



Low voltage switchgear and controlgear

Part 3: Switches, disconnectors, switch-disconnectors and fuse- combination units (IEC 60947-3:2015 (ED. 3.2) MOD)



This Australian Standard® was prepared by Committee EL-006, Industrial Switchgear and Controlgear. It was approved on behalf of the Council of Standards Australia on 7 June 2018. This Standard was published on 29 June 2018.

The following are represented on Committee EL-006:

- Association of Accredited Certification Bodies
 - Australian Industry Group
 - Bureau of Steel Manufacturers of Australia
 - Energy Network Australia
 - Engineers Australia
 - National Electrical and Communications Association
 - National Electrical Switchboard Manufacturers Association
 - Rail Industry Safety and Standards Board (RISSB)
-

This Standard was issued in draft form for comment as DR AS 60947.3:2018.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

Keeping Standards up-to-date

Australian Standards® are living documents that 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Standards may also be withdrawn.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 that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting www.standards.org.au

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

Australian Standard®

Low voltage switchgear and controlgear

Part 3: Switches, disconnectors, switch-disconnectors and fuse- combination units (IEC 60947-3:2015 (ED. 3.2) MOD)

Originated as AS 1775—1975.
Previous edition AS/NZS IEC 60947.3:2015.
Revised and designated as AS 60947.3:2018.

COPYRIGHT

© Standards Australia Limited

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.

Published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 978 1 76072 133 6

PREFACE

This Standard was prepared by the Australian members of Joint Standards Australia/Standards New Zealand Committee EL-006, Industrial Switchgear and Controlgear, to supersede AS/NZS IEC 60947.3:2015.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

AS/NZS IEC 60947.3:2015 will also remain current for 12 months and after this time it will be superseded by AS 60947.3:2018. Regulatory authorities that reference this Standard in regulation may apply these requirements at a different time. Users of this Standard should consult with these authorities to confirm their requirements.

The essential safety requirements for electrical equipment as specified in AS/NZS 3820, *Essential safety requirements for electrical equipment*, that could be applicable to equipment in the scope of this Standard, are covered by this Standard taken in conjunction with any other relevant requirements affecting safety.

This Preface is in addition to the IEC foreword of IEC 60947-3 Edition 3.2, which follows the table of contents.

The objective of this Standard is to state particular classifications, characteristics, marking and tests required as follows—

- (a) Classification:
 - (i) Utilization category.
 - (ii) Independent manual operation.
 - (iii) Suitable for isolation.
 - (iv) Individual dedicated outdoor enclosures to suit switch disconnectors are required to have an ingress protection (IP) rating of IP56NW and be suitable for vertical mounting.

The current rating type tests for I_{the} and $I_{the\ solar}$ with solar effects are to be done in the dedicated individual outdoor enclosure and enclosures, which differ from those used for type tests and may require additional tests.

- (b) Characteristics:
 - (i) Minimum of one circuit configuration per polarity.
 - (ii) Current rating $I_{the\ solar}$ to be the current rating when tested in a dedicated individual outdoor enclosure when subject to solar effects in accordance with D.8.3.11 at a shade ambient air temperature of 40 °C and be suitable for uninterrupted duty (I_u).

The $I_{the\ solar}$ current value is also to be stated for a shade ambient air temperature of 60 °C.

- (c) Marking: Additional information and change to locations.
- (d) Normal service: Minimum pollution P3.
- (e) Tests: Tests for hinged flaps or covers to ensure flaps and covers close and remain firmly closed when subject to external effects.

This Standard is an adoption with national modifications. It has been reproduced from IEC 60947-3:2008+A1:2012+A2:2015 CSV (ED. 3.2), *Low voltage switchgear and controlgear, Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*, and has been varied to take account of Australian conditions. ‘CSV’ means ‘consolidated version’ to indicate IEC amendments 1 and 2 are incorporated into the source text. IEC Amendment 2:2015 introduced requirements for photovoltaic (PV) d.c. applications in a new Annex D. The variations to take account of Australian conditions, which are set out in Appendix ZZ, relate to Annex D.

The variations in Appendix ZZ were prepared by Committee EL-006, Switchgear and Controlgear, in consultation with Committee EL-042, Renewable Energy Power Supply Systems and Equipment, and align with AS/NZS 5033, *Installation and safety requirements for photovoltaic (PV) arrays*.

Variations made to IEC 60947-3 form the Australian variations for the purposes of the CB scheme for recognition of testing to standards for safety of electrical equipment. The variations are clearly shown to enable certified test stations (refer to CTI listings) to test under the CB scheme.

The Standard is structured as follows:

- (A) Preface.
- (B) IEC 60947-3:2008+A1:2012+A2:2015 (ED. 3.2) (unedited from the contents page to the final clause of the source document).
- (C) Appendix ZZ, comprising Australian variations to the source document.

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

- (1) In the source text ‘this part of IEC 60947’ should read ‘this Australian/New Zealand Standard’.
- (2) 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. In Appendix ZZ, references to IEC 60947-1 are shown as (AS/NZS) IEC 60947.1 to reflect this interchangeability.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the annexes and appendices to which they apply. A ‘normative’ annex or appendix is an integral part of a Standard, whereas an ‘informative’ annex is only for information and guidance.

CONTENTS

FOREWORD.....	4
1 General	6
1.1 Scope and object.....	6
1.2 Normative references	7
2 Terms, definitions and index of terms.....	8
2.1 General	8
2.2 Alphabetical index of terms	8
2.3 Terms and definitions	8
2.4 Summary of the equipment types	11
3 Classification	12
3.1 According to the utilization category.....	12
3.2 According to the method of operation of manually operated equipment.....	12
3.3 According to suitability for isolation	13
3.4 According to the degree of protection provided.....	13
4 Characteristics.....	13
4.1 Summary of characteristics.....	13
4.2 Type of equipment.....	13
4.3 Rated and limiting values for the main circuit	13
4.4 Utilization category	15
4.5 Control circuits	16
4.6 Auxiliary circuits	16
4.7 Relays and releases	16
4.8 Co-ordination with short circuit protective devices (SCPD).....	16
5 Product information.....	16
5.1 Nature of information	16
5.2 Marking	17
5.3 Instructions for installation, operation and maintenance.....	18
6 Normal service, mounting and transport conditions.....	18
7 Constructional and performance requirements	18
7.1 Constructional requirements	18
7.2 Performance requirements.....	19
7.3 Electromagnetic compatibility.....	22
8 Tests	24
8.1 Kind of tests	24
8.2 Type tests for constructional requirements	25
8.3 Performance.....	26
8.4 Electromagnetic compatibility tests	43
8.5 Special tests.....	44
Annex A (normative) Equipment for direct switching of a single motor.....	45
Annex B (informative) Items subject to agreement between manufacturer and user.....	51
Annex C (normative) Single pole operated three pole switches	52
Annex D (normative) Switches, disconnectors, switch-disconnectors and fuse-combination units for use in photovoltaic (PV) d.c. applications.....	55
Bibliography	67

Figure C.1 – Typical arrangements	53
Table 1 – Summary of equipment definitions	12
Table 2 – Utilization categories	16
Table 3 – Verification of rated making and breaking capacities (see 8.3.3.3) – Conditions for making and breaking corresponding to the various utilization categories	20
Table 4 – Verification of operational performance – Number of operating cycles corresponding to the rated operational current	21
Table 5 – Test circuit parameters for Table 4	21
Table 6 – Immunity tests	23
Table 7 – Emission limits	23
Table 9 – List of type tests applicable to a given equipment	26
Table 10 – Overall scheme of test sequences	27
Table 11 – Test sequence I: general performance characteristics	31
Table 12 – Temperature-rise limits for terminals and accessible parts	34
Table 13 – Test sequence II: operational performance capability	34
Table 14 – Test sequence III: short-circuit performance capability	36
Table 15 – Test sequence IV: conditional short-circuit current	41
Table 16 – Test sequence V: overload performance capability	43
Table A.1 – Utilization categories	46
Table A.2 – Rated making and breaking capacity conditions corresponding to several utilization categories	46
Table A.3 – Relationship between current broken I_C and off-time for the verification of the rated making and breaking capacities	47
Table A.4 – Operational performance – Conditions for making and breaking corresponding to several utilization categories	47
Table A.5 – Verification of the number of on-load operating cycles – Conditions for making and breaking corresponding to several utilization categories	50
Table D.1 – Utilization categories	57
Table D.2 – Service arrangements	57
Table D.3 – Environmental conditions	58
Table D.4 – Rated impulse withstand levels for PV switches, PV disconnectors, PV switch-disconnectors or PV fuse-combination units	59
Table D.5 – Verification of rated making and breaking capacities (see 8.3.3.3) – Conditions for making and breaking corresponding to the DC-PV category	59
Table D.6 – Number of operating cycles	60
Table D.7 – Test circuit parameters for Table D.6	60
Table D.8 – Overall scheme of test sequences (addition)	61
Table D.9 – Number of operating cycles corresponding to the critical load current	64
Table D.10 – Test circuit parameters for Table D.9	64

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.

DISCLAIMER

This Consolidated version is not an official IEC Standard and has been prepared for user convenience. Only the current versions of the standard and its amendment(s) are to be considered the official documents.

This Consolidated version of IEC 60947-3 bears the edition number 3.2. It consists of the third edition (2008-08) [documents 17B/1601/FDIS and 17B/1608/RVD], its amendment 1 (2012-02) [documents 17B/1758/FDIS and 17B/1763/RVD] and its amendment 2 (2015-07) [documents 121A/42/FDIS and 121A/46/RVD]. The technical content is identical to the base edition and its amendments.

This Final version does not show where the technical content is modified by amendments 1 and 2. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 60947-3 has been prepared by subcommittee 17B: Low-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

The document 17B/1601/FDIS, circulated to the National Committees as amendment 3, led to the publication of the new edition.

This edition includes the following significant technical changes with respect to the previous edition:

- alignment with the fifth edition of IEC 60947-1;
- a switching operation without current allowed between making and breaking operation (Table 3);
- increased number of operations for AC-23 allowed with agreement of the manufacturer (Table 3);
- simplified test procedure amended, f) added to 8.3.2.1.3;
- temperature rise test shall be made at the rated operational current I_e instead of the conventional enclosed thermal current I_{the} (8.3.3.1).

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

A list of all parts of the IEC 60947 series can be found, under the general title *Low-voltage switchgear and controlgear*, on the IEC website.

This part is to be used in conjunction with IEC 60947-1. The numbering of the subclauses is sometimes not continuous because it is based on IEC 60947-1.

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.

The contents of the corrigenda 1 (September 2012) and 2 (November 2013) have been included in this copy.

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

AS 60947.3 : 2018 : EN PDF

-
- ⏪ Looking for additional Standards? Visit SAI Global Infostore
 - ⏪ Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-

Need to speak with a Customer Service Representative - Contact Us