

Australian/New Zealand Standard™

**Audio, video and similar electronic
apparatus—Safety requirements
(IEC 60065:2014 (ED. 8.0) MOD)**



AS/NZS 60065:2018

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee TE-001, Safety of Electronic Equipment. It was approved on behalf of the Council of Standards Australia on 8 January 2018 and by the New Zealand Standards Approval Board on 20 December 2017.
This Standard was published on 12 February 2018.

The following are represented on Committee TE-001:

Australian Chamber of Commerce and Industry
Australian Communications and Media Authority
Australian Industry Group
Australian Information Industry Association
Business New Zealand
CHOICE
Communications Alliance
Consumer Electronics Association of New Zealand
Consumer Electronics Suppliers Association
Department of Climate Change and Energy Efficiency
Electrical Compliance Testing Association
Electrical Regulatory Authorities Council
Energy Efficiency and Conservation Authority of New Zealand
Engineers Australia
Free TV Australia
National Retail Association
New Zealand Testing Interests
Worksafe New Zealand

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 Standards may also be withdrawn.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 joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at www.saiglobal.com or Standards New Zealand web site at www.standards.govt.nz and looking up the relevant Standard in the on-line catalogue.

For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of Standards Australia or the New Zealand Standards Executive at the address shown on the back cover.

This Standard was issued in draft form for comment as DR AS/NZS 60065:2017.

Australian/New Zealand Standard™

Audio, video and similar electronic apparatus—Safety requirements (IEC 60065:2014 (ED. 8.0) MOD)

Originated in Australia as AS 3250—1982.
First joint edition AS/NZS 3280:1995.
Previous edition AS/NZS 60065:2012.
Fourth edition 2018.

COPYRIGHT

© Standards Australia Limited

© The Crown in right of New Zealand, administered by the New Zealand Standards Executive

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 (Australia) or the Copyright Act 1994 (New Zealand).

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, PO Box 1473, Wellington 6140.

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TE-001 Safety of Electronic Equipment.

AS/NZS 60065:2012, *Audio, video and similar apparatus—Safety requirements* (IEC 60065, ED. 7.2 (2011) MOD) will also remain current for 2 years from the publication of AS/NZS 60065:2018, *Audio, video and similar electronic apparatus—Safety requirements (IEC 60065:2014 (ED. 8.0) MOD)*, and after this time will be superseded by AS/NZS 60065:2018. Regulatory authorities that reference these Standards in regulation may apply these requirements at a different time; users of this Standard should consult with these authorities to confirm their requirements.

The objective of this Standard is to provide Australian and New Zealand electrical and electronic industries with minimum safety requirements for electrically powered equipment intended for the reception, generation, recording or reproduction of audio, video and associated signals.

This Standard is an adoption with national modifications and has been reproduced from IEC 60065:2014 (ED.8.0), *Audio, video and similar apparatus—Safety requirements*, including Corrigendum 1 (2015), which has been added at the end of the source text. IEC Corrigendum 2 (2016) has not been included as it comprises a correction to Clause 12.7.1 that has been incorporated into Appendix ZZ. The Australian/New Zealand variations are listed in Appendix ZZ. This Standard has been varied from the IEC Standard as indicated to take account of Australian/New Zealand conditions.

This Standard is structured as follows:

- (a) Australian/New Zealand Preface.
- (b) IEC 60065:2014 (unedited from the scope to the final clause of the source document including Corrigendum 1).
- (c) Appendix ZZ—Australian/New Zealand variations to the source document.

The variations listed in Appendix ZZ address Australia/New Zealand issues including the following:

- (i) Addition of references to relevant normative Australian/New Zealand Standards.
- (ii) Alternate requirements for thermoplastic materials
- (iii) Appropriate tests of AS/NZS 3112.
- (iv) Australian/New Zealand requirements for flexible cords.
- (v) Requirements for stability of television receivers.
- (vi) Alternate resistance to fire tests.
- (vii) Change Table 21 flammability category.
- (viii) Reference to Australian Telecommunications Labelling Notice (Annex B).
- (ix) Additional requirements for batteries.
- (x) Abnormal conditions and single fault conditions output voltage test for external power supplies, docking stations and other similar devices.

The essential safety requirements in AS/NZS 3820, *Essential safety requirements for electrical equipment*, that could be applicable to electrically powered equipment intended for the reception, generation, recording or reproduction of audio, video and associated signals are covered by this Standard.

The variations described in Appendix ZZ form the Australian and New Zealand variations for the purposes of the CB scheme for recognition of testing to standards for safety of electrical equipment.

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

- (A) In the source text ‘this International Safety Standard’ should read ‘this Australian/New Zealand Standard’.
- (B) A full point should be substituted 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.

In cases where Australian or Australian/New Zealand Standards are modified-text adoptions of international normative reference Standards, references to those International Standards are required by Appendix ZZ to be replaced by references to Australian or Australian/New Zealand Standards, as follows:

<i>Reference to International Standard</i>		<i>Australian/New Zealand Standard</i>	
IEC		AS	
60038	IEC standard voltages	60038	Standard voltages
		AS/NZS	
60320	Appliance couplers for household and similar general purposes (series)	60320	Appliance couplers for household and similar general purposes (series)
60335	Household and similar electrical appliances—Safety	60335	Household and similar electrical appliances—Safety
60335-1	Part 1: General requirements	60335.1	Part 1: General requirements (IEC 60335-1 Ed 5, MOD)
60950	Safety of information technology equipment—Safety	60950	Information technology equipment—Safety
60950-1	Part 1: General requirements	60950.1	Part 1: General requirements (IEC 60950-1, Ed.2.2 (2013), MOD)
61058	Switches for appliances	61058	Switches for appliances
61058-1	Part 1: General requirements	61058.1	Part 1: General requirements (IEC 61058-1, Ed.3.1 (2000), MOD)
62368	Audio/visual, information and communication technology equipment	62368	Audio/visual, information and communication technology equipment
62368-1	Part 1: Safety requirements	62368.1	Part 1: Safety requirements (IEC 62368-1:2014 (ED. 2.0), MOD)

CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 General	10
2 Terms and definitions.....	15
3 General requirements	26
4 General test conditions	26
5 Marking and instructions	33
6 Hazardous radiations	39
7 Heating under normal operating conditions.....	41
8 Constructional requirements with regard to the protection against electric shock.....	45
9 Electric shock hazard under normal operating conditions.....	53
10 Insulation requirements.....	57
11 Fault conditions	60
12 Mechanical strength.....	64
13 CLEARANCES and CREEPAGE DISTANCES	70
14 Components	84
15 TERMINALS	100
16 External flexible cords.....	107
17 Electrical connections and mechanical fixings	109
18 Mechanical strength of picture tubes and protection against the effects of implosion.....	112
19 Stability and mechanical hazards	113
20 Resistance to fire.....	116
Annex A (normative) Additional requirements for apparatus with protection against splashing water.....	132
Annex B (normative) Apparatus to be connected to the TELECOMMUNICATION NETWORKS	133
Annex C (normative) Band-pass filter for wide-band noise measurement	135
Annex D (normative) Measuring network for TOUCH CURRENTS.....	136
Annex E (normative) Measurement of CLEARANCES and CREEPAGE DISTANCES.....	137
Annex F (normative) Table of electrochemical potentials	141
Annex G (normative) Flammability test methods	142
Annex H (normative) Insulated winding wires for use without interleaved insulation (see 8.16)	145
Annex I (Void).....	148
Annex J (normative) Alternative method for determining minimum CLEARANCES.....	149
Annex K (normative) Impulse test generators (see 13.3.4 and Annex J, Clause J.6).....	154
Annex L (normative) Additional requirements for electronic flash apparatus for photographic purposes	155
Annex M (informative) Examples of requirements for quality control programmes for allowing reduced clearances.....	159
Annex N (informative) Routine tests	160
Bibliography.....	163

Figure 1 – Test circuit for fault conditions	120
Figure 2 – Example of an assessment of REINFORCED INSULATION.....	120
Figure 3 – Example of ACCESSIBLE parts	121
Figure 4 – Test hook	122
Figure 5 – Surge test.....	123
Figure 6 – Dielectric strength test instrument.....	124
Figure 7 – Test voltages.....	125
Figure 8 – Impact test using a steel ball.....	125
Figure 9 – Test plug for mechanical tests on antenna coaxial sockets.....	126
Figure 10 – Minimum CLEARANCES and CREEPAGE DISTANCES ON PRINTED BOARDS	127
Figure 11 – Test apparatus for devices forming a part of the MAINS plug	128
Figure 12 – Scratch patterns for implosion test	129
Figure 13 – Distances from a POTENTIAL IGNITION SOURCE and an example for the design of barriers	129
Figure 14 – Mandrel	130
Figure 15 – Initial position of mandrel	130
Figure 16 – Final position of mandrel.....	130
Figure 17 – Position of metal foil on insulating material.....	131
Figure C.1 – Band-pass filter for wide-band noise measurement (amplitude/frequency response limits).....	135
Figure D.1 – Measuring network for TOUCH CURRENTS according to IEC 60990	136
Figure E.1 – Narrow groove.....	137
Figure E.2 – Wide groove.....	138
Figure E.3 – V-shaped groove	138
Figure E.4 – Rib	138
Figure E.5 – Uncemented joint with narrow groove	138
Figure E.6 – Uncemented joint with wide groove	139
Figure E.7 – Uncemented joint with narrow and wide grooves	139
Figure E.8 – Intervening, unconnected conductive part	139
Figure E.9 – Narrow recess	140
Figure E.10 – Wide recess	140
Figure K.1 – Impulse generating circuit.....	154
Table 1 – Voltage ranges of TNV-CIRCUITS.....	20
Table 2 – Test power supply.....	30
Table 3 – Permissible temperature rise of parts of the apparatus (1 of 2)	43
Table 4 – Test temperature and testing time (in days) per cycle	51
Table 5 – Test voltages for dielectric strength test and values for insulation resistance	60
Table 6 – Impact test on the enclosure of apparatus	65
Table 7 – Torque values for end-piece test.....	68
Table 8 – Minimum CLEARANCES for insulation in circuits CONDUCTIVELY CONNECTED TO THE MAINS and between such circuits and circuits not CONDUCTIVELY CONNECTED TO THE MAINS	74

Table 9 – Additional CLEARANCES for insulation in circuits CONDUCTIVELY CONNECTED TO THE MAINS with peak WORKING VOLTAGES exceeding the peak value of the nominal a.c. MAINS voltage and between such circuits and circuits not CONDUCTIVELY CONNECTED TO THE MAINS	75
Table 10 – Minimum CLEARANCES in circuits not CONDUCTIVELY CONNECTED TO THE MAINS.....	77
Table 11 – Minimum CREEPAGE DISTANCES.....	80
Table 12 – Minimum CLEARANCES and CREEPAGE DISTANCES (enclosed, enveloped or hermetically sealed constructions).....	83
Table 13 – Flammability category related to distance from POTENTIAL IGNITION SOURCES	86
Table 14 – Peak surge current	96
Table 15 – Nominal cross-sectional area to be accepted by TERMINALS	104
Table 16 – Minimum nominal thread diameter.....	104
Table 17 – Pull force on pins	106
Table 18 – Nominal cross-sectional areas of external flexible cords	107
Table 19 – Mass and pulley diameter for stress test.....	108
Table 20 – Torque to be applied to screws.....	110
Table 21 – Distances from POTENTIAL IGNITION SOURCES and consequential flammability categories	119
Table B.1 – Separation of TNV circuits	134
Table E.1 – Value of X	137
Table H.1 – Mandrel diameter	145
Table H.2 – Oven temperature	146
Table J.1 – MAINS transient voltages	150
Table J.2 – Minimum CLEARANCES	153
Table K.1 – Component values for impulse generating circuits.....	154
Table M.1 – Rules for sampling and inspection – Reduced CLEARANCES.....	159
Table N.1 – Test voltage	162

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60065 has been prepared by IEC technical committee 108: Safety of electronic equipment within the field of audio/video, information technology and communication technology. It has the status of a group safety publication in accordance with IEC Guide 104.

This eighth edition cancels and replaces the seventh edition published in 2001 including its Amendment 1 (2005) and Amendment 2 (2010). It constitutes a technical revision.

The principal changes in this edition as compared with the seventh edition are as follows:

- new requirements for wall and ceiling mounting means;
- new requirements for coin / button cell batteries;
- all notes have been reviewed to comply with the new directives;
- addition of requirements for LEDs;
- requirements for creepage distances are aligned with IEC 60950-1;
- change in optocoupler requirements.

The text of this standard is based on the following documents:

FDIS	Report on voting
108/523/FDIS	108/541/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this standard, the following print types or formats are used:

- requirements proper and normative annexes: in roman type;
- compliance statements and test specifications: *italic type*;
- notes/explanatory matter: in smaller roman type;
- normative conditions within tables: in smaller roman type;
- terms defined in Clause 2: SMALL CAPITALS.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

Principles of safety

General

This introduction is intended to provide an appreciation of the principles on which the requirements of this standard are based. Such an understanding is essential in order that safe apparatus can be designed and manufactured.

The requirements of this standard are intended to provide protection to persons as well as to the surroundings of the apparatus.

Attention is drawn to the principle that the requirements, which are standardized, are the minimum considered necessary to establish a satisfactory level of safety.

Further development in techniques and technologies may entail the need for future modification of this standard.

NOTE The expression "protection to the surroundings of the apparatus" implies that this protection should also include protection of the natural environment in which the apparatus is intended to be used, taking into account the life cycle of the apparatus, i.e. manufacturing, use, maintenance, disposal and possible end-of-life recycling of parts of the apparatus.

Hazards

The application of this standard is intended to prevent injury or damage due to the following hazards:

- electric shock;
- excessive temperatures;
- radiation;
- implosion;
- mechanical hazards;
- fire;
- chemical burns (for example, as a result of the ingestion of lithium chemistry button/coin cells).

Electric shock

Electric shock is due to current passing through the human body. Currents of the order of a milliampere can cause a reaction in persons in good health and may cause secondary risks due to involuntary reaction. Higher currents can have more damaging effects. Voltages below certain limits are generally regarded as not dangerous under specified conditions. In order to provide protection against the possibility of higher voltages appearing on parts that may be touched or handled, such parts are either earthed or adequately insulated.

For parts which can be touched, two levels of protection are normally provided to prevent electric shock caused by a single fault. Thus a single fault and any consequential faults will not create a hazard. The provision of additional protective measures, such as SUPPLEMENTARY INSULATION or protective earthing, is not considered a substitute for, or a relief from, properly designed BASIC INSULATION.

Cause

Contacts with parts normally at hazardous voltage.

Prevention

Prevent access to parts at hazardous voltage by fixed or locked covers, interlocks, etc.

Discharge capacitors at hazardous voltages.

Breakdown of insulation between parts normally at hazardous voltage and accessible parts.

Either use double or reinforced insulation between parts normally at hazardous voltages and accessible parts so that breakdown is not likely to occur, or connect accessible conductive parts to protective earth so that the voltage which can develop is limited to a safe value. Provide adequate mechanical and electrical strength.

Breakdown of insulation between parts normally at hazardous voltage and circuits normally at non-hazardous voltages, thereby putting accessible parts and terminals at hazardous voltage.

Segregate hazardous and non-hazardous voltage circuits either by double or reinforced insulation so that breakdown is not likely to occur, or by a protective earthed screen, or connect the circuit normally at non-hazardous voltage to protective earth, so that the voltage which can develop is limited to a safe value.

Touch current from parts at hazardous voltage through the human body.

Limit touch current to a safe value or provide a protective earthing connection to the accessible parts.

(Touch current can include current due to RFI filter components connected between mains supply circuits and accessible parts or terminals.)

Excessive temperatures

Requirements are included to prevent injury due to excessive temperatures of accessible parts, to prevent damaging of insulation due to excessive internal temperatures, and to prevent mechanical instability due to excessive temperatures developed inside the apparatus.

Radiation

Requirements are included to prevent injury due to excessive energy levels of ionizing and laser radiation, for example by limiting the radiation to non-hazardous values.

Implosion

Requirements are included to prevent injury due to implosion of picture tubes.

Mechanical hazards

Requirements are included to ensure that the apparatus and its parts have adequate mechanical strength and stability, to avoid the presence of sharp edges and to provide guarding or interlocking of dangerous moving parts.

Fire

A fire can result from:

- heat;
- arcing;

caused by

- overloads;
- component failure;
- insulation breakdown;
- bad connections;
- conductor breakage.

Requirements are included that are intended to prevent fire originating within the apparatus from spreading beyond the immediate vicinity of the source of the fire or from causing damage to the surroundings of the apparatus.

The following preventive measures are recommended:

- the use of suitable components and subassemblies;
- the prevention of excessive temperature rise that might cause ignition under normal or fault conditions;
- the use of measures to eliminate POTENTIAL IGNITION SOURCES such as inadequate contacts, bad connections, interruptions;
- the limitation of the quantity of combustible material used;
- the control of the position of combustible materials in relation to POTENTIAL IGNITION SOURCES;
- the use of materials with high resistance to fire in the vicinity of POTENTIAL IGNITION SOURCES;
- the use of encapsulation or barriers to limit the spread of fire within the apparatus;
- the use of suitable fire retardant materials for the enclosure.

AUSTRALIAN/NEW ZEALAND STANDARD

**Audio, video and similar electronic apparatus—Safety requirements
(IEC 60065:2014 (ED. 8.0) MOD)****1 General****1.1 Scope**

1.1.1 This International Safety Standard applies to electronic apparatus designed to be fed from the MAINS, from a SUPPLY APPARATUS, from batteries or from REMOTE POWER FEEDING and intended for reception, generation, recording or reproduction of audio, video and associated signals. It also applies to apparatus designed to be used exclusively in combination with the above-mentioned apparatus.

This standard primarily concerns apparatus intended for household and similar general use but which may also be used in places of public assembly such as schools, theatres, places of worship and the workplace. PROFESSIONAL APPARATUS intended for use as described above is also covered unless falling specifically within the scope of other standards.

This standard concerns only safety aspects of the above apparatus; it does not concern other matters, such as style or performance.

This standard applies to the above-mentioned apparatus, if designed to be connected to the TELECOMMUNICATION NETWORK or similar network, for example by means of an integrated modem.

Some examples of apparatus within the scope of this standard are:

- receiving apparatus and amplifiers for sound and/or vision;
- independent LOAD TRANSDUCERS and SOURCE TRANSDUCERS;
- SUPPLY APPARATUS intended to supply other apparatus covered by the scope of this standard;
- ELECTRONIC MUSICAL INSTRUMENTS, and electronic accessories such as rhythm generators, tone generators, music tuners and the like for use with electronic or non-electronic musical instruments;
- audio and/or video educational apparatus;
- video projectors;

NOTE 1 Film projectors, slide projectors and overhead projectors are covered by IEC 60335-2-56.

- video cameras and video monitors;
- video games and flipper games;
- juke boxes;
- electronic gaming and scoring machines;

NOTE 2 Video games, flipper games and gaming machines and other amusement games for commercial use are covered by IEC 60335-2-82.

- teletext equipment;
- record and optical disc players;
- tape and optical disc recorders;
- antenna signal converters and amplifiers;
- antenna positioners;
- Citizen's Band apparatus;