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Uporaba tehnik Markov (IEC 61165:2006)

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Application of Markov techniques (IEC 61165:2006)

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61165

July 2006

ICS 03.120.01; 03.12.30; 21.020

English version

Application of Markov techniques
(IEC 61165:2006)

Application des techniques de Markov
(CEI 61165:2006)

Anwendung des Markoff-Verfahrens
(IEC 61165:2006)

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European Committee for Electrotechnical Standardization
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Ref. No. EN 61165:2006 E

Foreword

The text of document 56/1096/FDIS, future edition 2 of IEC 61165, prepared by IEC TC 56, Dependability, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61165 on 2006-07-01.

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)	2007-04-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-07-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61165:2006 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:

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IEC 60812 NOTE Harmonized as EN 60812:2006 (not modified).

IEC 61078 NOTE Harmonized as EN 61078:2006 (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.

Publication	Year	Title	EN/HD	Year
IEC 60050-191	1990	International Electrotechnical Vocabulary (IEV) Chapter 191: Dependability and quality of service	-	-
IEC 60300-3-1	-[1)]	Dependability management Part 3-1: Application guide - Analysis techniques for dependability - Guide on methodology	EN 60300-3-1	2004[2)]
IEC 61508-4 + corr. April	1998 1999	Functional safety of electrical/electronic/programmable electronic safety-related systems Part 4: Definitions and abbreviations	EN 61508-4	2001

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[1)] Undated reference.

[2)] Valid edition at date of issue.

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Application des techniques de Markov

Application of Markov techniques

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Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

APPLICATION OF MARKOV TECHNIQUES

FOREWORD

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International Standard IEC 61165 has been prepared by IEC technical committee 56: Dependability.

This second edition cancels and replaces the first edition published in 1995, and constitutes a technical revision. The revision was necessary in order to facilitate the application of this standard for safety analysis as well as the increased importance of numerical solutions compared to analytical solutions of Markov techniques.

The main changes with respect to the previous edition are the following:

- additional annexes with application examples have been removed.
- the mathematical terminology and symbols have been updated.
- terminology has been harmonised.

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

FDIS	Report on voting
56/1096/FDIS	56/1111/RVD

Full information on the voting for the approval of this standard can be found in the voting report 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 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;
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INTRODUCTION

Several distinct analytical methods for reliability, availability, maintainability and safety analysis are available of which the Markov technique is one. IEC 60300-3-1 gives an overview of available methods and their general characteristics.

This standard defines the basic terminology and symbols for the application of Markov techniques. It describes ground rules for the development, representation and application of Markov techniques as well as assumptions and limitations of this approach.

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APPLICATION OF MARKOV TECHNIQUES

1 Scope

This International Standard provides guidance on the application of Markov techniques to model and analyze a system and estimate reliability, availability, maintainability and safety measures.

This standard is applicable to all industries where systems, which exhibit state-dependent behaviour, have to be analyzed. The Markov techniques covered by this standard assume constant time-independent state transition rates. Such techniques are often called homogeneous Markov techniques.

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 (IEV) – Chapter 191: Dependability and quality of service*

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IEC 60300-3-1: *Dependability management – Part 3-1: Application guide – Analysis techniques for dependability: Guide on methodology*

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IEC 61508-4:1998, *Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 4: Definitions and abbreviations*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050(191):1990 and the following apply.

NOTE To facilitate the application of this standard for safety evaluations, the terminology from IEC 61508 is used where appropriate.

3.1
system
set of interrelated or interacting elements

[ISO 9000, 3.2.1]

NOTE 1 In the context of dependability, a system will have a defined purpose expressed in terms of intended functions, stated conditions of operation/use, and defined boundaries.

NOTE 2 The structure of a system may be hierarchical.

3.2
element
component or set of components, which function as a single entity

NOTE An element can usually assume only two states: up or down (see 3.4 and 3.5). For convenience the term **element state** will be used to denote the state of an element.