SLOVENSKI STANDARD
SIST EN 50123-2:2003

01-maj-2003

Nadomeġļa:
SIST EN 50123-2:1998
SIST EN 50123-2:1998/A1:1998

Ģelezniġke naprave ï Stabilne naprave elektriļne vleke ï Stikalne naprave za enosmerni tok ï 2. del: Moļ nostna stikala za enosmerni tok

Railway applications - Fixed installations - D.C. switchgear -- Part 2: D.C. circuit breakers

Bahnanwendungen - Ortsfeste Anlagen - Gleichstrom-Schalteinrichtungen -- Teil 2: Gleichstrom-Leistungsschalter

Applications ferroviaires - Installations fixes - Appareillages à courant continu -- Partie 2: Disjoncteurs pour courant continu

Ta slovenski standard je istoveten z: **EN 50123-2:2003**

ICS:

29.130.99	Druge stikalne in krmilne naprave	Other switchgear and controlgear
29.280	Elektriļ na vleļ na oprema	Electric traction equipment

SIST EN 50123-2:2003 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50123-2

February 2003

ICS 29.120.60; 45.020

Supersedes EN 50123-2:1995 + A1:1996

English version

Railway applications – Fixed installations – D.C. switchgear Part 2: D.C. circuit breakers

Applications ferroviaires –
Installations fixes –
Appareillages à courant continu
Partie 2: Disjoncteurs
pour courant continu

Bahnanwendungen –
Ortsfeste Anlagen –
Gleichstrom-Schalteinrichtungen
Teil 2: Gleichstrom-Leistungsschalter

This European Standard was approved by CENELEC on 2002-09-01. 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and 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

Ref. No. EN 50123-2:2003 E

Foreword

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

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50123-2 on 2002-09-01.

This European Standard supersedes EN 50123-2:1995 + A1:1996. It has been prepared taking into account IEC 61992-2 in order to align technically as much as possible this EN 50123-2 and IEC 61992-2. These documents are to be considered as technically equivalent except for those references and peculiarities which are due to the European standardization in the railway application field.

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) 2003-09-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2005-09-01

This Part 2 is to be used in conjunction with EN 50123-1:2003.

Annexes designated “informative” are given for information only.
In this standard, annex A is informative.

Contents

1 Scope

This part of EN 50123 specifies requirements for d.c. circuit breakers for use in fixed installations of traction systems.

NOTE Switchgear assemblies, electromagnetic compatibility (EMC) and dependability are not covered in this part of EN 50123, but by other parts of this standard or by other standards, as indicated in EN 50123-1.

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

See EN 50123-1:2003.

3 Definitions

For the purposes of this European Standard, the terms and definitions given in EN 50123-1 apply.

4 Service requirements

Environmental conditions applicable to the equipment discussed in this standard are covered in 4.1 of EN 50123-1.

5 Characteristics of the circuit breaker

5.1 Enumeration of the characteristics

The characteristics of a circuit breaker and its assigned designations and values (where applicable) are covered below as follows:

- type of circuit breaker (5.2);
- rated values and limit values of the main circuit and short-circuit characteristics (5.3);
- control circuits (5.4);
- auxiliary circuits (5.5);
- releases (5.6);
- arc voltages (5.7).

5.2 Type of circuit breaker

A circuit breaker is defined by the following details, as applicable.

NOTE 1 As far as applicable, the following requirements also apply to single-pole circuit breakers electrically or mechanically interlocked in multiple systems.

a) Interruption:

- in air;
- via a semiconductor.

NOTE 2 In this standard only interruption in air or via a semiconductor is addressed. This standard may be used for other specified interrupting media, as far as applicable, where clearly specified by mutual agreement between purchaser and supplier.

b) Breaking characteristics (class designation):

- high speed current limiting circuit breakers H;
- very-high speed current limiting circuit breakers V;
- semi-high speed circuit breakers S.

c) Use (installation point) in the system:

- interconnector circuit breaker I (also called bus-section or section circuit breaker);
- line circuit breaker L;
- rectifier circuit breaker R.

d) Current interruption direction:

- unidirectional U:
  - fitted with a series unidirectional release U_1;
  - fitted with a series bidirectional release U_2.

NOTE 3 U_2 circuit breakers are used for application where the reverse fault current is low (distant fault current) and cannot operate the overload protection for normal discrimination purposes (i.e. substations where adjacent substations are a far distance away).

- bidirectional B.

e) Duty of the main circuit

NOTE 4 To be specified when different from 5.3.4.2 and Table 2.

f) Actuating of the closing and opening operations:

- stored energy operation;
- independent manual operation;
- independent power operation;
- use of magnet;
- type of automatic tripping due to a release or relay;
- interlocks for opening and/or closing operations;
- trip-free provision;
- anti-pumping device.

g) Relay or release type:

- type of the relay(s) or release(s) involved.

h) Provision of an enclosure:

- without provision of an enclosure O (see 3.3.16 of EN 50123-1);
- with provision of an integral enclosure E (see 3.3.17 of EN 50123-1);
- with provision of a separate protection enclosure P.

The purchaser shall indicate which characteristics are to be present in the required circuit breaker(s) and only those tests which relate to the chosen type are applicable to the selected type of circuit breaker.

The above designations are used in this standard and may be used elsewhere adopting the conventional grouping as given in Table 1:

Table 1 - Shortened type-designation

Items above	b	c	d[a]	h[a]
Options	H V S	/I /L /R	/U_1 /U_2 /B	/O /E /P
Examples	H/L/B/E V/I/P H /R and L/U_2 [b]			S/R/O
NOTE When a circuit breaker is not suitable to perform all duties as given in 5.3.4.2, this fact will be indicated by means of the lower case letter(s) designating actual capability according to Table 2, first column (for example, H/Iff, fr/ P).				
[a] Optional designations. [b] When a circuit breaker is or shall be suitable for multiple alternate functions, the indication of these functions shall be preceded by an «and».				

Where semiconductor circuit breakers are only designed for use in rectifier equipped substations, they shall be clearly so marked. If they may also be used as track paralleling circuit breakers, when the substation rectifier circuit breakers are out of service, they shall also be clearly so marked.

5.3 Rated values and limit values for the main circuit

5.3.1 General

The rated characteristic values shall be specified by the purchaser. Nominal voltage values are to be selected from the values indicated in Table 1 of EN 50123-1; current values and track time constant (based on the track configuration which gives the largest track time constant) should have one of the preferred values listed in 5.1.2 of EN 50123-1.

These values should be confirmed by the supplier, who should indicate the rated values for the type of circuit breaker proposed and supply any other relevant data.

All these values are to be stipulated in accordance with 5.3.2 to 5.3.4. Definitions are given in EN 50123-1. Some data may be omitted by agreement.

5.3.2 Voltages

A circuit breaker is identified by the following voltages:

- system voltages and limits (see 3.2.1 and 5.1.3 of EN 50123-1);
- nominal voltage U_n (see EN 50163);
- rated voltage U_{Ne} (see 3.2.3 of EN 50123-1);
- rated insulation voltage U_{Nm} (see 3.2.2 of EN 50123-1). It shall be equal to or higher than U_{max};
- rated impulse withstand voltage U_{Ni} (see 3.2.4 of EN 50123-1);
- power-frequency voltage withstand level (dry) U_a (see 3.2.5 and Table 1 of EN 50123-1);
- maximum arc voltage (see 3.2.6.1 of EN 50123-1);
- rated auxiliary and control supply voltages (see 3.2.3.1 of EN 50123-1).

5.3.3 Currents

A circuit breaker is defined by the following currents:

- conventional thermal current I_{th}, I_{the} (see 3.2.8 and 3.2.9 of EN 50123-1);
- rated service current I_{Ne} (see 3.2.10 of EN 50123-1);
- rated short circuit current I_{Nss} (see 3.2.12.1 of EN 50123-1);
- rated short-time withstand current I_{Ncw} (see 3.2.11 of EN 50123-1).

  NOTE 1 Short-time ratings only apply to circuit breakers not fitted with series trip devices, or in a unidirectional device where a series trip is inoperative. In practice this would apply to a rectifier circuit breaker in the forward direction where a series trip only acts in the reverse direction.

  NOTE 2 Rated short-time currents donot need to have the same value as the rated short-circuit current I_{Nss}.

- overload capability: the purchaser shall inform the supplier of the load cycle requirements (see 3.2.10, note 2 of EN 50123-1).

5.3.4 Short-circuit characteristics

5.3.4.1 Rated short-circuit breaking and making capacities

These values are defined in 3.2.19 and 3.2.23 of EN 50123-1 and are associated with the rated voltage U_{Ne}, the rated service current I_{Ne}, the rated short-circuit current I_{Nss}, the rated track time-constant T_{Nc} and the class designation H or V or S.

The rated short-circuit making capacity is the prospective peak value of the rated short-circuit current I_{Nss} (see 3.2.12.1 of EN 50123-1).

A rated short-circuit breaking capacity requires the circuit breaker to be able to interrupt any short-circuit current of a value lower than or equal to this rated breaking capacity at the circuit time constant stipulated.

A circuit breaker having a breaking capacity at a rated track time constant T_{Nc} is capable of the same breaking capacity at all lower values of track time constant T_c.

The prospective maximum short-circuit current is the sum of the prospective short-circuit currents from all sources connected to the system, including rectifier converters and regenerative trains.

When fixing the maximum short-circuit current and the above track time constant, clause 5 of EN 50123-1 shall be considered.

5.3.4.2 Duties and test duty cycles

The duties required of a circuit breaker for each of the three uses are listed in Table 2. The test duty cycles applying to the duties are shown in Table 3.

NOTE Where the circuit breaker chosen by the manufacturer or offered by the supplier has been designed with short circuit breaking characteristics in excess of those actually required in the installation, it may be agreed between purchaser and supplier to perform additional tests in accordance with 8.3.8 for duties f) and/or e) and/or d) using the test current actually required. These tests may be performed either at a standard test duty cycle (duty 1 or duty 2) or at an agreed duty cycle and may be repeated a number of times upon agreement between purchaser and supplier.

Table 2 - Circuit breaker duties

Duty	Use	Conditions	Test current	Prospective peak	Time constant
f	L	Maximum fault	I_{Nss}	≥ 1,42 I_{Nss}	By consequence of other circuit parameters
e	L [a]	Maximum energy	0,5 I_{Nss}	By consequence of other circuit parameters	0,5 T_{Nc}
d	L	Distant fault	2 I_{Ne}	By consequence of other circuit parameters	T_{Nc}
l	L	Low current	I_c	Not applicable	≅ 0,01 s
ff	I	Maximum fault forward	I_{Nss}	≥ 1,42 I_{Nss}	By consequence of other circuit parameters
fr	I	Maximum fault reverse	I_{Nss}	≥ 1,42 I_{Nss}	By consequence of other circuit parameters
lr	I, R [b]	Forward low current after reverse short circuit	I_c	Not applicable	≅ 0,01 s
r	R	Max fault reverse with paralleled converters	I_{Nss}	≥ 1,42 I_{Nss}	
s	R	Short time current forward	I_{Ncw}	≥ 1,42 I_{Ncw}	

NOTE 1 For substations equipped with smoothing reactors of high value, the maximum energy condition may correspond to the maximum fault condition.

NOTE 2 I_{Nss} is to be determined for each type of actual circuit situation. Therefore I_{Nss} may be different for Line L, Interconnector I and Rectifier R circuit breakers.

[a] The factor affecting both I_{Nss} and T_{Nc} for maximum fault position is taken for practical reasons as 0,5. For low values of T_{Nc} , see Table 2 in 5.1.1.3 of EN 50123-1.

[b] R only when explicitly required by the purchaser.