



A handout from...

**The Rehabilitation Engineering
Research Center on
Wheelchair Transportation Safety**

How Safe is your Wheelchair?

As more and more wheelchair users become independent and have active work, school, and social lives, they have a larger presence in our communities. This is a positive trend, both because it indicates rising social and economic status and because being visible breaks down stereotypes and attitudinal barriers. However, transportation safety concerns arise for wheelchair riders who lead *on-the-go* lifestyles. This article will shed some light on the complicated and often technical topic of wheelchair transportation safety.

If you are a wheelchair user, and you remain seated in your wheelchair while riding in vehicles, ask yourself the following questions:

1. Does my wheelchair have the “WC19” label on it?
2. Am I familiar with wheelchair transportation standards?
3. Is my seating system manufactured by the wheelchair company or is from a different company because of my specific positioning needs?
4. Do I have equipment mounted on my wheelchair such as a lap tray or augmentative communication device?
5. Do I always secure my wheelchair to the floor of the vehicle I am riding in?
6. Do I always use a pelvic and a shoulder belt restraint when I travel?
7. How well do the shoulder and lap belts fit me?

What does a "WC19 compliant" label mean?

If your wheelchair has the “WC19 Compliant” label on it, great! This label means that the manufacturer has designed the wheelchair for use as a seat in a motor vehicle. This is a big change from when manufacturers told consumers that wheelchairs were NOT to be used as vehicle seats.

A WC19-compliant wheelchair has features that make it easier to secure with 4-point strap-type tiedowns. A WC19 wheelchair is designed so that the person securing straps can do so easily and with one hand. The wheelchair has also passed a standardized crash or sled test, and has survived with little or no structural damage. Wheelchairs that have passed standardized tests have proven their ability to withstand the forces of a 30-mph/20-g change in velocity—the same crash pulse that all automotive equipment must survive.

Part of the requirement of the WC19 standard is labeling the wheelchair and the 4 securement points so that it can be clearly recognized as ready for use as a

seat in transportation vehicles. The manufacturer can provide more information about how the wheelchair performed in testing.

Wheelchairs that are not “WC19-compliant” have not been tested as to their performance when used as seats in moving vehicles. An up-to-date listing of all WC19 compliant wheelchairs can be found on the website of the RERC on Wheelchair Transportation Safety.

What are wheelchair transportation safety standards?

Several national and international working groups have developed industry standards for transit wheelchairs and wheelchair occupant restraint systems (seatbelts for wheelchair users). RESNA (the Rehabilitation Engineering and Assistive Technology Society of North America) and ANSI (the American National Standards Institute) have collaborated to create design, performance, testing and labeling requirements for wheelchairs used in transportation.

- According to the ANSI/RESNA standards, a wheelchair must be able to withstand a 30-mph collision at 20-g with little or no structural damage.
- Wheelchairs that meet the ANSI/RESNA standards must also have at least four securement points to which a wheelchair tiedown strap can be safely attached.
- The Society of Automotive Engineers, (SAE), has developed test requirements for wheelchair tiedown systems and wheelchair occupant restraint systems. These standards dictate the manner in which tiedowns and occupant restraint systems should be designed and used. They also describe the strength of materials in order to minimize the wheelchair user’s risk of injury in the event of a crash.
- The International Standards Organization, (ISO), has developed similar standards to those that ANSI/RESNA has designed, so you will see reference to ISO standards on wheelchairs produced in other countries.
- More information on these standards can be found at:
<http://www.rercwts.org> in the Knowledge Translation section.

While these standards represent great improvement in safety for people using wheelchairs as seats in transportation, complying with standards is voluntary for manufacturers. Manufacturers are not required to comply with standards or produce products that meet them. Thus, it is critical that consumers choose wheelchairs carefully if they plan to use them as seats in motor vehicles.

Seating Systems and Mounted Equipment

Choosing a WC19 compliant wheelchair will reduce a wheelchair user’s risk of injury in the event of a crash. However, it is important to bear in mind that replacing or modifying any component of a transit wheelchair may invalidate the wheelchair’s status.

For example:

1. If you elect not to use the seating system that comes with the wheelchair, remember, the after-market seating system is not necessarily crash tested. This is especially true for custom-designed seating systems. Even if the wheelchair frame is strong enough to withstand crash forces, the seat or back of the chair may bend, break, or detach from the wheelchair frame, increasing the user's risk of injury.
2. The same thing can happen with devices mounted on wheelchairs, such as augmentative communication (AAC) devices and lap trays.

Wheelchair users who required custom or aftermarket seating systems or who use devices mounted on their wheelchairs need to carefully consider the safety of using such devices during transit.

A new ANSI/RESNA standard, WC20, is nearing completion. It will allow the independent crash testing of wheelchair seats and backs so that they can be inserted in WC19 wheelchair frames with confidence.

How important is a wheelchair tiedown system?

The ADA requires all public buses and paratransit vehicles to be equipped with 2 wheelchair stations and the securement straps needed to tie down the wheelchair to the floor of the vehicle. Privately owned vans equipped for wheelchair users should also have these tiedown straps or a crash tested docking system.

Securing a wheelchair can be time consuming. Wheelchair users who ride the bus may encounter pressure from the driver or other passengers to forego securing a wheelchair to the floor of the bus in the interest of time. However, **failing to secure the wheelchair is a dangerous practice.** A wheelchair that is not secured to the floor can become a flying object in the event of a crash. Even in normal driving, when buses swerve or stop suddenly, a wheelchair can tip or slide out of place causing injury to the rider or other passengers. **Wheelchair riders need to feel confident in asking that their wheelchair be properly secured before the bus moves.**

Do I also need a wheelchair occupant restraint system?

Wheelchair occupant restraint systems are just as important as tiedown systems. People who ride seated in their wheelchairs often lack the strength and mobility to transfer from their wheelchair into a standard vehicle seat. In a crash situation, wheelchair riders may similarly be unable to grab and hold onto safety bars or other safety equipment in the vehicle. Therefore, in the event of a crash or even just a sudden stop, the occupant restraint system may be the only thing preventing the user from being ejected from the wheelchair.

Caution! A wheelchair rider's pelvic positioning belt is not the same or equivalent to an occupant restraint belt!

Positioning belts are only intended to provide postural support. These belts are NOT designed to withstand the forces of an impact. Coming in contact with the

interior of a vehicle or being ejected is the most common cause of injury and death in a motor vehicle accident. The wheelchair occupant restraint system is crucial for wheelchair transportation safety.

As with tiedown systems, occupant restraint systems take time to secure. All public buses and paratransit vehicles are equipped with vehicle-mounted lap and shoulder restraints. Privately owned vans should also be outfitted for 3-point occupant safety restraint belts. The wheelchair rider will often require assistance to use and adjust the safety restraint. **Wheelchair users should insist on the use of the occupant restraint system, even if they feel pressured not to do so by the driver or other passengers.**

Belt Fit

Vehicle-mounted occupant restraint systems do not always fit every body shape, size and wheelchair design. If you are larger or smaller than average, or have a very tall or very short wheelchair, chances are good that vehicle-mounted occupant restraint belts will need to be adjusted to fit properly. Belts that fit poorly do not effectively prevent injury.

Wheelchair riders with tilt-in-space wheelchairs should sit as upright as possible when traveling so that the torso belt fits snugly against their collar and breast bones to restrain forward movement of the upper body.

Summary Recommendations

1. If you sit in your wheelchair while riding in vehicles, be sure the wheelchair is WC19 compliant." When you get a new wheelchair ask for one that complies with the transportation standard.
2. If your current wheelchair is not WC19 compliant, use as many safety precautions as possible, such as:
 - a. Sit facing toward the front of the vehicle.
 - b. Secure all 4 securement straps to your wheelchair.
 - c. Use the 3-point vehicle mounted occupant restraint.
3. Remove and stow any equipment mounted to your wheelchair that might come loose in the event of a crash.
4. Insist that all 4 straps be used to secure your wheelchair to the floor of the vehicle. Take the extra time and buckle up the 3-point occupant restraint.
5. Stay informed about the progress of wheelchair transportation safety research so that you can take advantage of new technology as soon as it becomes available.

For more information on wheelchair transportation or visit:

www.ercwts.org

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