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BUREAU OF INDIAN STANDARDS
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मसौदा भारतीय मानक

विश्वसनीयता, उपलब्धता, रखरखाव और रखरखाव समर्थन शर्तों के लिए गणितीय अभिव्यक्तियाँ

Draft Indian Standard

Mathematical expressions for reliability, availability, maintainability and maintenance support terms

ICS 03.120.30; 21.020

Dependability of Electronic, Electrical Components, Equipment and Systems Sectional Committee, LITD 02	**Last Date for Comments: 20 October 2023**.

NATIONAL FOREWORD

(Formal clauses will be added later)

This draft Indian Standard which is identical with IEC 61703: 2016 'Mathematical expressions for reliability, availability, maintainability and maintenance support terms' issued by the International Electrotechnical Commission (IEC) *will be* adopted by the Bureau of Indian Standards on the recommendations of the Dependability of Electronic, Electrical Components, Equipment and Systems Sectional Committee and approval of the Electronics and Information Technology Division Council.

The text of IEC Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions and terminologies are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard', and

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their respective places, are listed below along with their degree of equivalence for the editions indicated.

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies:

International Standards	Corresponding Indian Standard	Degree of Equivalence
IEC 60050-192: 2015 International electrotechnical vocabulary – Part 192: Dependability	IS 1885 (Part 192): 2015 Electrotechnical vocabulary Part 192 Dependability	Identical
ISO 3534-1:2006 Statistics – Vocabulary and symbols – Part 1: General statistical terms and terms used in probability	IS 7920 (Part 1) : 2012 Statistical - Vocabulary and symbols: Part 1 general statistical terms and terms used in probability (Third Revision)	Technically equivalent to ISO 3534-1 : 2006

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2:1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Scope of IEC 61703:2016 is as follows:

This International Standard provides mathematical expressions for selected reliability, availability, maintainability and maintenance support measures defined in IEC 60050-192:2015. In addition, it introduces some terms not covered in IEC 60050- 192:2015. They are related to aspects of the system of item classes (see hereafter).

According to IEC 60050-192:2015, dependability [192-01-22] is the ability of an item to perform as and when required and an item [192-01-01] can be an individual part, component, device, functional unit, equipment, subsystem, or system.

To account for mathematical constraints, this standard splits the items between the individual items considered as a whole (e.g. individual components) and the systems made of several individual items. It provides general considerations for the mathematical expressions for systems as well as individual items but the individual items which are easier to model are analysed in more detail with regards to their repair aspects. The following item classes are considered separately:

• Systems;
• Individual items: – non-repairable [192-01-12];
– repairable [192-01-11]:
i) with zero (or negligible) time to restoration;
ii) with non-zero time to restoration.

In order to explain the dependability concepts which can be difficult to understand, keep the standard self-contained and the mathematical formulae as simple as possible, the following basic mathematical models are used in this standard to quantify dependability measures:

• Systems:
– state-transition models;
– Markovian models.
• Individual items:
– random variable (time to failure) for non-repairable items;
– simple (ordinary) renewal process for repairable items with zero time to restoration;
– simple (ordinary) alternating renewal process for repairable items with non-zero time to restoration.

The application of each dependability measure is illustrated by means of simple examples.

This standard is mainly applicable to hardware dependability, but many terms and their definitions may be applied to items containing software.

NOTE− The Technical content of this document has not been enclosed as these are identical with the corresponding IEC Standard. For details please refer IEC 61703:2016 or kindly contact.

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