

© Copyright SEK. Reproduction in any form without permission is prohibited.

**Järnvägsanläggningar –
Fasta installationer –
Särskilda fordringar på växelspänningsställverk –
Del 1: Enfas effektbrytare med märkspänning över 1 kV**

Railway applications –

Fixed installations –

Particular requirements for a.c. switchgear –

Part 1: Single-phase circuit breakers with U_n above 1 kV

Som svensk standard gäller europastandarden EN 50152-1:2007. Den svenska standarden innehåller den officiella engelska språkversionen av EN 50152-1:2007.

Nationellt förord

Standarden ska användas tillsammans med SS-EN 62271-100.

Tidigare fastställd svensk standard SS-EN 50152-1, utgåva 1, 1997, gäller ej fr o m 2010-07-01.

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

English version

**Railway applications -
Fixed installations -
Particular requirements for a.c. switchgear -
Part 1: Single-phase circuit-breakers with U_n above 1 kV**

Applications ferroviaires -
Installations fixes -
Spécifications particulières pour
appareillage à courant alternatif -
Partie 1: Disjoncteurs monophasés
avec U_n supérieur à 1 kV

Bahnanwendungen -
Ortsfeste Anlagen -
Besondere Anforderungen an
Wechselstrom-Schaltanlagen -
Teil 1: Einphasen-Leistungsschalter
mit U_n über 1 kV

This European Standard was approved by CENELEC on 2007-07-01. 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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard was prepared by SC 9XC, Electric supply and earthing systems for public transport equipment and ancillary apparatus (fixed installations), of Technical Committee CENELEC TC 9X, Electric and electronic applications for railways.

This European Standard supersedes EN 50152-1:1997 and has been prepared taking into account the changes that have been made in the high voltage switchgear and controlgear Standards of IEC TC 17 and in EN 50124-1/A2:2005.

This document is technically equivalent to EN 50152-1:1997 except for the normative references which have changed and the revised classification of rated insulation voltages according to Table A.2 of EN 50124-1/A2:2005.

The text of the draft was submitted to the unique acceptance procedure and was approved by CENELEC as EN 50152-1 on 2007-07-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2008-07-01
- latest date by which the national Standards conflicting
with the EN have to be withdrawn (dow) 2010-07-01

Contents

	Page
Introduction.....	5
1 Scope.....	6
2 Normative references.....	6
3 Definitions	6
4 Service conditions.....	7
5 Rating.....	7
5.1 General.....	7
5.2 Rated voltage (U_{Ne})	8
5.3 Nominal voltage (U_n)	8
5.4 Rated insulation voltage (U_{Nm}) [4.2]	8
5.5 Rated frequency [4.3]	9
5.6 Rated normal current and temperature rise [4.4]	9
5.7 Rated short-time withstand current [4.5]	10
5.8 Rated peak withstand current [4.6].....	10
5.9 Rated duration of short-circuit [4.7]	10
5.10 Rated supply voltage of closing and opening devices and auxiliary circuit [4.8].....	10
5.11 Rated supply frequency of closing and opening devices and auxiliary circuits [4.9]	10
5.12 Rated pressures of compressed gas supply for operation and for interruption [4.10]	10
5.13 Rated short-circuit breaking current (I_{Nss}) [4.101]	10
5.14 Rated transient recovery voltage for terminal faults [4.102].....	11
5.15 Standard values of initial transient recovery voltage [4.102.4].....	13
5.16 Rated short-circuit making current [4.103]	13
5.17 Rated operating sequence [4.104]	13
5.18 Rated out-of-phase breaking current [4.106]	14
5.19 Rated line-charging breaking current [4.107.1]	15
5.20 Rated cable-charging breaking current [4.107.2]	15
5.21 Rated single capacitor bank breaking current [4.107.3].....	15
5.22 Rated back-to-back capacitor bank breaking current [4.107.4].....	16
5.23 Rated capacitor bank inrush making current [4.107.5].....	16
5.24 Rated time quantities [4.109].....	17
5.25 Co-ordination of rated values	18
6 Design and construction [5].....	18
6.1 Requirements for liquids in circuit-breakers [5.1]	18
6.2 Requirements for gases in circuit-breakers [5.2].....	18
6.3 Earthing of circuit-breakers [5.3]	19
6.4 Auxiliary equipment [5.4]	19
6.5 Dependent power closing [5.5].....	19
6.6 Stored energy closing [5.6].....	19
6.7 Operation of releases [5.8]	19
6.8 Low and high pressure interlocking devices [5.9]	20
6.9 Nameplates [5.10]	20
6.10 Requirements for simultaneity of poles [5.101]	20
6.11 General requirement for operation [5.102]	20
6.12 Pressure limits of compressed gas for interruption in gas blast circuit-breakers [5.103].....	21
6.13 Vent outlet [5.104]	21
6.14 Safety overpressure device [5.105].....	21

7	Type tests [6]	21
7.1	General	21
7.2	Dielectric tests [6.2]	22
7.3	Radio interference voltage (r.i.v.) tests [6.3].....	23
7.4	Temperature-rise tests [6.5].....	23
7.5	Measurement of the resistance of the main circuit [6.4.1].....	24
7.6	Short-time withstand current and peak withstand current tests [6.6].....	24
7.7	Mechanical and environmental tests [6.101]	25
7.8	Miscellaneous provisions for making and breaking tests [6.102]	33
7.9	Test circuit for short circuit making and breaking tests [6.103]	38
7.10	Short-circuit test quantities [6.104]	39
7.11	Short-circuit test procedure [6.105]	43
7.12	Basic short-circuit test-duties [6.106].....	44
7.13	Critical current tests [6.107]	46
7.14	Out-of-phase making and breaking tests [6.110].....	46
7.15	Capacitive current switching tests [6.111]	46
8	Routine tests [7]	49
8.1	General	49
8.2	Power frequency voltage withstand dry on the main circuit [7.1]	49
8.3	Voltage withstand tests on control and auxiliary circuits [7.2]	49
8.4	Measurement of the resistance of the main circuit [7.3]	49
8.5	Mechanical operating tests [7.101].....	50
8.6	Design and visual check [7.102].....	51
9	Guide to the selection of circuit-breakers for service [8]	51
10	Information to be given with enquiries, tenders and orders [9]	51
	Bibliography	53

Tables

Table 1 - Nominal voltages (U_n), rated impulse voltages (U_{Ni}) and short-duration power-frequency (A.C.) test levels U_a for circuits connected to the contact line.....	9
Table 2 – Standard values of rated transient recovery voltage - Representation by two parameters - Single pole circuit-breaker	13
Table 3 - Standard values of prospective transient recovery voltage for 120 ° out-of-phase breaking - Representation by two parameters - Single pole circuit-breaker	14
Table 4 - Standard values of prospective transient recovery voltage for 180 ° out-of-phase breaking - Representation by two parameters - Single pole circuit-breaker	15
Table 5 - Suggested values of maximum permissible switching overvoltage to earth	16
Table 6 - Coordination table of rated values for circuit-breakers.....	18
Table 7 - Mechanical operation test at ambient temperature	28
Table 8 - Standard values of prospective transient recovery voltage for test-duty T60 - Representation by two parameters - Single pole circuit-breaker	41
Table 9 - Standard values of prospective transient recovery voltage for test-duty T30 - Representation by two parameters - Single pole circuit-breaker	42
Table 10	49

Introduction

The European Standard series EN 50152 is divided as follows.

Part 1: Single-phase circuit-breakers with U_n above 1 kV.

Part 2: Single-phase disconnectors, earthing switches and switches with U_n above 1 kV.

Part 3-1: Measurement, control and protection devices for specific use in a.c. traction systems – Application guide

Part 3-2: Measurement, control and protection devices for specific use in a.c. traction systems – Single-phase current transformers

Part 3-3: Measurement, control and protection devices for specific use in a.c. traction systems – Single-phase voltage transformers

EN 50152-1 has to be used in conjunction with EN 62271-100.

The essential requirements of EN 62271-100 have been transcribed in this European Standard. Other complementary clauses of EN 62271-100 are mentioned in this European Standard. Where a particular clause of EN 62271-100 is not mentioned, but is not referred as "not applicable" in this standard, that clause applies as far as reasonable. Where this standard states "addition" or "replacement", the relevant text of EN 62271-100 is to be adapted accordingly.

The numbering of clauses in EN 60694 and the EN 62271 series is not used in this European Standard. The numbering in square brackets refers to the numbering of clauses in EN 60694 and EN 62271.

NOTE 1 Where terms defined in EN 62271-100 conflict with definitions of the same terms as given in IEC 60050-811:1991 or of the other railway applications documents listed in the normative references, the definitions used in EN 62271-100 are to be used.

NOTE 2 The suffix N which appears in this standard for rated values is not present in EN 62271-100.

1 Scope

This EN 50152-1 is applicable to single-phase a.c. one-pole circuit-breakers designed for indoor or outdoor fixed installations for operation at frequencies of 16,7 Hz and 50 Hz on traction systems having an U_{Nm} above 1 kV up to 52 kV.

This EN 50152-1 is also applicable to two-pole circuit-breakers when connected in the following manner: one pole supplying the connection to the contact line of the track, the second pole supplying the connection to the feeder cable which runs alongside the same track and which is used to boost the track voltage at regular intervals in combination with autotransformers. The centre of this circuit is connected to earth.

This European Standard is also applicable to the operating devices of circuit-breakers and to their auxiliary equipment.

This European Standard does not address circuit-breakers with dependent manual operating mechanism.

NOTE A rated short-circuit making current cannot be specified for these circuit-breakers and the use of these mechanisms may give reasons for the objection based on their safety in operation.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 50124-1:2001 + amendment A2:2005, *Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment*

EN 50163:2004, *Railway applications - Supply voltages of traction systems*

EN 60044-1:1999, *Instrument transformers – Part 1: Current transformers* (IEC 60044-1:1996, modified)

EN 60507:1993, *Artificial pollution tests on high-voltage insulators to be used on a.c. systems* (IEC 60507:1991)

EN 60694:1996, *Common specifications for high-voltage switchgear and controlgear standards* (IEC 60694:1996)

EN 60721 (all parts), *Classification of environmental conditions* (IEC 60721 all parts)

EN 62271-100:2001, *High-voltage switchgear and controlgear – Part 100: High-voltage alternating-current circuit-breakers* (IEC 62271-100:2001)

EN 62271-102:2002, *High-voltage switchgear and controlgear – Part 102: Alternating-current disconnectors and earthing switches* (IEC 62271-102:2001)