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Mechanical vibration — Measurement and evaluation of human exposure to hand transmitted vibration — Supplementary method for assessing risk of vascular disorders

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National foreword

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Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
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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).

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For an explanation on 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 the following URL: 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*.

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Introduction

This document is a result of analyses of application of the W_h frequency weighting defined by ISO 5349-1 to the risk of vascular hand-arm vibration disorders. For vibration exposures dominated by particularly high or particularly low frequencies of vibration, there is evidence that weightings based on the (20 to 400) Hz frequency range may give an improved prediction of risk of vascular disorders over the weighting W_h.

This document proposes a frequency weighting and risk assessment parameter that can be used to supplement the method defined in ISO 5349-1. The purpose of this document is to

a) define a supplementary evaluation methodology that can be used in addition to that given in ISO 5349-1, and

b) ensure that additional data are collected in a common format to help to improve knowledge and understanding of vascular vibration risks.

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1 Scope

This document provides guidance on a supplementary method to that defined in ISO 5349-1 for measuring and reporting hand-transmitted vibration exposures. The method defined in this document provides an improved assessment methodology for evaluating vascular hand-arm vibration risks (vibration white finger). This document does not apply for other health effects (e.g. sensorineural and musculoskeletal disorders) induced from hand-transmitted vibration exposure (see ISO 5349-1:2001, Annex B).

This document is intended to facilitate future research on hand-arm vibration risks. It can be used to supplement the data given by the ISO 5349-1 methodology.

This document cannot be used as an alternative to ISO 5349-1. Data derived from this document cannot be used in place of ISO 5349-1 data for fulfilling duties under national regulations, guidance or recommendations for either workplace vibration exposures or machinery vibration emissions.

The methodology defined in this document is based on biomechanical and epidemiological studies which are reviewed in Annex A. Also provided in Annex A is tentative information on a relationship between vibration exposure and risk of developing vascular hand-arm vibration disorders.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and symbols

For the purposes of this document, the terms and definitions given in ISO 2041 and ISO 5349-1 and the following 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

Symbol	Definition
$a_{pi}(t)$	instantaneous value of the hand-transmitted vibration for the axis i at time t, in metres per second squared (m/s^2) frequency-weighted according to the hand-arm vascular weighting W_p;
a_{pi}	root-mean-square (r.m.s.) value of the hand-transmitted vibration for the axis i in metres per second squared (m/s^2) frequency-weighted according to the hand-arm vascular weighting W_p;
$a_{pv}(t)$	instantaneous value of the hand-transmitted vibration total value at time t, in metres per second squared (m/s^2) frequency-weighted according to the hand-arm vascular weighting W_p: $a_{pv}(t)=\sqrt{a_{px}^2(t)+a_{py}^2(t)+a_{pz}^2(t)}$;
a_{pv}	r.m.s. vibration total value of the hand-transmitted vibration, in metres per second squared (m/s^2) frequency-weighted according to the hand-arm vascular weighting W_p;

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