

Interim Australian Standard™

Electrostatics

**Part 5.2: Protection of electronic
devices from electrostatic phenomena—
User guide**

This Interim Australian Standard was prepared by Committee EL-025, Control of Undesirable Static Charges. It was approved on behalf of the Council of Standards Australia on 21 November 2000 and published on 23 January 2001.

The following interests are represented on Committee EL-025:

Australasian Plastics and Rubber Institute
Australia Post
Australian Electrical and Electronic Manufacturers Association
Australian Institute of Petroleum Ltd
Department of Mineral Resources N.S.W.
Institution of Electrical Engineers
WorkCover New South Wales

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Australia web site at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Australian Standard*, has a full listing of revisions and amendments published each month.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.com.au, or write to the Chief Executive, Standards Australia International Ltd, GPO Box 5420, Sydney, NSW 2001.

Interim Australian Standard™

Electrostatics

Part 5.2: Protection of electronic devices from electrostatic phenomena— User guide

published as AS 61340.5.2 (Int)—2001.

COPYRIGHT

© Standards Australia International

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.

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

ISBN 0 7337 3729 3

PREFACE

This Interim Standard was prepared by the Standards Australia Committee EL-025, Control of Undesirable Static Charges.

This Interim Standard is Part 5.2 of a series which when complete will consist of the following main Parts:

AS

61340	Electrostatics
61340.1	Part 1: General
61340.2	Part 2: Measurement methods in electrostatics
61340.3	Part 3: Methods for simulating electrostatic effects
61340.4	Part 4: Standard test methods for specific applications
61340.5	Part 5: Protection of electronic devices from electrostatic phenomena
61340.6	Part 6: Techniques to control electrostatic phenomena and methods to assess their effectiveness

This Interim Standard is identical in technical content to and has been reproduced from IEC Technical Specification IEC 61340-5-2:1999, *Electrostatics – Part 5-2: Protection of electronic devices from electrostatic phenomena – User guide*.

The objective of this Interim Standard is to provide clear guidelines to help the user implement the general requirements of AS 61340.5.1.

This Interim Standard will have a currency of two years from its date of publication. At the conclusion of that period it will either be superseded by another Standard, confirmed as an interim Standard in its present form for a further two year period or withdrawn.

A reference to an International Standard identified in the Normative References Clause by strikethrough (~~example~~) is replaced by a reference to the Australian or Australian/New Zealand Standard(s) listed immediately thereafter and identified by shading (example). Where the struck-through referenced document and the referenced Australian or Australian/New Zealand Standard are identical, this is indicated in parenthesis after the title of the latter.

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

- Its number does not appear on each page of text and its identity is shown only on the cover and title page.
- In the source text 'this technical specification' should read 'this Interim Australian Standard'.
- A full point should be substituted for a comma when referring to a decimal marker.

The terms 'normative' and 'informative' have been used in this Interim Standard 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.

CONTENTS

	<i>Page</i>
1 Scope.....	1
2 Normative references	2
3 Definitions	3
4 Signs and markings – General.....	4
4.1 Markings	4
4.1.1 ESDS marking	4
4.1.2 Packaging marking	5
4.1.3 Equipment marking.....	5
4.3 Signs for ESD protected areas (EPA)	5
5 ESD protected area (EPA) – General.....	5
5.1 Configuration.....	6
5.1.1 General	6
5.1.3 High-voltage EPA	6
5.2 Requirements for specific ESD protective items	6
5.2.1 General	6
5.2.2 Working surfaces and storage racks	7
5.2.3 Floors.....	7
5.2.4 Seating.....	7
5.2.5 Garments	8
5.2.6 Gloves and finger cots.....	8
5.2.7 Wrist strap.....	8
5.2.8 Footwear	9
5.2.9 Ionizers (see [3])	9
5.2.10 Tools, machinery and sensors and test equipment.....	13
5.2.11 Trolleys and carts	15
5.3 Construction of an EPA	15
5.3.1 General.....	15
5.3.2 EPA ground facility	15
5.3.3 EPA ground bonding point (EBP).....	15
5.3.4 EPA ground cords	16
5.3.5 Electrostatic fields	16
5.3.6 Certification of conformance	16
5.4 Field work	16
5.5 EPA working practices.....	17
6 Protective packaging	18
7 Purchase, receipt, storage and handling.....	20
7.1 General	20
7.2 Purchase.....	20
7.3 Receipt and storage	20
7.4 Unpacking, inspection and storage within an EPA	20
8 Training.....	21
8.1 Relevant structured training ESD.....	21
8.2 Personnel training	22

	<i>Page</i>
8.4	Items for consideration in training..... 22
8.5	Retraining 22
8.6	Register of trained personnel 22
8.7	Training provided by the ESD coordinator 22
8.8	Training officer qualification 23
9	Quality responsibilities 23
9.1	Responsibilities 23
9.2	ESD coordinator 23
9.3	Procurement of ESD protective items 23
9.4	Checking of electrostatic precautions 24
9.6	Daily checks..... 24
9.6.1	Visual daily check..... 24
9.6.2	Wrist straps 25
9.6.3	Non-permanent footwear 25
9.7	Monthly checks 25
9.8	Six-monthly checks 26
9.8.1	General 26
9.8.2	Electrostatic fields 26
9.8.3	Signs and labels 26
10	Periodic audit instructions 26
10.1	Table 1 of IEC 61340-5-1 – ESD protective item requirements 27
10.2	Table 2 of IEC 61340-5-1 – Packaging characteristics..... 28
10.3	Table 3 of IEC 61340-5-1 – Example of audit report (summary)..... 28
10.4	Table 4 of IEC 61340-5-1 – EPA equipment list..... 28
	Figure 101 – Maximum body voltage generated against resistance 18
Annex A	(normative) Test methods 29
A.1	Resistance measurement method for the testing of floor, working surface or storage rack..... 29
A.2	Resistance measurement method for the testing of seating 29
A.3	Resistance measurement method for the testing of garments 29
A.5	Wrist straps, footwear, gloves, finger cots and tools 29
A.6	Test method and equipment for ionization (see [3]) 30
A.7	Test method for evaluating the performance of electrostatic discharge shielding material – Bags (see [3]) 31
Annex B	(informative) Test methods for charge decay 32
B.1	Method of measurement of charge decay 32
Annex C	(informative) Design considerations to minimize the effects of ESD 33
C.1	Identification..... 33
C.3	Design of electrostatic discharge sensitive devices (ESDS)..... 33
C.4	Design of assemblies 34
C.5	Packaging design 35
C.6	System design..... 35
C.7	Design evaluation procedure 35

	<i>Page</i>
Annex DD (informative) Principles and methods of controlling static electricity	36
DD.1 Methods	36
DD.2 Principles	36
Annex EE (informative) Principles of relationship between charge, charge density, field and potential	39
EE.1 Insulated conducting body	39
EE.2 Insulating body	39
Annex FF (informative) Bibliography	42

Currently in preview, click buy full version

Currently in preview, click buy full version

STANDARDS AUSTRALIA

Interim Australian Standard

Electrostatics

**Part 5.2: Protection of electronic devices from electrostatic phenomena—
User guide****1 Scope**

1.1 This technical specification is intended to cover the protection from ESD damage of all electronic devices with voltage sensitivity of not lower than 100 V through their entire life. This is from the commencement of manufacture, through product assembly, product use and possible repair until the end of the product life.

This technical specification is intended to cater for electronic components, assemblies and subassemblies with a sensitivity of 100 V or greater (human body mode (HBM)), and as such covers most items available. There are on the market a few items which may suffer damage at lower levels. Where these are used, additional or alternative methods should be used. These are not covered by either IEC 61340-5-1 or this user guide, and it would not be reasonable or economic to equip the general EPA to cater for these. Additional information on these may be found in many of the references in the bibliography.

The HBM has been chosen as the major criteria, as damage from human contact is still the most common source even in today's automated society. There are several values given in different sources for HBM, but the chosen one is 100 pF and 1 500 Ω .

1.2 Low humidity

At low relative humidities the dissipation of static charges often becomes more difficult, and some materials may not work efficiently. Above about 20 % relative humidity most materials maintain most of their efficiency. Where relative humidity may go lower the user should pay particular attention that the materials selected will perform effectively at the minimum expected relative humidity. This is of particular importance in very cold and non-oceanic climates.

1.3 Clean rooms

For clean rooms, the specialist areas are considered to be class 100 or tighter. Many of the techniques in current use for ESD protection will not satisfy the clean room constraints, for example carbon breaking down, ionics from spray or particles from ionizer needles. Some alternative materials are available, with improved ones still being developed, that will cope with both conditions and these should be used. This area is particularly important as clean operation is an essential part of semiconductor manufacture. Damage occurring at this stage may result in undetected "walking wounded" devices which can have very expensive results. The clean room application is currently the most difficult to control, particularly in class 10 and class 1 rooms. IEC 61340-5-1 embodies current technology. As new and improved materials and techniques become available this area will be improved, with benefits in reliability.