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Technical systems and aids for disabled or handicapped persons — Wheelchair tiedown and occupant-restraint systems —

Part 3: Docking-type tiedown systems

Assistances et aides techniques pour les personnes invalides ou handicapées — Systèmes d'attache du fauteuil roulant et de retenue de l'occupant —

Partie 3: Systèmes de fixation par arrimage

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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 10542-3 was prepared by Technical Committee ISO/TC 173, *Assistive products for persons with disability*, Subcommittee SC 1, *Wheelchairs*.

ISO 10542 consists of the following parts, under the general title *Technical systems and aids for disabled or handicapped persons — Wheelchair tiedown and occupant-restraint sytems*:

— *Part 1: Requirements and test methods for all systems*

— *Part 2: Four-point strap-type tiedown systems*

— *Part 3: Docking-type tiedown systems*

— *Part 4: Clamp-type tiedown systems*

— *Part 5: Systems for specific wheelchairs*

Introduction

Providing effective protection for the wheelchair-seated occupant of a motor vehicle usually requires that after-market equipment be installed to secure the wheelchair and restrain the person in the wheelchair. ISO 10542-1 specifies requirements and test methods for all wheelchair tiedown and occupant-restraint systems (WTORS). Its provisions apply as amended and supplemented by this part of ISO 10542 for wheelchair tiedown and occupant-restraint systems that use a manual or powered docking system to secure the wheelchair.

At the time of the drafting of this part of ISO 10542, docking tiedown devices were most often used to allow wheelchair users to independently secure their wheelchairs in private vehicles. Extending the use of docking tiedown devices to public vehicles places the added demand that docking devices engage with, and safely secure, a wide range of wheelchair types. Therefore, this part of ISO 10542 also contains a specification for a universal docking interface geometry (UDIG). When adopted by both the wheelchair and wheelchair securement industries, the UDIG specification will allow the user increased independence in wheelchair securement for a wide range of vehicles, while in all likelihood reducing the time required for loading and unloading wheelchair passengers.

Technical systems and aids for disabled or handicapped persons — Wheelchair tiedown and occupant-restraint systems —

Part 3: Docking-type tiedown systems

1 Scope

This part of ISO 10542 specifies design and performance requirements and recommendations, instructions and warnings for both installers and users, and product marking and labelling, for wheelchair tiedown and occupant-restraint systems (WTORS) that use a docking-type wheelchair tiedown. It specifies the universal docking interface geometry (UDIG) and a method of testing wheelchair movement. It is applicable to docking-type wheelchair tiedown devices intended for securing all types of manual and powered forward-facing wheelchairs, including scooters with three or more wheels, used by adult passengers and drivers of motor vehicles.

This part of ISO 10542 is applicable primarily to complete WTORS, but a portion of this part of ISO 10542 can also be applied to components and sub-assemblies sold separately and for replacement parts.

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 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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10542-1 and the following apply.

3.1
docking-type tiedown
docking-type securement
method of wheelchair tiedown by which portions of the wheelchair structure, or add-on components fastened to the wheelchair, align, mate and engage with a docking tiedown device fastened to the vehicle, upon manoeuvring of the wheelchair into position in the vehicle

NOTE Securement of the wheelchair can occur automatically during wheelchair engagement, or could require manual intervention through operation of a mechanical lever or electrical switch. Release of the wheelchair will usually require operation of a mechanical lever or electrical switch.

3.2
docking tiedown device
docking securement device
assembly of fixtures and components intended by the manufacturer for installation in motor vehicles for the purpose of securing a wheelchair by engaging with, and locking onto, securement points on the wheelchair frame or on wheelchair securement adaptors attached to the wheelchair frame

3.3
powered docking tiedown device
powered docking securement device
docking tiedown device that requires external power to secure and/or release the wheelchair

3.4
universal docking interface geometry
UDIG
specifications for the size, shape, and location of wheelchair securement points, including surrounding clear zones, intended for use with a variety of docking tiedown devices installed in a wide range of vehicles

3.5
UDIG adaptor
wheelchair tiedown adaptor that conforms to the UDIG specification given in Annex A of this part of ISO 10542

3.6
wheelchair tiedown adaptor
wheelchair securement adaptor
hardware attached temporarily or permanently to the wheelchair frame to accommodate wheelchair securement by a wheelchair tiedown device

4 Design requirements and recommendations

4.1 Docking tiedown devices

4.1.1 The design requirements of ISO 10542-1:2001, 4.1, 4.2 and 4.3, shall apply, with the addition that the docking tiedown device shall

a) provide a rear head restraint if the docking tiedown device includes a back restraint,

b) provide auditory and visual means for indicating to the wheelchair user and vehicle driver when the wheelchair has been successfully secured or released,

c) include an accessible manual override to release the wheelchair in the event of loss of power to any power-operated mechanisms,

d) remain in the locked position until manually released, in the event of loss of power to any power-operated mechanisms,

e) allow for accessible operation of any electrical or mechanical devices necessary for engaging or disengaging the docking components, and

f) prevent inadvertent release during normal or emergency vehicle operation.

4.1.2 If the docking tiedown device is intended to secure a wide range of wheelchairs in a wide range of public and private vehicles, it shall be designed to engage effectively with wheelchair securement geometry specified in Annex A and according to the performance requirements given in Clause 6.

4.1.3 The engagement mechanism of the docking tiedown device should operate effectively when the following misalignment occurs on the approach of a wheelchair to a docking tiedown:

a) the wheelchair is laterally displaced from the mid-line of the docking station up to a maximum of 75 mm in either direction;

b) the wheelchair reference plane is rotated from the longitudinal centreline of the vehicle up to a maximum of 10° in either direction;

c) the structural components on the wheelchair that comprise the wheelchair securement points are angled relative to the vertical up to a maximum of 10° in any direction;

d) the height of any structural components of the wheelchair securement points vary vertically up to a maximum of 50 mm.

NOTE This is to allow for variation in height due to low tyre pressure or increased load in the wheelchair.

4.2 Wheelchair securement adaptors

4.2.1 Wheelchair securement adaptors shall be designed so that they do not become loose inadvertently during normal use.

4.2.2 If a wheelchair securement adaptor is intended by the manufacturer to be used for securing a wide range of wheelchair types in a wide range of public and private vehicles, the structural components that comprise the wheelchair securement points shall be in accordance with Annex A and the performance requirements given in Clause 6.

5 Information, identification and instruction

5.1 Identification and labelling

5.1.1 In addition to the requirements of ISO 10542-1:2001, 5.1.1 a) and b), the docking tiedown device and any replacement parts shall be permanently and legibly labelled to state that the device conforms to this part of ISO 10542.

5.1.2 A permanent notice shall be provided with the WTORS, indicating the proper use and operation of the docking tiedown device and the manual override. The notice design (size of lettering, colour and luminance contrast of the background) should take account of people with reduced vision.

5.2 Instructions for WTORS installers

The requirements of ISO 10542-1:2001, 5.2 apply, with the exception of 5.2.2 c). In addition, the manufacturer's instructions to the installer of a WTORS with docking-type tiedown device shall include statements specifying

a) that the WTORS conforms to this part of ISO 10542,

b) the procedure for manoeuvering a wheelchair to achieve effective engagement and disengagement with the docking tiedown device,

c) recommended locations for electrical switches or other devices intended for use by the wheelchair occupant or vehicle driver,

d) where to position the docking tiedown device in the vehicle relative to occupant-restraint anchor points for the most effective use of vehicle-anchored occupant-restraint systems,

e) the requirements for electrical wiring and, when appropriate, instructions for connecting to the power supply of the vehicle,

f) where the fuses or circuit breakers should be mounted to provide for easy access,

g) any required modifications to the vehicle,

h) a warning to consult the vehicle manufacturer before relocating original vehicle equipment,

i) a warning against damaging structural parts of the vehicle during installation of the docking tiedown device,

j) that the permanent notice provided with the WTORS indicating the proper use and operation of the docking tiedown device and the manual override should be posted in a visible location close to the installed device,

k) a description of the geometry and location of the wheelchair tiedown adaptor(s) or wheelchair securement point(s) needed to achieve effective engagement with the docking tiedown device, and

l) general information on any wheelchair securement adaptors that must be provided for the wheelchair in order to achieve effective engagement with the docking tiedown device.

5.3 Instructions for users

The requirements of ISO 10542-1:2001, 5.3, apply, with the exception of 5.3.2 a). In addition, the user instructions for a WTORS with docking tiedown device shall include statements specifying

a) that the WTORS conforms to this part of ISO 10542,

b) the schedule for any maintenance requirements, including routine lubrication and adjustments,

c) how to release the wheelchair from the docking device in the event of a power failure,

d) the procedure for manoeuvring a wheelchair to achieve effective engagement and disengagement with the docking tiedown device,

e) a description of the geometry and location of the wheelchair tiedown adaptor(s) or wheelchair securement point(s) needed to achieve effective engagement with the docking tiedown device, and

f) general information on any wheelchair securement adaptors that must be provided for the wheelchair in order to achieve effective engagement with the docking tiedown device.

6 Performance requirements and recommendations

6.1 The performance requirements of ISO 10542-1:2001, 6.1, 6.2 and 6.4, apply.

6.2 Docking devices should minimize wheelchair movement during normal vehicle operation.

NOTE Annex B presents an optional test for evaluating the potential for linear and rotational wheelchair movement.

7 Test report

The requirements of ISO 10542-1:2001, Clause 7, apply, with the exception of 7.4. In addition, the test report shall include the following:

a) a description of the modifications to the surrogate wheelchair used in the test;

b) a statement indicating whether the docking tiedown device conforms to the design requirements of 4.1;

c) if applicable, a statement that the wheelchair securement adaptor(s) conform to the requirements of 4.2;

d) a statement indicating that the appropriate requirements of Clause 5 have been met.