

---

---

**Wheelchair seating —**

**Part 2:**

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

*Sièges de fauteuils roulants —*

*Partie 2: Détermination des caractéristiques physiques et mécaniques des dispositifs de répartition de pression — Coussins d'assise*



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2007

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

## Contents

Page

1	Scope .....	1
2	Normative references .....	1
3	Terms and definitions .....	2
4	Symbols and abbreviated terms .....	2
5	Apparatus .....	3
6	Test environment .....	6
7	Preparation of test cushion .....	7
7.1	Choice of cushion .....	7
7.2	Preconditioning the cushion .....	7
7.3	Setup .....	8
8	Sequence of testing .....	8
9	Load-deflection and hysteresis test .....	8
9.1	Rationale .....	8
9.2	Test method .....	8
9.3	Method of calculation .....	9
9.4	Test report .....	10
10	Frictional properties .....	10
10.1	Rationale .....	10
10.2	Test method .....	10
10.3	Test report .....	10
11	Impact damping under normal loading conditions .....	10
11.1	Rationale .....	10
11.2	Test method .....	10
11.3	Method of calculation .....	12
12	Recovery .....	12
12.1	Rationale .....	12
12.2	Test method .....	12
12.3	Test report .....	13
13	Loaded contour depth and overload deflection .....	13
13.1	Rationale .....	13
13.2	Test method .....	13
13.3	Method of calculation .....	15
13.4	Test report .....	15
14	Water spillage .....	15
14.1	Rationale .....	15
14.2	Test method .....	15
14.3	Test report .....	15
15	Biocompatibility .....	15
15.1	Rationale .....	15

<b>15.2</b>	<b>Test method</b> .....	<b>15</b>
<b>15.3</b>	<b>Test report</b> .....	<b>15</b>
<b>16</b>	<b>Test report</b> .....	<b>16</b>
<b>17</b>	<b>Disclosure requirement</b> .....	<b>16</b>
<b>Annex A</b> (normative)	<b>Tapered uniform geometry RCLl</b> .....	<b>17</b>
<b>Annex B</b> (informative)	<b>Fire resistance considerations</b> .....	<b>19</b>
<b>Annex C</b> (informative)	<b>Horizontal and lateral stiffness</b> .....	<b>20</b>
<b>Bibliography</b>	.....	<b>25</b>

This document is a preview generated by EVS

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 16840-2 was prepared by Technical Committee 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*

## Introduction

Wheelchair seating is a sub-speciality of rehabilitation services involving the selection and provision of wheelchair seating products that provide improved body support and injury prevention to the wheelchair user. Seating products are designed and manufactured to meet the needs of persons with varying types and degrees of disability. Some products, such as wheelchair cushions, are designed to manage tissue integrity for persons who are at risk or have pressure ulcers.

The tests described herein are intended to differentiate performance characteristics between cushions and are not appropriate for ranking or scoring cushions or for directly matching these characteristics with the requirements of individual users. The link to clinical efficacy, although implied, has not been validated. It is intended that this part of ISO 16840 will evolve when the evidence of clinical relevance is confirmed. This part of ISO 16840 specifically describes test methods that characterize the physical and mechanical properties of seat cushions. Further parts of ISO 16840 are planned that describe test methods for disclosing the pressure distributing characteristics of seat cushions and their heat and water vapour dissipation characteristics.

This document is a preview generated by EVS

# Wheelchair seating —

## Part 2:

# Determination of physical and mechanical characteristics of devices intended to manage tissue integrity — Seat cushions

## 1 Scope

This part of ISO 16840 specifies apparatus, test methods and disclosure requirements for wheelchair seat cushions intended to maintain tissue integrity and prevent tissue trauma. It does not include test methods or requirements for determining the fire resistance of cushions. Annex B provides guidance on selecting cushions with appropriate fire resistance characteristics. This part of ISO 16840 does not address the interface pressure distributing characteristics of seat cushions nor the heat and water vapour dissipation characteristics of seat cushions that will be addressed in further parts of ISO 16840.

This part of ISO 16840 can also be applicable to tissue integrity management devices used as other support systems, as well as to cushions used in situations other than a wheelchair.

## 2 Normative references

The following referenced documents are indispensable for the application 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 554:1976, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 1302:2002, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ISO 7176-26, *Wheelchairs — Part 26: Vocabulary*

ISO 9073-8:1995, *Textiles — Test methods for nonwovens — Part 8: Determination of liquid strike-through time (simulated urine)*

ISO 10993-1:2003, *Biological evaluation of medical devices — Part 1: Evaluation and testing*

ISO 10993-10:2002, *Biological evaluation of medical devices — Part 10: Tests for irritation and delayed-type hypersensitivity*

ISO 16840-1:2006, *Wheelchair seating — Part 1: Vocabulary, reference axis convention and measures for body segments, posture and postural support surfaces*

GUM:1993, *Guide to expression of uncertainty in measurement*, BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML

BS 3424-10:1987, *Testing coated fabrics. Methods 12A and 12B. Determination of surface drag*

ECE Regulation 16, *Uniform provisions concerning the approval of safety belts and restraint systems for adult occupants of power-driven vehicles*, Revision 3, Amendment 3, 27 February 1996

FMVSS 209, Standard No. 209; *Seat Belt Assemblies. Federal Motor Vehicle Safety Standards*, 49 CFR part 571.209, 1 October 1992