

Safety Tips for Providers of Wheelchair Accessible Personally Licensed and Para-Transit Vehicles

Attention: Vehicle conversion companies and modifiers

Transportation safety tips for modifying a personally licensed or paratransit vehicle for use by a Wheelchair-Seated Passenger using a Four-Point Strap-Type Securement System.

Always follow the National Mobility Equipment Dealers Association (NMEDA) guidelines to ensure that adaptive vehicle equipment is installed and vehicle modifications are completed according to the highest level of industry standards and best practices. Below are key points included in the NMEDA guidelines and as well as additional tips to improve transportation safety for people who travel in a vehicle while seated in a wheelchair. For more information, refer to the Ride Safe Brochure found here wc-transportation-safety.umtri.umich.edu.

- 1) Always position the clients facing forward in the vehicle.
- 2) Install a four-point, strap-type tiedown system that meets all applicable requirements of voluntary standard RESNA WC18 or ISO 10542-1. These systems will be labeled either with this target symbol or with the words 'Conforms with ISO 10542-1:2012'.



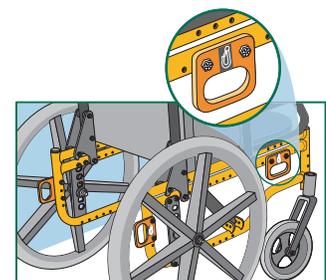
- Follow the securement system manufacturer's instructions during installation, using all fasteners, backing plates, etc. as indicated and/or supplied by the manufacturer.
- Anchorages for the four-point tiedown system shall not be attached to any movable or detachable vehicle components.

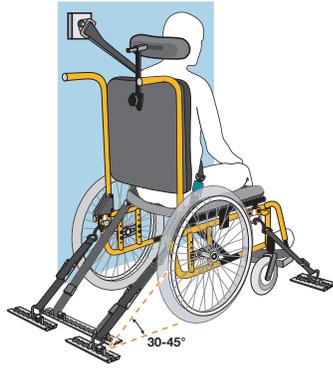
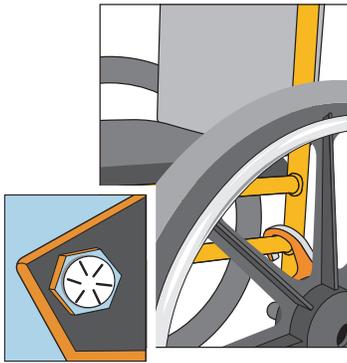


- When possible, install the floor anchor points for the rear tiedown straps of a four-point system directly behind the rear securement points on the wheelchair. If possible, the front tiedown anchor points should be installed so that they are spaced wider than the wheelchair to increase lateral stability while traveling.

- 3) Attach the tiedown straps or hooks to the wheelchair.

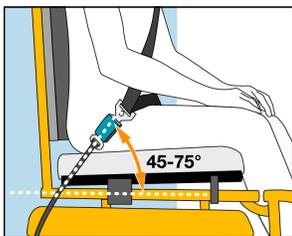
- Recommend that clients use a wheelchair that is designed and tested for use as a seat in motor vehicles, often referred to as a WC19 wheelchair or a transit wheelchair. These wheelchairs comply with voluntary standard RESNA WC19 and have four crash-tested securement points where tiedown straps and hooks can easily be attached.





- If clients do not have a WC19 wheelchair, it is best to attach the tiedown straps or hooks to welded junctions of the wheelchair frame or to other structural areas where the frame is fastened together with hardened steel bolts – indicated by six raised lines or bumps on the bolt head.
 - Never attach tiedown straps and hooks to any movable or detachable wheelchair components such as armrests, footrests, or wheels.
 - Choose structural securement points as close to the seat surface as possible to provide greater wheelchair stability during travel.
 - It is best if the rear securement points are high enough to result in angles of rear tiedown straps between 30 and 45 degrees to the horizontal.
 - Check that tiedown straps are not contacting or near any vehicle or wheelchair edges that may cause wear or shredding.

- 4) After installing the securement system and attaching the tiedown straps and hooks to the wheelchair, tighten the straps to remove all slack. The wheelchair should not be able to move more than ½ inch in any direction while the vehicle is maneuvering under normal conditions.
- 5) When possible, use the lap and shoulder seatbelts installed by the vehicle manufacturer as the primary restraint for the clients. Removal of the vehicle seat from the wheelchair station will usually require that an aftermarket component with a compatible seatbelt buckle receptacle be used to complete the lap/shoulder belt system.



- The aftermarket component with the buckle receptacle should be anchored to the vehicle floor near the inboard side of the wheelchair so that a forward lap belt angle of 45 to 75 degrees to the horizontal is achieved when the lap belt is positioned properly on the client's lower pelvis and upper thighs.
 - It is best for the buckle receptacle to be located above the vehicle floor by a stiff cable stalk or other structure so that the clients or their caregivers can reach it easily for seatbelt buckling or so that the lap portion of a pre-buckled seatbelt can be easily positioned over the client's thighs when they move forward into the wheelchair station.
 - The seatbelt buckle receptacle should be placed against the client's body near their hip and should not be in contact with or close to rigid wheelchair components that could contact the buckle release button or cause failure of the buckle cover during impact loading in a crash.
- 6) If an aftermarket lap and/or shoulder belt must be added to the vehicle to restrain the occupant (i.e., the original vehicle equipment will not work), use equipment that has been crash tested to RESNA WC18 or ISO 10542-1, and that has a permanent label indicating compliance with either of both of these voluntary industry standards.

- The lap belt ends should be anchored to the vehicle floor near the sides of the wheelchair so that a forward lap belt angle of 45 to 75 degrees to the horizontal is achieved when the lap belt is positioned properly on the client's lower pelvis and upper thighs.
- The seatbelt buckle receptacle should be placed against the client's body near their hip and should not be in contact with or close to rigid wheelchair components that could contact the buckle release button or cause failure of the buckle cover during impact loading in a crash.

6) Do not sew, pin, tie or otherwise modify the webbing of the original vehicle or aftermarket seatbelt systems.

7) If the client has armrests that are closed at the front:

- Recommend that the client retrofit their wheelchair with armrests that are open at the front (i.e., cantilevered from the back support) when possible. This will allow a lap belt to slide under the armrest and into contact with pelvis and upper thighs so that it fits snugly around the hips.



- If a retrofit is not possible, recommend that they pivot the armrests back or sideways out of the way or thread the lap belt through the gap between the armrest and the wheelchair back support so that the lap belt will contact them low on the pelvis near the thighs.

- Avoid routing the seatbelt over top of the armrests so that the lap belt is up on the client's belly and avoid routing around the front of the armrest structure so that there is a gap between the client's pelvis and the belt. Risk of injury in a crash is much higher with the poor seatbelt fit created by these routings.

8) The shoulder-belt portion of the three-point belt should cross over the middle of the left shoulder and diagonally across the center of the chest. The D-ring guide of the vehicle seatbelt will ideally be positioned above and behind the top of the client's shoulder so that the belt webbing makes good contact with the shoulder and chest while traveling.



9) Encourage the clients to use postural supports (i.e., belts, padded bars, lateral trunk supports, etc.) to improve the positioning and effectiveness of seatbelt restraints and to help maintain their balance when entering and exiting vehicles or during travel. But, clients seated in wheelchairs must always use a crashworthy lap and shoulder belt restraint as the primary occupant-protection system during travel.



10) Encourage the clients to use their wheelchair headrest. If they have one or if a vehicle-mounted headrest is to be installed, recommend that it be positioned so that it extends higher than the user's ears and is less than 2 inches from the back of the head to help reduce the risk of neck injuries during rear-end crashes.

11) When possible, cover or fill vehicle seat floor pockets in the wheelchair station to make maneuvering easier for the wheelchair user.