



SLOVENSKI STANDARD

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Tehnične analize zagotovitljivosti - Analiza z drevesom dogodkov (ETA) (IEC 62502:2010)

Analysis techniques for dependability - Event tree analysis (ETA) (IEC 62502:2010)

Verfahren zur Analyse der Zuverlässigkeit - Ereignisbaumanalyse (ETA) (IEC 62502:2010)

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Techniques d'analyse de la sûreté de fonctionnement - Analyse par arbre d'événement (AAE) (CEI 62502:2010)

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21.020

Značilnosti in načrtovanje
strojev, aparatov, opreme

Characteristics and design of
machines, apparatus,
equipment

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EUROPEAN STANDARD
NORME EUROPÉENNE
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November 2010

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English version

**Analysis techniques for dependability -
Event tree analysis (ETA)**
(IEC 62502:2010)

Techniques d'analyse de la sûreté de
fonctionnement -
Analyse par arbre d'événement (AAE)
(CEI 62502:2010)

Verfahren zur Analyse
der Zuverlässigkeit -
Ereignisbaumanalyse (ETA)
(IEC 62502:2010)

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This European Standard was approved by CENELEC on 2010-11-01. 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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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 56/1380/FDIS, future edition 1 of IEC 62502, prepared by IEC TC 56, Dependability, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62502 on 2010-11-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

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) 2011-08-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2013-11-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62502:2010 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:

- | | | |
|------------------------------|------|--|
| [12] ISO/IEC 31010 | NOTE | Harmonized as EN 31010.
https://standards.iteh.ai/catalog/standards/sist/2ef53dd-083e-4b7d-a703-e114a8090375/sist-en-62502-2011 |
| [13] IEC 60300-3-1:2003 | NOTE | Harmonized as EN 60300-3-1:2004 (not modified). |
| [15] IEC 60812:2006 | NOTE | Harmonized as EN 60812:2006 (not modified) |
| [16] IEC 61078:2006 | NOTE | Harmonized as EN 61078:2006 (not modified) |
| [17] IEC 61165:2006 | NOTE | Harmonized as EN 61165:2006 (not modified) |
| [18] IEC 61508 series | NOTE | Harmonized in EN 61508 series (not modified) |
| [19] IEC 61511-3:2003 | NOTE | Harmonized as EN 61511-3:2004 (not modified) |
| [20] IEC 61703:2001 | NOTE | Harmonized as EN 61703:2002 (not modified) |
| [22] IEC 62429:2007 | NOTE | Harmonized as EN 62429:2008 (not modified) |
| [23] IEC 62508:2010 | NOTE | Harmonized as EN 62508:2010 (not modified) |
| [24] IEC 62551 ¹⁾ | NOTE | Harmonized as EN 62551 ²⁾ (not modified) |

¹⁾ To be published.

²⁾ At draft stage.

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 61025	2006	Fault Tree Analysis (FTA)	EN 61025	2007

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INTERNATIONAL STANDARD

NORME INTERNATIONALE



Analysis techniques for dependability – Event tree analysis (ETA)

Techniques d'analyse de la sûreté de fonctionnement – Analyse par arbre d'événement (AAE)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ANALYSIS TECHNIQUES FOR DEPENDABILITY –
EVENT TREE ANALYSIS (ETA)**

FOREWORD

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International Standard IEC 62502 has been prepared by IEC technical committee 56: Dependability.

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

FDIS	Report on voting
56/1380/FDIS	56/1389/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 the stability 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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INTRODUCTION

This International Standard defines the basic principles and procedures for the dependability technique known as Event Tree Analysis (ETA).

IEC 60300-3-1 explicitly lists ETA as an applicable method for general dependability assessment. It is also used in risk and safety analysis studies. ETA is also briefly described in the IEC 60300-3-9.

The basic principles of this methodology have not changed since the conception of the technique in the 1960's. ETA was first successfully used in the nuclear industry in a study by the U.S. Nuclear Regulatory Commission, the so-called WASH 1400 report in the year 1975 [31]¹.

Over the following years, ETA has gained widespread acceptance as a mature methodology for dependability and risk analysis and is applied in diverse industry branches ranging from the aviation industry, nuclear installations, the automotive industry, chemical processing, offshore oil and gas production, to defence industry and transportation systems.

In contrast to some other dependability techniques such as Markov modelling, ETA is based on relatively elementary mathematical principles. However, as mentioned in IEC 60300-3-1, the implementation of ETA requires a high degree of expertise in the application of the technique. This is due in part to the fact that particular care has to be taken when dealing with dependent events. Furthermore, one can utilize the close relationship between Fault Tree Analysis (FTA) and the qualitative and quantitative analysis of event trees.

This standard aims at defining the consolidated basic principles of the ETA and the current usage of the technique as a means for assessing the dependability and risk related measures of a system.

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¹ Figures in square brackets refer to the bibliography.

ANALYSIS TECHNIQUES FOR DEPENDABILITY – EVENT TREE ANALYSIS (ETA)

1 Scope

This International Standard specifies the consolidated basic principles of Event Tree Analysis (ETA) and provides guidance on modelling the consequences of an initiating event as well as analysing these consequences qualitatively and quantitatively in the context of dependability and risk related measures.

More specifically, this standard deals with the following topics in relation to event trees:

- a) defining the essential terms and describing the usage of symbols and ways of graphical representation;
- b) specifying the procedural steps involved in the construction of the event tree;
- c) elaborating on the assumptions, limitations and benefits of performing the analysis;
- d) identifying relationships with other dependability and risk-related techniques and elucidating suitable fields of applications;
- e) giving guidelines for the qualitative and quantitative aspects of the evaluation;
- f) providing practical examples.

This standard is applicable to all industries where the dependability and risk-related measures for the consequences of an initiating event have to be assessed.

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2 Normative references

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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 61025:2006, *Fault tree analysis (FTA)*

3 Terms, definitions, abbreviations and symbols

For the purposes of this document, the following terms and definitions, as well as those given in IEC 60050-191, apply.

3.1 Terms and definitions

3.1.1

node

point in the graphical representation of the event tree depicting two or more possible outcomes for the mitigating factor

NOTE The top event of the corresponding fault tree can directly be linked to a node.

3.1.2

common cause

cause of occurrence of multiple events

[IEC 61025:2006, 3.15]