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Vibration-generating machines — Guidance for selection —

Part 2: Equipment for dynamic structural testing

Générateurs de vibrations — Lignes directrices pour la sélection — Partie 2: Moyens pour les essais dynamiques

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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 (see 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 (see www.iso.org/patents).

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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 108, *Mechanical vibration, shock and condition monitoring*, Subcommittee SC 6, *Vibration and shock generating systems*.

A list of all parts in the ISO 10813 series can be found on the ISO website.

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.

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Introduction

A proper selection of vibration generating system, when purchasing new test equipment or updating existing equipment for the purposes of a specific test or when choosing between the equipment proposed by a test laboratory or even selecting a laboratory which offers its service to carry out such a test, is very important. When making this type of selection, several factors should be considered simultaneously, as follows:

— the type of the test to be carried out (e.g. environmental testing, normal and/or accelerated, dynamic structural testing, diagnosis, calibration, etc.);

— the motions to be generated during the test;

— the test conditions (e.g. single or multiple excitations, one mode of vibration or combined vibration, single or combined test, for example, dynamic plus climatic, etc.);

— the objects to be tested and their mounting.

This document deals only with equipment intended to be used for dynamic structural testing, and selection procedures are predominantly designed to meet the requirements of this testing. However, specific test conditions and the specific object to be tested can significantly influence the selection.

If the equipment is expected to be used for different types of tests, all possible applications should be accounted for when selecting. Thus, if the vibration generator is acquired to be applied during both environmental and dynamic structural testing, ISO 10813-1 and this document should be used simultaneously. In this document, it is presumed that a system can be selected if it enables to swing the test object up to a specified level. To generate an excitation without undesired motions, a suitable control system should be used. The selection of a control system is not considered in this document.

Vibration generating systems are complex machines, so the correct selection always demands a certain degree of engineering judgement. Consequently, the purchaser, when selecting the vibration test equipment, can resort to the help of a third party. In such a case, this document can help the purchaser to ascertain if the solution proposed by the third party is acceptable or not. Designers and manufacturers can also use this document to assess the market environment.

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Vibration-generating machines — Guidance for selection —

Part 2: Equipment for dynamic structural testing

1 Scope

This document provides guidance to select a vibration generator that will be used to evaluate frequency responses of a test structure or to study how vibration grows/decreases along the structure. These structural dynamics tests can be carried out under field or laboratory conditions (see the ISO 7626 or ISO 10846[4][5][6][7] series).

This document describes the selection procedure in terms of the force developed by a single vibration generator. Meanwhile, to move massive structures such as dams or bridges, an assembly of vibration generators is usually applied. Properly phased generators produce in total the same force as calculated for a single vibration generator (see 6.2.6).

Guidance also can be applied for the selection of equipment to be used for modal testing to determine natural frequencies, modal shapes and damping in a structure; however, for such a test, more factors than covered by this document usually need to be considered.

This document deals only with translational excitation. For equipment applied to generate angular vibration, see Reference [8].

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 2041, *Mechanical vibration, shock and condition monitoring — Vocabulary*

ISO 7626-1, *Mechanical vibration and shock — Experimental determination of mechanical mobility — Part 1: Basic terms and definitions, and transducer specifications*

ISO 10846-1, *Acoustics and vibration — Laboratory measurement of vibro-acoustic transfer properties of resilient elements — Part 1: Principles and guidelines*

ISO 15261, *Vibration and shock generating systems — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2041, ISO 7626-1, ISO 10846-1 and ISO 15261 apply.

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

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

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

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