

Railway installations — Fixed installations — D.C. switchgear —

Part 2: D.C. circuit breakers

The European Standard EN 50123-2:1995 has the status of a British Standard

This British Standard should be read in conjunction with BS EN 50123-1:1996

ICS 29.120.60; 45.020

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PEL/9, Railway electrotechnical applications, upon which the following bodies were represented:

- British Cable Makers Confederation
- Confederation of Passenger Transport UK
- Docklands Light Railway
- Federation of the Electronics Industry
- Health and Safety Executive
- London Underground Ltd.
- Power Supply Manufacturers' Association — PSMA (BEAMA Ltd.)
- Railtrack
- Railway Industry Association

The following bodies were also represented in the drafting of the standard through subcommittees and panels:

- British Railways Board
- Transmission and Distribution Association (BEAMA Ltd.)

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 March 1996

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National foreword

This British Standard has been prepared by Technical Committee PEL/9 and is the English language version of EN 50123-2:1995 *Railway applications, — Fixed installations — D.C. switchgear — Part 2: D.C. circuit breakers*, including amendment A1:1996, published by the European Committee for Electrotechnical Standardization (CENELEC).

NOTE In the final sentence of 8.3.4.2 “the radiation heath” has been replaced by “and radiated heat”.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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English version

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

(includes amendment A1:1996)

Applications ferroviaires
Installations fixes
Appareillage à courant continu
Partie 2: Coupe-circuit
(inclut l'amendement A1:1996)

Bahnanwendungen
Ortsfeste Anlagen
Gleichstrom-Schaltanlagen
Teil 2: Gleichstrom-Leistungsschalter
(enthält Änderung A1:1996)

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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.

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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, 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 1994-12-06.

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) 1995-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1995-12-01

This Part 2 is to be used in conjunction with EN 50123-1:1995, *Railway applications — Fixed installations — D.C. switchgear — Part 1: General*. Annexes designated “normative” are part of the body of the standard. Annexes designated “informative” are given for information only. In this standard, Annex A and Annex B are normative and Annex C is informative.

Foreword to amendment A1

This amendment 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, Electrical and electronic applications for railways.

The text of the draft was submitted to the formal vote and was approved by CENELEC as amendment A1 to EN 50123-2 on 1996-03-05.

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- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1997-03-01

1 Scope

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

NOTE 1 EN 50123-6 specifies requirements for d.c. switchgear assemblies.

NOTE 2 EN 50121-5 specifies requirements for electromagnetic compatibility (EMC).

NOTE 3 EN 50126 specifies requirements for dependability.

2 Normative references

For the purposes of this standard, the normative references given in EN 50123-1:1995 apply.

3 Definitions

For the purposes of this standard, the definitions given in EN 50123-1:1995 apply.

4 Service conditions

Where service conditions differ from those defined as “normal” in clause 4 and Annex B of EN 50123-1:1995, the purchaser shall state this fact in the tender specification. Where a d.c. circuit breaker is suitable for use in service conditions different from those defined as “normal” in clause 4 and Annex B of EN 50123-1:1995, the manufacturer shall state this fact.

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 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 or relays (5.6);
- switching overvoltages (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 document only interruption in air or via a semiconductor are concerned. This document 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:

- 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:

- interconnecting circuit breaker (also called bus-section or section circuit breaker) (here indicated with the prefix I);
- 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 applications where the reverse fault current is low (distant fault current) and cannot operate the overload protection for normal discrimination purposes (i.e. rectifier 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 5.3.3 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);
- with provision of an integral enclosure (see 3.3.13 of EN 50123-1:1995) (E).
- with provision of a separate protection enclosure (P);

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

When a circuit breaker is not suitable to perform all duties as given in 5.3.4.2, this fact shall be indicated by means of the lower case letter(s) designating actual capability according to Table 2, first column (e.g. Iff, fr/V/P).

Table 1 — Shortened type-designation

Items above	c ^a	b	d ^a	h ^a
Options	I	/H	/U ₁	/O
	L	/V	/U ₂	/E
	R	/S	/B	/P
Examples	L/H/B/E			
	I/V/P		R/S/O	
^a Optional designations				

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 EN 50163, current values and track time constant (based on the track configuration which gives the largest time constant) should have one of the preferred values in EN 50123-1:1995.

These values should be confirmed by the supplier, who should indicate the limit 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. The definitions are given in EN 50123-1:1995. Some data may be omitted by agreement.

5.3.2 Voltages

A circuit breaker is identified by the following rated voltages:

- System voltages and limits
See 3.2.1 of EN 50123-1:1995.
- Rated voltage (U_{Ne})
See 3.2.3 and 5.1.3 of EN 50123-1:1995.
- Rated insulation voltage (U_{Nm})
See 3.2.2 of EN 50123-1:1995.
It shall be equal to or higher than U_{max} .
- Rated impulse withstand voltage (U_{Ni})
See 3.2.4 of EN 50123-1:1995.

- Power-frequency voltage withstand level (dry)
See 3.2.5 of EN 50123-1:1995.

NOTE This withstand level is a dry test, because it is applicable to indoor equipment.

5.3.3 Currents

A circuit breaker is defined by the following rated currents:

- Rated conventional thermal current (I_{th} I_{the})
See 3.2.8 and 3.2.9 of EN 50123-1:1995.
- Rated service current (I_{Ne})
See 3.2.10 of EN 50123-1:1995.
- Rated short circuit current (I_{Nss})
See 3.2.12 of EN 50123-1:1995.
- Rated short-time withstand current (I_{Ncw})
See 3.2.11 of EN 50123-1:1995.
- Overload capability

The purchaser shall inform the supplier of the load cycle needed. See 3.2.10, note 2 of EN 50123-1:1995.

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 50123-1:1995 and are associated with the rated voltage, the rated service current, the rated maximum short-circuit current, the track time-constant and the rated speed (H or V or S).

The rated short-circuit making capacity is the prospective peak of the rated short-circuit current I_{Nss} (see 3.2.12.1 of EN 50123-1:1995).

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 time-constant stipulated.

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

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

When fixing the maximum short-circuit current and the above time-constant, clause 5 of EN 50123-1:1995 shall be considered.

5.3.4.2 Duties and test cycles

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