



### Wheelchair Tie-Down and Occupant Restraint Systems

Wheelchairs referenced in this supplement have been equipped with a WC-19 and SAE J2249 compliant Wheelchair Tie-Down and Occupant Restraint System. (WTORS) This supplement is intended to provide transit compliance information and warnings for safe use to the owner of the wheelchair with the transit option installed.

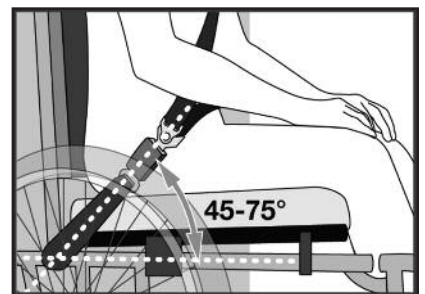
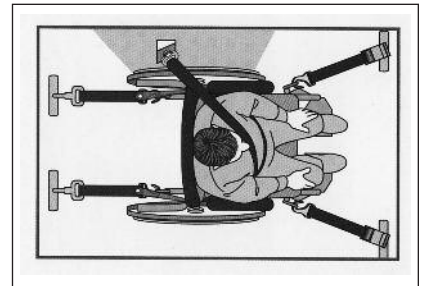
If you have questions about using your wheelchair for seating in a motor vehicle, please contact Sunrise Medical at 1-800-333-4000.

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#### Wheelchairs and Their Weight Capacities covered in this Supplement

- Quickie 2Lite - 265lbs/(120kg)
- Quickie 2 - 265lbs/(120kg)
- Quickie 2HD - 350lbs/(159kg)
- Quickie IRIS - 250lbs/(113kg)
- Zippie IRIS - 165lbs/(75kg)
- Quickie Q7 - 265lbs/(120kg)
- Quickie QRi - 265lbs/(120kg)
- Zippie X'CAPE - 165lbs/(75kg)



**A. GENERAL WARNINGS****⚠ WARNING**

When feasible, wheelchair occupants should transfer into the vehicle seat and use the OEM (Original Equipment Manufacturer) vehicle-installed restraint system.

**⚠ WARNING**

As of the date of this publication, the Department of Transportation has not approved any tie-down systems for transportation of a user while in a wheelchair, in a moving vehicle of any type. It is Sunrise Medical's position that users of wheelchairs should be transferred into appropriate OEM seating in vehicles used for transportation and that the restraints made available by the auto industry be used. Sunrise Medical cannot and does not recommend any wheelchair transportation systems. Use only Wheelchair Tie-down and Occupant Restraint Systems (WTORS) which meet the requirements of the SAE (Society of Automotive Engineers) J2249.

You may obtain a copy of this document by contacting SAE International at:

400 Commonwealth Drive  
Warrendale, PA 15096-0001

1.877.606.7323 (U.S. and Canada only)

1.724.776.4970 (Outside U.S. and Canada)

**⚠ WARNING**

It is important to note that the chairs and transit options included in this Supplement have been designed for use by occupants that weigh more than 51 lbs (23kg). Do not attempt to use this chair in a transit situation for an occupant that weighs less than 51 lbs(23kg), as they will not be restrained properly, and in the event of an accident, there is a risk of serious injury or death.

**⚠ WARNING**

The buckle of the belt restraint system should not be located near any item that may come in contact with the buckle release button in the event of a vehicle accident or collision.

**⚠ WARNING**

If a recline angle is required during transport, the manual chair seat/back should be positioned at an angle of no more than 30° to the vertical or the occupant is at risk of injury from sliding under the restraint in the event of an accident or collision while in the motor vehicle.

**⚠ WARNING**

Visually inspect all WTORS equipment at least once per month, and have worn or broken components replaced immediately.

**⚠ WARNING**

Interior components that can't be removed from the clear zones should be padded with material that complies with FMVSS201.

**⚠ WARNING**

Although postural supports and belts may be used in a moving vehicle in addition to the occupant belt restraint system, they should not be relied upon to replace occupant restraints that have been designed and tested for the purpose of securing an occupant during a motor vehicle collision or accident. Any postural supports that can be used during transit, must be positioned so that they do not interfere with the clear path for proper transit securement belt restraint.

**⚠ WARNING**

Backrests of wheelchairs with adjustable seat angles must not be tilted to more than 30°. Do not alter or substitute wheelchair frame parts, components, or seating systems.

**⚠ WARNING**

A sudden stop and/or collision may structurally damage your wheelchair. Wheelchairs involved in sudden stops should be inspected for possible failures in frame and/or components. Wheelchairs involved in collisions should be replaced.

**NOTE-** The warranty is void on any wheelchair that is involved in a collision.

**B. WTORS AND PROPER SET-UP****⚠ WARNING**

1. The wheelchairs listed in this supplement have been dynamically tested in a forward-facing mode with a specified crash test dummy restrained by both pelvic and upper-torso belt(s) (shoulder belts). Both pelvic and upper-torso belt(s) should be used to reduce the risk of head and chest impacts with vehicle components.
2. Testing was performed for seating in a motor vehicle with the factory installed seating system only. The wheelchairs must be in a forward facing position during travel in a motor vehicle.
3. The wheelchairs referred to in this supplement have been equipped and dynamically tested to rely on wheelchair-anchored pelvic belts.
4. To reduce the potential for injury, both pelvic and upper-torso belts should be used in a transit situation.

C. COMPONENTS AND MOUNTED ACCESSORIES

**⚠ WARNING**

1. To reduce the potential of injury to vehicle occupants, wheelchair-mounted accessories, including but not limited to IV poles, trays, respiratory equipment, backpacks, and other personal items should be removed and secured separately, before transport in a motor vehicle.
2. Postural supports, positioning devices, and/or strap(s) should not be relied on for occupant restraint. These items may be used in addition to the wheelchair anchored or vehicle-anchored belts.
3. Wheelchairs with adjustable seat angles should be set to 10°. Do not alter or substitute wheelchair frame parts, components, or seating systems.
4. Do not modify your wheelchair, or add accessories that have not been authorized by Sunrise Medical. Do not make alterations or substitutions to wheelchair structural parts or frame components without consulting Sunrise Medical.

D. WTORS SECUREMENT POINTS 1 2

**NOTE** - The WC-19 Transit System includes four factory-installed transport brackets and a wheelchair anchored pelvic belt system.

**⚠ WARNING**

Only use the transit brackets that have been included with your specific wheelchair, and use them only for the purposes described in this supplement. Depending on your specific wheelchair, the securement brackets may not look the same, and may be in a different location than what is shown in figure 1 and figure 2, these figures are for illustrative purposes only.



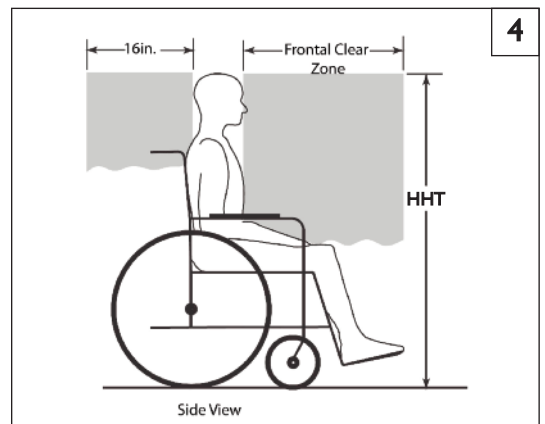
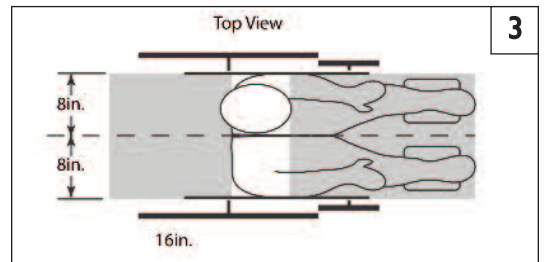
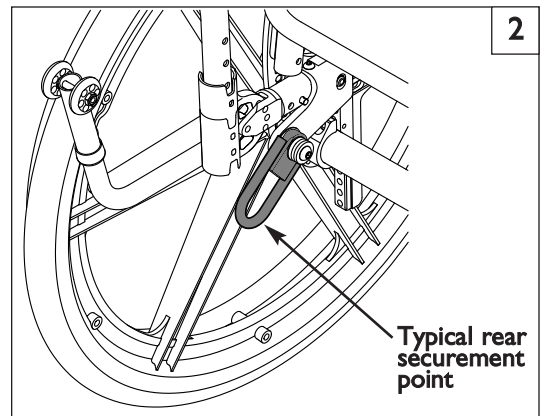
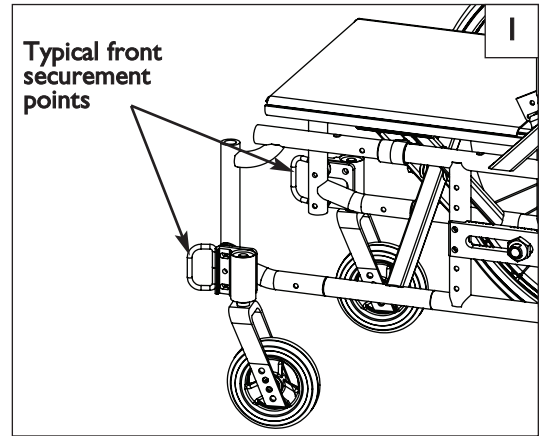
Look for this symbol on your wheelchair. It indicates wheelchair securement points which conform to ANSI RESNA (1998) V.1-Section 19 or ANSI/RESNA (2012) V.4 WC-19.

E. CLEAR ZONES FOR WHEELCHAIR IN A VEHICLE 3 4

**⚠ WARNING**

The wheelchair must be in a forward facing position during travel in a motor vehicle. The recommended **clear zones** for wheelchair seated occupants restrained by both pelvic and upper-torso belt(s) and/or only by a pelvic belt are shown at right

1. **Frontal Clear Zone (FCZ)** (Figures 3, 4) This minimum area should be larger when upper-torso belt(s) are not used.
2. **Frontal Clear Zone** is measured from the front most point on an occupant's head and is 26-inches with pelvic and upper-torso belt(s) and 37-inches with only a pelvic belt.
3. **The Frontal Clear Zone** may not be achievable for wheelchair-seated drivers.
4. **The Rear Clear Zone (RCZ)** (Figurest 3, 4) 16-inches from the rearmost point on an occupant's head. There must be no obstruction in this area.
5. **The estimated seated height (HHT)** (figure 4) from the ground or floor to the top of the wheelchair-seated occupant's head ranges from approximately 47-inches for a small adult female to about 61-inches for a tall adult male.



**F. SECURING THE OCCUPANT: WHEELCHAIR ANCHORED**

**BELTS** 5 6

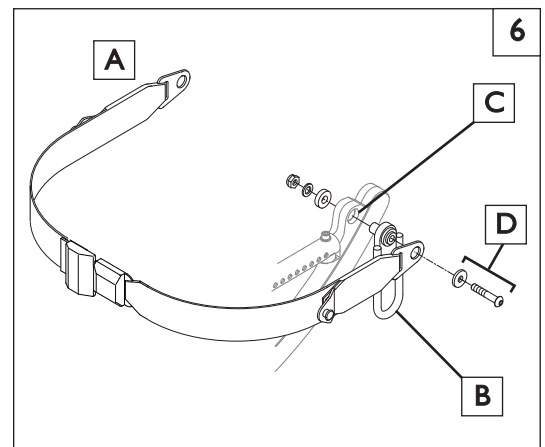
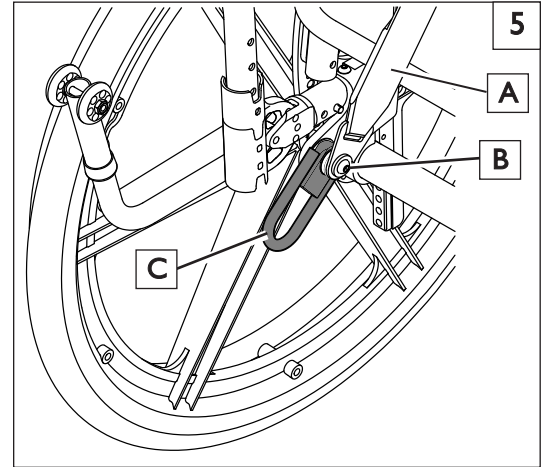
**⚠ WARNING**

Use only a pelvic belt system that meets the requirements of ANSI/RESNA WC-4 section 19 and SAE J2249.

The wheelchair's referenced in this supplement are used by adults and children who weigh more than 23kg (51lb) and are designed to provide for the anchoring of a pelvic belt restraint that conforms to the requirements of ANSI/RESNA WC-4, Section 19. They can be used in conjunction with a vehicle-anchored shoulder belt and a standard lower-anchorage connector as a crashworthy three-point-belt restraint in motor vehicles.

The use of postural pelvic belts attached to the wheelchair base or seat frame is encouraged during travel. These belts should be positioned so that they don't interfere with the proper positioning of crash worthy restraints. The postural belt should **NOT** be relied on for occupant protection in crash situations unless it has been designed to comply with the requirements of ANSI/RESNA WC-4, Section 19.

1. Install the pelvic belt (A) and hardware(B) onto the pelvic belt securement point (C) anchored to the seating frame of the wheelchair. Use a 5mm Allen head wrench and torque to 144 in-lbs when attaching the pelvic belt to the mounting anchor (B). The pelvic belt bolt and washer (D) are generally provided depending on your specific wheelchair.
2. Repeat Step 1 for the opposite side.



**G. USE AND FIT GRADES FOR VEHICLE ANCHORED BELTS** 7

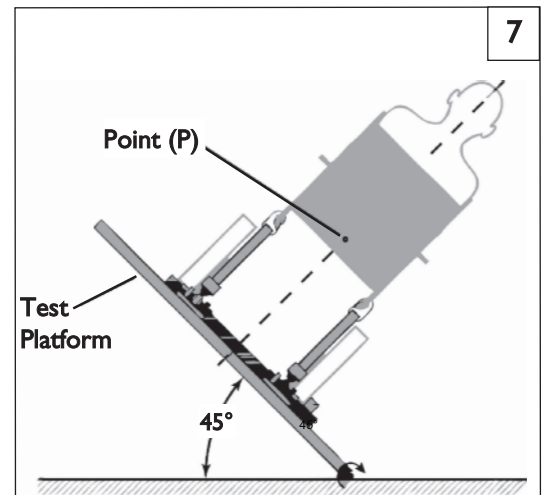
**⚠ WARNING**

The wheelchairs in this supplement, have an overall rating of "Good" with regard to accommodating the use and fit of vehicle-anchored belts. This rating is scored as follows: Good, Acceptable, or Poor. The test for Lateral Stability Displacement for Point (P) is shown in the figure below. The average test results for point (P) are:

- Quickie 2 Lite = 15.9mm "Good"
- Quickie 2 = 10.5mm "Good"
- Quickie 2HD = 14.0mm "Good"
- Quickie IRIS = 16.5mm "Good"
- Zippie IRIS = 16.5mm "Good"
- Quickie Q7 = 15.7mm "Good"
- Quickie QRi = 13.0mm "Good"
- Zippie X'CAPE = 11.1mm "Good"

The rating for ease of properly positioning a 3-point belt restraint as required by RESNA WC-4:2012:

- Quickie 2 Lite = "Excellent"
- Quickie 2 = "Excellent"
- Quickie 2HD = "Excellent"
- Quickie IRIS = "Excellent"
- Zippie IRIS = "Excellent"
- Quickie Q7 = "Good"
- Quickie QRi = "Good"
- Zippie X'CAPE = "Excellent"



Rear view of wheelchair and human surrogate secured on a test platform and tilted to 45°.

The rating for the degree to which proper 3-point belt positioning can be achieved as required by RESNA WC-4:2012:

- Quickie 2 Lite = “Excellent”
- Quickie 2 = “Excellent”
- Quickie 2HD = “Excellent”
- Quickie IRIS = “Excellent”
- Zippie IRIS = “Excellent”
- Quickie Q7 = “Excellent”
- Quickie QRi = “Good”
- Zippie X’CAPE = “Good”

## H. SEATING SYSTEMS

### **⚠ WARNING**

This wheelchair has been tested for seating in a motor vehicle with the factory installed seating system only. Ensure that the factory installed seating system is secured to the wheelchair frame before operation. Refer to the seating system owner’s manual. If you need to purchase a compatible, crashworthy, wheelchair -anchored pelvic-belt restraint, call Sunrise Customer service at: 1-800-333-4000.

## I. CORRECT POSITIONING OF BELT RESTRAINTS 8 9

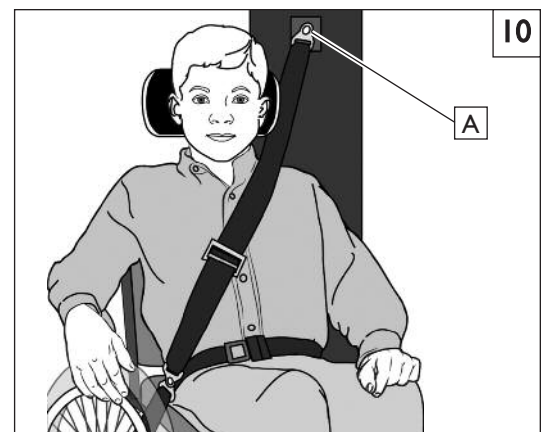
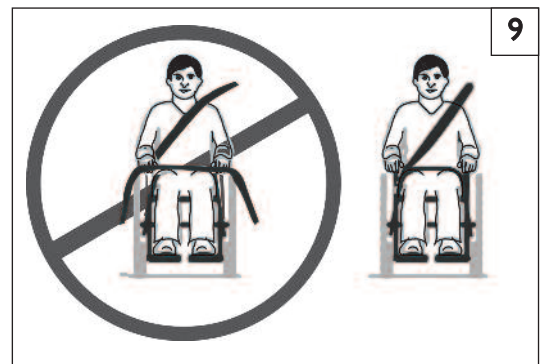
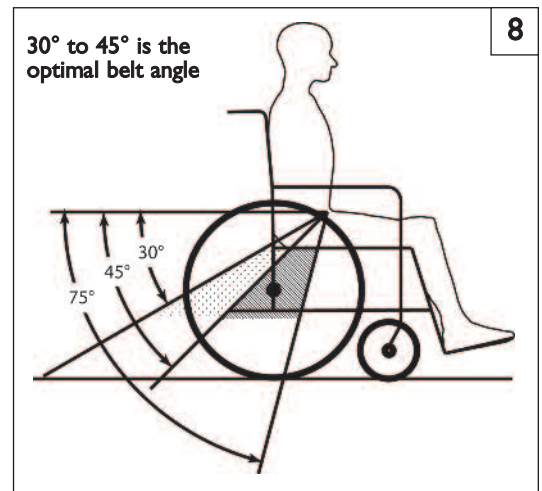
### **⚠ WARNING**

The angle of the pelvic belt should be within the preferred zone of 45 to 75 degrees to the horizontal or within the optional zone of 30 to 45 degrees to the horizontal (Figure 8).

Steeper side-view pelvic belt angles are important if the pelvic belt is intended to be used for postural support in addition to occupant restraint in a frontal crash. Steeper angles will reduce the tendency for a vertical gap to develop between the user and the belt, thereby reducing the tendency for the user to slip under the belt. Steeper belt angles reduce the tendency of upper-torso belts to pull the pelvic belt onto the abdomen during frontal impact loading.

## J. PROPER INSTALLATION AND FIT 8 9 10

- a. The pelvic belt should be worn low across the front of the pelvis.
- b. Position the upper-torso belt(s) over the shoulders.
- c. The belt(s) should not be held away from the body by the wheelchair components or parts, including but not limited to the armrests or wheels.
- d. Ensure the belt(s) are not twisted
- e. Adjust the belts as firmly as possible being mindful not to restrict bloodflow, or breathing of the occupant.
- f. If an upper torso belt is in use, the anchor point (A) should be above and behind the occupant to ensure the occupant is properly restrained during transport.
- g. Place the upper torso belt across the middle of the shoulder and the center of the chest, and connect to the pelvic belt near the hip of the occupant



## K. TESTED CONFIGURATIONS

**Quickie 2 Lite** was tested in the specific configuration of 16"x18", 36 lbs, straight back canes, standard back/seat upholstery, cushion, swing in/out hanger with composite footplate and heel loops, polyurethane front caster, standard forks, spoke rear wheel with pneumatic tire and airless insert. Minimum Turning Radius of 24.0 Inches, and Minimum Turn Around Width of 44.0 Inches.

**Quickie 2** was tested in the specific configuration of 16"x18", 36 lbs, straight back canes, standard back/seat upholstery, cushion, swing in/out hanger with composite footplate and heel loops, polyurethane front caster, standard forks, spoke rear wheel with pneumatic tire and airless insert. Minimum Turning Radius of 27.0 Inches, and Minimum Turn Around Width of 50.0 Inches.

**Quickie 2 HD** was tested in the specific configuration of 18"x20", 46 lbs, angled back canes, standard back/seat upholstery, cushion, swing in/out hanger with composite footplate and heel loops, polyurethane front caster, standard forks, spoke rear wheel with pneumatic tire and airless insert. Minimum Turning Radius of 27.0 Inches, and Minimum Turn Around Width of 50.0 Inches.

**The Quickie IRIS was selected to represent both in testing.**

**Quickie / Zippie IRIS** was tested in the specific configuration of 18"x18", 61 lbs, straight back canes, solid back, seat pan, cushion, swing in/out hanger with composite footplate and heel loops, polyurethane front caster, fork, mag rear wheel with pneumatic tire and airless insert. Minimum Turning Radius of 28.0 Inches, and Minimum Turn Around Width of 56.0 Inches

**Q7** was tested in the specific configuration of 16" x18", 24 lbs, straight back canes, standard back/seat upholstery, cushion, tubular footrest with leg strap, polyurethane front caster, standard fork, spoke rear wheel with pneumatic tire and airless insert. Minimum Turning Radius of 26.0 Inches, and Minimum Turn Around Width of 52.0 Inches.

**Quickie Qri.** was tested in the specific configuration of 16" x 18", 30 lbs, straight back canes, standard back/seat upholstery, cushion, tubular footrest with leg strap, polyurethane front caster, standard fork, spoke rear wheel with pneumatic tire and airless insert. Minimum Turning Radius of 29.0 Inches, and Minimum Turn Around Width of 58.0 Inches.

**Zippie X'CAPE** was tested in the specific configuration of 14"x16", 45 lbs, straight back canes, standard back, seat upholstery, cushion, tubular footrest with legstrap,spoke rear wheels, with pneumatic tire and airless insert, carbotechnology fork, polyurethane front caster. . Minimum Turning Radius of 25.0 Inches, and Minimum Turn Around Width of 38.0 Inches

## L. TESTING COMPLIANCE INFORMATION

The Quickie 2, Quickie 2Lite, Qri, Q7 (265 lbs wt. capacity), Quickie IRIS (250 lbs wt. capacity), Zippie IRIS (165 lbs wt. capacity), and Zippie X'CAPE (165 lbs wt capacity, have been crash-tested with a 172 lb (50% Adult male) crash dummy.

The Quickie 2 HD Heavy duty wheelchair (350 lb wt. capacity) has been crash-tested with a 225 lb (95% Adult male) crash dummy.

All wheelchairs listed have been tested in accordance with ANSI/RESNA WC (1998) V.1- Section 19 and/or ANSI/RESNA (2012) V.4 WC-19.- Front impact test requirements for wheelchairs.

### NOTE:

ANSI = American National Standards Institute.

RESNA= Rehabilitation Engineering and Assistive Technology Society of North America.



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