

SLOVENSKI STANDARD
SIST EN 50152-3-3:2002

01-julij-2002

Railway applications - Fixed installations - Particular requirements for a.c. switchgear --
 Part 3-3: Measurement, control and protection devices for specific use in a.c. traction
 systems - Single-phase inductive voltage transformers

Bahnanwendungen - Ortsfeste Anlagen - Besondere Anforderungen an Wechselstrom-
 Schalteinrichtungen -- Teil 3-3: Meß-, Steuerungs- und Schutzeinrichtungen für
 Wechselstrom-Bahnanlagen - Einphasen-Spannungswandler

STANDARD PREVIEW

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Applications ferroviaires - Installations fixes - Exigences particulières pour appareillage à
 courant alternatif -- Partie 3-3: Dispositifs de mesure, de commande et de protection
 pour usage spécifique dans les systèmes de traction à courant alternatif -
 Transformateurs de tension monophasés

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Ta slovenski standard je istoveten z: EN 50152-3-3:2001

ICS:

29.130.99	Druge stikalne in krmilne naprave	Other switchgear and controlgear
29.280	Ò\ dā } æ\ } æ\] \{ æ	Electric traction equipment

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EUROPEAN STANDARD

EN 50152-3-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2001

ICS 29.200

English version

**Railway applications - Fixed installations -
Particular requirements for a.c. switchgear
Part 3-3: Measurement, control and protection devices
for specific use in a.c. traction systems -
Single-phase inductive voltage transformers**

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Bahnanwendungen -

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Besondere Anforderungen an

Wechselstrom-Schaltanlagen

Teil 3-3: Meß-, Steuerungs- und

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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 SC9XC, 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 formal vote and was approved by CENELEC as EN 50152-3-3 on 2000-01-01.

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) 2001-09-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-01-01

This European Standard is to be used in conjunction with EN 60044-2:1999.

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Introduction

Part 3 of EN 50152, "Railway applications - Fixed installations - Particular requirements for a.c. switchgear", concerning the measurement, control and protection devices for specific use in a.c. traction systems, comprises:

- ENV 50152-3-1: Application guide (informative document)
- EN 50152-3-2: Single-phase current transformers (normative document)
- EN 50152-3-3: Single-phase inductive voltage transformers (normative document)

This European Standard applies when the equipment is concerned with the specified characteristics.

The requirements contained in this EN 50152-3-3 complement those given in EN 60044-2:1999.

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1 Scope

This European Standard gives particular requirements for voltage transformers used in a.c. single-phase railway applications, fixed installations.

This European standard refers to single-phase inductive voltage transformers for railway applications on 15 kV, 16 ⅔ Hz and 25 kV, 50 Hz overhead lines, these voltages and frequencies being defined in accordance with EN 50163.

The main uses of these voltage transformers are:

- voltage indication;
- measurement;
- protection.

2 Normative references

This European Standard incorporates by dated or undated reference, 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 reference the latest edition of the publication referred to applies.

EN 50121-5	2000	Railway applications - Electromagnetic compatibility -- Part 5: Emission and immunity of fixed power supply installations and apparatus
EN 50124-1	2001	Railway applications - Insulation coordination -- Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment
EN 50152	series	Railway applications - Fixed installations - Particular requirements for a.c. switchgear
EN 50163	1995	Railway applications - Supply voltages of traction systems
EN 60044-2	1999	Instrument transformers – Part 2: Inductive voltage transformers (IEC 60044-1:1997 modified)
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)

3 Definitions

For the purposes of this part of EN 50152; the terms and definitions given in EN 50152-1:1996, clause 3 and in EN 60044-2:1999, clause 2, apply.

4 Service conditions

Where the equipment described in this part of the standard is mounted on circuit breakers to EN 50152-1, then the service conditions of that standard apply. Where they are separately mounted and are used in association with switchgear then the same service conditions as the switchgear apply.

5 Characteristics and use

The voltage transformer shall be:

- a) either mounted inside the circuit breaker specified in EN 50152-1; technical requirements of this EN 50152-3-3 apply together with the construction and test requirements (as applicable) of EN 50152-1;
- b) or separately mounted free standing; technical requirements of this EN 50152-3-3 apply.

6 Rating and design requirements

Clauses 5 and 6 of EN 60044-2:1999 apply with the following exceptions:

- In subclause 5.1.2 the following shall be added at the end of the subclause:
The secondary voltage values of 100 V or 110 V shall be preferred.
The rated ratio is given by the primary nominal voltage, as defined in EN 50163, divided by the rated secondary voltage.
- In clause 6 the entire subclause 6.1.1 shall be replaced by:
6.1.1 Rated insulation levels for the primary winding
Voltage transformers covered by this standard shall have the same insulation ratings and test values as the equipment into which they are installed. See table Z1 of EN 50152-1 and EN 50152-2. Free standing voltage transformers shall meet the same requirements.”
- Subclause 6.1.5 of EN 60044-2 is valid unless inconsistent with 9.1 of this European Standard.

7 Withstand conditions

The following requirements, additional to those of EN 60044-2:1999, apply:
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7.1 Primary side

The voltage transformer shall withstand the overvoltage characteristics described in EN 50163, annex A.

NOTE These events occur often and special attention should be paid to protect these voltage transformers.

7.2 Secondary side

The voltage transformer shall withstand the current produced in secondary winding for 1 s, when its terminals are short circuited. The primary voltage shall be $U_{\max 2}$ for this condition.

NOTE A rapid fuse or a miniature circuit breaker may be inserted at the load. On request, a slow-blow low-voltage fuse should be inserted internal of the secondary terminals.

8 Ferro-resonance

8.1 General

The following requirements, additional to those of EN 60044-2:1999, apply:

The structure of railway electrification network may easily generate ferro-resonance phenomena. It occurs mainly in 25 kV, 50 Hz systems.

When specified by the purchaser, the voltage transformer connected directly to the overhead line shall have the following characteristics in order to avoid the generation of ferro-resonance phenomena and withstand the overvoltages caused by the same.

8.2 Prevention of the generation

The following features shall be adopted:

- minimum resistance of the primary winding: 50 k Ω ;
- flux density such that at U_{max2} (see EN 50163) the saturation point is not reached.

8.3 Prevention of damages in the voltage transformer

The following features shall be adopted:

- ability to withstand without damage on the primary side a voltage wave obtained by summing a sinusoidal wave at rated frequency with a square wave at 1/3 of the rated frequency, with a total peak value of approximately 1,6 U_n ;
- suitability to operate continuously at 1/3 of the rated frequency and rated voltage;
- voltage factor of 1,9 (1,9 U_n for 8 hours at rated frequency).

8.4 Ferro-resonance withstand test

The voltage transformer will be considered suitable to withstand ferro-resonance if these characteristics are checked and tested, as a special type test named ferro-resonance withstand test. This consists of a temperature-rise test at rated voltage, rated burden and $1/3$ of rated frequency. The standard temperature rises shall not be exceeded.

9 Particular design and construction characteristics

The following requirements, additional to those of EN 60044-2:1999, apply:

9.1 Pollution

The dust pollution on railway tracks (e.g. in tunnels and at the seaside) is often higher than on HV transmission lines. For this reason the creepage distance shall not be less than indicated in EN 50124-1, table A.7, for the appropriate pollution degree.

NOTE For the choice of the appropriate pollution degree, the degrees used in the associated switchgear (see EN 50152-1 and EN 50152-2) should be taken into account.

9.2 External flashover test

When specified by the purchaser, outdoor units shall be able to withstand an external flashover of the primary bushing and to be capable of continued service. This will be tested as a special type test named the external flashover test by repeating dielectric, partial discharge and accuracy tests after a flashover. The flashover is made by creating a permanent conduction on the creepage distance of the insulator. The voltage applied shall be U_{max1} the resulting fault current being maintained for 100 ms up to the following values:

- for 15 kV systems 50 kA r.m.s.
- for 25 kV systems 16 kA r.m.s.