Second edition
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Wheelchairs —

Part 19: Wheeled mobility devices for use as seats in motor vehicles

Fauteuils roulants —

Partie 19: Dispositifs de mobilité montés sur roues et destinés à être utilisés comme sièges dans des véhicules à moteur

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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 7176-19 was prepared by Technical Committee ISO/TC 173, *Assistive products for persons with disability*, Subcommittee SC 1, *Wheelchairs*.

This second edition cancels and replaces the first edition (ISO 7176-19:2001), most clauses of which have been technically revised.

ISO 7176 consists of the following parts, under the general title *Wheelchairs*:

— *Part 1: Determination of static stability*

— *Part 2: Determination of dynamic stability of electric wheelchairs*

— *Part 3: Determination of effectiveness of brakes*

— *Part 4: Energy consumption of electric wheelchairs and scooters for determination of theoretical distance range*

— *Part 5: Determination of dimensions, mass and manoeuvring space*

— *Part 6: Determination of maximum speed, acceleration and deceleration of electric wheelchairs*

— *Part 7: Measurement of seating and wheel dimensions*

— *Part 8: Requirements and test methods for static, impact and fatigue strengths*

— *Part 9: Climatic tests for electric wheelchairs*

— *Part 10: Determination of obstacle-climbing ability of electrically powered wheelchairs*

— *Part 11: Test dummies*

— *Part 13: Determination of coefficient of friction of test surfaces*

— *Part 14: Power and control systems for electrically powered wheelchairs and scooters — Requirements and test methods*

— *Part 15: Requirements for information disclosure, documentation and labelling*

— *Part 16: Resistance to ignition of upholstered parts — Requirements and test methods*

— *Part 19: Wheeled mobility devices for use as seats in motor vehicles*

— *Part 21: Requirements and test methods for electromagnetic compatibility of electrically powered wheelchairs and scooters, and battery chargers*

— *Part 22: Set-up procedures*

— *Part 23: Requirements and test methods for attendant-operated stair-climbing devices*

— *Part 24: Requirements and test methods for user-operated stair-climbing devices*

— *Part 25: Requirements and test methods for batteries and their chargers for electrically powered wheelchairs and motorized scooters*

— *Part 26: Vocabulary*

A technical report, ISO/TR 13570-1, is also available, giving a simplified explanation of these parts of ISO 7176.

Introduction

Transportation safety research has shown that the vehicle seat is an important part of the occupant-restraint system and therefore plays a key role in reducing the risk of serious injuries to vehicle occupants in many types of vehicle crashes. In particular, the seat needs to allow and facilitate the proper positioning of belt restraints on the skeletal regions of the occupant, not add to occupant loads during impact loading, and provide effective support for the occupant so that the belt restraint will remain in place over skeletal regions throughout a crash. People with physical disabilities must often remain in their wheelchairs whilst travelling in motor vehicles as drivers or passengers. Since many wheelchairs were not designed for this purpose, wheelchair-seated occupants are often at higher risk of injury in crashes than are people seated in seats provided by the vehicle manufacturer.

ISO 10542-1 provides design, performance, labelling, and the manufacturer's literature requirements, and specifies associated test methods, for wheelchair tiedown and occupant-restraint systems (WTORS). This part of ISO 7176 addresses the seating part of wheelchair-user occupant-protection systems by establishing design, performance, labelling, and the manufacturer's literature requirements, as well as associated test methods, for wheelchairs that may be used as seats in motor vehicles.

Whilst wheelchairs may be secured by various types of tiedown and securement systems that were available throughout the world at the time this part of ISO 7176 was developed, effective wheelchair securement in the real world requires compatibility of the wheelchair tiedown system available in the vehicle and the method of securement provided on the wheelchair. At the time that this part of ISO 7176 was developed, the four-point strap-type tiedown was considered to be the most effective, common, and universally adaptable system for securing a wide range of wheelchair types and sizes. For these reasons, this part of ISO 7176 requires that wheelchairs intended for use as seats in motor vehicles provide for securement using a four-point strap-type tiedown system by providing at least four designated securement points, with two in front and two in the back. However, this part of ISO 7176 also provides for evaluating wheelchairs that are also designed for securement by other methods, such as docking-type securement systems.

To evaluate the crashworthiness performance of a wheelchair, Annex A specifies procedures for dynamically testing a wheelchair loaded with an appropriate-size crash-test dummy using a 48 km/h crash pulse with the wheelchair secured facing forward on the impact sled. This test is based on well-documented motor vehicle crash and injury statistics, which show that more than 50 % of all serious injuries to occupants of motor vehicles occur in frontal crashes, and that more than 95 % of frontal crashes result in a longitudinal change in vehicle speed of less than 48 km/h. Dynamic performance for forward-facing wheelchairs in rear and side impacts might be addressed in future International Standards.

This part of ISO 7176 has also been developed with the recognition that the use of a pelvic-belt restraint alone does not provide the wheelchair occupant with the same level of crash protection in a frontal impact as the use of both pelvic-belt and shoulder-belt restraints. Therefore, the provisions and test methods of this part of ISO 7176 are based on the use of both pelvic- and shoulder-belt-type restraints.

Although the four-point strap-type tiedown system was considered to be the most common and universal method for effectively securing a wide range of wheelchairs at the time this part of ISO 7176 was developed, it is a method of wheelchair securement that requires the involvement of a second person and cannot be implemented by the wheelchair occupant. Accordingly, it is desirable to progress toward a securement method that can be implemented independently by the wheelchair-seated passenger who may travel in different public transportation and private vehicles. As a step toward this goal, this part of ISO 7176 includes a normative annex (Annex F) that establishes universal docking interface geometry (UDIG) for securement points on wheelchairs when it is intended for the wheelchair to be secured by docking-type securement devices in public transportation and/or multiple private vehicles.

Finally, this part of ISO 7176 can be viewed in the totality of daily wheelchair use and the range of standards to which all wheelchairs are expected to comply. Wheelchairs are designed primarily to serve as effective mobility devices and, in that respect, they must first conform to the applicable requirements set forth in other

parts of the ISO 7176 series. Transportation is only one of many daily activities that introduce unique circumstances and requirements that wheelchairs and wheelchair occupants may experience. Wheelchair products that comply with this part of ISO 7176 will have additional features that provide increased levels of occupant security and safety whilst their occupants are riding in motor vehicles. However, a wheelchair's failure to comply with this part of ISO 7176 cannot be used to limit access to, and availability of, motor vehicle transportation for wheelchair users.