEC 62308	NOTE Harmonized as EN 62308:2006 (not modified).
ISO 9000	NOTE Harmonized as EN ISO 9000:2005 (not modified).

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## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-191	1990	International Electrotechnical Vocabulary (IEV) - Chapter 191: Dependability and quality of service	-	-
IEC 60300-3-2	- <sup>1)</sup>	Dependability management - Part 3-2: Application guide - Collection of dependability data from the field	EN 60300-3-2	2005 <sup>2)</sup>
IEC 60300-3-10	- <sup>1)</sup>	Dependability management - Part 3-10: Application guide - Maintainability	-	-
IEC 60300-3-12	- <sup>1)</sup>	Dependability management - Part 3-12: Application guide - Integrated logistic support	EN 60300-3-12	2004 <sup>2)</sup>
IEC 60300-3-14	- <sup>1)</sup>	Dependability management - Part 3-14: Application guide - Maintenance and maintenance support	EN 60300-3-14	2004 <sup>2)</sup>
IEC 60812	- <sup>1)</sup>	Analysis techniques for system reliability - Procedure for failure mode and effects analysis (FMEA)	EN 60812	2006 <sup>2)</sup>

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<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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### **DEPENDABILITY MANAGEMENT –**

#### **Part 3-11: Application guide – Reliability centred maintenance**

### FOREWORD

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International Standard IEC 60300-3-11 has been prepared by IEC technical committee 56: Dependability.

This second edition cancels and replaces the first edition, published in 1999, and constitutes a technical revision.

The previous edition was based on ATA<sup>1</sup>-MGS-3; whereas this edition applies to all industries and defines a revised RCM algorithm and approach to the analysis process.

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<sup>1</sup> The Air Transport Association of America.

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

FDIS	RVD
56/1312/FDIS	56/1320/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.

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

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be:

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

## INTRODUCTION

Reliability centred maintenance (RCM) is a method to identify and select failure management policies to efficiently and effectively achieve the required safety, availability and economy of operation. Failure management policies can include maintenance activities, operational changes, design modifications or other actions in order to mitigate the consequences of failure.

RCM was initially developed for the commercial aviation industry in the late 1960s, resulting in the publication of ATA-MGS-3 [1]<sup>2</sup>. RCM is now a proven and accepted methodology used in a wide range of industries.

RCM provides a decision process to identify applicable and effective preventive maintenance requirements, or management actions, for equipment in accordance with the safety, operational and economic consequences of identifiable failures, and the degradation mechanism responsible for those failures. The end result of working through the process is a judgement as to the necessity of performing a maintenance task, design change or other alternatives to effect improvements.

The basic steps of an RCM programme are as follows:

- a) initiation and planning;
- b) functional failure analysis;
- c) task selection;
- d) implementation;
- e) continuous improvement.

All tasks are based on safety in respect of personnel and environment, and on operational or economic concerns. However, it should be noted that the criteria considered will depend on the nature of the product and its application. For example, a production process will be required to be economically viable, and may be sensitive to strict environmental considerations, whereas an item of defence equipment should be operationally successful, but may have less stringent safety, economic and environmental criteria.

Maximum benefit can be obtained from an RCM analysis if it is conducted at the design stage, so that feedback from the analysis can influence design. However, RCM is also worthwhile during the operation and maintenance phase to improve existing maintenance tasks, make necessary modifications or other alternatives.

Successful application of RCM requires a good understanding of the equipment and structure, as well as the operational environment, operating context and the associated systems, together with the possible failures and their consequences. Greatest benefit can be achieved through targeting of the analysis to where failures would have serious safety, environmental, economic or operational effects.

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<sup>2</sup> Figures in square brackets refer to the bibliography.

## DEPENDABILITY MANAGEMENT –

### Part 3-11: Application guide – Reliability centred maintenance

#### 1 Scope

This part of IEC 60300 provides guidelines for the development of failure management policies for equipment and structures using reliability centred maintenance (RCM) analysis techniques.

This part serves as an application guide and is an extension of IEC 60300-3-10, IEC 60300-3-12 and IEC 60300-3-14. Maintenance activities recommended in all three standards, which relate to preventive maintenance, may be implemented using this standard.

The RCM method can be applied to items such as ground vehicles, ships, power plants, aircraft, and other systems which are made up of equipment and structure, e.g. a building, airframe or ship's hull. Typically, equipment comprises a number of electrical, mechanical, instrumentation or control systems and subsystems which can be further broken down into progressively smaller groupings, as required.

This standard is restricted to the application of RCM techniques and does not include aspects of maintenance support, which are covered by the above-mentioned standards or other dependability and safety standards.

#### 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 60050-191:1990, *International Electrotechnical Vocabulary – Chapter 191: Dependability and quality of service*

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

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

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

IEC 60300-3-14, *Dependability management – Part 3-14: Application guide – Maintenance and maintenance support*

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

#### 3 Terms, definitions and abbreviations

For the purposes of this document, the terms and definitions of IEC 60050-191 apply, together with the following.

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