

**MADALPINGELISED LÜLITUSAPARAADID. OSA 3:
KOORMUSLÜLITID, LAHKLÜLITID, KOORMUS-
LAHKLÜLITID, SULAVKAITSMEKOMBINATSIOONID**

**Low-voltage switchgear and controlgear - Part 3:
Switches, disconnectors, switch-disconnectors and fuse-
combination units (IEC 60947-3:2020)**

EESTI STANDARDI EESSÕNA**NATIONAL FOREWORD**

See Eesti standard EVS-EN IEC 60947-3:2021 sisaldab Euroopa standardi EN IEC 60947-3:2021 ja selle paranduse AC:2021 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 60947-3:2021 consists of the English text of the European standard EN IEC 60947-3:2021 and its corrigendum AC:2021.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas. Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 19.02.2021.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation. Date of Availability of the European standard is 19.02.2021.
Parandusega AC lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega AC AC .	The start and finish of text introduced or altered by corrigendum AC is indicated in the text by tags AC AC .
Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 29.120.40; 29.130.20

<p>Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele</p> <p>Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis- ja Akrediteerimiskeskuse kirjaliku loata on keelatud.</p> <p>Kui Teil on küsimusi standardite autoriõiguse kaitse kohta, võtke palun ühendust Eesti Standardimis- ja Akrediteerimiskeskusega: Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee</p> <p>The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation</p> <p>No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.</p> <p>If you have any questions about standards copyright protection, please contact the Estonian Centre for Standardisation and Accreditation: Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee</p>
--

EUROPEAN STANDARD

EN IEC 60947-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2021

ICS 29.120.40; 29.130.20

Supersedes EN 60947-3:2009 and all of its amendments
and corrigenda (if any)

English Version

**Low-voltage switchgear and controlgear - Part 3: Switches,
disconnectors, switch-disconnectors and fuse-combination units
(IEC 60947-3:2020)**

Appareillage à basse tension - Partie 3: Interrupteurs,
sectionneurs, interrupteurs-sectionneurs et combinés-
fusibles
(IEC 60947-3:2020)

Niederspannungsschaltgeräte - Teil 3: Lastschalter,
Trennschalter, Lasttrennschalter und Schalter-Sicherungs-
Einheiten
(IEC 60947-3:2020)

This European Standard was approved by CENELEC on 2020-05-27. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 121A/340/FDIS, future edition 4 of IEC 60947-3, prepared by SC 121A “Low-voltage switchgear and controlgear” of IEC/TC 121 “Switchgear and controlgear and their assemblies for low voltage” was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60947-3:2021.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2021–08-19
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2024–02-19

This document supersedes EN 60947-3:2009 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annexes ZZA and ZZB, which is an integral part of this document.

Endorsement notice

The text of the International Standard IEC 60947-3:2020 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60364-5-52	NOTE	Harmonized as HD 60364-5-52
IEC 60447:2004	NOTE	Harmonized as EN 60447:2004 (not modified)
IEC 60664-1:2007	NOTE	Harmonized as EN 60664-1:2007 (not modified)
IEC 60898-1:2015	NOTE	Harmonized as EN 60898-1:2019
IEC 60947-2:2016	NOTE	Harmonized as EN 60947-2:2017 (not modified)

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Low-voltage switchgear and controlgear –
Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination
units**

**Appareillage à basse tension –
Partie 3: Interrupteurs, sectionneurs, interrupteurs-sectionneurs et combinés-
fusibles**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2020 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 000 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

67 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Low-voltage switchgear and controlgear –
Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination
units**

**Appareillage à basse tension –
Partie 3: Interrupteurs, sectionneurs, interrupteurs-sectionneurs et combinés-
fusibles**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.120.40; 29.130.20

ISBN 978-2-8322-8153-6

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	10
2 Normative references	11
3 Terms, definitions and index of terms	12
3.1 General.....	12
3.2 Alphabetical index of terms	12
3.3 General terms	13
4 Classification.....	15
4.1 According to the utilization category.....	15
4.2 According to the method of operation.....	15
4.2.1 Manually operated equipment.....	15
4.2.2 Remotely operated equipment	15
4.3 According to suitability for isolation.....	16
4.4 According to the degree of protection provided	16
4.5 Summary of symbols for equipment types	16
5 Characteristics	16
5.1 Summary of characteristics.....	16
5.2 Type of equipment	17
5.3 Rated and limiting values for the main circuit	17
5.3.1 General	17
5.3.2 Rated voltages	17
5.3.3 Currents	17
5.3.4 Rated frequency	18
5.3.5 Rated duty.....	18
5.3.6 Normal load and overload characteristics	18
5.3.7 Short-circuit characteristics	18
5.4 Utilization category	19
5.5 Control circuits.....	20
5.6 Auxiliary circuits.....	20
5.7 Relays and releases	20
5.8 Co-ordination with short-circuit protective devices (SCPD).....	20
6 Product information	20
6.1 Nature of information	20
6.2 Marking.....	21
6.3 Instructions for installation, operation and maintenance, decommissioning and dismantling.....	22
7 Normal service, mounting and transport conditions	22
8 Constructional and performance requirements	22
8.1 Constructional requirements	22
8.1.1 General	22
8.2 Performance requirements.....	23
8.2.1 Operating conditions.....	23
8.2.2 Temperature-rise	24
8.2.3 Dielectric properties.....	24

8.2.4	Ability to make and break under no-load, normal load and overload conditions.....	25
8.2.5	Ability to make, break or withstand short-circuit currents	27
8.2.6	Void.....	27
8.2.7	Additional performance requirements for equipment suitable for isolation.....	28
8.2.8	Critical load current performance: DC equipment	28
8.2.9	Overload requirements for equipment incorporating fuses.....	28
8.3	Electromagnetic compatibility (EMC)	28
8.3.1	General	28
8.3.2	Immunity.....	28
8.3.3	Emission.....	29
9	Tests	30
9.1	Kinds of test.....	30
9.1.1	General	30
9.1.2	Type tests.....	30
9.1.3	Routine tests	30
9.1.4	Sampling tests.....	31
9.1.5	Special tests.....	31
9.2	Compliance with constructional requirements.....	31
9.2.1	General	31
9.3	Performance	32
9.3.1	General	32
9.3.2	Test sequences	32
9.3.3	General test conditions	33
9.3.4	Test sequence I: general performance characteristics	36
9.3.5	Test sequence II: operational performance capability	40
9.3.6	Test sequence III: short-circuit performance capability.....	42
9.3.7	Test sequence IV: conditional short-circuit current.....	46
9.3.8	Test sequence V: overload performance capability	49
9.3.9	Test sequence VI: critical load current performance of equipment with a DC rating.....	50
9.4	Electromagnetic compatibility tests	53
9.4.1	General	53
9.4.2	Immunity.....	53
9.4.3	Emission.....	53
9.5	Special tests	54
9.5.1	Mechanical and electrical durability	54
9.5.2	Mechanical durability	54
9.5.3	Electrical durability	54
9.5.4	Damp heat, salt mist, vibration and shock.....	54
Annex A (normative)	Equipment for direct switching of a single motor.....	55
A.1	General.....	55
A.2	Rated.....	55
A.2.1	Intermittent periodic duty or intermittent duty	55
A.2.2	Temporary duty	55
A.3	Making and breaking capacities	55
A.4	Utilization category	55
A.5	Operational performance	58

A.6	Mechanical durability	59
A.7	Electrical durability	59
A.8	Verification of making and breaking capacities	59
A.9	Operational performance test	59
A.10	Special tests	59
A.10.1	General	59
A.10.2	Mechanical durability test	60
A.10.3	Electrical durability test	60
A.11	Critical load current performance for DC equipment	61
Annex B (informative)	Items subject to agreement between manufacturer and user	62
Annex C (normative)	Single pole operated three-pole switches	63
C.1	General	63
C.2	Tests	64
C.3	Test set-up and sequence	64
C.3.1	Making and breaking capacities (9.3.4.3) and operational performance (9.3.5.2)	64
C.3.2	Fuse protected short-circuit test (9.3.7.3)	64
C.4	Condition of equipment after tests	64
C.5	Instructions for use	64
Annex D (normative)	Switches, disconnectors, switch-disconnectors and fuse- combination units for use in photovoltaic (PV) DC applications	65
D.1	General	65
D.1.1	Background	65
D.1.2	Object	65
D.2	Normative references	65
D.3	Terms and definitions	65
D.4	Classification	66
D.4.1	According to the utilization category	66
D.5	Characteristics	66
D.6	Product information	67
D.7	Normal service, mounting and transport conditions	67
D.8	Constructional and performance requirements	67
D.9	Tests	71
Annex E (normative)	Additional requirements for LV switchgear intended for connection of aluminium conductors	77
E.1	Object	77
E.2	Normative references	77
E.3	Terms, definitions and index of terms	77
E.4	Classification	78
E.5	Characteristics	78
E.6	Product information	78
E.6.1	Nature of information	78
E.6.2	Marking	78
E.6.3	Instructions for installation, operation and maintenance, decommissioning and dismantling	78
E.7	Normal service, mounting and transport conditions	79
E.8	Constructional and performance requirements	79
E.9	Tests	79
E.9.1	General	79

E.9.2	Current cycling test.....	80
E.9.3	Mechanical properties of terminals	86
E.9.4	Test for insertability of unprepared round aluminium conductors having the maximum cross-section	86
Annex F (informative)	Power loss.....	89
F.1	General.....	89
F.2	Test methods	89
F.2.1	General	89
F.2.2	General case for AC switches and/or disconnectors	89
F.2.3	General case for AC fused combination units and fuse disconnectors	89
F.2.4	Switches and/or disconnectors of rated current not exceeding 400 A.....	90
F.2.5	Fused combination units and fuse disconnectors of rated current not exceeding 400 A.....	90
F.3	Test procedure.....	91
Annex ZA (normative)	Normative references to international publications with their corresponding European publications	94
Annex ZZA (informative)	Relationship between this European standard and the essential requirements of Directive 2014/30/EU [2014 OJ L96] aimed to be covered	96
Annex ZZB (informative)	Relationship between this European standard and the safety objectives of Directive 2014/35/EU [2014 OJ L96] aimed to be covered	97
Bibliography.....		98
Figure C.1 – Typical arrangements		63
Figure E.1 – General test arrangement		81
Figure E.2 – Mounting of terminals for the current cycling test		81
Figure F.1 – Example of power loss measurement according to F.2.2		91
Figure F.2 – Example of power loss measurement according to F.2.3		92
Figure F.3 – Example of power loss measurement according to F.2.4		92
Figure F.4 – Example of power loss measurement according to F.2.5		93
Table 1 – Summary of equipment definitions.....		16
Table 2 – Utilization categories		20
Table 3 – Product information		21
Table 4 – Verification of rated making and breaking capacities (see 9.3.4.4) – Conditions for making and breaking corresponding to the various utilization categories		25
Table 5 – Verification of operational performance – Number of operating cycles corresponding to the rated operational current		26
Table 6 – Test circuit parameters for Table 5		27
Table 7 – Immunity tests ^a		29
Table 8 – Emission limits		29
Table 9 – List of type tests applicable to a given equipment.....		32
Table 10 – Overall scheme of test sequences		33
Table 11 – Test sequence I: general performance characteristics		37
Table 12 – Temperature-rise limits for terminals and accessible parts.....		40
Table 13 – Test sequence II: operational performance capability		41

Table 14 – Test sequence III: short-circuit performance capability	43
Table 15 – Test sequence IV: conditional short-circuit current – circuit-breaker protected	47
Table 16 – Test sequence IV: conditional short-circuit current – fuse protected	48
Table 17 – Test sequence V: overload performance capability	50
Table 18 – Number of operating cycles corresponding to the critical load current	52
Table 19 – Test circuit parameters for Table 18	52
Table 20 – Test sequence VI: critical load current performance of equipment with a DC rating	53
Table A.1 – Utilization categories	56
Table A.2 – Rated making and breaking capacity conditions corresponding to several utilization categories	57
Table A.3 – Relationship between current broken I_C and off-time for the verification of the rated making and breaking capacities	58
Table A.4 – Operational performance – Conditions for making and breaking corresponding to several utilization categories	58
Table A.5 – Verification of the number of on-load operating cycles – Conditions for making and breaking corresponding to several utilization categories	61
Table D.1 – Utilization categories	66
Table D.2 – Service arrangements	67
Table D.3 – Environmental conditions	67
Table D.4 – Rated impulse withstand levels for PV switches, PV disconnectors, PV switch-disconnectors or PV fuse-combination units	68
Table D.5 – Verification of rated making and breaking capacities (see 9.3.4.4) – Conditions for making and breaking corresponding to the DC-PV category	69
Table D.6 – Number of operating cycles	70
Table D.7 – Test circuit parameters for Table D.6	70
Table D.8 – Overall scheme of test sequences	72
Table D.9 – Number of operating cycles corresponding to the critical load current	74
Table D.10 – Test circuit parameters for Table D.9	74
Table E.1 – List of tests for terminal connections ^a with aluminium cables	80
Table E.2 – Conductor length for current cycling test as per conductor cross-section	82
Table E.3 – Equalizer dimensions	82
Table E.4 – Starting test current for the current cycling test	84
Table E.5 – Example of stability factor calculation	85
Table E.6 – Test values for flexion and pull-out test for cables	86
Table E.7 – Test aluminium cable for test currents up to 800 A ^{a, d}	87
Table E.8 – Test aluminium bars for test currents above 150 A and up to 3 150 A ^{a, f}	88
Table ZZA.1 — Correspondence between this European standard and the Essential Requirements set out in Directive 2014/30/EU [2014 OJ L96]	96
Table ZZB.1 — Correspondence between this European standard and Annex I of Directive 2014/35/EU [2014 OJ L96]	97

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units

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 60947-3 has been prepared by subcommittee 121A: Low-voltage switchgear and controlgear, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage.

This fourth edition cancels and replaces the third edition published in 2008, Amendment 1:2012 and Amendment 2:2015. This edition constitutes a technical revision.

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

- addition of critical load current tests for DC switches (see 9.3.9);
- addition of requirements for a conditional short-circuit rating for disconnectors, switches, and switch-disconnectors protected by circuit-breakers (see 9.3.7.2);
- addition of new categories for high-efficiency motors switching (see Annex A);
- addition of new Annex E for connection to aluminium conductors;

- addition of new Annex F for power losses measurement.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
121A/340/FDIS	121A/354/RVD

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

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

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

This part is to be used in conjunction with the sixth edition of IEC 60947-1:2020. The numbering of the subclauses is sometimes not continuous because it is based on IEC 60947-1:2020.

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

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

INTRODUCTION

The provisions of the general rules dealt with in IEC 60947-1 are applicable to this document, where specifically called for. Clauses and subclauses, tables, figures and annexes of the general rules thus applicable are identified by reference to the sixth edition of IEC 60947-1:2020, for example, 5.3.4.1 of IEC 60947-1:2020, Table 4 of IEC 60947-1:2020, or Annex A of IEC 60947-1:2020.

document is a preview generated by EVS

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR –

Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units

1 Scope

This part of IEC 60947 applies to switches, disconnectors, switch-disconnectors and fuse-combination units and their dedicated accessories to be used in distribution circuits and motor circuits of which the rated voltage does not exceed 1 000 V AC or 1 500 V DC.

NOTE 1 Accessories are interconnecting units, extended terminals, internal coils, auxiliary contacts, motor operator, etc. offered as options with the basic unit.

This document does not apply to equipment coming within the scope of IEC 60947-2, IEC 60947-4-1 and IEC 60947-5-1.

Particular requirements for switches, disconnectors, switch-disconnectors and fuse-combination units for use in photovoltaic (PV) DC applications are given in Annex D.

Specific requirements for LV switchgear intended for the connections of aluminium conductors are given in Annex E.

Guidance on measurement of power loss is provided in Annex F.

This document does not include the additional requirements necessary for electrical apparatus for explosive gas atmospheres.

NOTE 2 Depending on its design, a switch (or disconnector) can be referred to as "a rotary switch (disconnector)", "cam-operated switch (disconnector)", "knife-switch (disconnector)", etc.

NOTE 3 In this document, the word "switch" also applies to the apparatus referred to in French as "commutateurs", intended to modify the connections between several circuits and *inter alia* to substitute a part of a circuit for another.

NOTE 4 In general, throughout this document, switches, disconnectors, switch-disconnectors and fuse-combination units will be referred to as "equipment".

The object of this document is to state:

- a) the characteristics of the equipment;
- b) the conditions that apply to the equipment with reference to:
 - 1) operation and behaviour in normal service;
 - 2) operation and behaviour in case of specified abnormal conditions, e.g. short-circuit;
 - 3) dielectric properties;
- c) the tests for confirming that these conditions have been met and the methods that are adopted for these tests;
- d) the information relevant to the marking of the equipment or made available by the manufacturer, e.g. in the catalogue.

Specific items requiring agreement between the user and the manufacturer are identified in Annex B.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60050-441, *International Electrotechnical Vocabulary – Part 441: Switchgear, controlgear and fuses* (available at <http://www.electropedia.org>)

IEC 60034-12:2016, *Rotating electrical machines – Part 12: Starting performance of single-speed three-phase cage induction motors*

IEC 60034-30-1:2014, *Rotating electrical machines – Part 30-1: Efficiency classes of line operated AC motors (IE code)*

IEC 60228:2004, *Conductors of insulated cable*

IEC 60269 (all parts), *Low-voltage fuses*

IEC 60417, *Graphical symbols for use on equipment* (available at <http://www.graphical-symbols.info/equipment>)

IEC 60695-2-11:2014, *Fire hazard testing – Part 2-11: Glowing/hot-wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

IEC 60947-1:2020, *Low-voltage switchgear and controlgear – Part 1: General rules*

IEC 60947-5-1:2016, *Low-voltage switchgear and controlgear – Part 5-1: Control circuit devices and switching elements – Electromechanical control circuit devices*

IEC 61000-4-2:2008, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2006, *Electromagnetic compatibility (EMC) – Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61000-4-3:2006/AMD1:2007

IEC 61000-4-3:2006/AMD2:2010

IEC 61000-4-4:2012, *Electromagnetic compatibility (EMC) – Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test*

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

IEC 61000-4-5:2014/AMD1:2017

IEC 61000-4-6:2013, *Electromagnetic compatibility (EMC) – Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields*

IEC 61545:1996, *Connecting devices – Devices for the connection of aluminium conductors in clamping units of any material and copper conductors in aluminium bodied clamping units*

IEC 62208:2011, *Empty enclosures for low-voltage switchgear and controlgear assemblies – General requirements*

IEC 62475:2010, *High-current test techniques – Definitions and requirements for test currents and measuring systems*

ISO 2859-1:1999, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 2859-1:1999/AMD1:2011

CISPR 11:2015, *Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement*

CISPR 11:2015/AMD1:2016

CISPR 32:2015, *Electromagnetic compatibility of multimedia equipment – Emission requirements*

3 Terms, definitions and index of terms

3.1 General

For the purposes of this document, the terms and definitions given in IEC 60050-441 and IEC 60947-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.2 Alphabetical index of terms

References

D

Disconnector.....	3.3.1
Disconnector-fuse.....	3.3.5
Disconnector-fuse single opening	3.3.5.1
Disconnector-fuse double opening	3.3.5.2

F

Fuse-combination unit.....	3.3.2
Fuse-disconnector	3.3.6
Fuse-disconnector single opening	3.3.6.1
Fuse-disconnector double opening.....	3.3.6.2
Fuse-switch	3.3.4
Fuse-switch single opening.....	3.3.4.1
Fuse-switch double opening.....	3.3.4.2
Fuse-switch-disconnector	3.3.8
Fuse-switch-disconnector single opening.....	3.3.8.1
Fuse-switch-disconnector double opening.....	3.3.8.2