PD ISO/TS 14837-32:2015

BSI Standards Publication

Mechanical vibration — Ground-borne noise and vibration arising from rail systems

Part 32: Measurement of dynamic properties of the ground

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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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 WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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*.

ISO 14837 consists of the following parts, under the general title *Mechanical vibration — Ground-borne noise and vibration arising from rail systems*:

— *Part 1: General guidance*

— *Part 32: Measurement of dynamic properties of the ground*

The following parts are under preparation:

— *Part 31: Measurement for the evaluation of complaints at residential buildings*

Introduction

In order to resolve received vibration and noise from rail systems where there is soil or rock in part of the transmission path between the source at the track and the receiver location in the building, it is necessary to know the noise and vibration transmission function of the ground. To know this necessitates knowledge of the properties of the materials in the ground and their stratification which influence the transmission. In general there is a need to measure or in other ways to estimate these properties. To this aim, this part of ISO 14837 defines methods for measurement and estimation of the relevant dynamic ground parameters.

After a brief survey about ground-borne noise and vibration in Clause 4, the key content of this part of ISO 14837 is outlined in two clauses. Clause 5 defines the relevant dynamic ground parameters, describes how they are interrelated and how they are related to basic physics of wave propagation. Clause 6 deals with methods to determine these parameters: 6.3 presents simple estimation methods based on empirical correlations with conventional geotechnical and engineering geological index parameters; 6.4 presents methods for indirect determination from geotechnical in-situ penetration test data, while 6.5 and 6.6 present more precise methods for direct measurement of the parameters in-situ and in the laboratory.

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Mechanical vibration — Ground-borne noise and vibration arising from rail systems —

Part 32: Measurement of dynamic properties of the ground

1 Scope

This part of ISO 14837 provides guidance and defines methods for the measurement of dynamic properties of the ground through which ground-borne noise and vibration is transmitted, from the operation of rail systems and into foundations of neighbouring buildings. The purpose is to determine the parameters of the ground system which are necessary to reliably predict the noise and vibration transmission, to design railroads and foundations to meet noise and vibration requirements, to design countermeasures and to validate design methods.

2 Normative references

The following 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.

ISO 14837-1:2005, *Mechanical vibration — Ground-borne noise and vibration arising from rail systems — Part 1: General guidance*

3 Symbols

The following symbols are used in this part of ISO 14837.

NOTE Abbreviations are summarized in Annex A.

B	dimensionless constant in equation for G_{max}
D	loss-related distance attenuation factor
d	distance travelled by wave
E_{max}	Young's modulus, low-strain dynamic value
e	void ratio, $e = \varphi/(1 - \varphi)$
f	frequency
G^*	complex shear modulus
G_{max}	shear modulus, low-strain dynamic value
G_{sec}	secant shear modulus, dynamic value
I_p	plasticity index
K_{max}	bulk modulus, low-strain dynamic value
k^*	complex wave number