

**Effects of electromagnetic interference on pipelines
caused by high voltage a.c. electric traction systems
and/or high voltage a.c. power supply systems**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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Effects of electromagnetic interference on pipelines caused by high voltage a.c. electric traction systems and/or high voltage a.c. power supply systems

Effets des perturbations électromagnétiques sur les canalisations causées par les systèmes de traction électrique ferroviaire en courant alternatif et/ou par les réseaux électriques H.T. en courant alternatif

Auswirkungen elektromagnetischer Beeinflussungen von Hochspannungswechselstrombahnen und/oder Hochspannungsanlagen auf Rohrleitungen

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Foreword

This document (EN 50443:2011) has been prepared by Technical Committee CLC/TC 9XC "Electric supply and earthing systems for public transport equipment and ancillary apparatus (Fixed installations)".

This European Standard gives limits relevant to the electromagnetic interference produced by high voltage a.c. railway and power supply systems on metallic pipelines.

Limits are relevant to the interference which can be tolerated on the metallic pipeline, by the equipment connected to it and by persons working on them or in contact with them.

This European Standard indicates the electromagnetic interference situations to which the limits must be related.

Suggestions concerning the interference situations to be examined are given in Annex A. Suggestions concerning the appropriate calculation methods are given in Annex B. Suggestions concerning the appropriate measurement methods are given in Annex C. Suggestions about the use of mitigation measures are given in Annex D. Suggestions for management of interference are given in Annex E.

The following dates are fixed:

- | | | |
|---|-------|------------|
| – latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2012-10-24 |
| – latest date by which the national standards conflicting with the amendment have to be withdrawn | (dow) | 2014-10-24 |

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1 Scope

The presence of a.c. power supply systems or of a.c. electric traction systems (in this standard also indicated as a.c. power systems) may cause voltages to build up in pipeline systems, (in this standard indicated as interfered systems) running in the close vicinity, due to one or more of the following mechanisms:

- inductive coupling,
- conductive coupling,
- capacitive coupling.

Such voltages may cause danger to persons, damage to pipelines or connected equipment or disturbance to the electrical/ electronic equipment connected to the pipeline.

This European Standard deals with the situations where these effects may arise and with the maximum tolerable limits of the interference effects, taking into account the behaviour of the a.c. power systems both in normal operating condition and/or during faults.

NOTE In the worst case, the pipe may not disperse current to ground. As a consequence, the prospective touch voltage coincides with the interference voltage.

This European Standard applies to all metallic pipelines irrespective of the conveyed fluid, e.g. liquid or gas, liable to be interfered by high voltage a.c. railway and high voltage a.c. power supply systems.

The objective of this standard is to establish:

- the procedure for evaluating the electromagnetic interference;
- the interference distance to be considered;
- the types of coupling to be considered for operating and fault conditions of the high voltage a.c. electric traction systems and high voltage a.c. power supply systems;
- the configurations to be considered for both metallic pipeline and high voltage a.c. electric traction systems or high voltage a.c. power systems;
- the limits of the voltages due to the electromagnetic interference;
- information on interference situations, calculation methods, measuring methods, mitigation measures, management of interference.

This European Standard is applicable to all new metallic pipelines and all new high voltage a.c. electric traction systems and high voltage a.c. power supply systems and all major modifications that may change significantly the interference effect.

This European Standard only relates to phenomena at the fundamental power frequency (e.g. 50 Hz or 16,7 Hz).

This European Standard does not apply to:

- all aspects of corrosion,
- the coupling from a.c. railway and power supply systems with nominal voltages less than or equal to 1 kV,
- interference effects on the equipment not electrically connected to the pipeline.

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.

IEC 60050-161, *International Electrotechnical Vocabulary — Chapter 161: Electromagnetic compatibility*

IEC 60050-195, *International Electrotechnical Vocabulary — Part 195: Earthing and protection against electric shock*

IEC 60050-826, *International Electrotechnical Vocabulary — Part 826: Electrical installations*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the International Electrotechnical Vocabulary (IEV) apply, unless they are defined in this European Standard:

3.1

a.c. electric traction system

a.c. railway electrical distribution network used to provide energy for rolling stock

NOTE The system may comprise:

- contact line systems,
- return circuit of electric railway systems,
- running rails of non-electric railway systems, which are in the vicinity of, and conductively connected to the running rails of an electric railway system.

3.2

a.c. power supply system

a.c. electrical system devoted to electrical energy transmission and including overhead lines, cables, substations and all apparatus associated with them

NOTE This includes HV transmission lines with 16,7 Hz.

3.3

a.c. power system

a.c. electric traction system or a.c. power supply system

NOTE Where it is necessary to differentiate, each interfering system is clearly indicated with its proper term.

3.4

interfering system

general expression encompassing an interfering high voltage a.c. electric traction system and/or high voltage a.c. power supply system

3.5

interfered system

system on which the interference effects appear

NOTE In this standard pipeline system.

3.6

pipeline system

system of pipe network with all associated equipment and stations

NOTE 1 In this standard pipeline system refers only to metallic pipeline system.

NOTE 2 The associated equipment is the equipment electrically connected to the pipeline.

3.7

earth

conductive mass of the earth, whose electric potential at any point is conventionally taken as equal to zero

[IEC 60050-826-04-01]