

SLOVENSKI STANDARD
SIST EN 50123-5:2003

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Railway applications - Fixed installations - D.C. switchgear -- Part 5: Surge arresters and low-voltage limiters for specific use in d.c. systems
 Bahnanwendungen - Ortsfeste Anlagen - Gleichstrom-Schaltanlagen -- Teil 5: Überspannungsableiter und Niederspannungsbegrenzer für spezielle Verwendung in Gleichstromsystemen
 Applications ferroviaires - Installations fixes - Appareillage à courant continu -- Partie 5: Parafoudres et limiteurs de tension pour utilisation spécifique dans les systèmes à courant continu

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Applications ferroviaires - Installations fixes - Appareillage à courant continu -- Partie 5: Parafoudres et limiteurs de tension pour utilisation spécifique dans les systèmes à courant continu

Ta slovenski standard je istoveten z: EN 50123-5:2003

ICS:

29.130.99	Druge stikalne in krmilne naprave	Other switchgear and controlgear
29.280	Električno vozno opremljena vozila	Electric traction equipment

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EUROPEAN STANDARD

EN 50123-5

NORME EUROPÉENNE

EUROPÄISCHE NORM

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Supersedes EN 50123-5:1997 + A1:1999

English version

**Railway applications –
Fixed installations - D.C. switchgear
Part 5: Surge arresters and low-voltage limiters
for specific use in d.c. systems**

Applications ferroviaires –
Installations fixes –
Appareillage à courant continu
Partie 5: Parafoudres et limiteurs
de tension pour utilisation spécifique
dans les systèmes à courant continu

Bahnanwendungen –
Ortsfeste Anlagen –
Gleichstrom-Schaltanlagen
Teil 5: Überspannungsableiter und
Niederspannungsbegrenzer
für spezielle Verwendung
in Gleichstromsystemen

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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.

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.

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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 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 50123-5 on 2002-09-01.

This European Standard supersedes EN 50123-5:1997 + A1:1999.

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 5 is to be used in conjunction with EN 50123-1:2003, with EN 60099-1:1994 and with EN 60099-4:1993.

Annexes designated “informative” are given for information only.

In this standard, annexes A and B are informative.

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Introduction

EN 50123-5 is divided into five clauses as follows:

- 1 common matters;
- 2 non-linear resistor type gapped surge arresters (based on EN 60099-1);
- 3 artificial pollution testing of surge arresters: under consideration;
- 4 metal-oxide surge arresters without gaps (based on EN 60099-4) and surge protective devices (based on EN 61643-11);
- 5 low-voltage limiters.

Clauses 2 and 4 of this standard shall be read in conjunction with the documents mentioned in 1.2.

In particular clauses 4 to 8 and Annex B, Annex D and Annex E of EN 60099-1 are referred to in clause 2 of EN 50123-5, unless explicitly otherwise indicated in this European Standard.

For gapless surge arresters and surge protective devices the appropriate portions of EN 60099-4 and EN 61643-11 respectively are quoted in clause 4 of this EN 50123-5, and apply.

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NOTE 1 Only those clauses and subclauses which are modified in respect to the above-mentioned CENELEC and IEC publications are mentioned in this document. The National Committees may copy the unchanged portions of the IEC 60099 publications referred altering the type face as necessary.

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NOTE 2 The numbering of this EN 50123-5 follows the following criteria:
- the first number identifies the five clauses of this standard;
- the remaining numbers, for clause 2 and clause 4, are taken unchanged from EN 60099-1 and EN 60099-4 respectively.

Annex A gives typical information required during enquiry and tenders. Annex B describes a typical solution for high voltage filters against voltage surges.

1 Common matters

1.1 Scope

Clauses 1, 2, 3 and 4 of this European Standard cover particular requirements for surge arresters (following named arresters) for specific use in fixed installations of d.c. traction systems. These are surge arresters consisting of one or more non-linear resistors which may be in series with single or multiple spark gaps.

Low-voltage limiters are covered under clause 5. These are protective devices mainly used in fixed installations of d.c. traction systems to connect certain portions of the circuit, when, owing to an abnormal situation, the voltage across the device exceeds a predetermined limited value. They may be associated with other devices such as contactors for self-restoring arrangements. They are not used in general to provide surge protection.

The following are the main uses of low-voltage limiters (LVL):

- connection to the rail of metallic masses;
- protection of rail circuits;
- earthing of rails in the substation;
- protection of cathodic circuits;
- protection of cable shields.

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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).

EN 50123-1	2003	Railway applications – Fixed installations - D.C. switchgear – Part 1: General
EN 50125-2	2002	Railway applications - Environmental conditions for equipment - Part 2: Fixed electrical installations
EN 60099-1	1994	Surge arresters -- Part 1: Non-linear resistor type gapped surge arresters for a.c. systems (IEC 60099-1:1991)
EN 60099-4	1993	Surge arresters -- Part 4: Metal-oxide surge arresters without gaps for a.c. systems (IEC 60099-4:1991)
EN 61643-11	2002	Low-voltage surge protective devices – Part 11: Surge protective devices connected to low voltage power systems – Requirements and tests (IEC 61643-1:1998, mod. + corrigendum December 1998)

2 Non-linear resistor type gapped surge arresters

2.1 General

See clause 1.

NOTE Gapped surge arresters should not be used for new installations

2.2 Definitions

For the purposes of this European standard the terms and definitions given in clause 3 of EN 50123-1, as well as the definitions in section 2 of EN 60099-1 apply.

2.3 Marking

Gapped surge arresters shall be identified by the following minimum information which shall appear either on the rating plate (nameplate) or, if a nameplate in accordance with EN 60099-1 is provided, separately with the arrester or on a paper sheet provided by the manufacturer together with the arrester:

- compliance with EN 50123-5;
- type: gapped - suitable for d.c. traction systems;
- rated voltage U_r ;
- protective voltage level U_p ;
- nominal discharge current I_n ;
- pressure relief class in kA (if any);
- manufacturer's name or trademark, type and identification;
- year of manufacture;
- serial number.

NOTE Information to be given in the enquiry or tender may be guided by Annex A of this standard or by Annex B of EN 60099-1.

2.4 Preferred ratings

A document giving a guidance in the selection of the characteristics which ensure the correct protection of the circuit is in preparation.

2.4.1 Preferred voltage ratings (U_r)

Preferred values of rated voltages for gapped arresters shall be as listed in Table 2.1A.

Table 2.1A - Preferred voltage ratings (kV)

0,750	1	2	4
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2.4.2 Preferred protective voltage levels (U_p)

Preferred protective voltage levels for gapped arresters shall be as listed in Table 2.1B.

Table 2.1B - Preferred protective voltage levels (kV_{cr})

3,0	4,5	5,0	6,0	8,0	10	12	15	18
20	25	30	35	40				

2.4.3 Preferred nominal discharge currents (I_n)

The preferred nominal discharge currents, are as listed in Table 2.1C.

Table 2.1C - Preferred nominal discharge currents (kA)

20	10	5	2,5
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2.4.4 Service requirements

Where service requirements differ from those defined as "normal" either in clause 4 and Annex B of EN 50123-1 (for indoor arresters) or in EN 60099 series (for outdoor arresters), the purchaser shall state this fact in the tender specification. Where a d.c. surge arrester is suitable for use in service requirements different from those defined as "normal" in the above mentioned documents, the manufacturer shall state this in the tender specification.

2.5 Requirements

See section 5 of EN 60099-1 except for the following.

2.5.4 Switching impulse sparkover voltage

No limits for the maximum switching impulse sparkover voltage have been specified. The test under 2.8.3.5 is considered an investigation test, i.e. a test carried out by agreement between purchaser and supplier for gaining experience, without reference to the contractual obligations.

NOTE The switching phenomena on d.c. systems are under consideration.

2.5.6 Not applicable.

2.5.8 Long-duration current withstand

Arresters shall withstand the long-duration current impulse test of 2.8.5.3 and Table 6 of EN 60099-1. The average dry power-frequency sparkover voltage of 2.8.2 recorded before and after this test shall not have changed by more than 10 %.

NOTE The switching phenomena on d.c. systems are under consideration.

2.6 General testing procedure

See section 6 of EN 60099-1.

2.7 Routine and acceptance tests

NOTE The term "acceptance test" is under revision.

2.7.1 Routine tests

The minimum requirement for the routine test to be made by the manufacturer shall be the dry power-frequency sparkover test (see 2.8.2).

2.7.2 Acceptance tests

When the purchaser specifies acceptance tests in the purchase agreement, the following tests shall be made on the nearest higher whole number to the cube root of the number of arresters to be supplied:

- a) dry power-frequency voltage sparkover test on the complete arrester (see 2.8.2);
- b) standard lightning impulse sparkover test on the complete arrester (see 2.8.3.2);
- c) only when specifically agreed between the manufacturer and the purchaser, residual voltage shall be determined on the complete arrester at a discharge current of not less than 0,25 times the nominal discharge current (see 2.8.4).

Any alteration in the number of samples or type of tests shall be specifically negotiated between the manufacturer and the purchaser.

2.8 Type tests

See section 8 of EN 60099-1 except for the following.

2.8.1 General

Same as in 8.1 of EN 60099-1, except for Table 3 which shall be substituted by the following Table 2.3 applicable for any standard discharge current.

Table 2.3 - Arrester test requirements

Test	Subclause
Power-frequency voltage sparkover test	2.8.2
Standard lightning voltage sparkover test	2.8.3.2
Front-of-wave-voltage sparkover test	2.8.3.4
Residual voltage test	2.8.4
Current impulse withstand:	
- High-current	2.8.5.2
- Long-duration	2.8.5.3
Operating duty test	2.8.6
Pressure relief test	2.8.7
Arrester disconnecter (when fitted)	2.8.8

2.8.2 Power-frequency voltage sparkover test

Dry and wet tests shall be made in accordance with 6.1, 6.2 and 6.3 of EN 60099-1 and 2.8.1 on three complete arresters of each voltage rating tested.

The performance for other voltage ratings of the same design (as defined in 2.8.1) within $\pm 25\%$ of a test sample rating can be determined by adjusting the voltage level in proportion to the voltage ratings.

The voltage applied to the arrester shall be switched on at a value low enough to avoid sparkover of arrester by resulting switching surge and risen rapidly at a uniform rate until sparkover of the series gap occurs. The time during which the voltage is allowed to exceed the rated voltage of the arrester shall be in the range of 2 s to 5 s when testing arresters using grading resistors which are subject to damages by overheating if the applied voltage exceeds the rated voltage for too long. After sparkover, the test voltage shall be switched off as rapidly as possible, preferably by automatic tripping and in any case within 0,5 s. If it is difficult to measure the rapidly increasing voltage with an indicating type of instrument, a high speed recorder or an oscillograph shall be used. The manufacturer shall be consulted about the permissible test procedure.

The load imposed on the testing circuit by a surge arrester having non-linear grading resistors of high conductivity gives rise to harmonics, and the test-circuit shall have a sufficiently low impedance to maintain the waveform of the voltage across the arrester within the limits specified in HD 588.1.

The voltage shall be applied not less than 5 times, with an interval of about 10 s between successive applications.

The average sparkover value of the five tests is adopted as the power-frequency sparkover voltage for purposes of a comparison of tests made before and after other type tests.