Sunrise Medical wheelchairs:
Tested to ISO 7176-19

SUNRISE MEDICAL









QUICKIE









Table of contents

1. Introduction

In this document you will find information on the crash-tested wheelchairs from Sunrise Medical. In addition, you will find information on the transport of wheelchair users while sitting in the wheelchair in a vehicle, information on tie-down systems used during crash tests, as well as diagrams of the securement points on wheelchairs.
The means of securement (hooks, loops, Karabiner clips, etc.) of the wheelchair tie-down system are to be fitted onto the securement points.

Furthermore, this document gives you information on the applicable standards, to which our products are tested.
On the basis of the tests carried out and the results achieved, we know that the Sunrise Medical products which are approved for transportation withstand the strong forces which occur during a crash test in accordance with ISO 7176-19, and are therefore suitable to be used as a seat in a vehicle for the transportation of wheelchair users.

As the Crash Test (simulation of a frontal impact) can in no way cover all situations in road traffic and represents a fictitious laboratory test, we always recommend, in so far as this is possible, that the wheelchair user is transferred to a vehicle seat when being transported in a vehicle and to stow the wheelchair in the boot. Due to its construction, the vehicle seat offers the highest level of safety as it is secured to the chassis and is designed for this purpose. If wheelchairs were to be developed to meet the requirements of vehicle seating, they would no longer fulfil their purpose of use (mobility aids for handicapped people).
Therefore not all wheelchairs are designed to withstand a crash test.

Due the great number of systems on the market, it is not possible for Sunrise Medical to crash test all wheelchair tie-down systems and personal restraint systems. However, all Sunrise Medical crash-tested wheelchairs can be transported with absolutely all wheelchair tie-down and personal restraint systems as long as these meet the requirements of ISO 10542. Where a wheelchair has a third-party product fitted, e.g. electric drive, Sunrise Medical only permits the transportation of an occupied wheelchair in a vehicle if that third-party product has passed a crash test in accordance with ISO 7176-19 and the manufacturer of this third-party product has the relevant approval.

In order to establish whether the system you have meets these requirements, we would ask you to contact the relevant manufacturer of the wheelchair and personal restraint system (see Page 26).
We are aware that wheelchairs have been transported for many years without any problem. However, since the publication of the ISO 7176-19, ISO 10542 standards and in particular the new issues of the EN 12183:2009 and EN 12184:2009 wheelchair standards, there is a new benchmark standard, which offers even more safety and protection for the wheelchair user as well as the vehicle driver and other occupants in the vehicle. We want to and must adhere to this benchmark standard due to the Medical Device Directive 93/42/EEC, adapted by Guideline 2007/74/EG.

We hope that the following information is of help to you.

2. Transportation of a wheelchair within a vehicle

A wheelchair secured in a vehicle does not offer the same level of safety as the bolted in seating system of a vehicle.
Sunrise Medical therefore recommends that the wheelchair user transfers or is transferred to a vehicle seat and uses the seat belt in the vehicle. We are aware that, in practice, this is not always possible.
If the user is to be transported in the vehicle while still sitting in the wheelchair, the following advice must be followed:

1. If the user is seated in the wheelchair, this must be located in a forward facing position, in the direction of travel and must be secured using the wheelchair tie-down system for the wheelchair the personal restraint system for the user (systems must meet the requirements of ISO 10542 or SAE J2249). The systems must be fitted in accordance with the manufacturer's user instructions for the wheelchair tie-down system and personal restraint system and the user instructions for the wheelchair manufacturer (see
the checklist on page 24).

The test standard in accordance with ISO 7176-19 only provides for the transport of wheelchairs in a forward-facing direction. So, for example, the wheelchair must never be transported in a side-facing direction. (Fig. 1).

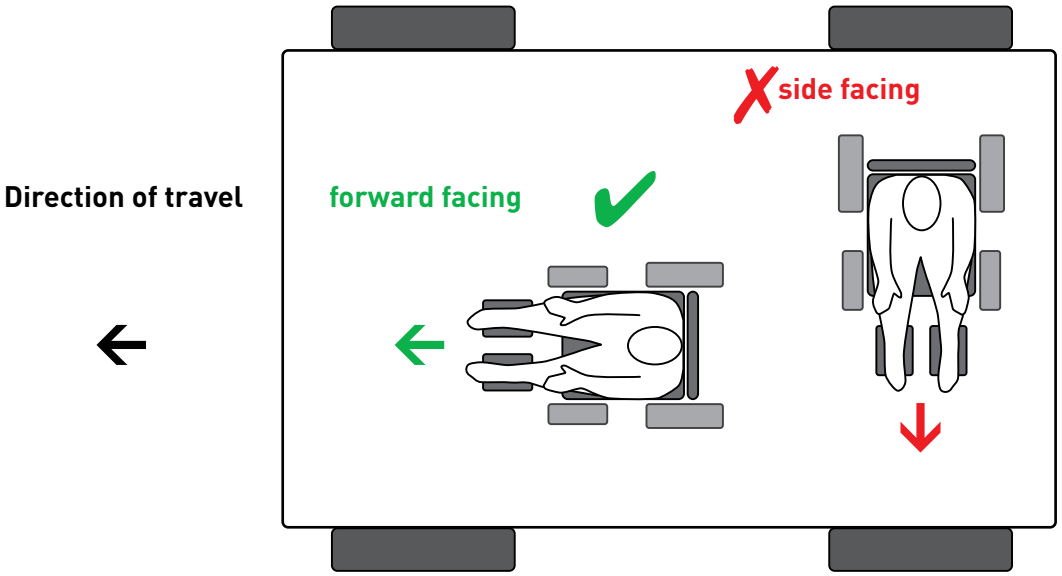


Fig. 1

2. As far as possible, all add-on components should be removed from the wheelchair and stowed safely. So for example:

- Kerb climber
- Crutches
- Loose cushions
- Therapy tables

3. Alterations or substitutions must not be made to the wheelchair securement points or to components of the chassis or frame without consulting the manufacturer. Failure to do this means that the wheelchair can no longer be transported in a vehicle and the manufacturer guarantee is void.

4. A powerchair which is to be transported in a vehicle must be fitted with leak-proof, sealed batteries, e.g. gel-type batteries.

5. Should there be an accident or impact, the wheelchair must be inspected by a dealer in Sunrise Medical products before it is used again.

6. Both lap belt and upper torso restraint belt must be used to restrain the wheelchair occupant (Fig. 2). In this way, the possibility of head and chest impacts with the vehicle components is reduced. The upper torso restraint belt must not lie across the neck. The lap belt should be positioned just above the hip bones.

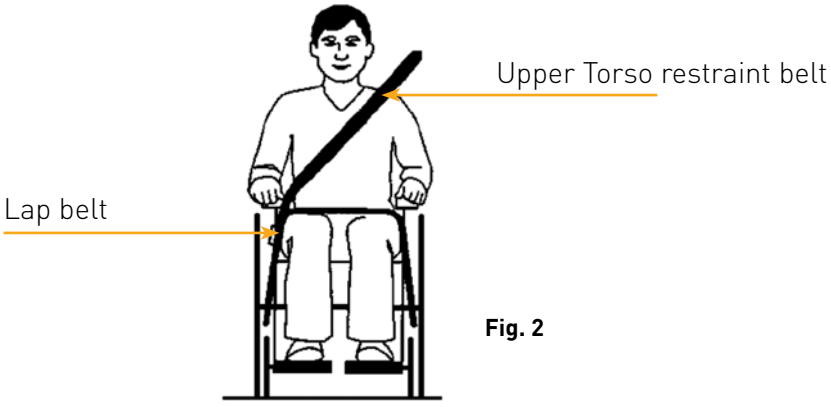


Fig. 2

7. A headrest suitable for transportation should, where possible, be fitted and suitably positioned at all times during transportation (Fig. 7).

8. Standard wheelchair lap belts used for positioning the wheelchair and preventing them from falling out of the wheelchair, for example those fitted to the wheelchair backrest, are **not** suitable.

Postural supports (lap straps, lap belts) should not be used or relied on for occupant restraint in a moving vehicle unless they are labelled as meeting the requirements specified in ISO 7176-19 (or SAE J2249) and ISO 10542.

Occupant Restraint Instructions

1. The belts of the wheelchair tie-down and personal restraint systems must be fitted on the lower front side of the pelvis (Fig. 5) in such a way, that the angle of the lap belt is within the range of 30° to 75° to the horizontal (Fig. 3).

A steeper (greater) angle of the belt is desirable. i.e. closer to, but never exceeding 75°.

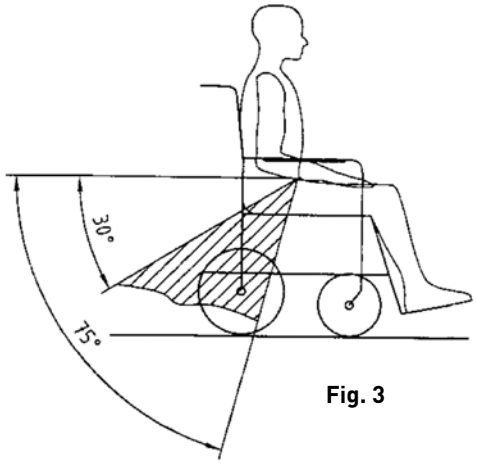


Fig. 3

Fixing angle of the lap belt

2. Restraint belts must not be placed over wheelchair components such as armrests or wheels, so that cannot be held away from the body (Fig. 4).

3. The upper torso restraint belt must be fitted over the shoulder and diagonally across the chest. (Fig. 6)

4. The upper torso restraint belt and lap belt must be as tight as possible, without restricting the user.

5. Restraint belt webbing must not be twisted when in use.

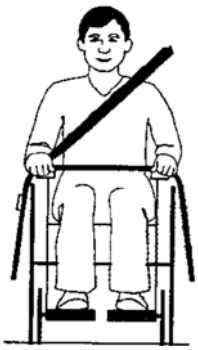


Fig. 4

Fig. 5

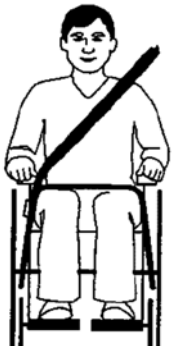


Fig. 6

Fig. 7

6. Suitable headrests (strongly recommended) should be positioned correctly (Fig. 7).

3. Sunrise Medical wheelchairs which are approved for transportation in accordance with ISO 7176-19

Sunrise Medical wheelchairs are tested in accordance with ISO 7176-19, with a 75 kg hybrid 2 test dummy, in the direction of travel, with a frontal impact and a wheelchair tie-down system (4-point system for manual and lightweight powerchairs, 6-point system for heavy powerchairs) and a 3-point personal restraint system for the wheelchair user (with lap and diagonal belt in accordance with ISO 10542).

Some of the variants of the models tested were assessed and deemed that they fulfil the dynamic test requirements because they have the same construction, i.e. the same frame resistance, the same cover materials, rigidity, structural integrity of the components and connections, as well as geometrical similarity with the models which have been approved for transportation in a vehicle. These products are marked in the tables with an asterisk (*) after the model number (e.g. Sopur Easy 200*).

For many years, dynamic testing (Crash testing) of Sunrise Medical products has run in parallel with the development of the ISO 7176-19 standard. From the very first working groups at the end of 1996 through to the drafts from the committees and ending up with the final version of the ISO 7176-19 standard. The collated results of our tests have influenced the development and improvement of the ISO 7176-19 standard, thereby all current products from Sunrise Medical can also benefit from this collaboration.

The products given in the following tables were tested in their European standard configuration and with standard settings. It is impossible to test the wide range of adjustable configurations and options.

The products were not tested with modifications, spare parts or third-party accessories.

The products were tested with a Crash Test Dummy up to 75 kg for adults and 54 kg for children (in accordance with the requirements of ISO 7176-19).

The following list of Crash tested Sunrise Medical products is being expanded all the time.

Sunrise Medical wheelchairs which are approved for transportation in accordance with ISO 7176-19

BREEZY WHEELCHAIRS

Wheelchair model	Test report	Test report no.	Date	Tested as a system in accordance with ISO 10542
Breezy 100	Breezy 100	TRL 139TT01	19/06/08	4-point wheelchair tie-down system
Breezy 210 Transit	Breezy 200 (Transit)	TRL 05MM03	17/04/01	4-point wheelchair tie-down system
Breezy 215 Self-propelling	Breezy 200 (half-folding back)	TRL 12MM01	22/06/01	4-point wheelchair tie-down system
Breezy 200 with adjustable backrest angle	Breezy 200 with adjustable backrest angle (with fixed headrest)	Millbrook S7847	24/05/02	4-point wheelchair tie-down system
Breezy 300	Breezy 300	TRL 150tt02	11/07/08	4-point wheelchair tie-down system
Breezy BasiX²	BasiX²	Millbrook S13817	24/11/15	4-point wheelchair tie-down system
Breezy BasiX², half-folding backrest	Breezy BasiX²	Millbrook MBK08-0227	25/03/08	4-point wheelchair tie-down system
Breezy Elegance	Breezy Elegance	Millbrook S8662	10/05/04	4-point wheelchair tie-down system
Breezy Moonlite	Breezy Moonlite	Millbrook MBK07-0431	31/05/07	4-point wheelchair tie-down system
Breezy RelaX	Breezy RelaX (seat angle adjustment)	Millbrook S9217	30/09/05	4-point wheelchair tie-down system
Breezy RelaX²	Breezy RelaX²	Millbrook S11315	29/11/10	4-point wheelchair tie-down system
Breezy RubiX²	RubiX²	Millbrook S13817	24/11/15	4-point wheelchair tie-down system
Breezy SL	Breezy Standard SL NHS	TRL 37LM01	11/12/00	4-point wheelchair tie-down system
Breezy SL NHS	Breezy Standard SL NHS	TRL 37LM01	11/12/00	4-point wheelchair tie-down system
Breezy SL OTS	Breezy Standard SL NHS	TRL 37LM01	11/12/00	4-point wheelchair tie-down system
Breezy TL NHS	Breezy Standard TL NHS	TRL 37LM02	11/12/00	4-point wheelchair tie-down system
Breezy TL	Breezy Standard TL NHS	TRL 37LM02	11/12/00	4-point wheelchair tie-down system
Breezy TL OTS	Breezy Standard TL NHS	TRL 37LM02	11/12/00	4-point wheelchair tie-down system
Breezy UniX²	Breezy UniX²	TRL 09309I02	06/05/10	4-point wheelchair tie-down system
Breezy 250	Breezy 250	Millbrook S11787	31/08/11	
Breezy PariX²	Breezy PariX²	Millbrook S11841	18/10/11	

Sunrise Medical wheelchairs which are approved for transportation in accordance with ISO 7176-19

SOPUR / QUICKIE WHEELCHAIRS

Wheelchair model	Test report	Test report no.	Date	Tested as a system in accordance with ISO 10542
Xenon SA	Xenon Swing Away	Millbrook S 12134	21/06/2012	4-point wheelchair tie-down system
Helium	Helium	MBK 11-0028	12/01/2011	4-point wheelchair tie-down system
Easy 160 i	Easy 160 i	TRL 150TT01	11/07/08	4-point wheelchair tie-down system
Easy 200*	Easy 300 with Unwin headrest	Millbrook S7845	24/05/02	4-point wheelchair tie-down system
Easy 300	Sopur Easy 300 with Unwin headrest	Millbrook S7845	24/05/02	4-point wheelchair tie-down system
Easy Life /Quickie Life	LCA	TRL 09309I01	06/05/10	4-point wheelchair tie-down system
Sopur Easy Life R / Quickie Life R	Easy Life R	Millbrook S12306	10/11/12	4-point wheelchair tie-down system
Easy max.	Quickie Easy max.	Millbrook S11842	18/10/11	4-point wheelchair tie-down system
Neon SA	Neon SA	Millbrook S9401	07/02/06	4-point wheelchair tie-down system
Neon FF*	Neon SA	Millbrook S9401	07/02/06	4-point wheelchair tie-down system
Spirit MT1	Spirit MT1	Middlesex SRM07	01/10/96	4-point wheelchair tie-down system
Quickie 2	Quickie 2 (high backrest)	TRL 05MM02	17/04/01	4-point wheelchair tie-down system
Quickie 2 HP	Quickie 2 (high backrest)	TRL 05MM02	17/04/01	4-point wheelchair tie-down system
Quickie 2 Kids	Quickie 2 (high backrest)	TRL 05MM02	17/04/01	4-point wheelchair tie-down system
Helix	Helix	TRL 08186101	12/02/09	4-point wheelchair tie-down system
Quickie RXS	Quickie RXS Standard	TRL 37LM04	11/12/00	4-point wheelchair tie-down system
Quickie RXS Kids	Quickie RXS Standard	TRL 37LM04	11/12/00	4-point wheelchair tie-down system
Quickie GPV	Quickie GPV (FF)	MBK08-0537	12/06/08	4-point wheelchair tie-down system
Quickie GPV SA	Quickie 2 (SA)	TRL 05MM02	17/4/01	4-point wheelchair tie-down system

Sunrise Medical wheelchairs which are approved for transportation in accordance with ISO 7176-19

Wheelchair model	Test report	Test report no.	Date	Tested as a system in accordance with ISO 10542
Classic Active / 2 Classic	Classic Active / 2 Classic	SUNTR-06001 (TRL)	03/12/04	4-point wheelchair tie-down system
Classic 160	Classic 160	Millbrook S8123	05/02/03	4-point wheelchair tie-down system
Classic 160	Sopur Classic 160	Millbrook S8122	05/02/03	4-point wheelchair tie-down system
Classic 160 / K3 Transit	Sopur Classic 160 K3 Transit	Millbrook S8282	03/07/03	4-point wheelchair tie-down system
Sopur Classic 160	Sopur Classic 160 Comfort	Millbrook S8548	11/02/04	4-point wheelchair tie-down system
Classic 160 XL	Sopur Classic 160 XL	Millbrook S8411	02/10/03	4-point wheelchair tie-down system
Argon	Argon	MBK 10-1669	20/12/10	4-point wheelchair tie-down system
Argon²	Argon²	Millbrook S12604	15/05/2013	4-point wheelchair tie-down system
Life i	Life i	Millbrook S13057	12/06/2014	4-point wheelchair tie-down system
Life RT	Life RT	Millbrook S13055	12/06/2014	4-point wheelchair tie-down system
Life T	Life T	Millbrook S13089	26/06/2014	4-point wheelchair tie-down system
Xenon²	Xenon² FF	Millbrook S13543	14/04/2015	4-point wheelchair tie-down system
Xenon² SA	Xenon² SA	Millbrook S13544	14/04/2015	4-point wheelchair tie-down system
Neon²	Neon²	Millbrook S13790	19/10/2015	4-point wheelchair tie-down system

*Fulfils the test requirements because the construction is the same (see Page 8).

Sunrise Medical wheelchairs which are approved for transportation in accordance with ISO 7176-19

QUICKIE WHEELCHAIRS

Wheelchair model	Test report	Test report no.	Date	Tested as a system in accordance with ISO 10542
Breezy P100	Breezy P100	TRL 02JM-SUN04	03/02/99	4-point wheelchair tie-down system
Breezy P100 NHS	Breezy P100 NHS Standard	TRL 37LM07	12/12/00	4-point wheelchair tie-down system
Powertec F40*	Powertec F45 Standard	TRL 05MM01	17/04/01	4-point wheelchair tie-down system
Powertec F45	Powertec F45 Standard	TRL 05MM01	17/04/01	4-point wheelchair tie-down system
Powertec F45 Golf	Powertec F45 Standard	TRL 05MM01	17/04/01	4-point wheelchair tie-down system
Quickie F55 Mk2	Quickie F55	TRL 06JM01	08/04/99	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie F55 Mk3	Quickie F55 MK3 with Unwin headrest	Millbrook S7611	29/11/01	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie F55 SL	Quickie F55 SL	Millbrook S8068	11/12/02	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie F35	Quickie F35	Millbrook S8248	04/06/03	4-point wheelchair tie-down system
Quickie Groove R (rear wheel drive)	Quickie Groove rear wheel drive	Millbrook S9210	26/08/05	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Groove F (front wheel drive)	Quickie Groove front wheel drive	Millbrook S9208	26/08/05	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie P220	Quickie P220	Millbrook S8246	04/06/03	4-point wheelchair tie-down system
Quickie Rumba	Quickie Rumba	Millbrook S9331	07/12/05	4-point wheelchair tie-down system
Quickie Rumba modular	Quickie Rumba modular	Millbrook S9331	07/12/05	4-point wheelchair tie-down system
Quickie Salsa	Quickie Tango	Millbrook MBK 07/0779	02/10/07	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Salsa M	Quickie Jive/Salsa M	Millbrook S10793	06/07/09	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Samba/Samba2	Quickie Samba	Millbrook S8410	03/07/03	4-point wheelchair tie-down system
Quickie Samba Lite/ Samba2 Lite	Quickie Samba Lite	Millbrook S8893	11/11/04	4-point wheelchair tie-down system
Quickie Groove M	Frontal impact of a Paramount powerchair with an average male test dummy.	MP 0511	21/09/05	4 chair fixing points with 2 double straps rear & 2 single straps front

*Fulfils the test requirements because the construction is the same (see Page 8).

Sunrise Medical wheelchairs which are approved for transportation in accordance with ISO 7176-19

QUICKIE WHEELCHAIRS

Wheelchair model	Test report	Test report no.	Date	Tested as a system in accordance with ISO 10542
Quickie Tango	Tango	Millbrook 10-1693	12/01/11	4 point restraint
Quickie Jive F	Quickie Jive Front wheel drive	Millbrook S11843	18/10/11	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Jive R	Quickie Jive Rear wheel drive	Millbrook S11843	18/10/11	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Jive M	Quickie Jive Mid wheel drive	MP 1007	23/09/10	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Salsa R²	Sunrise Quickie Salsa R2	Millbrook S12750	02/09/2013	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Jive R²	Sunrise Quickie Jive R2 / Quickie Salsa R2 HD	Millbrook S12752	02/092013	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Jive M	Quickie Jive M	Dahl 1611-2012	16/11/2012	Dahl docking system
Quickie Jive F	Quickie Jive F	Dahl 2703-2013	26/03/2013	Dahl docking system
Quickie Salsa M	Quickie Salsa M	Dahl 0802-2012-01	25/01/2012	Dahl docking system
Quickie Salsa R	Quickie Salsa R	Dahl 0902-2012-01	26/01/2012	Dahl docking system
Quickie Salsa R²	Sunrise Quickie Salsa R2	Dahl 1508-2013	08/08/2013	Dahl docking system
Quickie Jive R²	Sunrise Quickie Jive R2	Dahl 1110-2013	09/10/2013	Dahl docking system
Quickie Hula	Quickie Hula	Millbrook S12423	04/01/2013	4 chair fixing points with 2 single straps rear & front
Quickie Salsa M2	Salsa M2	Millbrook S13128	26/07/2014	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Jive Up	Jive Up	Millbrook S13310	14/10/2014	4 chair fixing points with 2 double straps rear & 2 single straps front

*Fulfils the test requirements because the construction is the same (see Page 8).

Sunrise Medical wheelchairs, which were tested in accordance with the US standard ANSI/RESNA WC 19 (harmonised ISO 7176-19)*:

ZIPPIE WHEELCHAIRS

Wheelchair model	Test report	Test report no.	Date	Tested as a system in accordance with ISO 10542
Quickie Kid Kart/ Quickie Xpress	Frontal impact of a Quickie Kid Kart Express wheelchair with thin tubing material. Test dummy representing a 6 year-old child.	KK9907	11/05/99	4-point wheelchair tie-down system
Quickie Kid Kart/ Quickie Xpress	Frontal impact of a Quickie Kid Kart Express wheelchair with thin tubing material. Test dummy representing a 6 year-old child.	KK9908	11/05/99	4-point wheelchair tie-down system
Quickie IRIS	Frontal impact of a Sunrise Medical CGTS 250 lb (113 kg) wheelchair in its basic configuration with an average male test dummy.	MP 0301	28/01/03	4-point wheelchair tie-down system
Quickie IRIS HD	Frontal impact of a Sunrise Medical CGTS 350 lb (158 kg) wheelchair in its basic configuration with an average male test dummy.	MP 0302	28/01/03	4-point wheelchair tie-down system
Zippie TS	Frontal impact of a Zippie TS wheelchair with an average male test dummy.	MP 9919 MP 9920	07/10/99	4-point wheelchair tie-down system
Quickie RX Kidz	Quickie RX Kidz	Millbrook S10268	12/03/08	4-point wheelchair tie-down system
Zippie TS	Quickie Zippie TS	PX00197	05/02/10	4-point wheelchair tie-down system
Zippie Youngster 2	Sopur Youngster 2 with Unwin headrest	Millbrook S7848	24/05/02	4-point wheelchair tie-down system
Zippie Youngster 3	Youngster 3 (ISO)	Millbrook S8462	17/11/03	4-point wheelchair tie-down system
Zippie Youngster 3	Zippie Youngster 3	S12023	16/03/12	4-point wheelchair tie-down system
Zippie Salsa	Tango	Millbrook 07/0779	02/10/07	4 chair fixing points with 2 double straps rear & 2 single straps front
Zippie Salsa M	Jive / Salsa M	Millbrook S10793	06/07/09	4 chair fixing points with 2 double straps rear & 2 single straps front
Zippie Simba	Simba	U0888SF001	14/07/11	4-point wheelchair tie-down system
Zippie RS Trapezoid Adapter	Zippie RS	Millbrook S13009	11/06/2014	4-point wheelchair tie-down system
Zippie RS	Zippie RS	Millbrook S13052	14/05/2014	4-point wheelchair tie-down system

*Wheelchairs manufactured in the USA are tested in accordance with the Crash Test requirements of ANSI/RESNA WC 19, which essentially corresponds to ISO 7176-19.

Sunrise Medical seating systems, which were tested in accordance with the Iso 16840-4:

JAY CUSHIONS / BACKS

Model	Test report	Test report no.	Date	Tested as a system in accordance with ISO 16840-4
JAY J3 back	Frontal Impact of J3 Model PASH Seatback and 16" Iris seatpan assembly installed on the ISO/RESNA surrogate wheelchair base (SWCB)	MP 0708	25/07/07	4-point strap type tie-down
JAY J3 back	Frontal Impact of J3 Model Seatback with an Axys 14"headrest installed on the unoccupied surrogate wheelchair base (SWCB)	MP 0711	04/10/07	4-point strap type tie-down
Jay Zip back	Frontal Impact of Jay Zip Back Support with a Iris Seapan Assembly installed on the ISO/ RESNA Surrogate Wheelchair Frame (SWCF)	MP1112	24/08/2011	4-point strap type tie-down
Jay Easy back	Frontal Impact of Jay EASY Back Support Installed on the ISO/ RESNA Surrogate Wheelchair Frame (SWCF)	MP1207	16/07/2012	4-point strap type tie-down

ISO 16840-4: Wheelchair seating systems for use in motor vehicles

ISO 16840-4 specifies test methods and requirements 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.

ISO 16840-4 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.

Sunrise Medical products which are approved for transportation in accordance with ISO 7176-19

STERLING SCOOTER

Model	Test report	Test report no.	Date	Tested as a system in accordance with ISO 10542
Sterling Elite II XS/ RS	Elite 2	S11891	02/12/2011	4-point wheelchair tie-down system
Sterling Elite II Plus	Elite 2 Plus	S12136	21/06/2012	4-point wheelchair tie-down system

4. History of the applicable standards

1. EN 12183:2009 and EN 12184:2009 wheelchair standards
Since March 2010 both revisions of EN 12183:2009 and EN 12184:2009 wheelchair standards came into force respectively.

Both these standards specify categorically that: if the wheelchair manufacturer permits the transportation of his wheelchair in a vehicle, the wheelchair must have passed a Crash Test in accordance with the ISO 7176-19 standard.

If the manufacturer establishes that the wheelchair is also designed as a seat for adults in a vehicle, the wheelchair must meet the performance requirements in accordance with ISO 7176-19, with the exception of the horizontal travel limit and the selection of the anthropomorphic test device (ATD). The horizontal travel limits as given in ISO 10542-5, Table 1, and the established selection of the ATD as in ISO 10542-5, Table A1 are to be applied.

If the wheelchair is not crash tested, it may not be used as a seat. The wheelchair user must be transferred to a securely mounted vehicle seat and the wheelchair must, as with any other item, be transported safely, e.g. in the boot.

2. ISO 7176-19 Crash Test Standard
The wheelchair crash test was derived from the crash test already used in the car industry. In this way, wheelchairs are crash tested with a speed of 48 kph and an impact deceleration of 20 *g*. The test dummy is limited to a maximum weight of 75 kg (54 kg for children). Up to now, only frontal impact has been simulated for wheelchairs.

3. Wheelchair tie-down systems and personal restraint systems in accordance with ISO 10542-2
There are various versions of wheelchair tie-down systems and personal restraint systems which meet the requirements of ISO 10542. In this way, the wheelchair is connected by means of loops, hooks, Karabiner clips, buckle tongues or other means of securement. The wheelchair tie-down system and personal restraint system itself is also tested by a dynamic Crash Test. To do this a so-called "surrogate wheelchair" is used. With this system, particular attention is given to the weight to be secured (wheelchair weight + user weight). For this reason, heavy powerchairs must also be secured in a vehicle using a 6-point wheelchair tie-down system.

Breezy BasiX in 20 *g* frontal crash

ISO 10542-2
personal restraint system

Person (75 kg or 54 kg hybrid dummy)

ISO 7176-19
Frontal Crash Test for wheelchairs as a seat in a vehicle (48 kph, 20 *g* deceleration)

ISO 10542-2
wheelchair tie-down system

EN 12183:2009 / EN 12184:2009
manual wheelchairs/power chairs

5. Crash Test Photos

These photos show you what happens during a wheelchair Crash Test.

Wheelchair secured on the rails, before impact

Wheelchair secured on the rails, after impact

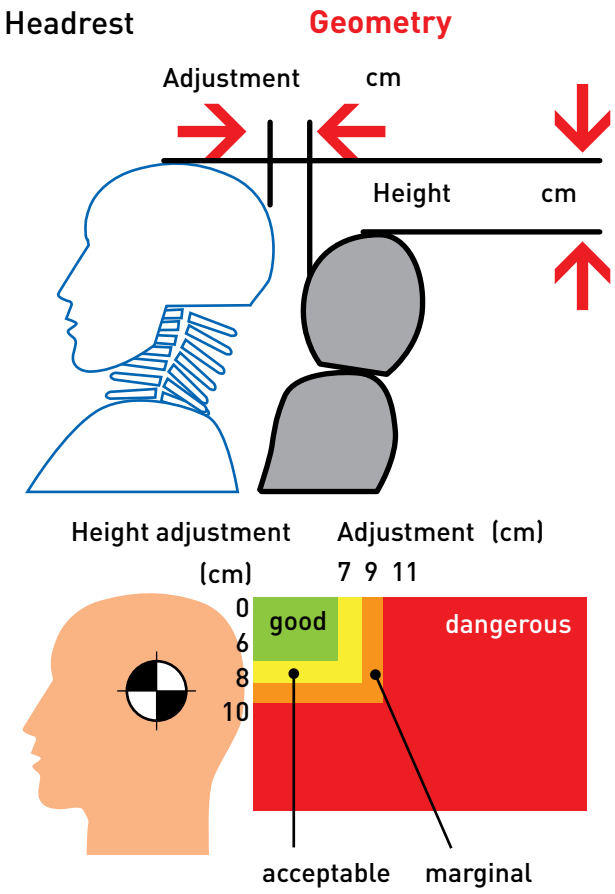
6. Headrests

Using a headrest is recommended (even though the Crash Test to ISO 7176-19 does not stipulate the use of a headrest), as this offers better protection in the event of an impact during the journey.

Adjusting the headrest

The most important characteristic of an effective headrest is having it adjusted correctly. If the headrest is not positioned directly behind head of the wheelchair user and close to the head, then a whiplash injury cannot be avoided in the case of a rear-end collision.

The headrest must be at least as high as the centre of gravity of the head, or approx. nine cm (3.5") below the top edge.
The gap behind the head should be as small as possible. If there is a gap of more than 10 cm behind the head (approx. 4") there is an increased risk of severe whiplash if there is an accident. (Source: Insurance Institute for Highway Safety, Highway Loss Data Institute, Arlington, USA)



7. Securement points for wheelchair tie-down systems on Sunrise Medical products

In this section there is information on the securement points for some of the approved Sunrise Medical products. In accordance with ISO 7176-19, the securement points on the wheelchair are equipped with the relevant standard hook label. This means the hooks, Karabiner clips, loops, etc. of the wheelchair tie-down system are to be fitted at the points indicated by the labels.

The figures only show the securement on one side of the wheelchair. Naturally the securement of the wheelchair tie-down system is to be carried out symmetrically, i.e. the same on both sides.

Manual wheelchairs

Breezy RubiX² / BasiX²

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Breezy RelaX²

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Breezy UniX

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Helium

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Life i

Rear tie-down point on the wheelchair

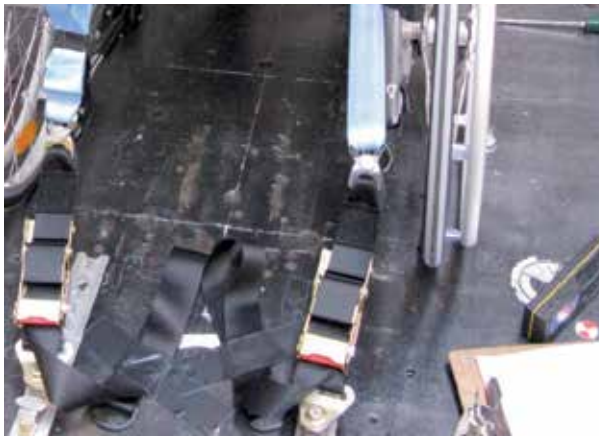
Front tie-down point on the wheelchair

Neon²

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Easy 160 i



Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Easy Life FF

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Zippie Youngster 3

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Zippie RS

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Xenon² / Xenon² SA

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair
Left: Xenon²; Right: Xenon² SA

Powerchairs

Quickie Samba

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Quickie Samba Lite

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Quickie Groove F (front wheel drive)

Rear tie-down point on the wheelchair
Caution: two straps on each side!

Front tie-down point on the wheelchair

Quickie Groove R (rear wheel drive)

Rear tie-down point on the wheelchair
Caution: two straps on each side!

Front tie-down point on the wheelchair

Quickie Groove M (midwheel drive)

Rear tie-down point on the wheelchair
Caution: two straps on each side!

Front tie-down point on the wheelchair

Quickie Salsa (rear wheel drive)

Rear tie-down point on the wheelchair

Front tie-down point on the wheelchair

Quickie Salsa R² (rearwheel drive)

Rear tie-down point on the wheelchair
Caution: two straps on each side!

Front tie-down point on the wheelchair

Quickie Jive R² (rearwheel drive)

Rear tie-down point on the wheelchair
Caution: two straps on each side!

Front tie-down point on the wheelchair

Quickie Jive UP

Rear tie-down point on the wheelchair
Caution: two straps on each side!

Front tie-down point on the wheelchair

8. Checklist: Transport of a person in a wheelchair

For those people who transport and/or accompany the wheelchair user, we advise that the following notes are also taken into account:

1. Sunrise Medical fundamentally recommends that you do not transport people in a vehicle while they are sitting in a wheelchair. Sunrise Medical recommends in the first place, that the person is transferred to a vehicle seat, whenever possible.

2. If a person must be transported in a vehicle while sitting in a wheelchair, because it is not possible to transfer, then the following must be noted:

A. The wheelchair must be tested in accordance with ISO 7176-19. Sunrise Medical wheelchairs which have been tested carry the relevant labels. On the nameplate you will find the corresponding symbol:

= Wheelchair tested to ISO 7176-19 and approved for transportation

= Wheelchair not approved for the transportation of a person while sitting in a wheelchair in a vehicle

B. A suitable wheelchair tie-down system and personal restraint system in accordance with ISO 10542 must be used. This means: a 4-point wheelchair tie-down system for all standard wheelchairs, or a 6-point system for heavy powerchairs, as well as a 3-point personal restraint system.

C. The wheelchair and user must be positioned in the direction of travel and in the axis of symmetry above the securement rails in the vehicle.

D. All removable and loose parts, such as, for example, tables, crutches, etc., must be removed and stowed safely. In order to lower the centre of gravity, remove the seat cushion, if possible.

E. The wheel locks of the wheelchair are to be applied.

F. The wheelchair tie-down system is to be fitted to the wheelchair in accordance with the manufacturer's recommendations. In doing this, the hook labels indicate the position of the securement points on the wheelchair. Fit the front straps on the wheelchair first. Then fit the rear straps. The rear straps put the system under tension. To do this, release the brakes first, so that the wheelchair can be tightened to the rear. Afterwards, re-apply the brakes.

G. After the wheelchair is firmly attached to the vehicle floor, the personal restraint system is fitted in accordance with the manufacturer's recommendations.
When doing this, please make sure that the upper torso restraint belt and lap belt are fitted securely. The belts must not be twisted and must not pass over wheelchair components such as the sideguards, armrests or other edges. The upper torso restraint belt and lap belt must be fitted close to the user. The upper belt should be passed over the shoulder and must not lie across the neck.

H. A headrest approved to ISO 7176-19 should be fitted and positioned correctly.

I. Finally the belts should be checked one more time to make sure that they are correctly positioned:

- Are the wheelchair straps firmly tensioned and fitted in the right place?
- Is the lap belt positioned just over the pelvis?
- Is the upper torso restraint belt positioned over the shoulder/collar bone?
- Is the upper torso restraint belt positioned away from the neck?
- Are the belts fitted close to the body?

9. Addresses of manufacturers of wheelchair tie down and personal restraint systems in accordance with ISO 10542

AMF-BRUNS
Gustav Bruns GmbH & Co. KG
Hauptstraße 101
26689 Apen
Germany

Tel.: +49 (0) 44 89 / 72 71 01
www.amf-hubmatik.de

Q'Straint Europe
72-76 John Wilson Business Park
Whitstable
Kent, CT5 3QT
Great Britain

Tel: +44 (0)1227 773035
www.qstraint.com

Unwin Safety Systems
Unwin House
The Horseshoe
Coat Road
Martock
Somerset, TA12 6EY
Great Britain

Tel: +44 (0)1935 827740
www.unwin-safety.com

SOPUR Live without limits.

QUICKIE Live without limits.

zippie Explore your world!

JAY Superior Clinical Seating.

Breezy Premium products. Quality service.

STERLING WHERE YOU WANT TO BE.

This document is available in large print in pdf format on our website www.SunriseMedical.de

SUNRISE MEDICAL

Sunrise Medical GmbH & Co. KG
Kahlbachring 2-4
69254 Malsch/HD
Tel.: +49 (0) 72 53 / 9 80-400
Fax: +49 (0) 72 53 / 9 80-222
E-mail:kundenservice@sunrisemedical.de
www.SunriseMedical.de