

RAUDTEEALASED RAKENDUSED. RAUDTEEVEEREM.  
ELEKTROMAGNETILISE ÜHILDUVUSE TESTIMINE  
RÖÖBASAHELATEGA

Railway applications - Rolling stock - Testing for  
electromagnetic compatibility with track circuits

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>See Eesti standard EVS-EN 50728:2024 sisaldab Euroopa standardi EN 50728:2024 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 13.12.2024.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN 50728:2024 consists of the English text of the European standard EN 50728:2024.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 13.12.2024.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
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English Version

## Railway applications - Rolling stock - Testing for electromagnetic compatibility with track circuits

Applications ferroviaires - Matériel roulant - Essais pour la compatibilité électromagnétique avec les circuits de voie

Bahnwendungen - Fahrzeuge - Prüfung der elektromagnetischen Verträglichkeit mit Gleisstromkreisen

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## European foreword

This document (EN 50728:2024) has been prepared by CLC/SC 9XB “Electromechanical material on board rolling stock” of CLC/TC 9X “Electrical and electronic applications for railways”.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2025-12-31
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2027-12-31

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZZ, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

## Introduction

This document defines the testing, measurement and evaluation methods for rolling stock interference current emissions to demonstrate compatibility with track circuits. The evaluation is done at the interface between rolling stock and infrastructure (the total interference current of the IU), and not at the receiver of a track circuit.

In the context of European interoperability, interference current limits for rolling stock are defined in the TSI Interface document ERA/ERTMS/033281.

Outside European interoperability, individual limits and summation rules are defined in other documents such as NNTRs and PD CLC/TS 50238-2. In specific application cases outside the scope of Interoperability Regulations, limit values can be notified by the track circuit manufacturer, according to the process defined in EN 50617-1.

Proof of compliance of rolling stock with the interference current limits is done in three main steps. First, a test specification is defined, based on the specific characteristics of rolling stock to be tested (see Clause 4). This ensures that the final results give sufficient confidence in the level of compliance. Then the tests are performed according to the specification. Finally, the results are processed under a defined set of rules, in order to demonstrate compliance with the given limits (see Clause 5).

Tests for the demonstration of vehicle compatibility are type tests and are performed before the first unit is put into regular service. When completed in accordance with this document, it is the goal to perform measurements only once per electric traction power supply system voltage and frequency.

As far as possible, common requirements are defined for both AC and DC systems. However, these differ in several aspects. In AC systems, the impedance of the electric traction power supply system is small compared with the impedance of the vehicle, but resonance effects need to be considered. The main source of interference is the rolling stock. In DC systems, the impedance and, therefore, the distance from substations, is important, but resonance effects are largely neglectable. Rectifier substations have a significant contribution to the total interference current in DC systems, and also the traction and auxiliary systems of DC rolling stock are normally different from those of AC. Where necessary or appropriate, this document differentiates between AC and DC systems. If requirements are not clearly indicated as relevant to AC or DC systems then they are relevant to both AC and DC.

In order to limit the influence from static converters (AC) and substations (DC) on track circuits, a minimum rolling stock impedance is required. This document defines how to prove conformity with such requirements as well.

## 1 Scope

This document defines the measurement and evaluation methods of rolling stock interference current emissions to demonstrate compatibility with track circuits. This includes rolling stock with or without traction equipment. The established limits for compatibility are defined in ERA/ERTMS/033281, PD CLC/TS 50238-2 or NNTRs as current flowing between the vehicle and the electric traction power supply system that can disturb the track circuit receiver, as part of the track circuit system. Additionally, the referred documents can define a minimum rolling stock impedance in order to guarantee compatibility between the electric traction power supply system and track circuits.

This document is relevant to the interference current limits defined in the “frequency management” for track circuits as defined in ERA/ERTMS/033281. It is also applicable to the demonstration of compatibility with all other types of track circuits which have established compatibility according to EN 50617-1. Finally, the methodology defined in this document can also be applied to other track circuit types, including those for which the only requirements are defined in NNTRs.

NOTE 1 Interface parameters between rolling stock and track circuits other than interference currents and impedance are out of the scope of this document.

NOTE 2 For track circuits prone to wrong side failures additional precautions might be needed to mitigate safety risks. The necessary precautions and safety considerations are outside the scope of this document, but can be found in NNTRs.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN 50388-1:2022, *Railway Applications - Fixed installations and rolling stock - Technical criteria for the coordination between electric traction power supply systems and rolling stock to achieve interoperability - Part 1: General*

EN 50163:2004,<sup>1</sup> *Railway applications. Supply voltages of traction systems*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

## 3 Terms, definitions and abbreviations

### 3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

#### 3.1.1

##### **beating**

interference pattern between two or more slightly different frequencies, perceived as a periodic variation in amplitude with a rate dependent on the differences in frequencies

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<sup>1</sup> As impacted by EN 50163:2004/A1:2007, EN 50163:2004/corrigendum May 2010, EN 50163:2004/AC:2013, EN 50163:2004/A2:2020, EN 50163:2004/A3:2022.