TECHNICAL REPORT

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Mechanical vibration — Description and determination of seated postures with reference to whole-body vibration

Vibrations mécaniques — Description et détermination des postures assises en référence à des vibrations transmises à l'ensemble du corps

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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

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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).

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 108, *Mechanical vibration, shock and condition monitoring*, Subcommittee SC 4, *Human exposure to mechanical vibration and shock.*

This second edition cancels and replaces the first edition (ISO/TR 10687:2012) which has been technically revised.

This edition was created to clarify conventions and measurements and was updated with some of the latest research results.

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.

Introduction

Seated persons exposed to whole-body vibration carry a risk for musculoskeletal problems such as low-back problems and for spinal degeneration which is most likely increased by unfavourable postures. However, the biomechanical mechanism of this increase is not fully understood.

It is therefore necessary, as a first step, to determine the posture and ergonomic environment of a seated person with special focus on the spine.

This document is offering a collection of ideas on how to measure postures which are dynamic. To this end, this document summarizes descriptive quantities that

— are likely to be relevant for the assessment of adverse health effects due to whole-body vibration and unfavourable seated posture,

— can be determined using a variety of methods,

— are in accordance with the description of static, unfavourable seated postures as far as angles of body segments are concerned, and

— include additional information, e.g. the presence of arm- or backrests.

The whole set of quantities and conventions used can be reported in order to

— facilitate the comparison of seated postures,

— be able to compare different methods for the determination of the seated posture, and

— permit further investigation, e.g. in biomechanical laboratories, on the basis of the determined seated postures.

Due to limitations of the applied assessment methods, it might be necessary to combine different methods in order to be able to report a complete list of quantities.

This document does not specify sampling strategies or evaluation methods.

Mechanical vibration — Description and determination of seated postures with reference to whole-body vibration

1 Scope

This document summarizes descriptive quantities for those responsible (e.g. scientists, safety engineers) for determination of postures for a seated person who is exposed to whole-body vibration. It is the intention that the results of different methods can be easily related to these quantities and that they allow for a common terminology between practitioners. The focus of this document is to offer a collection of ideas on how to measure postures in practice. The postures determined can also be used as a basis for further investigation or as a means of comparison for different methods. Although some of the approaches described here can be applied to standing or recumbent positions, additional considerations are likely to be required in these cases.

NOTE 1 This work is closely related to International Standards which focus on static postures (ISO 11226[4]) or on radiologically accessible landmarks, i.e. points on the body (ISO 8727[3]).

Additionally, this document deals with dynamic postures where body angles or associated movements are determined visually or by measuring points on the skin or clothing.

NOTE 2 Nevertheless, ISO 8727[3] and ISO 11226[4] put forward principles for further extensions of posture determination which are followed in this document, in particular for measurements of body angles.

This document does not specify sampling strategies or evaluation methods.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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 https://www.electropedia.org/

4 Description of posture quantities

4.1 General

This clause summarizes the description of measurable quantities used in 7.2. The basis of the descriptions is the points on the body as shown in Figure 1.

4.2 Points on the body

With the help of the points on the body presented in Figure 1, lines and planes can be defined, which in turn define a posture. They are chosen in such a way that their position in space is relevant for the strain on the spine.