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Mechanical vibration and shock — Cold provocation tests for the assessment of peripheral vascular function —

Part 1: Measurement and evaluation of finger skin temperature

Vibrations et chocs mécaniques — Essais de provocation à froid pour l'évaluation de la fonction vasculaire périphérique —

Partie 1: Mesurage et évaluation de la température de la peau des doigts

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

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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 4, *Human exposure to mechanical vibration and shock.*

This second edition cancels and replaces the first edition (ISO 14835-1:2005), of which it constitutes a minor technical revision. The main change is the specification of additional test conditions in 4.3.2.

ISO 14835 consists of the following parts, under the general title *Mechanical vibration and shock — Cold provocation tests for the assessment of peripheral vascular function*:

— *Part 1: Measurement and evaluation of finger skin temperature*

— *Part 2: Measurement and evaluation of finger systolic blood pressure*

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Introduction

Finger skin temperature (FST) is related indirectly to finger blood flow and reflects the contribution of feed capillaries, nutritive capillaries and arteries. Mechanical, physiologic and pharmacologic effects at any of these levels may affect FST.

Assessing FST over a sufficient observation time can identify the presence and extent of finger vasoconstriction in response to cold provocation produced by appropriate hand cooling.

The changes in FST during hand cooling normally reflect the degree of vasoconstriction and resistance to blood flow caused by cold provocation, and possibly also alterations of this physiological process. The changes in FST after cold provocation reflect different neurovascular processes that control recovery from cold exposure and the return to steady-state circulatory conditions. The measurement of FST during cold provocation is carried out in a well-controlled environment.

FST indicates intra- and inter-individual variability to some extent. The test results of cold provocation are interpreted together with subjective symptoms, signs and history, including vibration exposure.

After having gained experience with the use of ISO 14835-1:2005 over several years, it turned out that cold provocation tests are carried out in some countries using slightly different test parameters. In particular, the test conditions 12 °C water temperature and 5-min immersion duration are not generally used. A survey of ISO/TC 108/SC 4 revealing the current measurement practice of four countries constitutes the background for the development of this second edition of this part of ISO 14835.

The intention is to open the possibility to undertake the tests with specified different test parameters (in particular water temperature and immersion duration) in a clearly defined way in order to make the test results nevertheless comparable. Finally, the overall usage of this International Standard needs to be promoted.

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Mechanical vibration and shock — Cold provocation tests for the assessment of peripheral vascular function —

Part 1: Measurement and evaluation of finger skin temperature

1 Scope

This part of ISO 14835 specifies

a) the methods for measuring the finger skin temperature (FST),

b) the procedures for conducting the measurements (including the performance of cold provocation tests), and

c) how to report the measurement results.

The methods specified in this part of ISO 14835 are designed to assist in the collection of basic data for a quantitative evaluation of vascular response to cold provocation, and to enable specification of normative figures.

This part of ISO 14835 is applicable to the measurement of FST in response to cold provocation for the assessment of various peripheral vascular disorders in persons exposed to hand-arm vibration, and is intended to be used together with a battery of tests for diagnosing hand-arm vibration syndrome.

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 5349-1, *Mechanical vibration — Measurement and evaluation of human exposure to hand-transmitted vibration — Part 1: General requirements*

IEC 60601-1, *Medical electrical equipment — Part 1: General requirements for basic safety and essential performance*

3 Measurement equipment

3.1 General

Several types of transducers are available for the measurement of FST. Thermocouples and thermistors (point transducers) are often used. They are simple to use and practical for following up. Thermal imaging devices have also been used, sometimes with infrared sensors. These devices, however, tend to be expensive and difficult to calibrate accurately compared with point transducers.

It is recommended that all equipment be checked for correct operation before and after use.

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