SLOVENSKI STANDARD
SIST EN 61078:2002

01-september-2002

Analysis techniques for dependability - Reliability block diagram method (IEC 61078:1991)

Analysis techniques for dependability - Reliability block diagram method

Techniken für die Analyse der Zuverlässigkeit - Verfahren mit dem Zuverlässigkeitsblockdiagramm

Techniques d'analyse de la sûreté de fonctionnement - Méthode du diagramme de fiabilité

Ta slovenski standard je istoveten z: **EN 61078:1993**

ICS:

21.020	Značilnosti in načrtovanje strojev, aparatov, opreme	Characteristics and design of machines, apparatus, equipment

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ENGLISH VERSION

Analysis techniques for dependability Reliability block diagram method (IEC 1078:1991)

Techniques d'analyse de la sûreté de fonctionnement Méthode du diagramme de fiabilité (CEI 1078:1991)

Techniken für die Analyse der Zuverlässigkeit Verfahren mit dem Zuverlässigkeitsblockdiagramm (IEC 1078:1991)

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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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

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

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FOREWORD

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 1078:1991 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as European Standard.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 61078 on 22 September 1993.

The following dates were fixed:

- latest date of publication of an identical national standard	(dop)	1994-09-01
- latest date of withdrawal of conflicting national standards	(dow)	1994-09-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given only for information.
In this standard, annexes A and ZA are normative and annex B is informative.

ENDORSEMENT NOTICE

The text of the International Standard IEC 1078:1991 was approved by CENELEC as a European Standard without any modification.

ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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

IEC Publication	Date	Title	EN/HD	Date
50(191)	1990	International Electrotechnical Vocabulary (IEV) - Chapter 191: Dependability and quality of service	-	-

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Analysis techniques for dependability – Reliability block diagram method

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ANALYSIS TECHNIQUES FOR DEPENDABILITY –

RELIABILITY BLOCK DIAGRAM METHOD

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

This International Standard has been prepared by IEC Technical Committee No. 56: Dependability.

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

Six Months' Rule	Report on Voting
56(CO)137	56(CO)145

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

Annex A forms an integral part of this International Standard.

Annex B is for information only.

INTRODUCTION

Different analytical methods of dependability analysis are available, of which the Reliability Block Diagram (RBD) is one. The purposes of each method and their individual or combined applicability in evaluating the reliability and availability of a given system or component should be examined by the analyst prior to starting work on the RBD. Consideration should also be given to the results obtainable from each method, data required to perform the analysis, complexity of analysis, and other factors identified in this standard.

ANALYSIS TECHNIQUES FOR DEPENDABILITY –

RELIABILITY BLOCK DIAGRAM METHOD

1 Scope

This International Standard describes procedures for modelling the dependability of a system and for using the model in order to calculate reliability and availability measures.

A standard set of symbols related to reliability parameters is given in annex A. Some formulae are given in Annex B.

2 Normative references

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 50 (191): 1990, *International Electrotechnical Vocabulary (IEV), Chapter 191: Dependability and quality of service.*

3 Definitions

Terms and definitions are in accordance with the International Electrotechnical Vocabulary (IEV), Chapter 191.

4 Symbols

Symbols and abbreviations are given in annex A.

5 Applicability

An RBD is a pictorial representation of a system's reliability performance. It shows the logical connection of (functioning) components needed for system success.

The modelling techniques described are intended to be applied primarily to systems without repair and where the order in which failures occur does not matter. For systems where the order of failures must be taken into account or where repairs are to be carried out, other modelling techniques, such as Markov analysis, are more suitable. At any instant in time, an item is considered to be in only one of two possible states: operational or faulty.

In the symbolic representation, no distinction is made between open circuit, short circuit or other fault modes; however, in the numerical evaluation this is possible.

6 System fault definitions and reliability requirements

6.1 *General considerations*

A prerequisite for constructing system reliability models is a sound understanding of the ways in which the system can operate. Systems often require more than one fault definition. These should be defined and listed.

In addition there should be clear statements concerning:

- functions to be performed;
- performance parameters and permissible limits on such parameters;
- environmental and operating conditions.

Various qualitative analysis techniques may be employed in the construction of an RBD. Therefore the system's fault definition has to be established. The system success is dependent on one or more system failures. For each system fault definition the next step is to divide the system into logical blocks appropriate to the purpose of the reliability analysis. Particular blocks may represent system substructures, which in turn may each be represented by other RBDs (system reduction).

For the quantitative evaluation of an RBD, various methods are available. Depending on the type of structure, simple Boolean techniques and/or path and cut set analyses may be employed. Calculations may be made using basic component reliability/availability data.

It should be noted that a reliability block diagram does not necessarily represent the way the hardware is physically connected. While this is obvious to experienced reliability engineers, it may not be so to others.

6.2 *Detailed considerations*

6.2.1 *System operation*

It may be possible to use a system for more than one functional mode. If separate systems were used for each mode, such modes should be treated independently of the rest, and separate reliability models should be used accordingly. If the same system were used to perform all these functions, then separate diagrams should be used for each type of operation. Clear statements of the reliability requirements associated with each aspect of system operation is a prerequisite.

6.2.2 *Environmental conditions*

The system performance specifications should be accompanied by a description of the environmental conditions under which the system is designed to operate. This should