



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

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

ISO 3095

**Fourth edition
2025-09**

**Corrected version
2026-05**



COPYRIGHT PROTECTED DOCUMENT

© ISO 2025

All rights reserved. Unless otherwise specified, or required in the context of its implementation, 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
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Foreword	vi
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
3.1 General definitions.....	2
3.2 Definitions of track properties.....	3
3.3 Definitions of acoustic measurement quantities.....	4
3.4 Definitions for noise from parked trains.....	6
4 Instrumentation and calibration	6
4.1 Instrumentation.....	6
4.2 Calibration.....	7
5 Stationary test	7
5.1 General.....	7
5.2 Environmental conditions.....	7
5.2.1 Acoustical environment.....	7
5.2.2 Meteorological conditions.....	8
5.2.3 Background sound pressure level.....	8
5.3 Track conditions.....	8
5.4 Vehicle conditions.....	9
5.4.1 General.....	9
5.4.2 Normal operating conditions.....	9
5.4.3 Additional operating conditions.....	10
5.5 Measurement positions.....	10
5.5.1 Standard measurement positions.....	10
5.5.2 Additional measurement positions.....	11
5.6 Measured quantities.....	11
5.7 Test procedure.....	11
5.8 Data processing.....	12
5.8.1 Standard processing.....	12
5.8.2 Additional processing.....	12
6 Constant speed test	13
6.1 Environmental conditions.....	13
6.1.1 Acoustical environment.....	13
6.1.2 Meteorological conditions.....	14
6.1.3 Background sound pressure level.....	14
6.2 Track conditions.....	14
6.2.1 General.....	14
6.2.2 Geometry of the line.....	14
6.2.3 Track superstructure.....	15
6.2.4 Track quality.....	15
6.2.5 Acoustic rail roughness of the test track.....	15
6.2.6 Dynamic properties of the test track.....	16
6.2.7 Special conditions.....	17
6.3 Vehicle conditions.....	17
6.3.1 General.....	17
6.3.2 Normal operating conditions.....	18
6.3.3 Occupancy and load.....	18
6.3.4 Wheel tread conditioning.....	19
6.3.5 Train composition (adjacent vehicles).....	19
6.4 Measurement positions.....	20
6.4.1 Standard measurement positions.....	20
6.4.2 Additional measurement positions.....	21

This is a preview of ISO 3095:2025. [Click here to purchase the full version from the ANSI store.](#)

6.6.1	General	21
6.6.2	Pass-by speeds	21
6.6.3	Recording and measurement time intervals	21
6.7	Data processing	24
6.7.1	Standard processing	24
6.7.2	Additional processing	24
7	Acceleration test from standstill	24
7.1	General	24
7.2	Environmental conditions	25
7.2.1	Acoustical environment	25
7.2.2	Meteorological conditions	25
7.2.3	Background sound pressure level	25
7.3	Track conditions	25
7.4	Vehicle conditions	26
7.4.1	General	26
7.4.2	Normal operating conditions	27
7.4.3	Occupancy and load	27
7.5	Maximum level method	27
7.5.1	Measurement positions	27
7.5.2	Measured quantities	29
7.5.3	Test procedure	30
7.5.4	Data processing	30
7.6	Averaged level method	30
7.6.1	Measurement positions	30
7.6.2	Measurement quantity	31
7.6.3	Test procedure	31
7.6.4	Data processing	31
8	Braking test	32
8.1	General	32
8.2	Environmental conditions	32
8.2.1	Acoustical environment	32
8.2.2	Meteorological conditions	32
8.2.3	Background sound pressure level	32
8.3	Track conditions	33
8.4	Vehicle conditions	33
8.4.1	General	33
8.4.2	Normal operating conditions	34
8.4.3	Occupancy and load	34
8.4.4	Braking modes	34
8.5	Measurement positions	34
8.6	Measurement quantity	35
8.7	Test procedure	35
8.8	Data processing	35
8.8.1	Standard processing	35
8.8.2	Additional processing	36
9	Quality of the measurements	36
9.1	General	36
9.2	Deviations from the requirements	36
9.3	Measurement tolerances	36
9.4	Measurement spread	36
9.5	Measurement uncertainties	36
10	Test report	37
Annex A (normative) Method to characterize the impulsive character of the noise		38
Annex B (normative) Tests at constant speed — Special cases		41

This is a preview of ISO 3095:2025. [Click here to purchase the full version from the ANSI store.](#)

Annex D (normative) Method to assess acceptable small deviations from acoustic rail roughness requirements	61
Annex E (informative) Guidance for urban rail vehicles measurement	63
Annex F (informative) Additional measurements	65
Annex G (informative) Quantification of measurement uncertainties according to ISO/IEC Guide 98-3:2008^[1]	71
Annex H (informative) Noise from parked trains	76
Annex I (informative) Data processing for tonal noise assessment at standstill	86
Bibliography	89

This is a preview of ISO 3095:2025. Click here to purchase the full version from the ANSI store.

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 document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 256, *Railway applications*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 3095:2013), which has been technically revised.

The main changes are as follows:

- the alignment of measurement conditions with ISO 3381:2021^[6];
- an improvement of the tonality assessment;
- the introduction of specific measurement conditions for hybrid vehicles;
- a new informative [Annex C](#) providing guidance information on the track influence on pass-by test results;
- an improved specification for additional noise measurements on bridges and other elevated structures in concrete bridge sections (see [Annex F](#));
- a new informative [Annex H](#) specifying the measurement method for noise from parked trains to support a potential regulation aiming at taking into account annoyance produced in that situation;
- a new informative [Annex I](#) outlining a procedure for assessing tonal noise using a narrow band analysis at standstill.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

This corrected version of ISO 3095:2025 incorporates the following correction:

- In the last sentence of [6.3.4](#), the value "4 kPa" was corrected into "400 kPa".

This is a preview of ISO 3095:2025. [Click here to purchase the full version from the ANSI store.](#)

Railway exterior noise is encountered both along open tracks and in and around depots, stops, stations and other holding locations. It includes a number of different physical sources such as rolling noise,^{[20][28][29][30]} 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 from vehicle running on open tracks. It contains a significant and sometimes dominant noise contribution from the track. This document is intended to characterize the noise emission from the unit, minimizing the influence of the track.

These conditions are relevant for type testing of rollingstock, enabling comparisons of rolling stock noise emission levels for train operating and test conditions to comply with regulatory or contractual sound level limits. Where measurements are undertaken on other track designs or with different rolling stock operating conditions, noise levels can differ from the type test conditions described herein.

When project proponents are specifying project noise limits for rolling stock, they should include consideration of what is appropriate to their network/environment, temperature ranges, track type (ballast/slab/tunnel, light rail, etc.), and note that the limit values will be dependent on the network conditions, track decay rates, wheel/rail maintenance expectations, speed range, curves, and so on.

Railway environments carry particular safety risks. The measurement procedures specified in this document need to take into account relevant safe work methods applicable to each network.