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**Wheelchair seating —**

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

*Sièges de fauteuils roulants —*

*Partie 4: Systèmes d'assise dans les véhicules à moteurs*



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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)  
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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.

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 16840-4 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

Transportation safety research has demonstrated that the design of the vehicle seat, the occupant restraints and seat compartment in motor vehicles play a vital role in protecting the occupant in the event of a crash. For some wheelchair users, it is not feasible to transfer to the seat provided by the vehicle manufacturer and they must remain seated in their wheelchair while travelling in a vehicle. ISO 7176-19 provides a means of evaluating the design and frontal crashworthiness performance of complete wheelchairs when used as forward-facing seats in motor vehicles. However, it is common practice that a seating system from one manufacturer and a wheelchair base from another manufacturer be used to form the complete wheelchair. Wheelchair seating systems may also be intended for use on multiple models of wheelchair bases. For this reason, there is a need to be able to evaluate the design and performance of wheelchair seating systems independent of the commercial wheelchair bases on which they may be installed. This part of ISO 16840 provides a means of assessing frontal impact crashworthiness of seating systems without the host wheelchair by using a surrogate wheelchair base.

Manufacturers may choose to not test customized variations of a given seating system. The manufacturer may test a representative variation of the seating system and it is for the manufacturer to document how the results of this test would apply to the limitations in use and instructions for use supplied with the product.

This part of ISO 16840 is intended to encourage safer motor vehicle transportation of wheelchair users by increasing the availability of wheelchair seating systems that comply with basic principles of occupant protection. This part of ISO 16840 should not be used to deny or limit wheelchair user access to motor vehicle transportation.

Currently this part of ISO 16840 addresses only complete wheelchair seating systems and the test requirements are representative of frontal impact conditions. However, future versions may address testing of the individual components of the seating system as well as other directions of impact such as side or rear.

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# Wheelchair seating —

## Part 4:

## Seating systems for use in motor vehicles

### 1 Scope

This part of ISO 16840 specifies test methods and requirements for design and performance, for instructions and warnings and for product marking and labelling of seating systems intended to be used as a forward-facing seat in a motor vehicle when fitted to a manual or powered wheelchair. It evaluates the frontal crashworthiness performance of complete seating systems for occupancy by adults or children of mass equal to or greater than 22 kg.

This part of ISO 16840 only applies to complete wheelchair seating systems including attachment hardware, designed to be used with a wheelchair base tested as part of a wheelchair system that conforms to ISO 7176-19 performance requirements and that has securement points for use with four-point, strap-type tiedowns.

This part of ISO 16840 applies to seating systems designed to be used with occupant restraints that anchor either to the vehicle, the tiedown system, the seating system or the wheelchair base.

Seating systems that are intended only for use with a specific wheelchair base should be tested to ISO 7176-19 using the specifically intended wheelchair base.

### 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 898-7, *Mechanical properties of fasteners — Part 7: Torsional test and minimum torques for bolts and screws with nominal diameters 1 mm to 10 mm*

ISO 6487, *Road vehicles — Measurement techniques in impact tests — Instrumentation*

ISO 7176-19:2008, *Wheelchairs — Part 19: Wheeled mobility devices for use as seats in motor vehicles*

ISO 10542-1:2001, *Technical systems and aids for disabled or handicapped persons — Wheelchair tiedown and occupant-restraint systems — Part 1: Requirements and test methods for all systems*

ISO 10542-2, *Technical systems and aids for disabled or handicapped persons — Wheelchair tiedown and occupant-restraint systems — Part 2: Four-point strap-type tiedown systems*

FMVSS 201, *Standard No. 201, Occupant protection in interior impact. (Federal Motor Vehicle Safety Standards), 49 CFR 571.201*

ECE Regulation 21, *Uniform provisions concerning the approval of vehicles with regard to their interior fittings, Revision 2, Amendment 2*

ASTM E527-83 (2003), *Standard Practice for Numbering Metals and Alloys (UNS)*