



## TiLite ZRA/AERO Z OWNER'S MANUAL SUPPLEMENT WHEELCHAIR TRANSIT TIE-DOWN OPTION AND TRANSPORT BRACKET OPTION

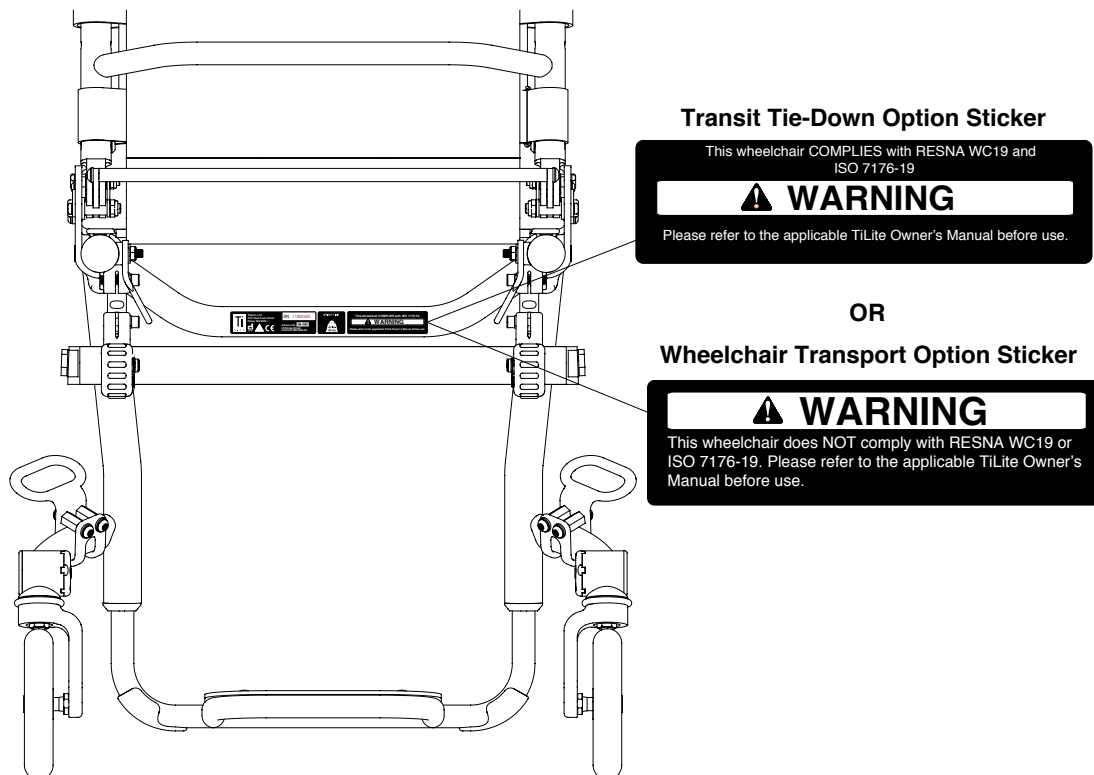
### TRANSPORTATION OPTIONS

The TiLite ZRA and Aero Z are available with a Transit Tie-Down Option, which is only available as a factory-installed option. The Transit Tie-Down Option, has been crash-tested in accordance and complies with RESNA WC-4:2012, Section 19 ("WC19") and ISO 7176-19:2008 ("ISO 7176-19"). The Transit Tie-Down Option consists of four factory-installed Tie-Down Brackets, two factory-installed Pelvic Belt Mounting Brackets and a reinforced frame. It is approved for OCCUPIED transit use.

A Wheelchair Transport Option is available as an aftermarket, field installation option for the TiLite ZRA and Aero Z. The Wheelchair Transport Option has NOT been crash-tested in accordance with either WC19 or ISO 7176-19. The Wheelchair Transport Option only includes four Tie-Down Brackets. It is approved only for transportation of an UNOCCUPIED wheelchair.

To determine whether your TiLite ZRA or Aero Z is equipped with the Transit Tie-Down Option or the Wheelchair Transport Option, see Figure 1.

**Figure 1  
Option Stickers**



You should contact TiLite Customer Service at 800-545-2266 with any questions you may have about using this wheelchair for seating in a motor vehicle.

## GENERAL WARNINGS

### **⚠WARNING**

If you cannot locate a Transit Tie-Down Option Sticker on your TiLite ZRA or Aero Z (see Figure 1), you must assume that your chair is equipped with the Wheelchair Transport Option and is only to be used for UNOCCUPIED transport of a wheelchair in a motor vehicle.

### **⚠WARNING**

Whenever feasible, wheelchair users should transfer into the vehicle seat and use the Original Equipment Manufacturer (OEM) vehicle-installed restraint system and the unoccupied wheelchair should be stored in a cargo area or secured in the vehicle during travel.

### **⚠WARNING**

As of the date of this publication, the U.S. 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 TiLite's position that wheelchair users should transfer into the OEM seating in vehicles used for transportation and that the restraints made by the automobile industry should be used. TiLite does not recommend any wheelchair transportation systems. Use only Wheelchair Tie-Down and Occupant Restraint Systems ("WTORS") that meet the requirements of Society of Automotive Engineers ("SAE") J2249 Recommended Practice - Wheelchair Tie-Down and Occupant Restraint Systems for Use in Motor Vehicles ("SAE J2249"). To obtain a copy of SAE J2249, please contact SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, USA. Telephone: 724-776-4970. Web: [www.sae.org](http://www.sae.org).

### **⚠WARNING**

This Supplement contains detailed information regarding the exact configuration of the TiLite ZRA and Aero Z wheelchairs that were subjected to the frontal impact and other tests required by WC19 and ISO 7176-19. See "Statement of Compliance" on pages 10 and 11. Those test results apply only to the configuration of the wheelchair as tested and described herein. Therefore, if you order your chair in a different configuration, such as with another manufacturer's seating system, you are hereby advised that the wheelchair was not tested in such different configuration and should not be considered "transit approved" by TiLite. Because TiLite has not tested the chair in such different configurations, TiLite has no knowledge of how the product would perform in such configurations. Therefore, TiLite makes no claims or warranties about the wheelchair's performance in any configuration other than the configuration described herein. TiLite has not authorized any person to make any such claims or warranties on behalf of TiLite.

### **⚠WARNING**

The TiLite ZRA and Aero Z wheelchairs and the Transit Tie-Down Option described in this Owner's Manual Supplement are designed for use by occupants that weigh 51 lbs. (23 kg) or more. Do not attempt to use this chair in a transit situation for an occupant that weighs less than 51 lbs. (23 kg) because they will not be restrained properly and, in the event of an accident, there is a risk of serious injury or death.

### **⚠WARNING**

Do not ride in a TiLite ZRA or Aero Z in a motor vehicle if your weight, together with the weight of all items attached to the wheelchair (such as backpacks, seat pouches, etc.) is more than the Maximum User Weight listed in Table 1 on page 10. If there are items attached to the wheelchair, such as backpacks, seat pouches, etc., the weight of such attached items must be counted as part of the Maximum User Weight limit for the wheelchair. For example, in the case of the Aero Z, if the wheelchair rider has a 20 lb (9.1 kg) backpack attached to the wheelchair, then the wheelchair rider must not weigh more than 245 lbs. (111 kg).

### **⚠WARNING**

TiLite expressly disclaims that use of its Transit Tie-Down Option or Transport Bracket Option on a TiLite wheelchair will prevent the wheelchair user from injury or death in the event of a motor vehicle accident.

### **⚠WARNING**

A sudden stop and/or collision may structurally damage your wheelchair. Such damage may not be visible.

IMMEDIATELY STOP using any wheelchair that is involved in any such incident. Because the structural damage may not be visible, you **MUST** replace any wheelchair that is involved in any such incident.

**⚠WARNING**

The TiLite Transit Tie-Down Option cannot be retrofitted to existing wheelchairs and it is not serviceable except by an authorized TiLite dealer.

**⚠WARNING**

The backrest angle may be adjustable on your TiLite ZRA or Aero Z wheelchair. You must adjust the backrest angle so that it does not exceed the angle specified in Table 1 on page 10, when the wheelchair is occupied during transit in a motor vehicle.

**⚠WARNING**

You **MUST** use your TiLite ZRA or Aero Z wheelchair in strict accordance with all warnings and instructions contained in the TiLite ZRA/Aero Z Owner's Manual and this Owner's Manual Supplement.

**⚠WARNING**

The TiLite Wheelchair Transport Bracket Option has NOT been crash-tested either pursuant to WC19 or ISO 7176-19. Therefore, the Wheelchair Transport Bracket Option is provided solely for the purpose of securing an UNOCCUPIED wheelchair in a motor vehicle.

**⚠WARNING**

IF YOU FAIL TO HEED THE WARNINGS IN THE TILITE ZRA/AERO Z OWNER'S MANUAL AND THIS OWNER'S MANUAL SUPPLEMENT, YOU MAY DAMAGE YOUR WHEELCHAIR, CAUSE SEVERE PHYSICAL INJURY TO OTHERS OR SUFFER SEVERE PHYSICAL INJURIES YOURSELF, UP TO AND INCLUDING DEATH.

## **WARNINGS REGARDING WTORS AND PROPER SET-UP**

**⚠WARNING**

Your TiLite ZRA or Aero Z wheelchair **MUST** be used with WTORS that meet the requirements of SAE J2249. Do NOT use WTORS that are designed to rely on the wheelchair structure to transfer occupant restraint loads to the vehicle. Do NOT use your TiLite ZRA or Aero Z wheelchair with a WTORS unless the WTORS has been installed fully in accordance with the instructions of the manufacturer of such restraints and SAE J2249.

**⚠WARNING**

ALWAYS attach the WTORS to your TiLite ZRA or Aero Z wheelchair at all four (4) of the Tie-Down Brackets (see Figure 3) in accordance with the instructions provided by the manufacturers of the WTORS and SAE J2249.

**⚠WARNING**

ALWAYS attach vehicle-anchored occupant restraints (pelvic belts and shoulder belts) in accordance with the instructions of the manufacturer of such restraints and SAE J2249.

**⚠WARNING**

The TiLite ZRA or Aero Z equipped with the Transit Tie-Down Option was dynamically tested in a forward-facing orientation with a 170 lb. (77 kg) crash test dummy restrained by BOTH a wheelchair-anchored pelvic belt and a vehicle-anchored shoulder belt. Every TiLite ZRA or Aero Z equipped with the Transit Tie-Down Option comes equipped with Pelvic-Belt Mounting Brackets (for use with an optional Q'Straint®-WC19 wheelchair-anchored pelvic belt). BOTH pelvic and shoulder belts should be used to reduce the possibility of head and chest impacts with components of the motor vehicle. TILITE REQUIRES THAT BOTH PELVIC AND SHOULDER BELTS BE USED FOR MAXIMUM PROTECTION IN A FRONTAL IMPACT COLLISION. TILITE STRONGLY RECOMMENDS THAT THE Q'STRAIT® WC19 WHEELCHAIR-ANCHORED PELVIC BELT BE PURCHASED AND USED.

## **WARNINGS REGARDING USE OF COMPONENTS AND ACCESSORIES**

### **⚠ WARNING**

Postural supports and positioning accessories, such as pelvic positioning belts, anterior trunk supports and lateral trunk supports, should NEVER be relied upon for occupant restraint in a moving vehicle unless they are labeled as being in accordance with the requirements specified in WC19 or ISO 7176-19. 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**

Whenever possible, other auxiliary wheelchair equipment should be either effectively secured to the wheelchair or removed from the wheelchair and secured in the vehicle during travel so that such equipment does not break free and cause injury to the vehicle occupants in the event of a collision.

### **⚠ WARNING**

In order to reduce the potential of injury to vehicle occupants, wheelchair-mounted trays and other accessories, such as IV poles, respiratory equipment, backpacks and other personal items, not specifically designed for crash safety should: (i) be removed and secured separately in the vehicle, or (ii) be secured to the wheelchair but positioned away from the occupant with energy-absorbing padding that complies with FMVSS201 placed between the tray or other accessory and the occupant.

### **⚠ WARNING**

Do not modify or alter your wheelchair or add accessories that have not been authorized by TiLite. Do not make alterations or substitutions to the wheelchair securement points or to structural or frame parts or components. Any significant modification or substitution to the wheelchair's securement points, structural or frame parts or components could significantly alter the chair's performance during a collision.

## **WARNINGS REGARDING WTORS SECUREMENT POINTS**

### **⚠ WARNING**

Only use the Tie-Down Brackets and Pelvic Belt Mounting Brackets that were factory-installed by TiLite. Only use Tie-Down Brackets and Pelvic Belt Mounting Brackets for the purposes described in this Owner's Manual Supplement.

## **POSITIONING THE WHEELCHAIR IN THE VEHICLE**

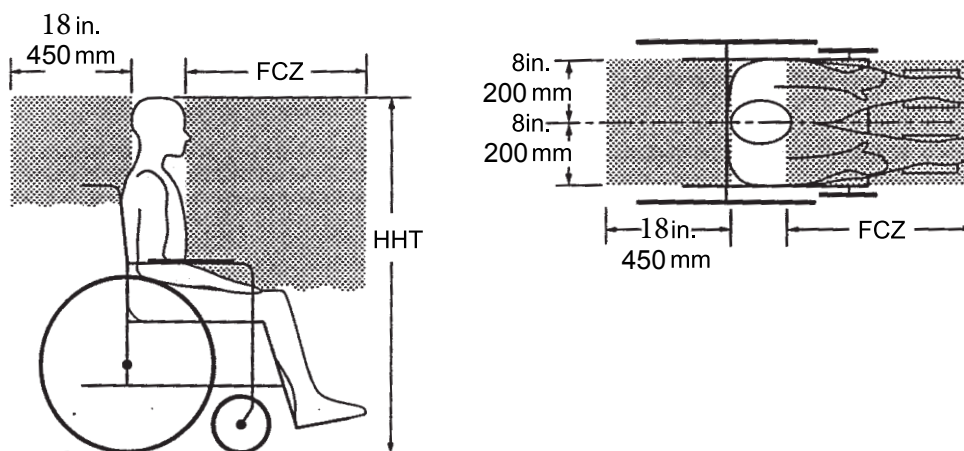
### **⚠ WARNING**

The TiLite ZRA or Aero Z wheelchair equipped with the Transit Tie-Down Option have been dynamically tested in a forward-facing orientation for a 30 mph (48 km/h) frontal impact with a 170 lb. (77 kg) crash test dummy. Accordingly, these wheelchairs comply with WC19 and ISO 7176-19 ONLY when traveling forward-facing and should be used ONLY for forward-facing seating in motor vehicles. This TiLite wheelchair MUST be in a forward-facing position during travel in a motor vehicle. This TiLite wheelchair was not designed or tested in other orientations (e.g., rearward-facing or sideways-facing) when used as a seat in a motor vehicle and should NOT be used in such other orientations.

### **⚠ WARNING**

It is imperative that the wheelchair ALWAYS be positioned in a vehicle with appropriate clear zones around the wheelchair because in a frontal impact, even when properly secured, the wheelchair and its occupant will move from their secured position. Clear zones are required whether the wheelchair occupant is restrained by both pelvic and shoulder belts or only by a pelvic belt. The use of only pelvic or only shoulder belts is highly dangerous and is never recommended. The minimum necessary clear zones for the TiLite wheelchairs are shown in Figure 2.

**Figure 2**  
**Clear Zones**



- **Frontal Clear Zone** (“FCZ”) is measured from the front most point on an occupant’s head and is 26” (650 mm) with pelvic and shoulder belts and 37-1/2” (950mm) with pelvic belt only. The recommended clearance may not be achievable for wheelchair-seated drivers.
- **Rear Clear Zone** (“RCZ”) is 18” (450 mm) and is measured from the rear most point on an occupant’s head. There must be no obstructions in the RCZ.
- **Seated head height** (“HHT”) is measured from the floor of the vehicle to the top of the occupant’s head and it ranges from about 47” (1200 mm) for a small adult female to about 61” (1550 mm) for a tall adult male.

## SECURING THE WHEELCHAIR TO THE VEHICLE

### ⚠ WARNING

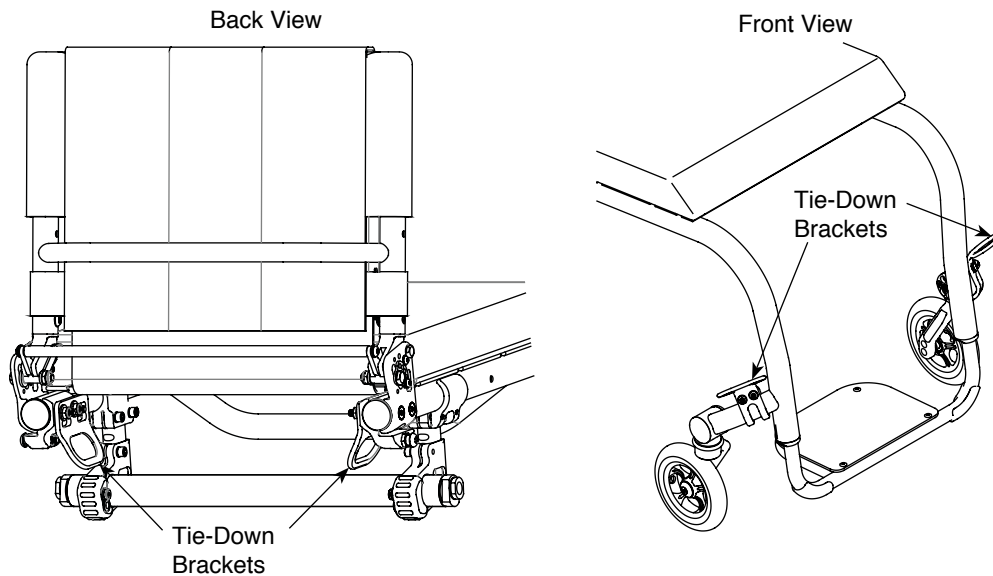
The Tie-Down Brackets on your wheelchair were designed, located and installed by TiLite to comply with WC19 and ISO 7176-19 standards to ensure that they operate properly and maximize the performance of the brackets in a frontal impact collision. The two front Tie-Down Brackets (see Figure 3) should NEVER be removed or relocated to another position on the wheelchair frame. The two rear Tie-Down Brackets (see Figure 3) may be removed ONLY if it is necessary to adjust the seat depth and an authorized TiLite dealer must ALWAYS perform such adjustment. If such an adjustment is made, the bolts and nuts that originally shipped with your wheelchair must ALWAYS be used. If you substitute another bolt or nut, the Tie-Down Brackets may not operate properly.

### ⚠ WARNING

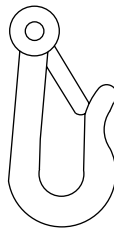
ALWAYS inspect the brackets before securing the wheelchair in a motor vehicle to ensure that they are properly secured. If necessary, the bolts should be tightened by an authorized TiLite dealer.

1. This wheelchair must be used ONLY with a WTORS comprised of a four-point, strap-type wheelchair tie-down that has been installed in accordance with the manufacturer’s instructions and SAE J2249. It is NOT compatible with other types of WTORS.
2. The positions of the four wheelchair securement points (Tie-Down Brackets) are shown in Figure 3. Each of the Tie-Down Brackets is identified with the symbol shown in Figure 4.
3. Carefully inspect each of the four Tie-Down Brackets to ensure that they are properly secured to the wheelchair.
4. Carefully inspect each WTORS wheelchair tie-down strap for damage or wear.
5. The four wheelchair tie-down straps must be attached to the four Tie-Down Brackets in accordance with the WTORS manufacturer’s instructions and SAE J2249.
6. Each of the four wheelchair tie-down straps must be tightened to ensure that the wheelchair is securely fastened to the vehicle--there should be no “play” or looseness in any of the four wheelchair tie-down straps.

**Figure 3**  
**Tie-Down Brackets**



**Figure 4**



## SECURING THE OCCUPANT; POSITIONING THE RESTRAINT BELTS

### **⚠ WARNING**

A properly installed three-point occupant restraint system that meets the requirements of WC19 or ISO 7176-19 and SAE J2249 must be used to secure the occupant within the wheelchair.

### **⚠ WARNING**

The TiLite ZRA and Aero Z wheelchairs with the Transit Tie-Down Option are intended for use by adults and children weighing 52 lbs. (23 kg) or more.

### **⚠ WARNING**

The TiLite ZRA and Aero Z wheelchairs include a Pelvic Belt Mounting Bracket (see Figure 5) for the purpose of anchoring a pelvic belt restraint that conforms to the requirements of WC19 or ISO 7176-19 and that can be used in conjunction with a vehicle-anchored shoulder belt with standard lower-anchorage connectors as a crashworthy three-point belt restraint in motor vehicles. The TiLite ZRA and Aero Z wheelchairs were tested with Q'Straint® Q2-6322 wheelchair-anchored pelvic belt. Therefore, TiLite offers such belt as an optional accessory for these wheelchairs. TiLite strongly recommends that such wheelchair-anchored pelvic belt be purchased and used to secure the occupant when restrained in a motor vehicle.

### **⚠ WARNING**

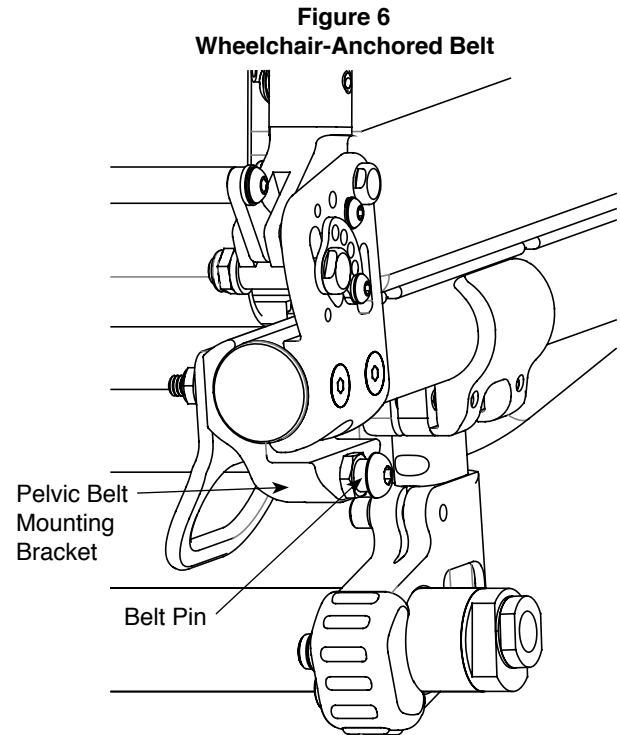
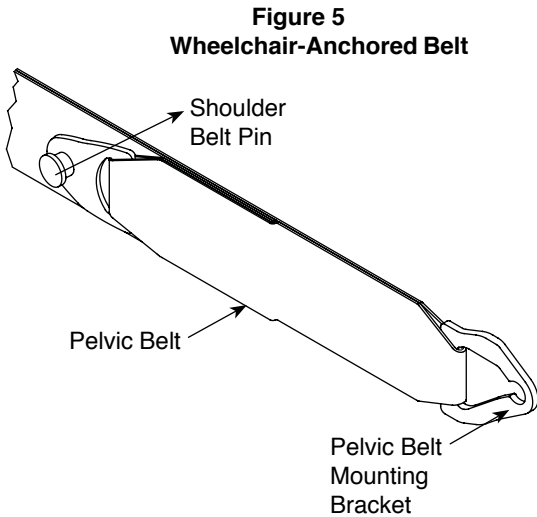
Always ensure that the pelvic and shoulder belt buckles are positioned so that the release buttons will not come into contact with any other item or by wheelchair components in the event of a vehicle accident or collision.

## **⚠ WARNING**

Always carefully inspect the occupant restraint system belts, brackets and clamps to ensure that they are properly secured to the vehicle and are not damaged or worn.

### **WHEELCHAIR-ANCHORED BELTS**

1. Install the pelvic belt by securing the Belt Mounting Hardware (see Figure 5) to the Belt Pin (see Figure 6) on the Pelvic Belt Mounting Bracket (see Figure 6). Pull to ensure that the mounting hardware snaps into place.
2. Repeat Step 1 for the Belt Mounting Hardware on the other end of the Pelvic Belt.
3. Install the vehicle-anchored shoulder belt by connecting it to the Shoulder Belt Pin on the Pelvic Belt. See Figure 6.

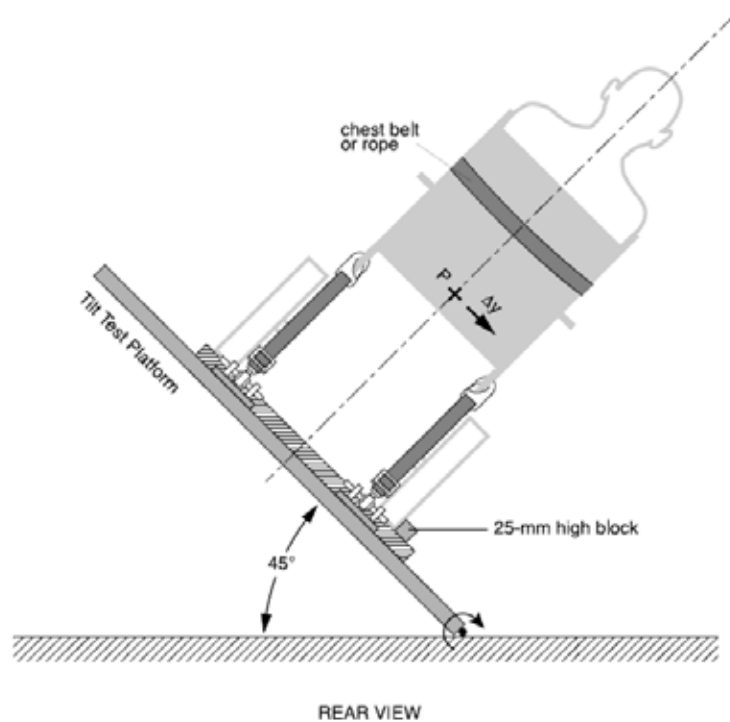


### **VEHICLE-ANCHORED BELTS**

In accordance with WC19 Annex C, the TiLite ZRA and Aero Z were evaluated with regard to lateral stability. The test for lateral stability is shown in Figure 7 below. The average test results for point “P” were as follows:

- ZRA 16.4 mm “Good”
- Aero Z 17.9 mm “Good”

**Figure 7**  
**Vehicle-Anchored Belts**



In accordance with WC19 Annex E, the TiLite ZRA and Aero Z were evaluated with regard to the ability to accommodate vehicle-anchored pelvic and shoulder belts:

- The TiLite ZRA received a rating of “Good” with respect to the ease of optimizing proper pelvic belt placement and an overall score of “Excellent” (16 of 16 points) with respect to the ability to achieve proper positioning and geometry of the three-point belt restraints.
- The TiLite Aero Z received a rating of “Excellent” with respect to the ease of optimizing proper pelvic belt placement and an overall score of “Excellent” (16 of 16 points) with respect to the ability to achieve proper positioning and geometry of the three-point belt restraints.

In accordance with ISO 7176-19 Annex D, the TiLite ZRA and Aero Z were evaluated with regard to the ability to accommodate vehicle-anchored pelvic and shoulder belts:

- The TiLite ZRA received an overall score of “Good” (15 points).
- The TiLite Aero Z received an overall score of “Excellent” (16 points).

## **CORRECT POSITIONING OF BELTS**

### **⚠WARNING**

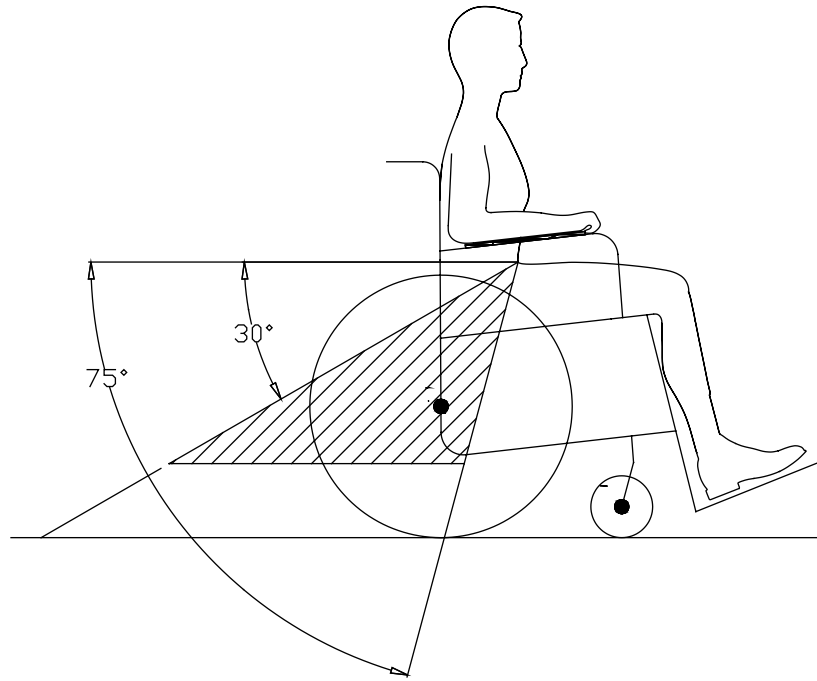
A side-view pelvic-belt angle of 30° to 75° to the horizontal (see Figure 8) is preferred to lower pelvic belt angles.

It is imperative that you position the belts properly. Paragraphs 1 to 6 below explain how to properly position the restraint belts.

1. The pelvic belt should be worn low across the front of the pelvis so that the angle of the pelvic belt is within the preferred zone of 30° to 75° to the horizontal. See Figure 8. A steeper (greater) angle within the preferred zone is desirable.



**Figure 8**  
**Pelvic Belt Angle**



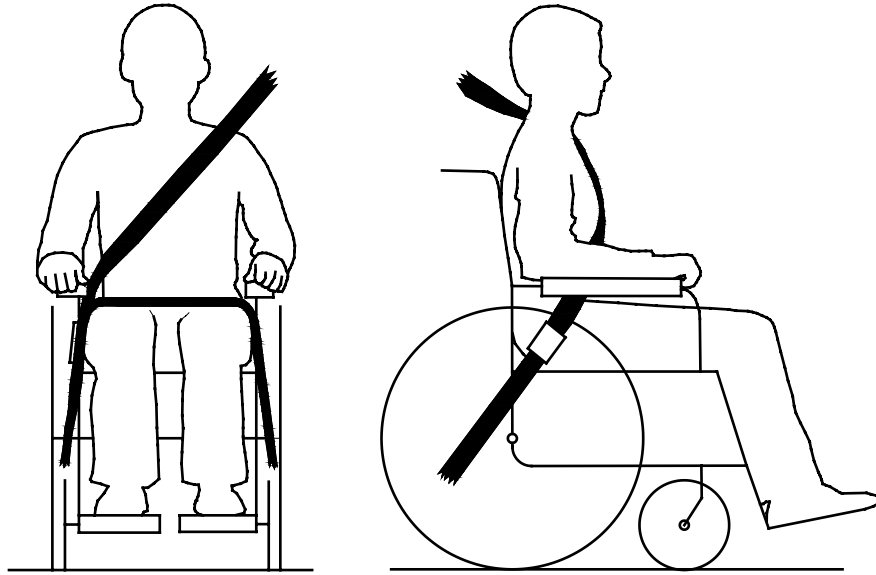
**Note:** Steeper side-view pelvic-belt angles are especially important if the pelvic belt is used for postural support in addition to occupant restraint in a frontal crash. Steeper angles will reduce the tendency for a vertical gap to develop between the user and the belt due to compliance of seat cushions and belt movement, thereby reducing the tendency for the user to slip under the belt and for the belt to ride up on the soft abdomen during normal use.

**Note:** Steeper belt angles also reduce the tendency for shoulder belts to pull the pelvic belt onto the abdomen during frontal impact loading.

2. The shoulder belt should fit over the shoulder and across the chest. See Figure 9.
3. Belt restraints should not be held away from the body by wheelchair components or parts, including, for example, the wheelchair armrests or wheels. See Figure 9 for the correct position of the belt restraints. See Figure 10 for the incorrect position of the belt restraints.
4. Always adjust the belt restraints to fit as tightly as possible, consistent with the wheelchair user's comfort.
5. Always carefully inspect the belt webbing to ensure that it is not twisted. If it is twisted, it will reduce the surface area of the belt that is in contact with the user, which could adversely affect the performance of the belt and injure the user in the event of an impact.

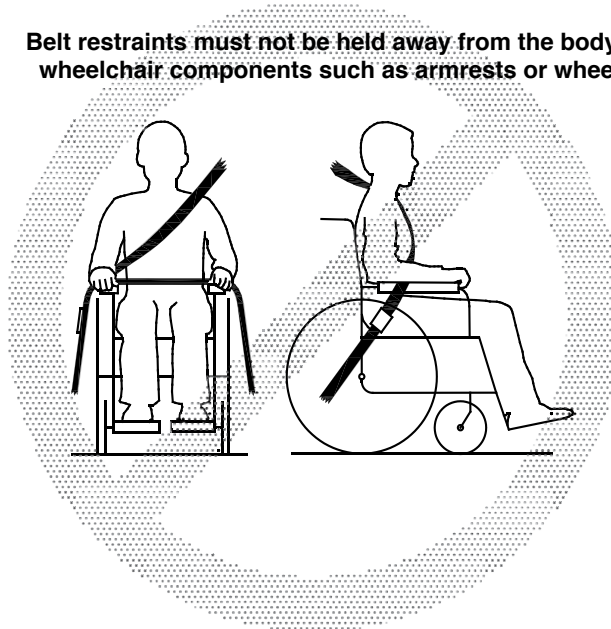
**Figure 9**  
**Illustration of Proper Belt-Restraint Fit**

**Belt restraints should make full contact with the shoulder, chest, and pelvis and pelvic belts should be positioned low on the pelvis near the thigh-abdominal junction.**



**Figure 10**  
**Illustration of Improper Belt-Restraint Fit**

**Belt restraints must not be held away from the body by wheelchair components such as armrests or wheels.**



## **SEATING OPTIONS**

### **⚠WARNING**

The TiLite ZRA and Aero Z wheelchairs were crash-tested in accordance with WC19 and ISO 7176-19 only with TiLite Tension Adjustable Bolt-On seat upholstery and Tension Adjustable by Straps back upholstery. Therefore, these are the only seating options approved by TiLite for use with the Transit Tie-Down Option. If you order your TiLite wheelchair with the Transit Tie-Down Option and you use seating components other than these, the performance of the other seating system or upholstery is unknown. Therefore, TiLite makes no warranty or claim as to the performance of the TiLite wheelchair in the event of a motor vehicle accident of any type, even if the other seating system was crash tested with a different manufacturer's wheelchair or with a surrogate wheelchair in accordance with RESNA WC-4: 2012, Section 20.

## WARRANTY MODIFICATION

A copy of the TiLite Limited Warranty was enclosed with your new wheelchair when it was shipped from our factory. Our warranty is also available on our website, [www.tilite.com](http://www.tilite.com). That Limited Warranty applies to your TiLite wheelchair with the Transit Tie-Down Option, with the following modification: The warranty is void if the wheelchair is involved in a collision or is otherwise damaged as a result of transit use.

## CONFIGURATIONS TESTED CHAIRS

**TABLE 1**  
**TiLite Wheelchair Test Configuration**

	<b>ZRA &amp; Aero Z (Titanium Frame)</b>	<b>Aero Z (Aluminum Frame)</b>
Seat Width	16"	16"
Seat Depth	17"	17"
Seat Back Height	20.5"	20.5"
Rear Seat Height	17"	17"
Seat Angle	5°	8°
Seat Back Angle	6°	8°
Wheelchair Weight	25 lbs. (11.4 kg)	24 lbs. (10.9 kg)
Seat Sling	Tension Adjustable Bolt-On	Tension Adjustable Bolt-On
Back Upholstery	Tension Adjustable by Straps Padded Nylon	Tension Adjustable by Straps Padded Nylon
Backrest Type	Folding, Aluminum Adjustable Height with Aluminum TiShaft Back Release Bar	Folding, Aluminum Adjustable Height with Aluminum TiShaft Back Release Bar
Frame Angle	80°	80°
Wheels	24" Shadow Wheels with 2° of camber	24" Shadow Wheels with 2° of camber
Casters	5" Litespeed Billet Aluminum wheels with Soft Roll Tires	5" Litespeed Billet Aluminum wheels with Soft Roll Tires
Footrest	Angle Adjustable Footrest set at 16.5"	Angle Adjustable Footrest set at 16.5"
Other Options	Q'Straint Q2-6322 Pelvic Belt	Q'Straint Q2-6322 Pelvic Belt
Mass of ATD	170 lbs. (77 kg)	170 lbs. (77 kg)
Maximum User Weight	265 lbs. (120 kg) 300 lbs. (136 kg) if Heavy Duty Frame option is ordered	265 lbs. (120 kg)

## STATEMENT OF COMPLIANCE

TiLite ZRA and Aero Z wheelchairs equipped with the Transit Tie-Down Option conform to the requirements of WC19. Specifically, they have been tested in accordance with Section 5.3 (Frontal Impact), Section 5.4 (Clear Paths for Four-Point, Strap-Type Tie-Downs), Section 5.5 (Lateral Stability) and Section 5.7 (Accommodation of Vehicle-Anchored Three-point Belt Restraints).

TiLite ZRA and Aero Z wheelchairs equipped with the Transit Tie-Down Option conform to the requirements of ISO 7176-19. Specifically, they have been tested in accordance with Section 5.2 (Frontal Impact), Section 5.3 (Accessibility of Securement Points Intended for Use with Four-Point Strap-Type Tie-Downs with Hook-Type End-Fittings) and Section 5.4 (Accommodation of Vehicle-Anchored Belt Restraints).

The TiLite ZRA and Aero Z wheelchairs with the Transit Tie-Down Option were tested in accordance with WC19 Section 5.3 and ISO 7176-19 Section 5.2 using a WTORS that complied with WC19 Annex D and ISO 7176-19 Annex E, respectively. The 170 lb. (77 kg) crash test dummy was secured using a three-point occupant restraint system consisting of a vehicle-anchored shoulder belt and a wheelchair-anchored lap

belt. The wheelchairs that were tested passed the frontal impact test configured as described in Table 1.

**The TiLite ZRA and Aero Z wheelchairs were tested with a Q'Straint® Q2-6322 wheelchair-anchored pelvic belt. Therefore, TiLite offers such belt as an optional accessory for these wheelchairs. TiLite strongly recommends that the TiLite ZRA and Aero Z wheelchairs be used with such Q'Straint® Q2-6322 wheelchair-anchored pelvic belt when the wheelchairs are used for occupied transit in a motor vehicle.**