INTERNATIONAL STANDARD

ISO 10815

Second edition
2016-09-15

Mechanical vibration — Measurement of vibration generated internally in railway tunnels by the passage of trains

Vibrations mécaniques — Mesurage des vibrations produites à l'intérieur des tunnels ferroviaires par le passage des trains

Reference number
ISO 10815:2016(E)

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Foreword

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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 (see www.iso.org/directives).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 108, *Mechanical vibration, shock and condition monitoring*, Subcommittee SC 2, *Measurement and evaluation of mechanical vibration and shock as applied to machines, vehicles and structures*.

This second edition cancels and replaces the first edition (ISO 10815:1996), of which it constitutes a minor revision with the following changes:

— normative references have been updated;

— subclause numbering has been updated;

— bibliography has been updated.

Introduction

Railway tunnels are regularly exposed to vibration originating from internal sources (trains and service carriages. maintenance work, etc.).

In this document, only vibration resulting from the passage of trains is considered.

Vibration is measured in tunnels for different purposes, which are summarized as follows.

When a tunnel is reported to be exposed to vibration which might cause concern regarding its integrity, suitable measurements (see 9.2) should be taken to assess whether the levels are acceptable.

Measurements of vibration might be carried out in the following cases:

— when the maximum allowable vibration level has been established and a regular check is required (see 9.3);

— when the dynamic performance of a newly built tunnel has been predicted and performance has to be checked against design data (see 9.2);

— a special situation may arise when the tunnel has been exposed to abnormal external action (e.g. due to fires, earthquakes, blasting, pile drivers or demolition of nearby buildings) and the integrity of the structure has to be checked (see 9.2);

— when any modification to the track and/or internal vibration sources (e.g. load on vehicle axles) has been made.

Mechanical vibration — Measurement of vibration generated internally in railway tunnels by the passage of trains

1 Scope

This document establishes the basic principles for measuring, processing and evaluating vibration generated internally in railway tunnels by the passage of trains.

By establishing a standard procedure, comparative data may be obtained on response of the tunnel elements from time to time, provided that the excitation source is the same. Data obtained in different tunnels may also be compared.

The measurements considered in this document concern the response of the structure and secondary elements mounted in the tunnel. They do not concern the response of persons in the tunnel or in its vicinity, or of passengers on trains running through the tunnel.

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.

ISO 1683, *Acoustics — Preferred reference values for acoustical and vibratory levels*

ISO 5348, *Mechanical vibration and shock — Mechanical mounting of accelerometers*

3 Terms and definitions

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

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
tunnel
underground structure in which passenger trains, freight trains or service trains travel

3.2
background noise
sum of all the signals except the one under investigation

4 Factors affecting vibration

4.1 Tunnel-related factors

4.1.1 General

The dynamic characteristics of a tunnel depend largely on its geometry, secondary elements, depth of the tunnel and soil properties.