

Australian Standard™

Programmes for reliability growth

This Australian Standard was prepared by Committee QR-005, Dependability. It was approved on behalf of the Council of Standards Australia on 12 February 2004 and published on 1 April 2004.

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First published as AS IEC 61014—2004.

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Published by Standards Australia International Ltd
GPO Box 5420, Sydney, NSW 2001, Australia

ISBN 0 7337 5797 9

PREFACE

This Standard was prepared by the Standards Australia Committee QR-005, Dependability. This Standard is identical with, and has been reproduced from, IEC 61014:2003, *Programmes for reliability growth*.

This Standard specifies requirements and gives guidelines for the exposure and removal of weaknesses in hardware and software for the purpose of reliability growth.

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

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<i>Reference to International Standard</i>		<i>Australian Standard</i>	
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60300	Dependability management	60300	Dependability management
60300-1	Part 1: Dependability management systems	60300.1	Part 1: Dependability management systems
60300-2	Part 2: Guidance for dependability programme management	60300.2	Part 2: Guidance for dependability programme management (in preparation)
60300-3-1	Part 3-1: Application guide— Analysis techniques for dependability —Guide on methodology	60300.3.1	Part 3.1: Application guide— Analysis techniques for dependability—Guide on methodology

Only International Standard referenced documents identical to Australian Standards have been listed.

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INTRODUCTION

Reliability improvement by a growth programme should be part of an overall reliability activity in the development of a product. This is especially true for a design that uses novel or unproven techniques, components, or a substantial content of software. In such a case the programme may expose, over a period of time, many types of weaknesses having design-related causes. It is essential to reduce the probability of failure due to these weaknesses to the greatest extent possible to prevent their later appearance in formal tests or in the field. At that late stage, design correction is often highly inconvenient, costly and time-consuming.

Life-cycle costs can be minimized if the necessary design changes are made at the earliest possible stage.

IEC 60300-3-5, Clause 1 refers to a “reliability growth (or improvement) programme” employing equipment reliability design analysis and reliability testing, with the principal objective to realize reliability growth. Reliability design analysis applies analytical methods and techniques described in IEC 60300-3-1. Reliability design analysis is of a particular value, as it allows early identification of potential design weakness, well before design completion. This allows introduction of design modifications that are inexpensive and relatively easy to implement without consequences such as major design changes, programme delays, modification of tooling and manufacturing processes. The reliability growth testing and environmental arrangements for the test part of this programme are essentially the same as those covered by IEC 60300-3-5, IEC 60605-2 and IEC 60605-3.

The importance of the reliability growth programme, integrated into the design or product development process, and known as integrated reliability engineering, is driven by limited time to market, programme costs and striving for product cost reduction.

Although effective for disclosure of potential field problems, a reliability growth testing programme alone is typically expensive, requiring extensive test time and resources, and the corrective actions are considerably more costly than if they were found and corrected in the early stages of design. Additionally, the duration of these tests, sometimes lasting for a very long time, would seriously affect the marketing or deployment schedule of the system.

The cost-effective solution to these challenges is a reliability growth programme fully integrated in both the design and evaluation phase as well as the testing phase. This effort is enabled by strong project management, by design engineering and often by customer participation and involvement. Over the past few years, leading industry organizations have developed and applied analytical and test methods fully integrated with the design efforts for increasing the reliability during the product design phase. This reduces reliance on formal and lengthy reliability growth testing. This technology is the basis for the integrated reliability growth strategy in this standard and will be discussed further in Clause 6. Some definitions and concepts are given first in order to lay the groundwork for discussing the integrated reliability growth methodologies.

AUSTRALIAN STANDARD

Programmes for reliability growth**1 Scope**

This International Standard specifies requirements and gives guidelines for the exposure and removal of weaknesses in hardware and software items for the purpose of reliability growth.

It applies when the product specification calls for a reliability growth programme of equipment (electronic, electromechanical and mechanical hardware as well as software) or when it is known that the design is unlikely to meet the requirements without improvement.

A statement of the basic concepts is followed by descriptions of the management, planning, testing (laboratory or field), failure analysis and corrective techniques required. Mathematical modelling, to estimate the level of reliability achieved, is outlined briefly.

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.

IEC 60300-1, *Dependability management – Part 1: Dependability management systems*¹

IEC 60300-2, *Dependability management – Part 2: Guidance for dependability programme management*²

IEC 60300-3-1, *Dependability management – Part 3-1: Application guide – Analysis techniques for dependability – Guide on methodology*

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

IEC 60605-2, *Equipment reliability testing – Part 2: Design of test cycles*

IEC 60605-3 (all parts), *Equipment reliability testing – Part 3: Preferred test conditions*

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

IEC 60812, *Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA)*

IEC 61025, *Fault tree analysis (FTA)*

IEC 61160, *Formal design review*

IEC 61164, *Reliability growth – Statistical test and estimation methods*

¹ Second edition to be published.

² Second edition to be published.