

Australian/New Zealand Standard™

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



## AS/NZS IEC 61703:2020

This Joint Australian/New Zealand Standard™ was prepared by Joint Technical Committee QR-005, Dependability. It was approved on behalf of the Council of Standards Australia on 22 April 2020 and by the New Zealand Standards Approval Board on 5 February 2020.

This Standard was published on 1 May 2020.

The following are represented on Committee QR-005:

- Asset Management Council (Australia)
- Australian Industry Group
- Department of Defence (Australian Government)
- Engineering New Zealand
- Engineers Australia
- Human Factors and Ergonomics Society of New Zealand
- Institution of Occupational Safety and Health
- National Rail Safety Regulator (Australia)
- National Road Carriers Association (New Zealand)
- New Zealand Institute of Safety Management
- Professionals Australia
- Risk Engineering Society (Australia)
- Risk Management Institute of Australasia
- RiskNZ
- University of New South Wales
- University of Western Australia
- University of Wollongong

This Standard was issued in draft form for comment as DR AS/NZS IEC 61703:2019.

### **Keeping Standards up-to-date**

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

[www.standards.org.au](http://www.standards.org.au)

[www.standards.govt.nz](http://www.standards.govt.nz)

AS/NZS IEC 61703:2020  
IEC 61703:2016

Australian/New Zealand Standard™

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

First published as AS/NZS IEC 61703:2020.

**COPYRIGHT**

© IEC 2020 — All rights reserved

© Standards Australia Limited/the Crown in right of New Zealand, administered by the New Zealand Standards Executive 2020

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968 (Cth) or the Copyright Act 1994 (New Zealand).

## Preface

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee QR-005, Dependability.

The objective of this Standard is to provide 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:

- (a) Systems;
- (b) Individual items —
  - (i) non-repairable [192-01-12];
  - (ii) repairable [192-01-11] —
    - (A) with zero (or negligible) time to restoration;
    - (B) 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:

- (i) Systems —
  - (A) state-transition models;
  - (B) Markovian models.
- (ii) Individual items —
  - (A) random variable (time to failure) for non-repairable items;
  - (B) simple (ordinary) renewal process for repairable items with zero time to restoration;
  - (C) 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.

This Standard is identical with, and has been reproduced from, IEC 61703:2016, *Mathematical expressions for reliability, availability, maintainability and maintenance support terms*.

As this document has been reproduced from an International Standard, the following applies:

- (A) In the source text “this International Standard” should read “this Australian/New Zealand Standard”.
- (B) A full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- Looking for additional Standards? Visit Intertek Inform Infostore
  - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-