

High-voltage switchgear and controlgear - Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and

Appareillage à haute tension - Partie 105: Combinés interrupteurs-fusibles pour courant alternatif de tensions assignées supérieures à 1 kV et jusqu'à 52 kV inclus

Hochspannungs-Schaltgeräte und - Schaltanlagen - Teil 105: Wechselstrom- Lastschalter-Sicherungs-Kombinationen für Bemessungsspannungen über 1 kV bis

National Foreword

This European Standard EN IEC 62271-105:2023 was adopted as Luxembourgish Standard ILNAS-EN IEC 62271-105:2023.

Every interested party, which is member of an organization based in Luxembourg, can participate for FREE in the development of Luxembourgish (ILNAS), European (CEN, CENELEC) and International (ISO, IEC) standards:

- Participate in the design of standards
- Foresee future developments
- Participate in technical committee meetings

<https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation.html>

THIS PUBLICATION IS COPYRIGHT PROTECTED

Nothing from this publication may be reproduced or utilized in any form or by any mean - electronic, mechanical, photocopying or any other data carries without prior permission!

ILNAS-EN IEC 62271-105:2023

EUROPEAN STANDARD **EN IEC 62271-105**

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2023

ICS 29.130.10

Supersedes EN 62271-105:2012

English Version

High-voltage switchgear and controlgear - Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52 kV (IEC 62271-105:2021)

Appareillage à haute tension - Partie 105: Combinés interrupteurs-fusibles pour courant alternatif de tensions assignées supérieures à 1 kV et jusqu'à 52 kV inclus (IEC 62271-105:2021)

Hochspannungs-Schaltgeräte und -Schaltanlagen - Teil 105: Wechselstrom-Lastschalter-Sicherungskombinationen für Bemessungsspannungen über 1 kV bis einschließlich 52 kV (IEC 62271-105:2021)

This European Standard was approved by CENELEC on 2021-07-20. 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, Türkiye 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 17A/1300/FDIS, future edition 3 of IEC 62271-105, prepared by SC 17A "Switching devices" of IEC/TC 17 "High-voltage switchgear and controlgear" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62271-105:2023.

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) 2024-05-10
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2026-11-10

This document supersedes EN 62271-105:2012 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.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 62271-105:2021 was approved by CENELEC as a European Standard without any modification. In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 62271-202 NOTE Harmonized as EN 62271-202

Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Clause 2 of EN 62271-1:2017 applies with the following additions:

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-441	-	International Electrotechnical Vocabulary. Switchgear, controlgear and fuses	-	-
IEC 60282-1	2020	High-voltage fuses - Part 1: Current-limiting fuses	EN IEC 60282-1	2020
IEC 62271-1	2017	High-voltage switchgear and controlgear - Part 1: Common specifications for alternating current switchgear and controlgear	EN 62271-1	2017
IEC 62271-100	2021	High-voltage switchgear and controlgear - Part 100: Alternating-current circuit-breakers	EN IEC 62271-100	2021
IEC 62271-102	2018	High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches	EN IEC 62271-102	2018
IEC 62271-103	2021	High-voltage switchgear and controlgear - Part 103: Alternating current switches for rated voltages above 1 kV up to and including 52 kV	EN IEC 62271-103	2023

Annex ZB (informative)

A-deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN and/or CENELEC member.

This European Standard does not fall under any Directive/Regulation of the EU.

In the relevant CEN and/or CENELEC countries, these A-deviations are valid instead of the respective provisions of the European Standard until the national situation causing the A-deviation has changed

<u>Clause</u>	<u>Deviation</u>
General	Italy CAPITOLO VSR 8.B D.M. 1 DICEMBRE 1980 e succ. Modifiche Disciplina dei contenitori a pressione di gas con membrane miste di materiale isolante e di materiale metallico, contenenti parti attive di apparecchiature elettriche. Gas filled compartments having a design pressure exceeding 0,5 bar (gauge) or a volume exceeding 2 m³ shall be designed according to the Italian pressure vessel code for electrical switchgear.



INTERNATIONAL STANDARD

NORME INTERNATIONALE

**High-voltage switchgear and controlgear –
Part 105: Alternating current switch-fuse combinations for rated voltages above
1 kV up to and including 52 kV**

**Appareillage à haute tension –
Partie 105: Combinés interrupteurs-fusibles pour courant alternatif de tensions
assignées supérieures à 1 kV et jusqu'à 52 kV inclus**

CONTENTS

FOREWORD	5
1 Scope	7
2 Normative references	8
3 Terms and definitions	8
3.1 General terms and definitions	8
3.2 Assemblies of switchgear and controlgear	8
3.3 Parts of assemblies	8
3.4 Switching devices	8
3.5 Parts of switchgear and controlgear	9
3.6 Operational characteristics of switchgear and controlgear	10
3.7 Characteristic quantities	10
3.101 Fuses	13
4 Normal and special service conditions	14
5 Ratings	14
5.1 General	14
5.2 Rated voltage (U_r)	15
5.3 Rated insulation level (U_d , U_p , U_S)	15
5.4 Rated frequency (f_r)	15
5.5 Rated continuous current (I_r)	15
5.6 Rated short-time withstand current (I_k)	15
5.7 Rated peak withstand current (I_p)	15
5.8 Rated duration of short-circuit (t_k)	15
5.9 Rated supply voltage of auxiliary and control circuits (U_a)	15
5.10 Rated supply frequency of auxiliary and control circuits	15
5.11 Rated pressure of compressed gas supply for controlled pressure systems	15
5.101 Rated short-circuit breaking current	16
5.102 Rated short-circuit making current	16
5.103 Rated transfer current (striker operation) ($I_{rtransfer}$)	16
5.104 Rated take-over current for release-operated combinations (I_{rto})	16
6 Design and construction	16
6.1 Requirements for liquids in switch-fuse combinations	16
6.2 Requirements for gases in switch-fuse combinations	16
6.3 Earthing of switch-fuse combinations	16
6.4 Auxiliary and control equipment and circuits	17
6.5 Dependent power operation	17
6.6 Stored energy operation	17
6.7 Independent unlatched operation (independent manual or power operation)	17
6.8 Manually operated actuators	17
6.9 Operation of releases	17
6.10 Pressure/level indication	17
6.11 Nameplates	17
6.12 Locking devices	19
6.13 Position indication	19
6.14 Degrees of protection provided by enclosures	19

6.15	Creepage distances for outdoor insulators	19
6.16	Gas and vacuum tightness	19
6.17	Tightness for liquid systems	19
6.18	Fire hazard (flammability)	19
6.19	Electromagnetic compatibility (EMC)	19
6.20	X-ray emission	19
6.21	Corrosion	19
6.22	Filling levels for insulation, switching and/or operation	19
6.101	Linkages between the fuse striker(s) and the switch release	19
6.102	Low over-current conditions (long fuse-pre-arcing time conditions)	19
7	Type tests	20
7.1	General	20
7.1.1	Basics	20
7.1.2	Information for identification of test objects	20
7.1.3	Information to be included in type-test reports	20
7.2	Dielectric tests	21
7.3	Radio interference voltage (RIV) test	21
7.4	Resistance measurement	21
7.5	Continuous current tests	21
7.6	Short-time withstand current and peak withstand current tests	21
7.7	Verification of the protection	21
7.8	Tightness tests	21
7.9	Electromagnetic compatibility tests (EMC)	21
7.10	Additional tests on auxiliary and control circuits	21
7.11	X-radiation test for vacuum interrupters	21
7.101	Making and breaking tests	22
7.101.1	General	22
7.101.2	Conditions for performing the tests	22
7.101.3	Test-duty procedures	28
7.101.4	Behaviour of the combination during tests	33
7.101.5	Condition of the apparatus after testing	34
7.102	Mechanical operation tests	35
7.103	Mechanical shock tests on fuses	35
7.104	Thermal test with long pre-arcing time of fuse	35
7.105	Extension of validity of type tests	36
7.105.1	Dielectric	36
7.105.2	Continuous current tests	36
7.105.3	Making and breaking	36
8	Routine tests	36
8.101	Mechanical operating tests	37
9	Guide to the selection of switch-fuse combinations (informative)	37
9.101	Guide to the selection of switch-fuse combination for transformer protection	37
9.101.1	General	37
9.101.2	Rated short-circuit breaking current	38
9.101.3	Primary fault condition caused by a solid short-circuit on the transformer secondary terminals	38
9.102	Coordination of switch and fuses for extension of the reference list of fuses	39
9.102.1	General	39
9.102.2	Rated continuous current	39

9.102.3	Low over-current performance	39
9.102.4	Transfer current	39
9.102.5	Take-over current	39
9.102.6	Extension of the validity of type tests	40
10	Information to be given with enquiries, tenders and orders (informative)	40
10.1	General	40
10.2	Information with enquiries and orders	40
10.3	Information with tenders	40
11	Transport, storage, installation, operating instructions and maintenance	40
12	Safety	41
13	Influence of the product on the environment	41
Annex A (informative)	Example of the coordination of fuses, switch and transformer	42
Annex B (normative)	Procedures for determining transfer current	45
B.1	Background	45
B.2	Mathematical determination of ΔT	45
B.3	Simplified method for determination of transfer current	48
Annex C (normative)	Tolerances on test quantities for type tests	50
Bibliography		52
Figure 1	– Arrangement of test circuits for test duties $TD_{I_{SC}}$ and $TD_{I_{Wmax}}$	23
Figure 2	– Arrangement of test circuits for test-duty $TD_{I_{transfer}}$	24
Figure 3	– Arrangement of test circuits for test-duty $TD_{I_{to}}$	24
Figure 4	– Determination of power-frequency recovery voltage	26
Figure 5	– Representation of a specified TRV by a two-parameter reference line and a delay line	27
Figure 6	– Example of a two-parameter reference line for a TRV	28
Figure 7	– Characteristics for determining take-over current	32
Figure 8	– Transfer current in relation to the primary fault current I_{SC} due to a solid short circuit in the transformer secondary terminal	38
Figure A.1	– Characteristics relating to the protection of an 11 kV, 400 kVA transformer	43
Figure A.2	– Discrimination between HV and LV fuses	44
Figure B.1	– Practical determination of the transfer current	46
Figure B.2	– Determination of the transfer current with the iterative method	48
Table 1	– Nameplate information	18
Table 2	– Summary of the conditions for combining tests and alternative procedures	23
Table 3	– Values of prospective TRV for test-duty $TD_{I_{transfer}}$ based on practice in Europe	30
Table 4	– Values of prospective TRV for test-duty $TD_{I_{transfer}}$ based on practice in the United States of America	31
Table 5	– Summary of test parameters for test duties	33
Table C.1	– Tolerances on test quantities for type tests	50