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Australian Standard®

Reliability growth—Statistical test and estimation methods

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- Australian Chamber of Commerce and Industry
- Australian Electrical and Electronic Manufacturers Association
- Australian Industry Group
- Australian Nuclear Science & Technology Organisation
- Australian Organisation for Quality
- Certification Interests (Australia)
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- Energy Networks Association
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STANDARDS AUSTRALIA

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OF
AS IEC 61164–2008
Reliability growth–Statistical test and estimation methods

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Australian Standard®

Reliability growth—Statistical test and estimation methods

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PREFACE

This Standard was prepared by the Standards Australia Committee QR-005, Dependability.

The objective of this Standard is to describe the power law reliability growth model and related projection model, and give step-by step guidance on their use. It includes statistical methods for reliability growth planning and tracking in the product design phase that may be used in conjunction with IEC 61164, *Programmes for reliability growth*, which has been adopted as AS IEC 61164—2004, and provides procedures to estimate some or all of the quantities required in the design phase of IEC 61014.

This Standard is identical with, and has been reproduced from IEC 61164 Ed.2.0 (2004), *Reliability growth—Statistical test and estimation methods*, which is part of a suite of Standards developed by the IEC Technical Committee IEC/TC 56, Dependability.

As this Standard is reproduced from an International Standard, the following applies:

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The terms ‘normative’ and ‘informative’ are used to define the application of the annex to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

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INTRODUCTION

This International Standard describes the power law reliability growth model and related projection model and gives step-by-step directions for their use. There are several reliability growth models available, the power law model being one of the most widely used. This standard provides procedures to estimate some or all of the quantities listed in Clauses 4, 6 and 7 of IEC 61014.

Two types of input are required. The first one is for reliability growth planning through analysis and design improvements in the design phase in terms of the design phase duration, initial reliability, reliability goal, and planned design improvements, along with their expected magnitude. The second input, for reliability growth in the project validation phase, is for a data set of accumulated test times at which relevant failures occurred, or were observed, for a single system, and the time of termination of the test, if different from the time of the final failure. It is assumed that the collection of data as input for the model begins after the completion of any preliminary tests, such as environmental stress screening, intended to stabilize the product's initial failure intensity.

Model parameters estimated from previous test results may be used to plan and predict the course of future reliability growth programmes, provided the conditions are similar.

Some of the procedures may require computer programs, but these are not unduly complex. This standard presents algorithms for which computer programs should be easy to construct.

STANDARDS AUSTRALIA

Australian Standard

Reliability growth—Statistical test and estimation methods

1 Scope

This International Standard gives models and numerical methods for reliability growth assessments based on failure data, which were generated in a reliability improvement programme. These procedures deal with growth, estimation, confidence intervals for product reliability and goodness-of-fit tests.

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.

References to international standards that are struck through in this clause are replaced by references to Australian or Australian/New Zealand Standards that are listed immediately thereafter and identified by shading. Any Australian or Australian/New Zealand Standard that is identical to the International Standard it replaces is identified as such.

IEC 60050(191):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 191: Dependability and quality of service*

IEC 60300-3-5:2001, *Dependability management – Part 3-5: Application guide – Reliability test conditions and statistical test principles*

IEC 60605-4, *Equipment reliability testing – Part 4: Statistical procedures for exponential distribution – Point estimates, confidence intervals, prediction intervals and tolerance intervals*

IEC 60605-6, *Equipment reliability testing – Part 6: Tests for the validity of the constant failure rate or constant failure intensity assumptions*

~~IEC 61014:2003, *Programmes for reliability growth*~~

AS IEC 61014—2003, *Programmes for reliability growth* (identical to IEC 61014:2003)

3 Terms and definitions

For the purposes of this document, the terms and definitions of IEC 60050(191) and IEC 61014, together with the following terms and definitions, apply.

3.1
reliability goal
desired level of reliability that the product should have at the end of the reliability growth programme

3.2
initial reliability
reliability that is estimated for the product in earlier design stages before any potential failure modes or their causes have been mitigated by the design improvement

