



**NSAI**  
Standards

Irish Standard  
I.S. EN ISO 3095:2013

# Acoustics - Railway applications - Measurement of noise emitted by railbound vehicles (ISO 3095:2013)

© CEN 2013

No copying without NSAI permission except as permitted by copyright law.

## I.S. EN ISO 3095:2013

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWIFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

*This document replaces:*  
EN ISO 3095:2005

|                                   |                   |
|-----------------------------------|-------------------|
| <i>This document is based on:</i> | <i>Published:</i> |
| EN ISO 3095:2013                  | 14 August, 2013   |
| EN ISO 3095:2005                  | 15 August, 2005   |

This document was published under the authority of the NSAI and comes into effect on:  
14 August, 2013

**ICS number:**

17.140.30  
45.020

**NSAI**  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

**Sales:**  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

English Version

## Acoustics - Railway applications - Measurement of noise emitted by railbound vehicles (ISO 3095:2013)

Acoustique - Applications ferroviaires - Mesurage du bruit  
émis par les véhicules circulant sur rails (ISO 3095:2013)

Bahnanwendungen - Akustik - Messung der  
Geräuschemission von spurgebundenen Fahrzeugen (ISO  
3095:2013)

This European Standard was approved by CEN on 1 May 2013.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN 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 CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

**Contents**

Page

**Foreword.....3**

## **Foreword**

This document (EN ISO 3095:2013) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 43 "Acoustics".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2014, and conflicting national standards shall be withdrawn at the latest by February 2014.

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

This document supersedes EN ISO 3095:2005.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### **Endorsement notice**

The text of ISO 3095:2013 has been approved by CEN as EN ISO 3095:2013 without any modification.

*This page is intentionally left BLANK.*

**I.S. EN ISO 3095:2013**  
**INTERNATIONAL**  
**STANDARD**

**ISO**  
**3095**

Third edition  
2013-08-01

---

---

**Acoustics — Railway applications**  
**— Measurement of noise emitted by**  
**railbound vehicles**

*Acoustique — Applications ferroviaires — Mesurage du bruit émis  
par les véhicules circulant sur rails*



Reference number  
ISO 3095:2013(E)

© ISO 2013



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2013

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland



# Contents

|  | Page      |
|--|-----------|
| <b>Foreword</b> .....  | <b>v</b>  |
| <b>Introduction</b> .....  | <b>vi</b> |
| <b>1 Scope</b> .....   | <b>1</b>  |
| <b>2 Normative references</b> .....  | <b>1</b>  |
| <b>3 Terms and definitions</b> .....   | <b>2</b>  |
| <b>4 Instrumentation and calibration</b> .....   | <b>5</b>  |
| 4.1 Instrumentation.....   | 5         |
| 4.2 Calibration.....   | 5         |
| <b>5 Stationary test</b> .....   | <b>5</b>  |
| 5.1 General.....   | 5         |
| 5.2 Environmental conditions.....  | 5         |
| 5.3 Track conditions.....  | 6         |
| 5.4 Vehicle conditions.....  | 6         |
| 5.5 Measurement positions.....   | 7         |
| 5.6 Measured quantities.....   | 8         |
| 5.7 Test procedure.....  | 8         |
| 5.8 Data processing.....   | 9         |
| <b>6 Constant speed test</b> .....   | <b>10</b> |
| 6.1 Environmental conditions.....  | 10        |
| 6.2 Track conditions.....  | 11        |
| 6.3 Vehicle conditions.....  | 13        |
| 6.4 Measurement positions.....   | 16        |
| 6.5 Measured quantities.....   | 17        |
| 6.6 Test procedure.....  | 17        |
| 6.7 Data processing.....   | 20        |
| <b>7 Acceleration test from standstill</b> .....   | <b>21</b> |
| 7.1 General.....   | 21        |
| 7.2 Environmental conditions.....  | 21        |
| 7.3 Track conditions.....  | 22        |
| 7.4 Vehicle conditions.....  | 22        |
| 7.5 Maximum level method.....  | 23        |
| 7.6 Averaged level method.....   | 25        |
| <b>8 Braking test</b> .....  | <b>26</b> |
| 8.1 Environmental conditions.....  | 26        |
| 8.2 Track conditions.....  | 27        |
| 8.3 Vehicle conditions.....  | 27        |
| 8.4 Measurement positions.....   | 27        |
| 8.5 Measurement quantity.....  | 28        |
| 8.6 Test procedure.....  | 28        |
| 8.7 Data processing.....   | 28        |
| <b>9 Quality of the measurements</b> .....   | <b>29</b> |
| 9.1 Deviations from the requirements.....  | 29        |
| 9.2 Measurement tolerances.....  | 29        |
| 9.3 Measurement spread.....  | 29        |
| 9.4 Measurement uncertainties.....   | 29        |
| <b>10 Test report</b> .....  | <b>29</b> |
| <b>Annex A (normative) Method to characterize the impulsive character of the noise</b> ..... | <b>31</b> |
| <b>Annex B (normative) Tests at constant speed — Special cases</b> .....                     | <b>32</b> |
| <b>Annex C (normative) Method to assess acceptable small deviations from acoustic rail</b>   |           |

|  |           |
|--|-----------|
| <b>roughness requirements</b> .....  | <b>37</b> |
| <b>Annex D (informative) Guidance for light rail vehicles measurement</b> .....  | <b>39</b> |
| <b>Annex E (informative) Comparability of test situations in terms of acoustic rail roughness</b> .....                                | <b>43</b> |
| <b>Annex F (informative) Additional measurements</b> .....   | <b>46</b> |
| <b>Annex G (informative) Quantification of measurement uncertainties according to ISO/<br/>IEC Guide 98-3:2008<sup>[8]</sup></b> ..... | <b>47</b> |
| <b>Bibliography</b> .....  | <b>52</b> |

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2. [www.iso.org/directives](http://www.iso.org/directives)

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received. [www.iso.org/patents](http://www.iso.org/patents)

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

The committee responsible for this document is the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 3095:2005), which has been technically revised.

## **Introduction**

Railway exterior noise is encountered both along open track and in and around depots, stops, stations and other holding locations. It includes a number of different physical sources such as rolling noise, impact noise, traction noise, aerodynamic noise, curving noise, braking noise, horn noise and noise from auxiliary equipment and other components. The noise for any given train type strongly depends on the rolling stock design, operating conditions and the track type and condition.

Rolling noise is one of the main sources which contain a significant and sometimes dominant noise contribution from the track. This International Standard is intended to characterize the noise emission from the unit, minimizing the influence of the track.

# Acoustics — Railway applications — Measurement of noise emitted by railbound vehicles

## 1 Scope

This International Standard specifies measurement methods and conditions to obtain reproducible and comparable exterior noise emission levels and spectra for all kinds of vehicles operating on rails or other types of fixed track, hereinafter conventionally called “unit”.

This International Standard is applicable to type testing of units. It does not include all the instructions to characterize the noise emission of the other infrastructure related sources (bridges, crossings, switching, impact noise, curving noise, etc.).

This International Standard is not applicable to:

- the noise emission of track maintenance units while working;
- environmental impact assessment;
- noise immission assessment;
- guided buses;
- warning signal noise.

The results may be used, for example:

- to characterize the exterior noise emitted by units;
- to compare the noise emission of various units on a particular track section;
- to collect basic source data for units.

NOTE 1 The type testing procedures specified in this International Standard are of engineering grade (grade 2), that is the preferred one for noise declaration purposes, as defined in ISO 12001. If test conditions (e.g. vehicle and/or track conditions, measuring conditions) are relaxed (e.g. as done for trackside monitoring of in-service trains), then the results are no longer of engineering grade.

NOTE 2 The procedures specified for accelerating and decelerating tests are of survey grade, see ISO 12001.

NOTE 3 Additional guidance is provided in [Annex D](#) for measurements in the specific case of light rail vehicles.

## 2 Normative references

The following referenced documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60942:2003, *Electroacoustics — Sound calibrators*

IEC 61260:1995, *Electroacoustics — Octave-band and fractional-octave-band filters*

IEC 61260:1995/Amd. 1:2001, *Electroacoustics — Octave-band and fractional-octave-band filters — Amendment 1*

IEC 61672-1:2002, *Electroacoustics — Sound level meters — Part 1: Specifications*

IEC 61672-2:2003, *Electroacoustics — Sound level meters — Part 2: Pattern evaluation tests*

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
  - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-