TECHNICAL SPECIFICATION

ISO/TS 16840-11

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Wheelchair seating —

Part 11: Determination of perspiration dissipation characteristics of seat cushions intended to manage tissue integrity

Sièges de fauteuils roulants —

Partie 11: Détermination des caractéristiques de dissipation de la transpiration des coussins de siège censés gérer l'intégrité du tissu

Reference number
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Contents

Page

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Foreword

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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 173, *Assistive products for persons with disability*, Subcommittee SC 1, *Wheelchairs*.

ISO 16840 consists of the following parts, under the general title *Wheelchair seating*:

— *Part 1: Vocabulary, reference axis convention and measures for body segments, posture and postural support surfaces*

— *Part 2: Determination of physical and mechanical characteristics of devices intended to manage tissue integrity — Seat cushions*

— *Part 3: Determination of static, impact and repetitive load strengths for postural support devices*

— *Part 4: Seating systems for use in motor vehicles*

— *Part 6: Simulated use and determination of the changes in properties — Seat cushions*

— *Part 10: Resistance to ignition of non-integrated seat and back support cushions — Requirements and test methods*

— *Part 11: Determination of perspiration dissipation characteristics of seat cushions intended to manage tissue integrity* [Technical Specification]

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Introduction

Dissipating perspiration and moisture on seat cushions is important to prevent pressure ulcers, tissue maceration and for comfortable sitting. This part of ISO 16840 specifies a test method for the measurement of the perspiration dissipating characteristics of wheelchair cushions under test conditions that simulate body loading on support surfaces with flat and contoured profiles. The test method is intended to be applicable to a wide variety of seat cushions that are used across the world.

This part of ISO 16840 specifies apparatus to measure dissipation characteristics (of perspiration) of seat cushions and the approach to be employed in measuring these characteristics. It is the intention of ISO/TC 173/SC 1 to further evaluate the outcomes of this test method and their clinical implications with the aim of developing an International Standard on this topic.

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Wheelchair seating —

Part 11: Determination of perspiration dissipation characteristics of seat cushions intended to manage tissue integrity

1 Scope

This part of ISO 16840 specifies a method for determining the dissipation characteristics of simulated perspiration exposure on wheelchair seat cushions.

This part of ISO 16840 is applicable to wheelchair seat cushions that include a cushion cover.

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 16840-2:2007, *Wheelchair seating — Part 2: Determination of physical and mechanical characteristics of devices intended to manage tissue integrity — Seat cushions*

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
ischial tuberosity
IT
one of two locations on the inferior surface of the RCLI or PRCLI that corresponds in position to the location of a human ischial tuberosity

3.2
rigid cushion loading indenter
RCLI
cushion loading indenter with a rigid exterior surface contour

Note 1 to entry: Example details of the RCLI are provided in Annex A of ISO 16840-2:2007.

3.3
electrical impedance
complex number ratio of the voltage to the current in an alternating current circuit.

Note 1 to entry: Impedance extends the concept of electrical resistance to the alternating current circuit.

3.4
perspiration rigid cushion loading indenter
PRCLI
rigid cushion loading indenter modified to the specifications of 5.1

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4 Principle

Human sensible perspiration in the area between the cushion and buttocks have four possible states: a) existing between a cushion and the buttock (such as with a sealed vinyl cover); b) dissipated into the cushion cover but not into the cushion; c) dissipated more generally into both the cover and cushion; d) drawn away from the cover (which becomes dry) and into the cushion. We can evaluate the dissipation behaviour of the cover/cushion system by measuring the changing impedance at a location of interest over time following a discharge of simulated perspiration into the area between the rigid cushion loading indenter and the cushion.

The testing system has four elements: a) an RCLI simulating temperature, weight, and shape of a loading buttock; b) a discharge system that releases a discrete amount of solution that simulates perspiration; c) a measurement system of the changing impedance associated with changing solution concentration near the electrodes (indirectly indicating the absorption of the cover/cushion); d) a test environment of temperature and humidity.

5 Test apparatus

The following test apparatus is necessary to complete the test method of this part of ISO 16840.

5.1 Perspiration rigid cushion loading indenter (PRCLI)

5.1.1 Shape of PRCLI

The PRCLI is formed from 4 mm ± 1 mm polycarbonate sheet formed according to the specifications for a rigid cushion loading indenter (RCLI) with the inner surface of the shell formed to match the contour specified in ISO 16840-2:2007 Annex A (Figure A.1).

5.1.2 Temperature control on the PRCLI

The PRCLI shall include a means of maintaining the temperature at 27 °C ± 2 °C at the inferior surface of PRCLI.

5.1.3 Loading mechanism

A means to load the cushion through the PRCLI with a vertical force of 500 N ± 10 N as in ISO 16840-2.

5.1.4 Discharge mechanism

A system to discharge 10 ml ± 1 ml of 0,01 % sodium chloride (NaCl) solution within 1 s from a hole 0,2 mm in diameter (see Figure 2) located at the ischial tuberosity of the PRCLI (see Figure 1).

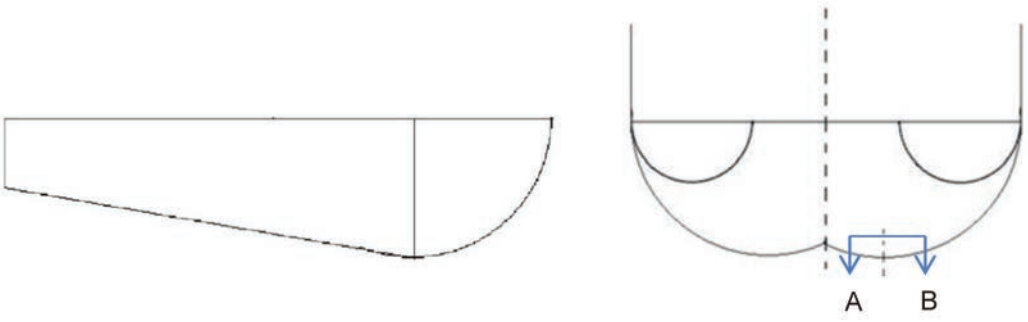

Figure 1 — Drawing of the PRCLI

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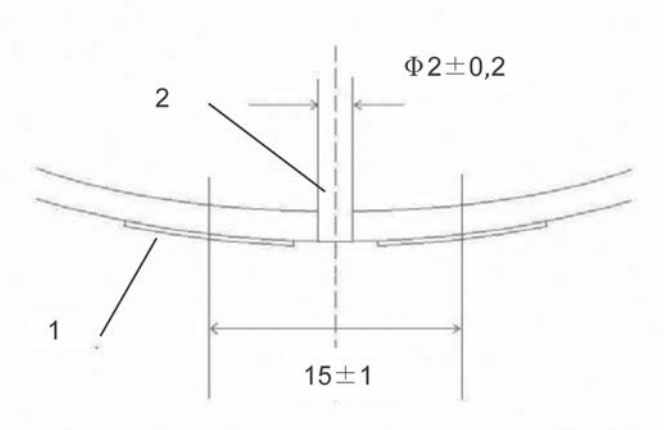
Dimensions in millimetres



Key

1 round electrode (see 5.1.5)

2 hole for the discharge

Figure 2 — A-B Cross section

5.1.5 Sensing system (see Figure 2)

The sensing system shall have a pair of equally sized round stainless steel electrodes. The electrode shall be a thin plate with diameter of 10 mm ± 1 mm and thickness of 0,1 mm, preserving smoothness of the buttock surface. The centre of each electrode shall be 15 mm ± 1 mm from the centre of the hole as shown in the cross sectional diagram of the PRCLI.

5.2 Electrical impedance measurement system

An electrical impedance measurement system able to measure electrical impedance between the two electrodes, ranging from 0,001 MΩ to 1,0 MΩ, at a sampling rate of 1 Hz.

The electrodes shall be connected to the impedance measurement box external to the PRCLI by appropriately shielded electrical wires to minimize electrical noise from the test environment.

NOTE Alternating current should be selected as the applying current for measurement to prevent electrolysis of the electrodes when in contact with the solution.

5.3 Test environment

A test environment maintained at 23 °C ± 2 °C and 50 % ± 5 % relative humidity as specified in ISO 554 and which includes the means to measure and record its temperature and humidity during the test period.

6 Preparation for testing

Precondition the cushion to be tested by holding it in the test environment of 23 °C ± 2 °C, and 50 % ± 5 % relative humidity for 24 h prior to initiating the test.

7 Test method

7.1 Commence measurement of the impedance with a sampling rate of 1 Hz, with the PRCLI not in contact with the cushion/cover surface.

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7.2 After 1 min ± 5 s, apply the PRCLI with 500 N load to the cushion and allow 1 min ± 5 s for settling.

7.3 Between the PRCLI and the cushion discharge 10 ml ± 1 ml of the NaCl solution from the tube within 1 s.

7.4 Continue to record the impedance until at least 1 h ± 1 min has elapsed from the commencement of the test. In some cases, change can be very slow and extended testing will be required.

8 Test report

The test report shall contain the following:

a) a reference to this part of ISO 16840 (i.e. ISO/TS 16840-11);

b) the name, address, and accreditation status of the testing institution;

c) the name and address of the manufacturer of the cushion;

d) the date of issue of the test report;

e) the test environmental conditions as specified;

f) the model type and nominal size that uniquely describes the test cushion and any cover that is used;

g) a photograph of the test cushion with the cover prior to and following the test;

h) the preparation of the test cushion;

i) a graph of impedance values *versus* time for the period of the whole test as per 7.4;

EXAMPLE See Figure 3 for an example of the type of graph that can result.

j) a table of the values of impedance at

1) the commencement of the test,

2) immediately prior to the injection of the NaCl solution, and

3) 12 min ± 20s intervals (from commencement of test) until the conclusion of the test.

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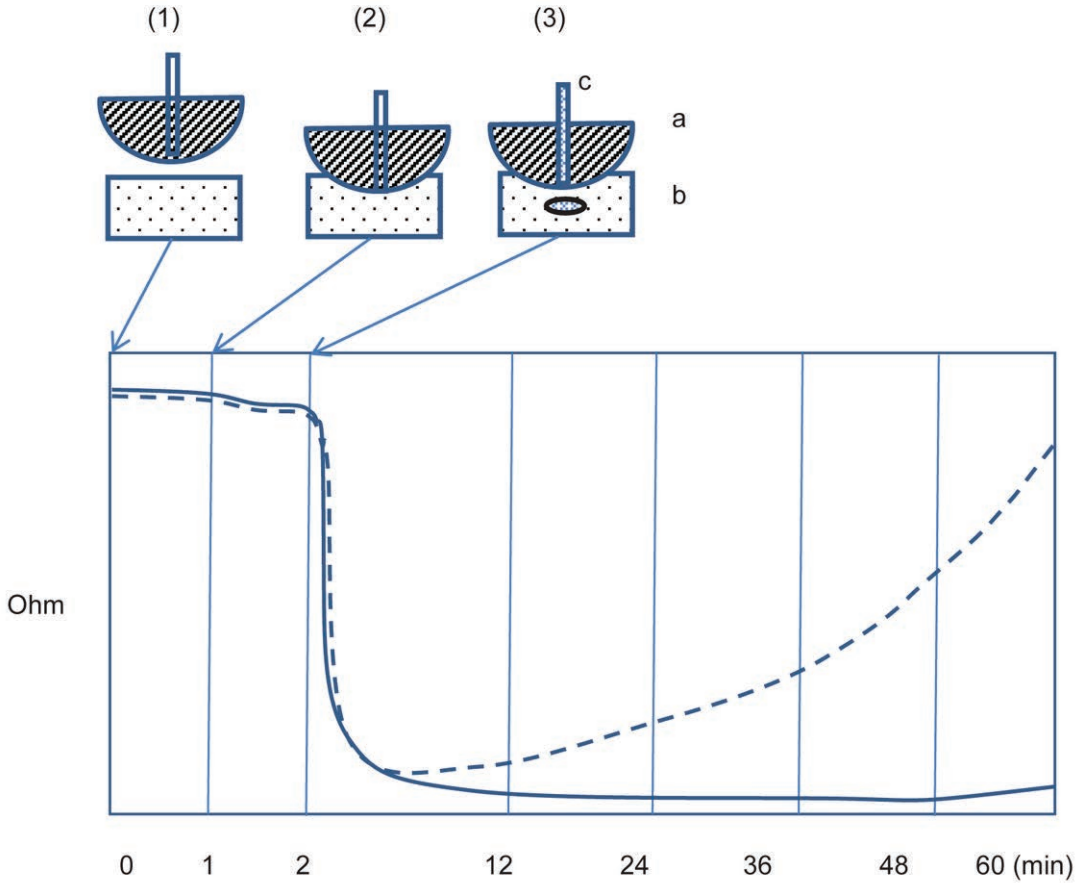

Key

(1) start to measure impedance
(2) start to load 500N
(3) start to pour the liquid
a perspiration rigid cushion loading indenter
b cushion
c discharge mechanism

NOTE The dotted graph represents outstanding moisture dissipation, and the solid line, a cover that does not dissipate the moisture.

Figure 3 — An example of two possible graphs of the impedance against time when testing according to Clause 7

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ICS 11.180.10

Price based on 5 pages

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