



CRASH TEST BROCHURE

SUNRISE MEDICAL
ISO 7176-19
AUS 2023



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01

Introduction

In this document you will find information on the crash tested wheelchairs and accessories 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, docking systems 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 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 only) can in no way cover all situations in road traffic and represents a 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 to 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.

When a wheelchair has a third-party product fitted, e.g. e-mobility, Sunrise Medical only permits the transportation of an 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.

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 12183:2022 and EN 12184:2022 wheelchair standards, there is a new 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 adhere to this benchmark standard Medical Device Regulation MDR 745/2017)

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

02

Transportation of a wheelchair in 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. Simply because of the intended purpose of a wheelchair is a mobility medical device not a vehicle seat. 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 or universal docking interface 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, universal docking interface and the user instructions for the wheelchair manufacturer (see the checklist on page 24).

The test standard in accordance with ISO 7176-19 only accounts 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).

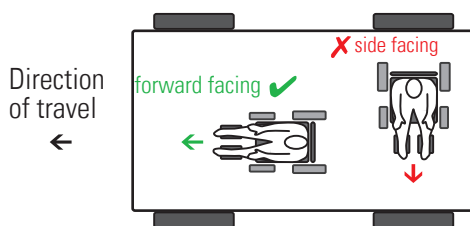


Fig. 1

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. ISO 10542 or SAE J2249 occupant restraint system, with 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. The lap belt supplied with your wheelchair is not ISO 10542/ SAE J2249 compliant.

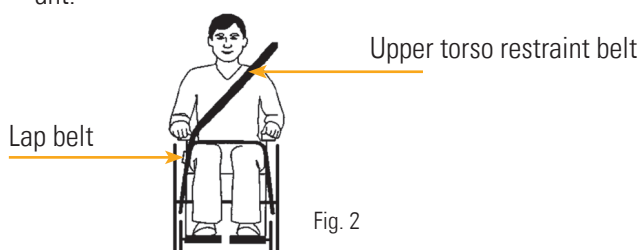


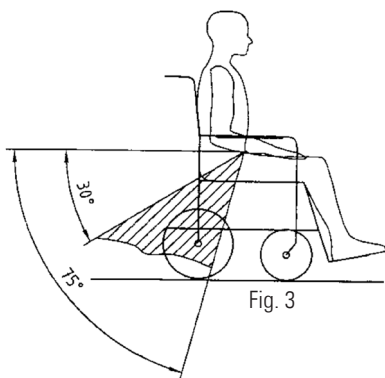
Fig. 2

7. A headrest suitable for transportation should, where possible, be fitted and suitably positioned at all times during transportation (Fig. 7). But a headrest is not an obligation as many wheelchairs don't have a headrest at all.
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) cannot 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°.



Fixing angle of the lap belt

2. Restraint belts must not be placed over wheelchair components such as armrests or wheels, so they 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. Please always check the flat belts to make sure they are not defective.

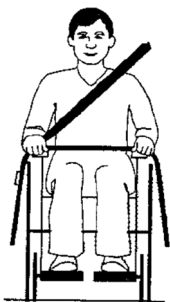


Fig. 4

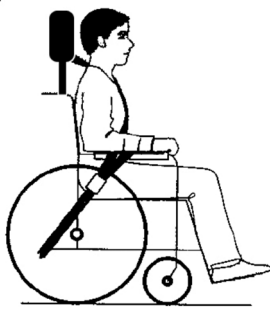


Fig. 5

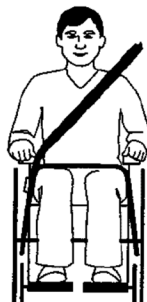


Fig. 6

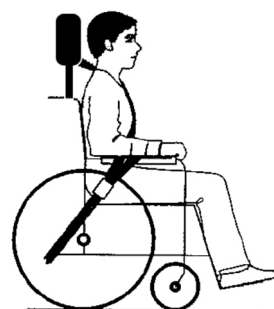


Fig. 7

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

03

Sunrise Medical wheelchairs and accessories which are approved for transportation

Sunrise Medical wheelchairs and accessories are tested in accordance with ISO 7176-19, with a 24 kg, 76 kg or 102 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) or a universal docking system 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.

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 a 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 76 kg or 102 kg for adults and 24 kg, 54 kg for children (in accordance with the requirements of ISO 7176-19).

The following list of Sunrise Medical products that have been crash tested is correct at the time of printing, Sunrise Medical continuously expands the list of its crash-tested products.

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 or a universal docking 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.

BREEZY WHEELCHAIRS

Wheelchair model	Test date	Tested as a system in accordance with ISO 10542
Breezy 100	19/06/08	4-point wheelchair tie-down system
Breezy 210 Transit	17/04/01	4-point wheelchair tie-down system
Breezy 215 Self-propelling	22/06/01	4-point wheelchair tie-down system
Breezy 200 with adjustable backrest angle	24/05/02	4-point wheelchair tie-down system
Breezy 300	11/07/08	4-point wheelchair tie-down system
Breezy BasiX ²	24/11/15	4-point wheelchair tie-down system
Breezy BasiX ² , half-folding backrest	25/03/08	4-point wheelchair tie-down system
Breezy Elegance	10/05/04	4-point wheelchair tie-down system
Breezy Moonlite	31/05/07	4-point wheelchair tie-down system
Breezy RelaX	30/09/05	4-point wheelchair tie-down system
Breezy RelaX ²	29/11/10	4-point wheelchair tie-down system
Breezy RubiX ²	24/11/15	4-point wheelchair tie-down system
Breezy SL	11/12/00	4-point wheelchair tie-down system
Breezy SL NHS	11/12/00	4-point wheelchair tie-down system
Breezy SL OTS	11/12/00	4-point wheelchair tie-down system
Breezy TL NHS	11/12/00	4-point wheelchair tie-down system
Breezy TL	11/12/00	4-point wheelchair tie-down system
Breezy TL OTS	11/12/00	4-point wheelchair tie-down system
Breezy UniX ²	06/05/10	4-point wheelchair tie-down system
Breezy 250	31/08/11	4-point wheelchair tie-down system
Breezy PariX ²	18/10/11	4-point wheelchair tie-down system

SOPUR / QUICKIE WHEELCHAIRS MANUAL

Wheelchair model	Test Date	Tested as a system in accordance with ISO 10542
Quickie Xenon SA	21/06/12	4-point wheelchair tie-down system
Quickie Helium	12/01/11	4-point wheelchair tie-down system
Quickie Easy 160 i	24/05/02	4-point wheelchair tie-down system
Quickie Easy 200*	24/05/02	4-point wheelchair tie-down system
Quickie Easy 300	24/05/02	4-point wheelchair tie-down system
Quickie Easy Life / Life	06/05/10	4-point wheelchair tie-down system
Quickie Easy Life R / Life R	10/11/12	4-point wheelchair tie-down system
Quickie Easy max.	18/10/11	4-point wheelchair tie-down system
Quickie Neon SA	07/02/06	4-point wheelchair tie-down system
Quickie Neon FF*	07/02/06	4-point wheelchair tie-down system
Quickie Spirit MT1	01/10/96	4-point wheelchair tie-down system
Quickie 2	17/04/01	4-point wheelchair tie-down system
Quickie 2 HP	17/04/01	4-point wheelchair tie-down system
Quickie 2 Kids	17/04/01	4-point wheelchair tie-down system
Quickie Helix	12/02/09	4-point wheelchair tie-down system
Quickie RXS	11/12/00	4-point wheelchair tie-down system
Quickie RXS Kids	11/12/00	4-point wheelchair tie-down system
Quickie GPV	12/06/08	4-point wheelchair tie-down system
Quickie GPV SA	17/04/01	4-point wheelchair tie-down system
Quickie Classic Active / 2 Classic	03/12/04	4-point wheelchair tie-down system
Quickie Classic 160	05/02/03	4-point wheelchair tie-down system
Quickie Classic 160 / K3 Transit	03/07/03	4-point wheelchair tie-down system

Wheelchair model	Test Date	Tested as a system in accordance with ISO 10542
Quickie Classic 160	11/02/04	4-point wheelchair tie-down system
Quickie Classic 160 XL	02/10/03	4-point wheelchair tie-down system
Quickie Argon	20/12/10	4-point wheelchair tie-down system
Quickie Argon ²	15/05/13	4-point wheelchair tie-down system
Quickie Life i	12/06/14	4-point wheelchair tie-down system
Quickie Life RT	12/06/14	4-point wheelchair tie-down system
Quickie Life T	26/06/14	4-point wheelchair tie-down system
Quickie Xenon ²	14/04/15	4-point wheelchair tie-down system
Quickie Xenon ² SA	14/04/15	4-point wheelchair tie-down system
Quickie Neon ²	19/10/15	4-point wheelchair tie-down system
Quickie Easy Life SA	28/03/15	4-point wheelchair tie-down system
Quickie Nitrum	04/12/19	4-point wheelchair tie-down system
Quickie Nitrum Hybrid	02/12/20	4-point wheelchair tie-down system
Quickie QS5 X	04/02/22	4-point wheelchair tie-down system

QUICKIE WHEELCHAIRS POWER

Wheelchair model	Test date	Tested as a system in accordance with ISO 10542
Quickie P100	03/02/99	4-point wheelchair tie-down system
Quickie P100 NHS	12/12/00	4-point wheelchair tie-down system
Quickie Powertec F40*	17/04/01	4-point wheelchair tie-down system
Quickie Powertec F45	17/04/01	4-point wheelchair tie-down system
Quickie Powertec F45 Golf	17/04/01	4-point wheelchair tie-down system
Quickie F55 Mk2	08/04/99	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie F55 Mk3	29/11/01	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie F55 SL	11/12/02	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie F35	04/06/03	4-point wheelchair tie-down system
Quickie Groove RWD	26/08/05	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Groove FWD	26/08/05	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie P220	04/06/03	4-point wheelchair tie-down system
Quickie Rumba	07/12/05	4-point wheelchair tie-down system
Quickie Rumba modular	07/12/05	4-point wheelchair tie-down system
Quickie Salsa	02/10/07	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Salsa M	06/07/09	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Samba/Samba2	03/07/03	4-point wheelchair tie-down system
Quickie Alex FWD/RWD	24/12/08	4-point wheelchair tie-down system
Quickie IRIS	28/01/03	4-point wheelchair tie-down system

Wheelchair model	Test date	Tested as a system in accordance with ISO 10542
Quickie IRIS	28/01/03	4-point wheelchair tie-down system
Quickie Samba Lite/Samba2 Lite	11/11/04	4-point wheelchair tie-down system
Quickie Groove MWD	21/09/05	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Tango	12/01/11	4 point restraint
Quickie Jive F	18/10/11	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Jive R	18/10/11	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Jive M	23/09/10	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Salsa R ²	02/09/13	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Jive R ²	02/09/13	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Hula	04/01/13	4 chair fixing points with 2 single straps rear & front
Quickie Salsa M2	26/07/14	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Jive Up	14/10/14	4 chair fixing points with 2 double straps rear & 2 single straps front

QUICKIE WHEELCHAIRS POWER

Wheelchair model	Test date	Tested as a system in accordance with ISO 10542
Quickie Q700-UP M	31/10/17	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Q300 M Mini	06/12/19	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Puma FWD	27/05/14	4 chair fixing points with double straps rear & single straps front
Quickie Puma RWD	27/05/14	4 chair fixing points with double straps rear & single straps front
Quickie Luca FWD	01/08/12	4 chair fixing points with double straps rear & single straps front
Quickie Luca MWD	01/08/12	4 chair fixing points with double straps rear & single straps front
Quickie Luca RWD	01/08/12	4 chair fixing points with double straps rear & single straps front
Quickie Luca XL	15/07/14	4 chair fixing points with double straps rear & single straps front
Quickie Puma Easy Fit	12/05/14	4 chair fixing points with double straps rear & single straps front
Quickie Samm MWD	01/11/13	4 chair fixing points with double straps rear & single straps front
Quickie Q500 H	14/05/19	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Q400 R	26/03/19	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Q500 R	08/11/21	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Q200 R	14/12/17	4 chair fixing points with 2 single straps rear & 2 single straps front
Quickie Q400 F	28/06/18	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Q500 F	28/06/18	4 chair fixing points with 2 double straps rear & 2 single straps front

Wheelchair model	Test date	Tested as a system in accordance with ISO 10542
Quickie Q700 R	15/08/18	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Q500 M	08/02/22	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Q700 F	22/04/22	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Q700 UP F	29/05/18	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Q700 M	18/04/22	4 chair fixing points with 2 double straps rear & 2 single straps front
PUMA 40 RWD	23/05/18	4 chair fixing points with 2 double straps rear & 2 single straps front
PUMA 40 FWD	23/05/18	4 chair fixing points with 2 double straps rear & 2 single straps front
Quickie Q100 R	14/12/17	4 chair fixing points with 2 double straps rear & 2 single straps front and Dahl docking system
Quickie Q300 M	15/03/22	4 chair fixing points with 2 single straps front and Dahl docking system
Quickie Q300 R	22/09/22	4 chair fixing points with 2 single straps front and Dahl docking system
Quickie Q500 F	22/10/21	4 chair fixing points with 2 single straps front and Dahl docking system
Quickie Q300 M Mini Kids/Teen	15/03/22	4 chair fixing points with 2 single straps front and Dahl docking system
Q300 M Mini Pro	15/03/22	4 chair fixing points with 2 double straps rear & 2 single straps front
Q300 M Mini Lite	15/03/22	4 chair fixing points with 2 double straps rear & 2 single straps front

QUICKIE WHEELCHAIRS WITH UNIVERSAL DOCKING SYSTEM

Wheelchair model	Test date	Tested as a system in accordance with ISO 10542
Quickie Q700 M & Quickie Q700 M HD	13/12/21	Docking system
Quickie Q200 R	14/12/17	Docking system
Quickie Puma 40 FWD	23/05/18	Docking system
Quickie Puma 40 RWD	23/05/18	Docking system
Q700 UP M	20/12/22	Docking system
Q300 R	20/12/22	Docking system
Quickie Q500 M	07/09/21	Docking system
Quickie Q500 R	07/09/21	Docking system
Quickie Q500 F	07/09/21	Docking system
Quickie Q400 M	28/06/18	Docking system
Quickie Q400 F	28/06/18	Docking system
Quickie Q700 R	15/08/18	Docking system
Quickie Q400 R	26/03/19	Docking system
Quickie Q500 H	14/05/19	Docking system
Quickie Jive M	16/11/12	Docking system
Quickie Jive F	26/03/13	Docking system
Quickie Salsa M	25/01/12	Docking system
Quickie Salsa R	26/01/12	Docking system
Quickie Salsa R ²	08/08/13	Docking system
Quickie Jive R ²	09/10/13	Docking system
Quickie Q100 R	11/07/18	Docking system
Quickie Q300 M Mini	20/05/22	Docking system
Quickie Q200 R	09/10/18	Docking system
Quickie Q700 F	22/06/22	Docking system
Quickie Q400 M	04/06/18	Docking system
Magic Mobility Magic 360	09/10/20	Docking system

ZIPPIE WHEELCHAIRS

Wheelchair model	Test date	Tested as a system in accordance with ISO 10542
Zippie Kid Kart/ Xpress	11/05/99	4-point wheelchair tie-down system
Zippie Kid Kart/ Xpress	11/05/99	4-point wheelchair tie-down system
Zippie IRIS	28/01/03	Quickie Q300 M Mini with Leckey BeMe large
Zippie TS	07/10/99	4-point wheelchair tie-down system
Zippie RX Kidz	12/03/08	4-point wheelchair tie-down system
Zippie TS	05/02/10	4-point wheelchair tie-down system
Zippie Youngster 2	24/05/02	4-point wheelchair tie-down system
Zippie Youngster 3	16/03/12	4-point wheelchair tie-down system
Zippie Salsa	02/10/07	4 chair fixing points with 2 double straps rear & 2 single straps front
Zippie Salsa M	06/07/09	4 chair fixing points with 2 double straps rear & 2 single straps front
Zippie Simba	14/07/11	4-point wheelchair tie-down system
Zippie RS Trapezoid Adapter	11/06/14	4-point wheelchair tie-down system
Zippie RS	14/05/14	4-point wheelchair tie-down system
Zippie Voyage	15/01/15	4-point wheelchair tie-down system

JAY

JAY BACKS

Model	Test date	Tested as a system in accordance with ISO 16840-4
JAY J3 back	25/07/07	Tested as a system in accordance with ISO 16840-4
JAY J3 back	04/10/07	Tested as a system in accordance with ISO 16840-4
JAY Zip back	24/08/11	Tested as a system in accordance with ISO 16840-4
JAY Easy back	16/07/12	Tested as a system in accordance with ISO 16840-4
JAY FIT back	20/04/21	Tested as a system in accordance with ISO 16840-4
JAY FIT 2U back	20/04/21	Tested as a system in accordance with ISO 16840-4

RGK

RGK MANUAL WHEELCHAIR, WHEELCHAIR SPORTS

Model	Test date	Tested as a system in accordance with ISO 10542
RGK Tiga	19/07/17	Tested as a system in accordance with ISO 10542
RGK Tiga F2	15/05/19	Tested as a system in accordance with ISO 10542
RGK HiLite XTR	15/05/19	Tested as a system in accordance with ISO 10542
RGK Tiga JR	01/08/11	Tested as a system in accordance with ISO 10542

EMPULSE

EMPULSE POWER ASSIST WHEELCHAIR

Model	Test date	Tested as a system in accordance with ISO 10542
Empulse Wheeldrive	04/12/19	4-point strap tie-down system

MAGIC MOBILITY

MAGIC MOBILITY OUTDOOR WHEELCHAIRS

Model	Test date	Tested as a system in accordance with ISO 10542
Magic Mobility Extreme X8	02/10/19	4-point wheelchair tie-down system
Magic Mobility Frontier V6	03/10/19	4-point wheelchair tie-down system
Magic Mobility Magic 360	02/10/19	4-point wheelchair tie-down system

LECKEY SEATING

Model	Test date	Tested as a system in accordance with ISO 16840-4
Leckey Squiggles seat	15/04/10	Tested as a system in accordance with ISO 16840-4
Leckey Mygo seat SIZE 1	14/06/10	Tested as a system in accordance with ISO 16840-4
Leckey Mygo seat SIZE 2	15/04/10	Tested as a system in accordance with ISO 16840-4
Leckey BeMe small	29/01/21	Tested as a system in accordance with ISO 7176-19
Leckey BeMe large	18/01/21	Tested as a system in accordance with ISO 16840-4

HEADRESTS

WHITMYER



LINX



LINX 2



AXYS



PLUSH



ADJUST-A-PLUSH



COBRA

SEDEO PRO



SEDEO HEADREST
PAD, FLEXIBLE



SEDEO HEADREST
PAD, SMALL

*Crash tested

04

History of the applicable standards

1. EN 12183:2022 and EN 12184:2022 wheelchair standards

Since 2010 both revisions of EN 12183 and EN 12184 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 7176-19:2008/2022 standard."

If the manufacturer establishes that the wheelchair is allowed to be used as a seat in a vehicle, the wheelchair must meet the performance requirements in accordance with ISO 7176-19.

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 102 kg. Up to now, only frontal impact has been simulated for wheelchairs.

3. Wheelchair tie-down systems, universal docking systems and personal restraint systems in accordance with ISO 10542-2

There are various versions of wheelchair tie-down systems, universal docking 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 (2 front, 4 rear).

05

Headrests

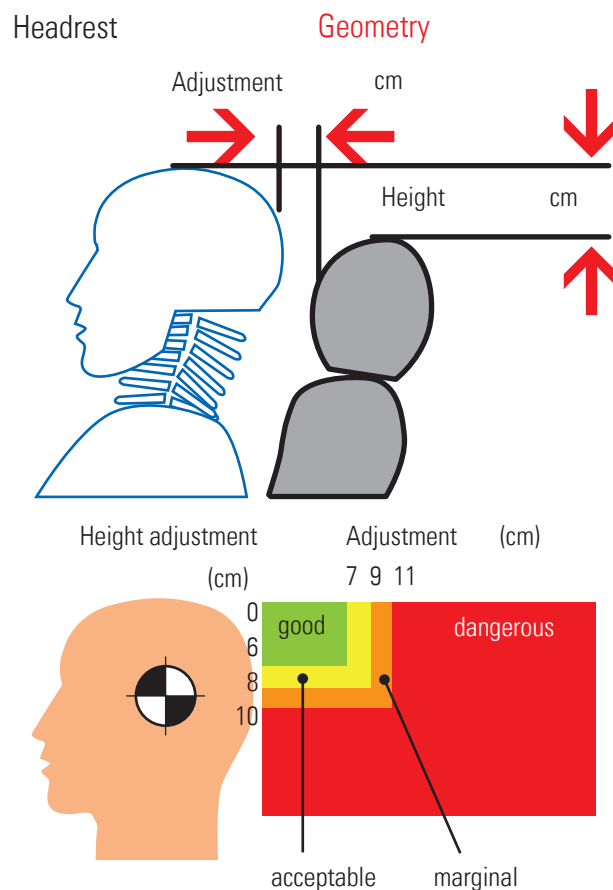
Using a headrest is recommended (even though the crash test to ISO 7176-19 does not stipulate the use of a headrest), as this offers better protection in the event of an impact during the journey.

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. 9 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)



06

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. The attachment of each wheelchair can be found in the Owners Manual.

Positioning of wheelchair tie down restraints on manual wheelchairs: (This is an example, for more detailed information please refer to the user manual)



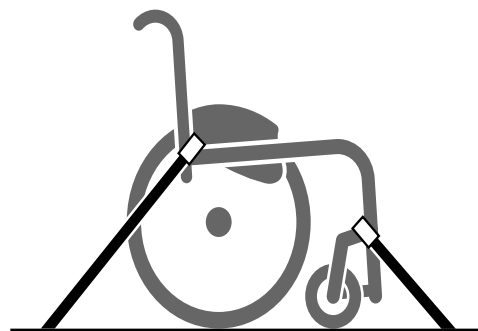
Location of the front and rear tie down labels.



Location of the front and rear tie down labels.



Position of the rear wheelchair tie down restraint and the tie down label.

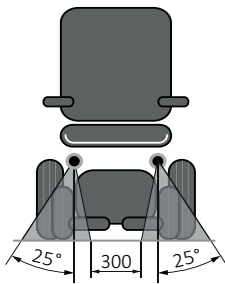


Side view of tie down straps.

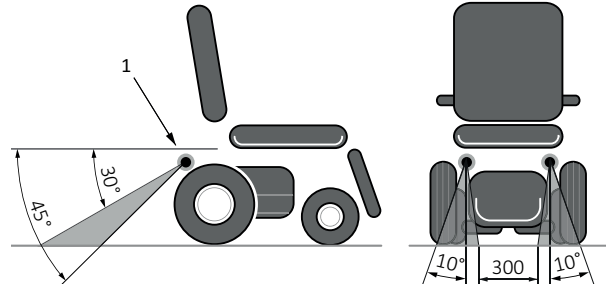
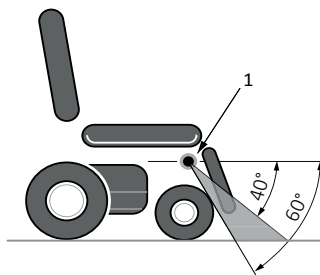
Note: Wheelchairs tested since 2022 may also have this sticker to confirm they are crash tested.



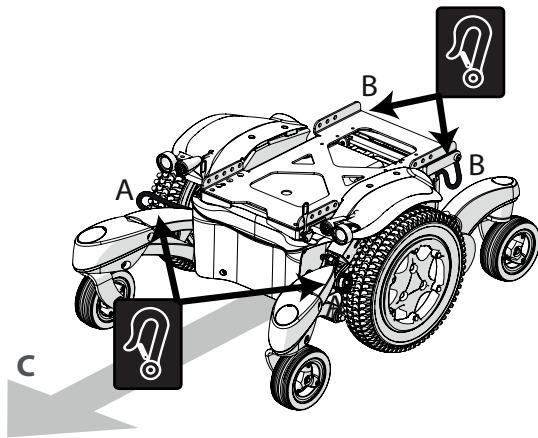
Positioning of wheelchair tie down restraints on powered wheelchairs: (This is an example, for more detailed information please refer to the user manual)



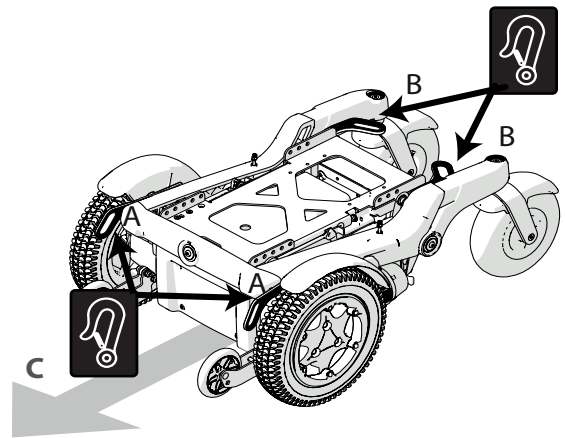
Front Securement Points



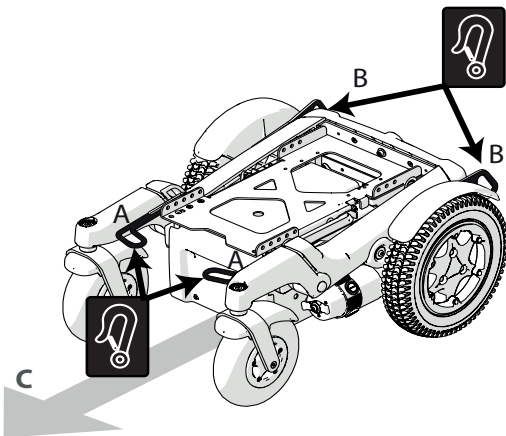
Rear Securement Points



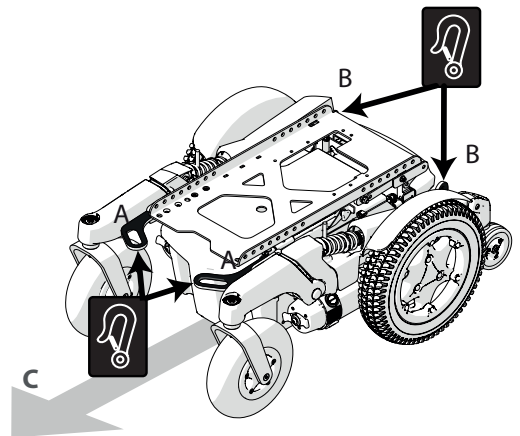
Middle wheel drive (MWD) powered wheelchair



Front wheel drive (FWD) powered wheelchair



Rear wheel drive (RWD) powered wheelchair



Hybrid wheel drive (HWD) powered wheelchair

A = Front Tie Down Points

B = Rear Tie Down Points

C = Direction of Travel

Using the Dahl Docking System

(This is an example, for more detailed information please refer to the user manual)

CAUTION!

The installation should be performed or supervised by a technician. Read all instructions carefully before proceeding with the installation.

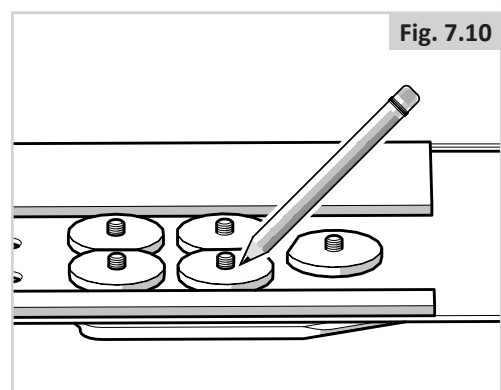
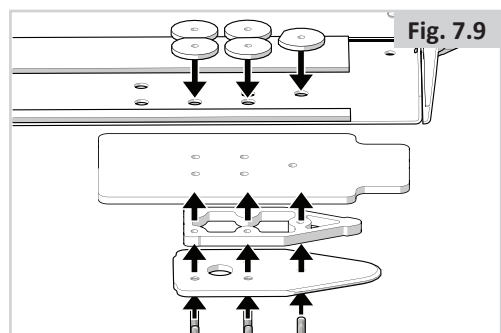
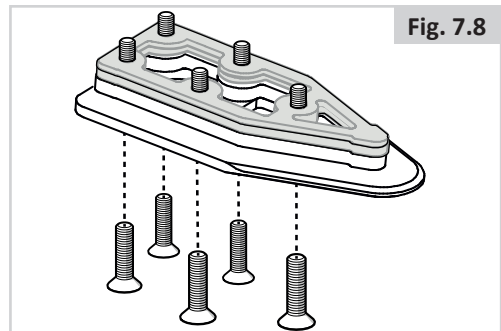
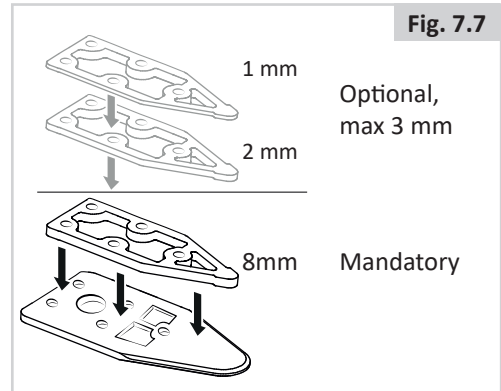
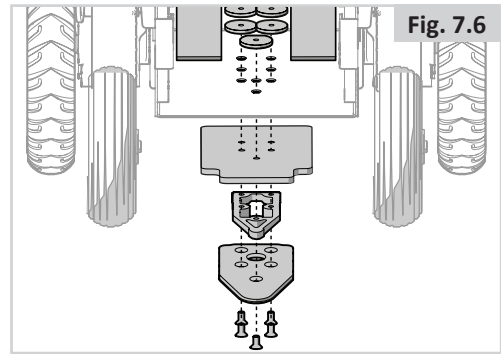
To install Docking Plate use Dahl Adaption Kit #500094

1. Fit the 8 mm spacer onto the lock plate (Fig. 7.6).
2. Use more spacers to achieve desired thickness with regards to, for instance, user weight and tire pressure. Additional spacers can be mounted under the locking station (Fig. 7.7). To align the height of the lock plate under wheelchair with the docking station fit spacers between the docking station and the vehicle floor to raise the docking station.
3. Put the five screws through the lock plate, the mandatory 8 mm spacer and the selected optional spacers (gray in picture) (Fig. 7.8).

WARNING!

Do not use any other screws than those supplied from Dahl engineering (Part #502800 or #500782 which is Quality 14.9 with Torx Key Size 27 or 25). Standard screws will not be strong enough in the event of a collision.

4. Mount the five screws together with the spacer/spacers and the lock plate on the underside of the chassis box (Fig. 7.9).
5. Mark where to cut the screws. (Fig. 7.10).



6. Remove the screws together with the spacer/spacers (Fig. 7.11).

7. Cut the screw where the mark is (Fig. 7.12).

It is very important that the fitter checks that the length of the bolts are correct. If bolts are too short to reach through all the threads - they will not have the strength to carry the loads required. If bolts are too long the batteries or other wheel chair components can be damaged. If necessary replace with longer bolts, or shorten them.

8. Apply Loctite 222 (or an equivalent product) onto the screw (Fig. 7.13).

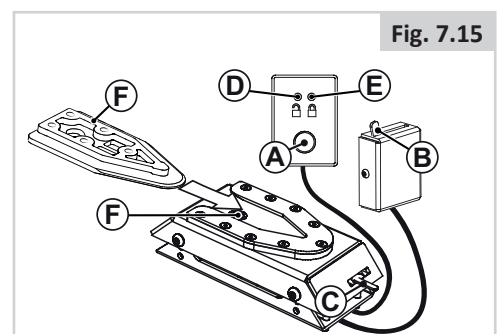
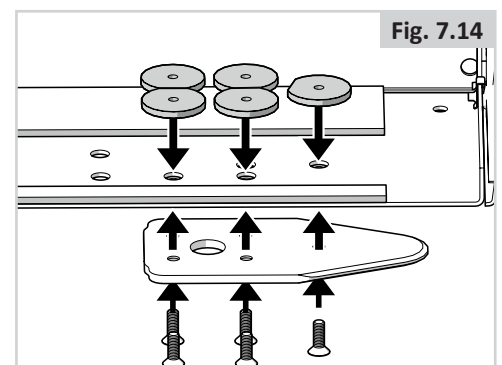
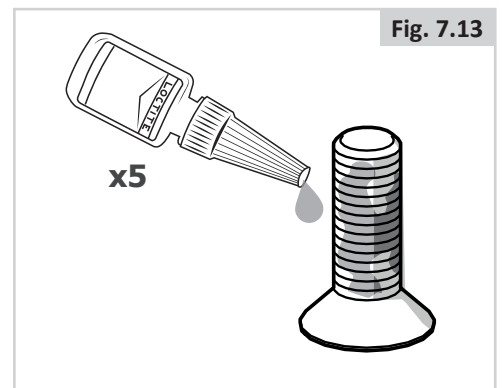
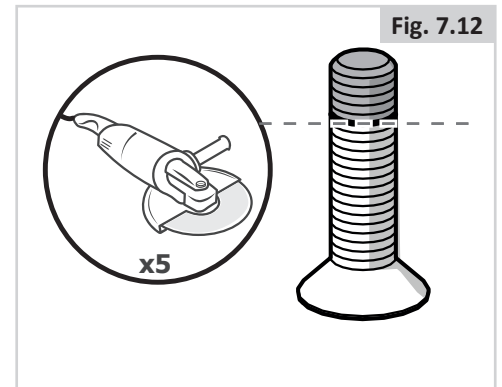
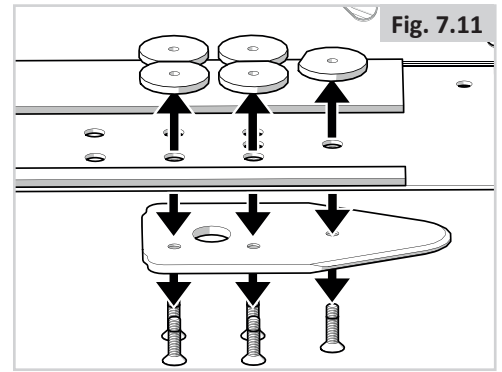
9. Attach the five screws together with the plastic spacer/spacers (to prevent the batteries from coming into contact with the nuts) and the lock plate on the underside of the chassis box. Tightening torque: 16-18 Nm/13.3 lb.ft (Fig. 7.14).

Please refer to Section 6.6 of this manual for reverse the procedure to replace batteries.

10. Perform final check by connecting the wheelchair to the docking station. Check that it is securely locked and make sure that all release methods work as intended (Fig. 7.15).

A warning tone will sound if the lock plate is not properly engaged.

- (A) Release button.
- (B) Manual operating lever.
- (C) Emergency release.
- (D) Red LED.
- (E) Green LED.
- (F) Lock Plate.
- (G) Lock Pin.



Securing the wheelchair in the docking station:

Make sure that the leg rests are not colliding with the ramp or the docking station when entering the vehicle.

1. Manoeuvre the wheelchair slowly and in a uniform direction over the docking station. The lock plate under the wheelchair helps to guide the wheelchair into place in the docking station. When the lock plate is fully engaged in the docking station, a spring-action locking pin automatically secures the lock plate.
2. The docking station is equipped with a control switch that indicates whether the lock plate is correctly secured in the docking station. As soon as the lock plate comes into contact with the locking pin, a warning tone will sound (a high-pitched howl), and the red diode/lamp (LED) in the control panel will light up until the lock plate is either fully engaged or else the wheelchair is removed from the docking station.
3. As an indication that the wheelchair is properly secured, the warning tone will cease, the red diode in the control panel will go out and the green diode lamp (LED) will light up.
4. Do not forget to buckle up for driving.

Release from the docking station

1. When the vehicle has been brought to a halt, remove the safety belt.
2. To unlock commence by driving the wheelchair forward to release pressure on the lock pin and then press the red release button in the control panel. The locking pin will be triggered/released for approx. 5 seconds, after which the locking pin is automatically locked/activated again. Do not attempt to reverse out of the docking station until the red LED on the control module, which indicates the unlock position, has been illuminated.
WARNING! Attempting to reverse the wheelchair before the red LED has been illuminated will result in blocking the docking stations lock mechanism, which makes it impossible to reverse. If this happens repeat above unlocking procedure.
3. Move the wheelchair away from the docking station within this 5-second period.

Manual release in case of electrical failure

1. In the event of electrical failure, a manual emergency release is located at the front edge of the docking station. Move wheelchair forward to release pressure on the lock pin and push the red release arm to one side and hold it there while the wheelchair reverses out of the docking station.
2. A cable-activated manual operating lever can also be fitted (accessory). The red release arm must pushed to one side and should be held there whilst the wheelchair moves away.
3. If the described manual release procedures fails, an emergency release tool made from red plastic comes with each docking station.

Move wheelchair forward to release pressure on the lock pin and place the emergency release tool in the gap between the locking plate and the docking station. Push the release tool forward until the locking pin will has been forced down - after which the wheelchair can be reversed out of the docking station.

Please also refer to Dahl Engineering instructions for Installation, Use and Maintenance

07 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 recommends that you do not transport people in a vehicle while they are sitting in a wheelchair. Sunrise Medical recommends, 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 or ISO 0716-19:2022. Sunrise Medical wheelchairs which have been tested carry the relevant labels. On the nameplate you will find the corresponding symbol:



= Wheelchair tested to ISO 7176-19:2008 or 2022 and approved for transportation



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



= approved for transportation

- 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 occupant restraint system or universal docking 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 side guards, 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?

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For further information on the full specification, options, and accessories, please refer to the order form. All information is subject to change without notification. Please consult Sunrise Medical with any queries you may have.



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