

Low Volume Vehicle Technical Association Incorporated

Low Volume Vehicle Standard

45-60(02)

(Disability Transportation Systems)

This Low Volume Vehicle standard corresponds with a number of Land Transport Rules, but principally Land Transport Rule 32011 - Seatbelts and Seatbelt Anchorages 2002, and Land Transport Rule 31001 - Passenger Service Vehicles 1999



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Signed in accordance with clause 1.5 of the Low Volume Vehicle Code, on.....by:
 on behalf of the New Zealand Transport Agency: on behalf on the Low Volume Vehicle Technical Association(Inc):

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Note that highlighted text shows amendments that have been made subsequent to the document's previous issue, and a grey vertical stroke to the left of the text denotes information that is of a technical (rather than a formatting) nature.

Overview

Background

The Low Volume Vehicle Technical Association Incorporated (LVVTA) represents ten specialist automotive groups who are dedicated to ensuring that vehicles, when scratch-built or modified, meet the highest practicable safety standards. The information in these standards has stemmed from work undertaken by LVVTA founding member organisations that commenced prior to 1990 and has been progressively developed as an integral part of NZ Government safety rules and regulations by agreement and in consultation with the New Zealand Transport Agency. As a result, the considerable experience in applied safety engineering built up by LVVTA and the specialist automotive groups over the past twenty years can be of benefit to members of the NZ public who also wish to build or modify light motor vehicles.

Availability of low volume vehicle standards

Low volume vehicle standards are developed by the LVVTA, in consultation with the New Zealand Transport Agency, and are printed and distributed by the LVVTA. The standards are available to the public free of charge from the LVVTA website; www.lvvt.org.nz

Further information on the availability of the low volume vehicle standards may be obtained by contacting the LVVTA at info@lvvt.org.nz.

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Associated information

Other associated information relevant to the subject matter contained in this low volume vehicle standard, which in the interest of comprehensiveness, should be read in conjunction with this standard, includes:

Document	Page #/Section/Chapter
• LVVTA News August-December 2014 Issue 50	Page 5 Disability Vehicle Brake Testing – Relaxation of Requirements
• LVVTA News May-July 2015 Issue 52	Page 3 Well-designed Disability Vehicle Achieves LVVTA Series-Production Approval
• LVV Standard 155-20 (Door Retention Systems)	Relevant requirements for electrically-opening doors
• LVV Standard 175-00 (Seatbelt Anchorages)	Relevant requirements for seatbelt anchorages
• LVV Standard 185-00 (Seats & Seat Anchorages)	Relevant requirements for seats and anchorages

Note that all documents referred to in this table, with the exception of the [NZ Car Construction Manual](#), can be accessed from www.lvvt.org.nz free of charge. For information on obtaining the [NZ Car Construction Manual](#), contact info@lvvt.org.nz

Note also that paper copies of documents can become out of date and as such should not be relied upon, therefore LVVTA advises users of this standard to check to ensure that the Associated Information listed here is current, by going to www.lvvt.org.nz/standards.html

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Disability Transportation Systems

(45-60[02])

Purpose of this standard

The purpose of this low volume vehicle standard is to specify technical requirements for the design, construction, and attachment of special equipment and systems that are intended to aid people with disabilities to safely enter and exit, and be safely seated in a motor vehicle during normal vehicle operation, and to minimise the likelihood of injury to a disabled occupant in the event of a collision.

This low volume vehicle standard takes into consideration that some disabled people must, due to the nature of their disability, remain seated in their wheelchair whilst travelling, and that in some cases the wheelchair that best meets the needs of the disabled person's physical condition may not be best-suited for optimum protection in the event of a motor vehicle collision. This situation is a world-wide conundrum, but it is generally recognised that whilst some additional risk may exist for the people concerned, this situation must be balanced against disabled people's basic needs and rights for mobility, and care must be taken not to exclude the availability of transportation for wheelchair-dependent people.

Further, this low volume vehicle standard also recognises that there must be a carefully-drawn balance between specifying optimum levels of safety for disabled people in the event of a motor vehicle collision, against providing the broadest possible range of vehicle sizes, configurations, and budgets for those people and their families to choose from, in order to enable the needs of everyone concerned to be best met. The standard recognises that there are some smaller vehicles available on the market that provide an excellent option for some families – perhaps those with a light child in a non-powered wheelchair - who neither need, nor can manage, a full-size converted cargo van with a 300 Kg-rated wheelchair hoist.

Section 1 Scope and application of this standard

1.1 Scope of this standard

- 1.1(1) This low volume vehicle standard applies to all light vehicles, other than those specified in 1.1(2), that have:
- (a) 9 seating positions or less, and are fitted with disability transportation equipment or systems on or after 1 January 1992; or
 - (b) more than 9 seating positions, and are fitted with disability transportation equipment or systems on or after 1 March 1999.

NOTE: The requirement for LVV certification in the case of disability transportation equipment or systems was triggered by the introduction of a number of Transport (Vehicle Standards) Regulations. These are: Interior Impact (with an application date of 1 January 1992); Seatbelt Anchorages (with an application date of 1 January 1992 for vehicles with 9 seats or less and 1 March 1999 for vehicles with more than 9 seats); and Seats and Seat Anchorages (with an application date of 1 October 2004). Because most light vehicles fitted with disability transportation equipment or systems incorporate retro-fitted seatbelt anchorages (either directly to the vehicle or via wheelchair restraints), the dates of 1 January 1992 and 1 March 1999 are the application dates of this low volume vehicle standard.

1.1(2) This low volume vehicle standard does not apply to:

- (a) powered bicycles of Class AB; or
- (b) motorcycles and mopeds of Class LA, LB, LC, or LD; or
- (c) light trailers of Class TA or TB; or
- (d) those vehicles specified in *section 4*.

1.2 **Application of this standard**

1.2(1) A light vehicle that is fitted with disability transportation equipment or systems as in *1.1(1)*, becomes a low volume vehicle, and must:

- (a) be certified in accordance with the procedures specified in *chapter 2* of the *Low Volume Vehicle Code*; and
- (b) unless *section 3* applies, comply with all applicable technical requirements contained in *section 2* of this standard.

NOTE 1: Where a light vehicle is required to be certified to the *Low Volume Vehicle Code*, but the modification date precedes the date upon which this standard takes effect (1 February 2012), an LVV Certifier must ensure that the vehicle meets the general safety requirements contained in *2.1* of this standard, and should use the applicable technical requirements of *section 2* of this standard as a guideline upon which to base his judgements on the safety of the vehicle.

NOTE 2: It is recognised that in many cases an LVV Certifier will be assessing numerous and varied aspects of a vehicle fitted with disability transportation equipment and systems, and establishing the suitability of that equipment and those systems for the user, without having the benefit of the user or the user's wheelchair being present.

This difficult situation is unavoidable due to the nature of the industry, and due to the fact that (unlike most other low volume vehicle standards) this standard goes beyond just the application of straight-forward technical requirements. This situation is understood and accepted in the most common cases where the wheelchair occupant is a passenger, and on that basis the LVV Certifier must do the best he can, equipped with the information that he has available to him.

The LVV Certifier must, where practical, in the case of private users, establish the approximate weight of the wheelchair occupant and the type and weight of wheelchair being used.

NOTE 3: Whilst LVV Standard 45-60 (Disability Transportation Systems) does not require an occupational therapist to be involved in driver assessment as part of the LVV certification process, a driving assessment will still be required (as a separate process) by the Ministry of Health as part of their 'equipment and modification service' funding criteria. LVVTA recommends that any members of the disabled public who are not accessing equipment and modification service funding through the Ministry of Health should seek the help of a suitably qualified person to ensure that all modifications meet the individual needs of the disabled driver.

Section 2 Technical requirements of this standard

2.1 General safety requirements

General operational safety

- 2.1(1) A low volume vehicle must:
- (a) be designed and constructed using materials and components that are fit for their purpose; and
 - (b) be safe to be operated on the road.

NOTE: The requirements specified in 2.1(1) are selected from 2.3 of Part 2 of the *Low Volume Vehicle Code*, reproduced here in the interest of convenience, and are over-riding requirements which make it clear that, regardless of what technical requirements are or are not in place, every vehicle certified to the *Low Volume Vehicle Code* must be fit for its purpose, and must be safe.

Tradesman-like manner

- 2.1(2) Any mechanical, engineering, or fabrication work associated with a modification or construction feature in a low volume vehicle must:
- (a) be carried out in a thorough, tidy, and tradesman-like manner; and
 - (b) follow sound automotive engineering principles.

NOTE 1: 2.1(2)(a) specifies that it is an expectation of the LVV certification system that modification work is not only compliant and safe, but is carried out to a reasonable standard. Engineering work that - whilst compliant and safe - has been executed in a manner that makes the job rough or crude in appearance, can bring the LVV certification system into disrepute through observers' perception (rightly or wrongly) of any such work. This in turn can lead to complaint investigations being raised, which can consume time unnecessarily.

NOTE 2: 'Automotive engineering principles' referred to in 2.1(2)(b) is intended to mean those top-end quality engineering principles employed throughout the light passenger vehicle manufacturing industry, and not industrial equipment such as fork-lifts.

Entry, exit, and restraint of wheelchair occupants

- 2.1(3) All disability transportation systems and equipment installed in a low volume vehicle for the purpose of assisting a person in a wheelchair to enter and exit the vehicle must provide the greatest practical level of safety for the wheelchair occupant.

NOTE: Hand-holds should be provided for wheelchair occupants wherever possible, particularly during the entry and exit of the vehicle. Note that hand-holds are mandatory for passenger service vehicles.

- 2.1(4) All disability transportation systems and equipment installed in a low volume vehicle for the purpose of restraining a person in a wheelchair within a vehicle, must:
- (a) enable the wheelchair occupant to be correctly and safely restrained within the wheelchair during normal vehicle operation; and
 - (b) reduce the likelihood of injury to the wheelchair occupant as much as can be practicably achieved in the event of a collision.

Interior impact issues for wheelchair occupants

- 2.1(5) All disability transportation systems and equipment installed in a low volume vehicle, together with any other seating or other aspects of a vehicle's modifications, must be carried out so that:
- (a) there are no surfaces, fixtures, or fittings that may present a hazard to any wheelchair occupant whilst entering, travelling in, or exiting the vehicle; and
 - (b) any applicable requirements of *Low Volume Vehicle Standard 155-40 (Interior Impact)* are met.

NOTE: Particular attention must be paid to hard or sharp surfaces or items that may be adjacent to or near a wheelchair occupant's head-strike area, such as exposed seat frames and hinging and latching mechanisms of seats that are folded upward to enable access for wheelchair occupants, and other disability transportation equipment such as hoists and personal transfer devices.

Floors in vehicles that transport wheelchair occupants

- 2.1(6) A low volume vehicle used to transport one or more wheelchair occupants must have a floor that is predominantly flat throughout the area where a wheelchair may travel, with no steps, corrugations, protruding latches, or any other obstructions, items, or surfaces that may impede wheelchair movement, or which may trip any person walking through the inside of the vehicle.

NOTE: Professionally-manufactured disability transportation equipment such as tracks and fittings that incorporated tapered edges and are fitted as closely as possible to the floor surface, are not considered to be items that would impede wheelchair movement, or act as tripping hazards, as referred to in 2.1(6).

Hazards from moving parts during equipment operation

- 2.1(7) Any equipment or systems installed in a low volume vehicle for the purpose of assisting a disabled person in a wheelchair to enter, travel in, and exit the vehicle, must be designed and installed in such a way that, during any cycles of movement such as swinging in or out, or raising and lowering:
- (a) the equipment maintains clearance between any of its moving parts and any part of the vehicle to which it is attached; and
 - (b) when operated correctly, the likelihood of any parts of the equipment being able to pinch, shear, cut, or entrap a disabled person, care-giver, or any part of a wheelchair, are minimised as much as is practicable.

Safe operation of controls

- 2.1(8) Any equipment or systems installed in a low volume vehicle for the purpose of assisting a disabled person in a wheelchair to enter, travel in, and exit the vehicle, must be designed so that a care-giver can safely control the process of loading and restraining a wheelchair occupant, whilst minimising the likelihood of injury to either the care-giver or wheelchair occupant.

Externally-mounted equipment

- 2.1(9) An externally-mounted wheelchair hoist or external wheelchair stowage system fitted to a low volume vehicle must:
- (a) incorporate a clamping or latching system that prevents any part of the hoist or wheelchair from swinging out during vehicle operation; and
 - (b) comply with any applicable requirements of *Low Volume Vehicle Standard 100-30 (External Projections)*.

Effects on vehicle warning systems and lights

- 2.1(10) A modification made to a low volume vehicle for the purpose of transporting a disabled person must not:
- (a) obscure driver information systems, such as warning lights; or
 - (b) obscure any of the vehicle's exterior lighting equipment; or
 - (c) unreasonably restrict access to parts of the vehicle which require regular servicing activities, such as light-bulb replacement.

Vehicle load-carrying capacity

2.1(11)

Any equipment or systems installed in a low volume vehicle for the purpose of assisting a disabled person in a wheelchair to enter, travel in, and exit the vehicle, together with the wheelchair(s), occupants, and luggage that can be carried in the vehicle, must not cause the vehicle to:

- (a) exceed the manufacturer's gross vehicle mass or any axle rating; or
- (b) exceed the maximum load carrying capacity of the wheels or tyres fitted to the vehicle.

NOTE: Where a vehicle has the ability to accommodate multi-combination seating situations, such as seats that fold-up in order to make way for one or more wheelchair positions, each combination should be assessed.

Vehicle and equipment safe working load rating

2.1(12)

A low volume vehicle that is used to transport one or more disabled persons must be issued with a vehicle and equipment safe working load (VESWL) rating which establishes:

- (a) the load-carrying capacity of the vehicle, which is calculated by subtracting the post-modification tare from the vehicle manufacturer's GVM; and
- (b) the safe working load rating of the wheelchair hoist or ramp; and
- (c) the safe working load rating of the wheelchair restraint systems for each wheelchair position.

NOTE 1: The 'post-modification tare' referred to in 2.1(12)(a) is the actual weight of the vehicle (measured over a weighbridge) with all additional post-modification seats, hoist, restraint systems, and other disability transportation systems and equipment.

NOTE 2: When determining the payload, the vehicle's GVM must be based on the vehicle manufacturer's information, and not a Japanese de-registration certificate, which are often incorrect.

NOTE 3: A figure of 80 Kg **must** be applied where any calculations are being carried out to allow for the weight of a wheelchair occupant.

NOTE 4: An LVV Certifier must be satisfied, through either documented evidence or thorough visual inspection and assessment, that every wheelchair anchorage used to secure a wheelchair into a vehicle, is capable of supporting the safe working load rating of the wheelchair restraint system that is attached to it.

NOTE 5: The ability of a wheelchair anchorage to support the safe working load rating of any wheelchair restraint system must be calculated at 20G. For example, the load which a wheelchair anchorage must withstand in the case of an 85 Kg wheelchair restraint strap is: $85 \text{ Kg} \times 20 = 1700 \text{ Kg}$.

2.1(13)

The vehicle and equipment safe working load rating must be recorded on an LVVTA-issued VESWL label, affixed on a vehicle window immediately adjacent to the wheelchair entry and exit point, in such a way that it can be easily seen by the wheelchair occupant and the care-giver.

NOTE: To clarify the intended consequences of 2.1(12) and 2.1(13); part of an LVV Certifier's responsibility in relation to certifying a vehicle against this low volume vehicle standard is to establish the vehicle's new payload (post-modification), the safe working load of the wheelchair hoist, and the safe working load of the wheelchair restraint system. The LVV Certifier will provide these three figures to enable the vehicle and equipment safe working load (VESWL) capacity, in order to enable the VESWL label to be produced by LVVTA, and affixed by the LVV Certifier to the window nearest the wheelchair entry and exit point.

An occupational therapist or other suitably-qualified person involved in the assessment of a disabled person will be able to use this VESWL label as a means of ensuring that the vehicle and its equipment can be safely used for its intended purpose. This process saves the assessor from having to make technical judgements in relation to the vehicle or its equipment, which he or she may not be qualified or willing to do, and instead can simply determine that all aspects of the vehicle – by its VESWL label – is appropriate for the combined mass of their client and their client's wheelchair.

2.2 Wheelchair crane and winch requirements

2.2(1) A wheelchair crane and winch system may be installed into the rear cargo area or the rear passenger compartment area of a low volume vehicle, provided that:

- (a) the crane is securely bolted to the vehicle structure; and
- (b) the crane and winch is intended only for lifting wheelchairs or mobility scooters without occupants; and
- (c) unless impact protection is provided to the equipment, any parts of the crane and winch system within 300 mm of any vehicle occupants has no sharp edges or protrusions; and
- (d) the crane and winch does not unreasonably restrict the entry or exit of any door by any passengers that rely on that door for entry and exit.

2.2(2) A wheelchair crane and winch system must be attached to the structure of a low volume vehicle by a secure attachment system that is capable of withstanding a collision force of:

- (a) in the forward direction, 20 times the weight of the crane and winch system; and
- (b) in the rearward direction, 10 times the weight of the crane and winch system; and
- (c) in the sideways direction, 15 times the weight of the crane and winch system.

NOTE: The process of assessing the requirements specified in 2.2(2) should take into consideration the centre of gravity of the crane and winch system.

2.3 Wheelchair hoist requirements

Wheelchair hoist types

- 2.3(1) A wheelchair hoist fitted to a low volume vehicle must be a professionally-manufactured wheelchair hoist that is designed specifically as a wheelchair hoist for transferring disabled people.

NOTE: A hoist that is designed and manufactured for the purpose of lifting goods (as opposed to being designed and manufactured as a wheelchair hoist) may only be used for lifting an unoccupied wheelchair.

- 2.3(2) A wheelchair hoist fitted to a low volume vehicle may be either:
- (a) a fixed electric, manually-powered, or hydraulic lifting device; or
 - (b) a removable type, designed for a care-giver or wheelchair occupant to stow.
- 2.3(3) A wheelchair hoist fitted to a low volume vehicle may be designed for lifting or transferring either:
- (a) a wheelchair together with its occupant; or
 - (b) an unoccupied wheelchair only.

Wheelchair hoist information

- 2.3(4) A wheelchair hoist installed in a low volume vehicle for the purpose of assisting a disabled person in a wheelchair to enter and exit the vehicle, must be provided with information, either written in English or using clear and comprehensive illustrations, and positioned in such a place that can be easily found and read by any user, that includes:
- (a) the product make, model, and serial number; and
 - (b) the manufacturer's specified safe working load rating; and
 - (c) operating instructions for the safe use of the equipment.

Wheelchair hoist safe working load rating

- 2.3(5) The minimum safe working load rating of a wheelchair hoist fitted to a low volume vehicle must be:
- (a) in the case of any hoist fitted to a passenger service vehicle, 300 Kg; and

- (b) in the case of an aftermarket hoist fitted to a vehicle that is not a passenger service vehicle, 150 Kgs; and
- (c) in the case of a specialised combination wheelchair hoist and wheelchair fitted to a vehicle that is not a passenger service vehicle, 100 Kgs.

NOTE 1:	<p>An 'aftermarket' hoist as referred to in 2.3(5)(b) is typically a hoist that is manufactured by the aftermarket industry for retro-fitment into a vehicle to be used for disability transportation purposes.</p> <p>A 'specialised combination wheelchair hoist and wheelchair' referred to in 2.3(5)(c) is typically an integrated wheelchair hoist with its own dedicated wheelchair, that are purpose-designed to work with each other, and which is incorporated into a vehicle immediately post-production by a secondary manufacturer. These systems are intended for non-powered wheelchairs only, and are therefore typically rated for 100 to 150 Kgs. Such systems are typically found in small Japanese import vehicles, such as the Toyota Porte.</p>
NOTE 2:	<p>Due to the differing needs and constraints of families and care-givers (as opposed to a passenger service vehicle), and the wide variation in wheelchair and occupant weights, there must be some flexibility provided as to the type of wheelchair hoists (which can in turn determine the type of vehicles required to carry them) so as to enable a family or care-giver to use a wheelchair hoist and vehicle that meets their specific needs.</p> <p>The minimum safe working load of a wheelchair hoist fitted to a low volume vehicle in private use, must, therefore, be suited to its application, and be fit for its intended purpose, hence the different safe working load ratings provided under 2.3(5).</p>
NOTE 3:	<p>The safe working load of a wheelchair hoist fitted to a low volume vehicle must be recorded on the LVV certification plate, and must not be exceeded during use.</p>

Re-rating of wheelchair hoist safe working load

- 2.3(6) A wheel-chair hoist fitted to a low volume vehicle must not have the safe working load rating assigned by the hoist manufacturer re-rated or changed.

Wheelchair hoist platform size

- 2.3(7) A wheelchair hoist fitted to a low volume vehicle must incorporate a platform that:
- (a) in the case of a wheelchair hoist for a passenger service vehicle, is of a size of not less than:
 - (i) 800 mm in useable width; and
 - (ii) 1280 mm in useable length, and in all cases of sufficient length so that the occupant's feet are contained within the outer perimeter of the platform; and
 - (b) in the case of a wheelchair hoist for private use, is of a size of not less than;

- (i) 680 mm in useable width; and
- (ii) 1000 mm in useable length, and in all cases of sufficient length so that the occupant's feet are contained within the outer perimeter of the platform.

NOTE: Wherever possible, the LVV Certifier should view the occupant in his or her wheelchair on the hoist to ensure that the hoist platform is of a suitable size for the application. It is recognised however, that for various reasons, this will not always be possible.

Wheelchair hoist edge barrier and roll-stop protection

2.3(8) A wheelchair hoist fitted to a low volume vehicle must incorporate:

- (a) fixed or locking edge barriers that are 70 mm in height so as to prevent the wheelchair from rolling off either side of the hoist when in use; and
- (b) inner and outer roll-stops that are designed and attached so as to prevent the wheelchair from rolling forwards or backwards off the hoist when in use, that:
 - (i) are of a height of not less than 70 mm; and
 - (ii) have a positive lock or interlock device that prevents unintentional dropping of the roll-stops whilst the hoist is in use.

NOTE 1: In most cases, an 'approach flap' becomes the 'outer roll-stop'. An 'inner roll-stop' is also known as a 'bridging flap'. An 'inner roll-stop' or 'bridging flap' should, as well as providing a smooth entry into the vehicle, prevent entrapment of the wheelchair occupant's feet between the hoist platform and the vehicle.

NOTE 2: In the case of under-floor 'cassette'-type wheelchair hoists (as typically found in small Japanese import vehicles, where the systems are incorporated into the vehicle when brand new by a secondary manufacturer) the edge barriers may be less than 70 mm in height as required by 2.3(8)(a).

NOTE 3: It is recommended that where a vehicle carries more than one wheelchair, a barrier or other system is fitted that will prevent a wheelchair from being able to unintentionally exit from the vehicle floor when the hoist is below the vehicle floor level.

NOTE 4: If a hoist has an integrated arm system that prevents the wheelchair from moving sideways off the platform, fixed or locking edge barriers may be of a height of less than the 70 mm required by 2.3(8)(a).

Traversing gaps and steps on wheelchair hoists

2.3(9) A wheelchair hoist fitted to a low volume vehicle must not incorporate any:

- (a) channels that a wheelchair must traverse which are greater than 15 mm across; or
- (b) steps or obstructions that a wheelchair must traverse which are greater than 12 mm high.

Wheelchair hoist surface, markings, and illumination

2.3(10) The platform, and inner and outer roll-stops of a wheelchair hoist fitted to a low volume vehicle must be made from, or covered in, a slip-resistant material or finish on any areas where the wheelchair wheels can contact the platform or barriers.

2.3(11) Any platform sides of a wheelchair hoist fitted to a low volume vehicle that extend outside the vehicle perimeter must have high-visibility markings applied, that will be clearly visible to other motorists.

NOTE: In the case of a hoist that deploys to the rear of a vehicle, the 'perimeter' as specified in 2.3(11) includes the open rear doors, so high visibility markings are only required on hoist platforms that extend further than those doors.

2.3(12) A vehicle to which a wheelchair hoist is fitted, must be equipped with a means of illuminating the fully-extended wheelchair hoist, so as to enable the safe use of the hoist during darkness.

NOTE: The vehicle's original interior lights may meet the requirement specified in 2.3(12) provided that the light is bright, and directed to the exterior.

Wheelchair hoist operation

2.3(13) A wheelchair hoist fitted to a low volume vehicle must operate:

- (a) in a free, controlled, and reliable manner, with no 'jerking'; and
- (b) with all functions provided by the hoist manufacturer in good working order; and
- (c) in the case of a hydraulically-actuated hoist, without any hydraulic fluid leaks.

2.3(14) The control system for the operation of a wheelchair hoist fitted to a low volume vehicle must:

- (a) be positioned in a convenient location on the left-hand side of the vehicle; and
- (b) be clearly and durably marked in such a way that all control functions can be readily understood and applied; and
- (c) in the case of an electrically or hydraulically-powered hoist, provide actuation by a momentary switch, so that hoist operation can only be achieved by the application of constant pressure on the switch.

Wheelchair hoist safety systems

- 2.3(15) A wheelchair hoist fitted to a low volume vehicle that is deployed through an electric and hydraulic means, must incorporate safety devices that:
- (a) in the event of an electrical or hydraulic failure, prevent a sudden descent of the hoist; and
 - (b) prevent accidental stowage of the platform when a wheelchair is still on the platform; and
 - (c) audibly or visually alert the driver that that the hoist has not been stowed; and
 - (d) in the case of a hoist that powers down, ensures that the hoist ceases lowering when the platform has reached the ground, in order to prevent 'jacking' of the vehicle.

NOTE 1: In order to comply with 2.3(15)(a), a velocity fuse, flow-valve, or similar feature must be incorporated into the hoist's safety systems.

NOTE 2: In order to comply with 2.3(15)(b), an inter-lock or similar feature must be incorporated into the hoist's safety systems.

NOTE 3: A suitable method of compliance with 2.3(15)(c) is a door-open warning light, provided that this is a reliable indicator that a hoist is not fully stowed.

NOTE 4: The term 'powers down' in 2.3(15)(d) refers to a system where the hoist lowers under power, as opposed to, as some systems do, lower by gravity.

- 2.3(16) A wheelchair hoist must incorporate a safety device, that in the event of an electrical failure, enables a manual means by which to operate the hoist, if:
- (a) the hoist is an electric and hydraulic hoist; or
 - (b) the hoist is an electric only hoist and there is not a ready means of exit available to the wheelchair occupant; or
 - (c) the hoist is fitted to a passenger service vehicle.

NOTE: A ready means of exit, as specified in 2.3(16)(b), intends that the occupant can exit the vehicle without his or her wheelchair, with assistance from a care-giver, rather than have a clear path to wheel a wheelchair out of the vehicle.

Wheelchair hoist electrical system

- 2.3(17) An electrically-operated wheelchair hoist fitted to a low volume vehicle must incorporate:

- (a) an electrical overload device positioned as closely as possible to the vehicle's battery; and
- (b) an isolation or interlock device; and
- (c) a battery supply cable that is:
 - (i) well secured at regular intervals; and
 - (ii) routed in such a way as to remain clear of the exhaust system, moving components, and sharp edges; and
 - (iii) protected by a cable cover at any points where it makes contact with the vehicle body.

Wheelchair hoist manufacture

2.3(18) All components within a wheelchair hoist fitted to a low volume vehicle must:

- (a) be coated with a permanent anti-corrosive protection; and
- (b) have the sharpness of all corners and edges that are contactable by occupants or care-givers minimised as much as practicable.

Fasteners used within wheelchair hoist manufacture

2.3(19) Fasteners used in the assembly of a wheelchair hoist fitted to a low volume vehicle must:

- (a) be in good condition; and
- (b) be of an appropriate size for the application; and
- (c) be secured with nyloc nuts, spring washers, or other vibration-proof locking devices; and
- (d) in the case of a fastener relied upon for the safe operation of the hoist:
 - (i) have the correct shank area for the application; and
 - (ii) have a tensile strength of not less than grade-8.8 metric (grade-5 imperial); and
 - (iii) if of a higher tensile strength than grade-8.8 metric (grade-5 imperial), not be electroplated unless the electroplating process is carried out as part of the manufacturing process of the fastener by the fastener manufacturer.

Wheelchair hoist positioning

- 2.3(20) A wheelchair hoist fitted to a low volume vehicle must be positioned within the vehicle as far from other seated occupants as practicable, in order to minimise the likelihood of other vehicle occupants contacting the wheelchair hoist in the event of a collision.
- 2.3(21) A wheelchair hoist fitted to a low volume vehicle must deploy only to the left side or rear of the vehicle.

Wheelchair hoist installation

- 2.3(22) A wheelchair hoist must be attached to the structure of a low volume vehicle by a secure attachment system that is capable of withstanding a collision force of:
- (a) in the forward direction, 20 times the weight of the wheelchair hoist; and
 - (b) in the rearward direction, 10 times the weight of the wheelchair hoist; and
 - (c) in the sideways direction, 15 times the weight of the wheelchair hoist.

NOTE: The process of assessing the requirements specified in 2.3(22) should take into consideration the centre of gravity of the wheelchair hoist.

- 2.3(23) A mounting system for a wheelchair hoist must not be welded to a floor section of a production vehicle, unless the welding is carried out in accordance with written specifications approved by the vehicle manufacturer.
- 2.3(24) The installation of a wheelchair hoist into a low volume vehicle must:
- (a) be in accordance with the wheelchair hoist manufacturer's installation instructions; and
 - (b) be designed so as to spread the wheelchair hoist's applied loads directly into the chassis or sub-frame rails or cross-members.

NOTE 1: The design of a wheelchair hoist installation must take into account that the hoist, and therefore the vehicle structure to which the hoist is attached, will be subjected to considerable leverage loads, in some cases equivalent to over 1500 Kg where a combined wheelchair and occupant load of 300 Kg is cantilevered out from where the hoist is mounted. The installation must be such, therefore, that the potential wheelchair and occupant loads are spread widely enough that the vehicle structure can safely cope with the ongoing cyclic fatigue loads that may be applied by the loaded wheelchair hoist.

NOTE 2: In any case where a wheelchair hoist is likely to apply especially high loads into the vehicle structure, or where an LVV Certifier is unsure about the vehicle structure's ability to withstand the repeated loads, LVVTA recommends a reinforcement system for a wheelchair hoist installation where the main post of the hoist is supported back to the cant rail, waist rail, or wheel-arch, or combination thereof. Such a reinforcement system is highly recommended for any 300 Kg applications.

- 2.3(25) In the case of the modification to, or trimming of, any material within a chassis section, sub-frame section, or cross-member necessitated by the installation of a wheelchair hoist into a low volume vehicle, the original strength of the chassis, sub-frame, or cross-member must be reinstated to at least that of its original strength by additional bracing, gussets, or additional material.

NOTE: Modifications to chassis sections, sub-frame sections, or cross-members, should not take place during the process of a normal wheelchair hoist installation. 2.3(25) is aimed at major modification work associated with a lowered-floor self-drive system.

Wheelchair hoist installation assessment

- 2.3(26) The installation of a wheelchair hoist into a low volume vehicle must be assessed by the LVV Certifier to ensure that:

- (a) when the platform is fully extended and loaded (centrally and evenly) to 1.25 times the specified safe working load:
 - (i) the wheelchair hoist platform remains predominantly level; and
 - (ii) significant temporary deformation of the part of the vehicle structure to which the wheelchair hoist is attached does not occur during the period which the load is applied;

and

- (b) after removal of the load specified in 2.3(26)(a), there is no visible permanent deformation to the part of the vehicle structure to which the wheelchair hoist is attached.

NOTE: 'Predominantly level' as specified in 2.3(26)(a)(i) means that a very small amount of rearward tilt is acceptable (this actually assists with ensuring that the approach flap sits on the ground nicely), however the amount of tilt must not be such that a wheelchair occupant would experience any discomfort or concern.

- 2.3(27) After installation of a wheelchair hoist in a low volume vehicle, if in the low volume vehicle certifier's opinion as a result of a road-test assessment, the vehicle's stability has been adversely affected, or the vehicle has become too low to be safely operated, the vehicle's stability or ride-height must be restored to a safe condition.

NOTE: A vehicle's stability may be improved by the addition of, or a change to, an anti-sway bar, and the ride-height may be restored by a change to the vehicle's spring rate or height.

Wheelchair hoist attachment

- 2.3(28) Welding involved in the installation of a wheelchair hoist into a low volume vehicle, may only be carried out by a person specified in 2.12(1).

- 2.3(29) A fastener used to attach a wheelchair hoist to the structure of a low volume vehicle, where attaching through a hollow section such as a sub-frame or cross-member, must pass through a packer so as to enable correct tightening of the fastener without causing deformation of the section through which the fastener passes.
- 2.3(30) A packer specified in 2.3(29) must:
- (a) be constructed from a non-compressible material such as aluminum or mild steel; and
 - (b) be coated, together with the structure or surface to which the packer attaches, with a permanent anti-corrosive protection such as paint or zinc plating; and
 - (c) provide a metal-to-metal contact throughout the span of the fastener's attachment.

NOTE: 2.3(29) and 2.3(30) refers to a 'packer', rather than a 'crush-tube'. This is because, whilst a crush-tube works well in applications where the chassis or sub-frame section above and below the crush-tube is made from a heavy wall material such as 2.0 mm or 3.0 mm rectangular hollow section or similar, most wheelchair hoist installations are into modern vehicles constructed from very thin-section panel steel, which will be likely to 'tear' around a heavy-wall crush-tube. Therefore, a 'packer' is better suited to these applications.

- 2.3(31) The surface of the area of a low volume vehicle to which a wheelchair hoist attaches must be free from any sound deadening or other compressible material to ensure that a full steel-to-steel contact is made.

2.4 Personal transfer device requirements

Personal transfer device approval and testing

- 2.4(1) A personal transfer device fitted to a low volume vehicle must be a known and reputable brand of professionally-manufactured equipment that is designed specifically as a transfer device for disabled people.

NOTE: A transfer device that is designed for transferring goods may not be used as a personal transfer device for disabled people.

Personal transfer device safe working load rating

- 2.4(2) The minimum safe working load rating of a personal transfer device fitted to a low volume vehicle must be 80 Kg.

Personal transfer device information

- 2.4(3) A personal transfer device installed to enable a disabled person to transfer between a wheelchair and a seat in a low volume vehicle, must display information on a plate or label, written in English and positioned in such a place that it can be easily found and read by any user, which incorporates the manufacturer's specified maximum safe working load rating.

NOTE: The maximum safe working load rating of a personal transfer device fitted to a low volume vehicle should not be exceeded during normal use.

Personal transfer device operation

- 2.4(4) A personal transfer device fitted to a low volume vehicle must operate:
- (a) in a free and reliable manner; and
 - (b) in such a way as to allow easy and safe transference between the wheelchair and the vehicle seat; and
 - (c) with all functions provided by the device manufacturer in good working order.
- 2.4(5) The control system for the operation of a personal transfer device fitted to a low volume vehicle must:
- (a) be positioned in a convenient location; and
 - (b) be clearly and durably marked in such a way that all control functions can be readily understood and applied; and
 - (c) in the case of an electrical or hydraulically-powered device, provide actuation by a momentary switch, so that operation of the device can only be achieved by the application of constant pressure on the switch.

NOTE: A personal transfer device in a low volume vehicle should be designed and installed in such a way that a disabled person cannot be placed in an unstable or unsafe position within the device.

Personal transfer device safety features

- 2.4(6) The control system for the operation of a personal transfer device fitted to a low volume vehicle must be designed in such a way that, with the device loaded to 1.25 times its safe working load, the system provides, when operating normally, a smooth and steady descent, throughout its complete travel.

NOTE: Written verification provided by the personal transfer device manufacturer that the requirements of 2.4(6) will be met is adequate evidence of compliance with 2.4(6). If no written verification is available from the manufacturer, the LVV Certifier will be required to carry out a test to confirm compliance with 2.4(6).

2.4(7) A personal transfer device fitted to a low volume vehicle that is lowered through an electrical means, which, when in its normal position is blocking the only vehicle exit, must incorporate a safety device that, in the event of an electrical failure, provides a manual means of operating the device.

2.4(8) The installation of a personal transfer device into a low volume vehicle must be designed so that when not in use, it can be securely stowed in such a way as to be capable of withstanding a collision force of:

- (a) in the forward direction, 20 times the weight of the personal transfer device; and
- (b) in the rearward direction, 10 times the weight of the personal transfer device; and
- (c) in the sideways direction, 15 times the weight of the personal transfer device.

NOTE 1: The process of assessing the requirements specified in 2.4(8) should take into consideration the centre of gravity of the personal transfer device.

NOTE 2: Wherever possible, attachment of a personal transfer device to the B-pillar is recommended rather than the A-pillar, in order to minimise the risk of the occupant contacting hard objects in the event of a collision. However, when mounting a personal transfer device, consideration must be given to the consequences of the attachment method and location, to ensure that no weakening has occurred to any part of the vehicle structure supporting any of the vehicle's seatbelt anchorages, as well as minimising interior impact issues for any user of the personal transfer device.

2.4(9) A personal transfer device fitted to a low volume vehicle that extends outside the area of the vehicle's open door must, where practical, have high visibility markings on the area that extends beyond the open door.

Personal transfer device electrical system

2.4(10) An electrically-operated personal transfer device fitted to a low volume vehicle must incorporate:

- (a) an electrical overload device positioned as closely as possible to the vehicle's battery; and
- (b) an isolation or interlock device; and
- (c) a battery supply cable that is:
 - (i) well secured at regular intervals; and
 - (ii) routed in such a way as to remain clear of the exhaust system, moving components and sharp edges; and

- (iii) protected by a cable cover at any points where it makes contact with the vehicle body.

Personal transfer device manufacture

2.4(11) All components within a personal transfer device fitted to a low volume vehicle must:

- (a) be coated with a permanent anti-corrosive protection; and
- (b) have the sharpness of all corners and edges that are contactable by occupants or care-givers minimised as much as practicable.

Fasteners used within personal transfer device manufacture

2.4(12) Fasteners used in the assembly of a personal transfer device fitted to a low volume vehicle must:

- (a) be in good condition; and
- (b) be of an appropriate size for the application; and
- (c) be secured with nyloc nuts, spring washers, or other vibration-proof locking devices; and
- (d) in the case of a fastener relied upon for the safe operation of the personal transfer device:
 - (i) have the correct shank area for the application; and
 - (ii) have a tensile strength of not less than grade-8.8 metric (grade-5 imperial); and
 - (iii) if of a higher tensile strength than grade-8.8 metric (grade-5 imperial), not be electroplated unless the electroplating process is carried out as part of the manufacturing process of the fastener by the fastener manufacturer.

Personal transfer device positioning

2.4(13) A personal transfer device fitted to a low volume vehicle must be positioned within the vehicle as far from other seated occupants as practicable, in order to minimise the likelihood of other vehicle occupants contacting the device in the event of a collision.

Personal transfer device installation

- 2.4(14) The installation of a personal transfer device into a low volume vehicle must incorporate the addition of localised reinforcement where the vehicle structure may be inadequate for the loads that will be applied to it by the loaded device.
- 2.4(15) A mounting system for a personal transfer device must not be welded to a floor section of a production vehicle, unless the welding is carried out in accordance with written specifications approved by the vehicle manufacturer.
- 2.4(16) In the case of the modification to, or trimming of, any material within a chassis section, sub-frame section, or cross-member necessitated by the installation of a personal transfer device into a low volume vehicle, the original strength of the chassis, sub-frame, or cross-member must be reinstated to at least that of its original strength by additional bracing, gussets, or addition of material.
- 2.4(17) Welding involved in the installation of a personal transfer device into a low volume vehicle, may only be carried out by a person specified in 2.12(1).

Personal transfer device assessment

- 2.4(18) In any case where an LVV Certifier does not have complete confidence in the installation of a personal transfer device, the LVV Certifier may, at his discretion, elect to assess the device, by checking that:
- (a) when the personal transfer device is loaded (centrally and evenly) to 1.25 times the specified safe working load, significant temporary deformation of the part of the vehicle structure to which the device is attached does not occur during the period throughout which the load is applied; or
 - (b) after the load is removed, there is no visible permanent deformation to the part of the vehicle structure to which the personal transfer device is attached.

NOTE: When testing, the transfer device (with the weight applied to the device) should be fully extended, so as to cantilever the maximum load out as far from the vehicle floor as possible.

Personal transfer device attachment

- 2.4(19) A fastener used to attach a personal transfer device to the structure of a low volume vehicle, must, where attaching through a hollow section such as a sub-frame or cross-member, pass through a packer so as to enable correct tightening of the fastener without causing deformation of the section through which the fastener passes.
- 2.4(20) A packer specified in 2.4(19) must:
- (a) be constructed from a non-compressible material such as aluminium or mild steel material; and

- (b) be coated, together with the structure or surface to which the packer attaches, with a permanent anti-corrosive protection such as paint or zinc plating; and
- (c) provide a metal-to-metal contact throughout the span of the fastener's attachment.

NOTE: 2.4(19) and 2.4(20) refers to a 'packer', rather than a 'crush-tube'. This is because, whilst a crush-tube works well in applications where the chassis or sub-frame section above and below the crush-tube is made from a heavy wall material such as 2.0 mm or 3.0 mm rectangular hollow section or similar, most personal transfer device installations are into modern vehicles constructed from very thin-section panel steel, which will be likely to 'tear' around a heavy-wall crush-tube. Therefore, a 'packer' is better suited to these applications.

- 2.4(21) The surface of the area of a low volume vehicle to which a personal transfer device attaches must be free from any sound deadening or other compressible material to ensure that a full steel-to-steel contact is made.

2.5 Wheelchair ramp requirements

Wheelchair ramp approval and testing

- 2.5(1) A wheelchair ramp used on a low volume vehicle must, either:
- (a) be a known and reputable brand of professionally-manufactured wheelchair ramp that is designed specifically as a wheelchair ramp for disabled people; or
 - (b) in the case of a wheelchair ramp that is not specified in 2.5(1)(a), in addition to the requirements specified for ramps in this standard, be independently tested and proven to comply with the requirements of *Appendix E 'Ramp Strength Test' of AS/NZS 3856.1:1998 'Hoists and Ramps for People With Disabilities – Vehicle Mounted, Part 1 Product Requirements'* (or subsequent version).

NOTE 1: A ramp that is designed for loading goods **may not be used for an occupied wheelchair**, unless modified so as to meet all applicable technical requirements within this LVV standard, and independently tested in accordance with the requirements specified in 2.5(1)(b).

NOTE 2: The tests specified in 2.5(1)(b), which are relatively simple static load tests, can be carried out by a Low Volume Vehicle Certifier, however they must be conducted in strict accordance with the procedures specified within the tests.

Wheelchair ramp durability

- 2.5(2) A wheelchair ramp used on a low volume vehicle must be designed and manufactured in a way that ensures that the ramp will operate in a safe and durable manner.

Wheelchair ramp width and gradient

2.5(3)

A wheelchair ramp used on a low volume vehicle must:

- (a) except as specified for a passenger service vehicle in 2.5(12)(d), incorporate a minimum useable width of 675 mm; and
- (b) provide a gradient of:
 - (i) in the case of a wheelchair ramp less than 300 mm from the ground, not more than 1 in 4; or
 - (ii) in the case of a wheelchair ramp 300 mm or more from the ground, not more than 1 in 6.

NOTE 1: Although a gradient of 1 in 6 (10 degrees) is allowed, wheelchair users and care-givers should be encouraged by LVV Certifiers to use a ramp that provides a gradient of less than 1 in 6 wherever possible.

NOTE 2: A gradient of 1 in 4 is equal to 15 degrees.

Wheelchair ramp edge barrier and roll-out protection

2.5(4)

A wheelchair ramp used on a low volume vehicle must incorporate edge barriers that either:

- (a) have a minimum height of 50 mm; or
- (b) meet the requirements for a ramp used in a passenger service vehicle, as specified in 2.5(12).

NOTE: Edge barriers may taper down to less than 50 mm as the height from the wheelchair ramp to the ground reduces.

Traversing gaps and steps in wheelchair ramps

2.5(5)

A wheelchair ramp used on a low volume vehicle must not incorporate any:

- (a) gaps or openings that a wheelchair must traverse which are greater than 15 mm across; or
- (b) steps or obstructions that a wheelchair must traverse which are greater than 12 mm high.

Wheelchair ramp location and finish

2.5(6)

A wheelchair ramp used on a low volume vehicle must:

- (a) be fitted only to either the left side or rear of the vehicle; and
- (b) have the sharpness of all corners and edges that are contactable by occupants or care-givers minimised as much as practicable; and
- (c) incorporate a slip-resistant material or finish on any areas where the wheelchair wheels can contact the ramp.

Wheelchair ramp installation

- 2.5(7) A folding wheelchair ramp must, when stowed, be attached to the structure of a low volume vehicle by a secure attachment system, so that the wheelchair ramp is capable of withstanding a collision force in the forward direction of 20 times the weight of the ramp.

NOTE: A ramp can be detachable provided that the ramp is sufficiently light-weight so as to ensure ease of use by a caregiver.

Wheelchair ramp safety systems

- 2.5(8) A folding wheelchair ramp used on a low volume vehicle must be designed and attached to the vehicle in such a way that it cannot fold or become disengaged from the vehicle when subjected to the load of a person or a wheelchair.
- 2.5(9) A low volume vehicle that is fitted with a wheelchair ramp that is stowed or deployed by electric power, which, when in its normal position is blocking the only exit, must incorporate a safety device that provides a manual means of operating the ramp in the event of an electrical failure.
- 2.5(10) A wheelchair ramp that deploys to the side of a low volume vehicle that is lowered through a powered system must incorporate a safety device that prevents the vehicle from being operated while the ramp is deployed.

NOTE: A safety device specified in 2.5(10) usually requires the park brake to be applied, or the transmission to be in the 'Park' position.

Wheelchair ramp operation

- 2.5(11) A manually-folding wheelchair ramp used on a low volume vehicle must be able to be folded and unfolded, with an applied force of not more than 10 Kgs.

Additional wheelchair ramp requirements for PSVs

- 2.5(12) A low volume vehicle that is used as a passenger service vehicle, which is fitted with a wheelchair ramp, must, in addition to meeting the requirements specified for wheelchair ramps in 2.5(1) to 2.5(11):

- (a) provide the driver with an unobstructed view, either directly or indirectly, of the inside and outside of the doorway area used for the wheelchair ramp access, and of the ramp itself and the wheelchair parking position; and
 - (b) be fitted with a means of illuminating the fully-extended wheelchair ramp, so as to enable the safe use of the ramp during darkness; and
 - (c) have a wheelchair ramp that is:
 - (i) at least 800 mm wide; or
 - (ii) at least 760 mm with a 20 mm high edge barrier on each side; or
 - (iii) over 800 mm wide with no edge barriers and a conspicuous stripe, at least 20 mm wide, along each side edge of the ramp;
- and
- (d) in the case of a powered wheelchair ramp:
 - (i) if the ramp cannot be clearly seen by the driver, be fitted with a sensor so that upon inadvertent contact with an obstruction before becoming fully extended, the ramp extension will stop or retract; and
 - (ii) be fitted with a warning device that emits an audible signal during ramp extension or retraction.

NOTE: The requirements specified in 2.5(12) are reproduced from *section 8.2* of the *Land Transport Rule Passenger Service Vehicles 1999 Rule 31001/1*, reproduced here in the interest of convenience.

2.6 Wheelchair requirements

Wheelchair design

- 2.6(1) A wheelchair used for a seating position within a low volume vehicle must either:
- (a) be a type of wheelchair that is designed and manufactured specifically for use as a seat in a motor vehicle, and comply with one or more of the following approved standards for wheelchairs used in motor vehicles:
 - (i) ISO7176-19; or
 - (ii) ANSI/RESNA WC19; or

(iii) AS/NZS 3696.19:2009;

or

(b) in the case of a wheelchair that is not designed and manufactured specifically for use as a seat in a motor vehicle, incorporate either:

- (i) a support structure or barrier immediately behind the wheelchair, that is capable of providing the wheelchair with a similar level of support that would be expected to be provided by a normal automotive seat-back; or
- (ii) a prominently-located label, placed adjacent to where the wheelchair is positioned within the vehicle, that notifies any user of the wheelchair that the wheelchair may not provide adequate occupant protection in the event of a collision.

NOTE 1: A support structure or barrier as referred to within 2.6(1)(b)(i) should be incorporated wherever possible where motor vehicle-compatible wheelchairs are not used, however, such structures or barriers should ideally be tailored to meet the individual needs of the wheelchair occupant. It is recognised that there will be many circumstances which will make the installation of a support structure or barrier impractical.

NOTE 2: A wheelchair as specified in 2.6(1)(a), or a support structure or barrier as specified in 2.6(1)(b)(i), are not mandatory, however LVV Certifiers should, at every opportunity, make all care-givers and wheelchair users aware that the commonly-used folding wheelchairs may not incorporate sufficient strength to properly protect the occupant in the event of a collision, and encourage the use of a wheelchair specifically designed and built for use in motor vehicles.

NOTE 3: As a guide, the typical weights of wheelchairs are as follows:

- manual folding wheelchair: 9-25 Kgs
- powered wheelchair: 75-150 Kgs

Note that the width of a wheelchair is usually relevant to the weight of the occupant that the wheelchair is intended to be used for. For example, a 16" wide wheelchair base is generally intended for a 40-90 Kg occupant whereas a 22" wide wheelchair base is generally intended for an occupant of more than 90 Kgs.

NOTE 4: A figure of 80 Kg should be applied where any calculations are being carried out to allow for the weight of a wheelchair occupant.

NOTE 5: In relation to standards compliance, as referred to in 2.6(1)(a), a 'CE label' may be voluntarily fitted by a goods or product manufacturer to indicate that the product in question complies with one or more applicable or relevant manufacturing standards. However, due to evidence that some manufacturers have applied CE labels incorrectly (ie where a product clearly does not comply with the applicable standards), the presence of a CE label should not be relied upon as sole evidence of compliance with a applicable manufacturing standard.

Wheelchair positioning and spacing

2.6(2) A wheelchair must not be situated within a low volume vehicle in a side-ways facing position.

- 2.6(3) Sufficient space must be provided around each wheelchair position within a low volume vehicle that enables a care-giver to easily and comfortably secure the wheelchair into the vehicle.
- 2.6(4) A wheelchair position must have sufficient clear-space immediately forward of it, so as to minimise the risk of a wheelchair occupant contacting other seating, or other passengers, in the event of a collision.
- 2.6(5) A wheelchair may be transported within a low volume vehicle in a rearward-facing position, provided that the wheelchair will be prevented from overturning in the event of a collision, by locating the back of the wheelchair against a suitably padded seatback support structure as specified in 2.7 of *LVVTA Low Volume Vehicle Standard 185-00 (Seats and Seat Anchorages)*.

NOTE 1: A low volume vehicle which is used for the transportation of an occupant in a wheelchair should always have at least 50 mm of clear space between the top of the head of the wheelchair occupant, and the head-lining of the vehicle.

NOTE 2: Whilst the requirement in 2.6(5) provides scope for a wheelchair occupant to be seated in a rearward-facing position, ensuring that correct neck and torso support is provided in the event of an impact is very important, and specialist advice should be sought with such installations.

NOTE 3: Whilst 2.7 of *LVV Standard 185-00* provides for a transverse cross-beam as a means of supporting a normal rearward-facing seat, this option must not be used to support a rearward-facing wheelchair.

Head restraints for wheelchair positions

- 2.6(6) A low volume vehicle which is used for the transportation of an occupant in a wheelchair must incorporate a head restraint for each wheelchair occupant, that meets the requirements specified in 2.3 of *LVVTA Low Volume Vehicle Standard 185-40 (Head Restraints)* if:
- (a) the seat is a rearward-facing seat; or
 - (b) in the case of a forward-facing seat, a solid structure is positioned within 300 mm from the rearmost part of the back of the wheelchair.

NOTE: It is highly recommended that head support be provided for any wheelchair occupant, either attached to the vehicle, or to the wheelchair, in order to reduce whiplash injury in the event of a collision. This subject should be treated with caution however, so as to ensure against a rigidly-mounted head restraint causing additional risk in the event of a side-impact or roll-over situation.

2.7 Anchorage for wheelchair restraint straps

Design requirements for wheelchair restraint strap anchorages

- 2.7(1) A low volume vehicle that carries within it one or more wheelchairs, must incorporate within the vehicle structure an anchorage system that enables the secure positioning and attachment of each wheelchair.

NOTE 1: There are two aspects of restraining a wheelchair into a vehicle. There are the wheelchair restraint straps, and there are the anchorages fixed into the vehicle structure to which the restraint straps attach. These two aspects are treated separately – sub-section 2.7 focuses on just the anchorages into the vehicle structure, whereas sub-section 2.8 focuses on the restraint straps.

NOTE 2: An LVV Certifier must be satisfied, through either documented evidence or thorough visual inspection and assessment, that every wheelchair anchorage used to secure a wheelchair into a vehicle, is capable of supporting the safe working load rating of the wheelchair restraint system that is attached to it.

NOTE 3: The ability of a wheelchair anchorage to support the safe working load rating of any wheelchair restraint system must be calculated at 20G. For example, the load which a wheelchair anchorage must withstand in the case of an 85 Kg wheelchair restraint strap is: $85 \text{ Kg} \times 20 = 1700 \text{ Kg}$.

NOTE 4: As a wheelchair restraint docking device is the only system that provides a restraint system and an anchorage system all in one, wheelchair restraint docking devices are treated separately within 2.10.

2.7(2) A wheelchair anchorage system, or a component thereof, within a low volume vehicle, must, except in the case of 2.7(4)(b), comply with either:

- (a) SAE J2249 WTORS;
- (b) ISO 10542 WTORS Parts 1 - 5;
- (c) CSA Z605 MASORS;
- (d) AS 2942;
- (e) AS/NZS 10542.1:2009.

NOTE: In relation to standards compliance, as referred to in 2.7(2), a 'CE label' may be voluntarily fitted by a goods or product manufacturer to indicate that the product in question complies with one or more applicable or relevant manufacturing standards. However, due to evidence that some manufacturers have applied CE labels incorrectly (ie where a product clearly does not comply with the applicable standards), the presence of a CE label should not be relied upon as sole evidence of compliance with a applicable manufacturing standard.

Wheelchair anchorage track systems

2.7(3) In the case of a track system used for the anchorage of a wheelchair into a low volume vehicle, the track system must:

- (a) be professionally manufactured; and
- (b) be a system that is purpose-designed for the anchorage of wheelchairs; and
- (c) comply with one or more approved standards for the anchorage of wheelchairs specified in 2.7(2); and

- (d) attach to the vehicle structure using the fastening system provided, specified, or recommended by the track system manufacturer, and be installed in accordance with the track manufacturer's instructions.

NOTE 1: Track system brands which are in common use in New Zealand that have been tested to an international standard and are recognised as being suitable for the purpose of anchoring wheelchairs into motor vehicles include Q-Straint and Unwin brands.

Approved systems can be identified by the manufacturers' markings on the track, and within manufacturers' documentation. Other brands may be suitable, but the LVV Certifier is responsible for establishing their suitability. LVVTA should be consulted if doubt exists.

NOTE 2: Where the drilling and counter-sinking process is not performed correctly, there is a significant risk of counter-sinking too far and weakening the track to the extent that the fasteners could pull through the track with only minor impact loads.

LVV Certifiers should carefully inspect any hand-drilled and counter-sunk tracks, and measure the hole diameter on the underside of the track to ensure against unsafe work.

Wheelchair anchorage fixed-mount systems

2.7(4) In the case of a fixed-mount system used for the anchorage of a wheelchair into a low volume vehicle, the fixed-mount must be a system that is purpose-designed for the anchorage of wheelchairs, and must either:

- (a) in the case of a professionally-manufactured system:
 - (i) comply with one or more approved standards for the anchorage of wheelchairs specified in 2.7(2); and
 - (ii) attach to the vehicle structure using the fastening system provided, specified, or recommended by the fixed-mount system manufacturer, and be installed in accordance with the fixed-mount system manufacturer's instructions;

or

- (b) in the case of a custom-manufactured system, be accompanied by documented evidence to verify that the custom-manufactured system is entirely as suitable as a professionally-manufactured system specified in 2.7(4)(a).

NOTE 1: A 'fixed-mount system' is a wheelchair anchorage system that provides one single fixed mounting point into the vehicle structure, unlike 'track' systems that provide scope for a range of positions.

NOTE 2: The anchorage requirements specified in *Low Volume Vehicle Standard 175-00 (Seatbelt Anchorages)* is not appropriate for verification of compliance with 2.7(4)(b), and must not be used as guidance for a wheelchair anchorage. This is because the mass of a wheelchair can be up to 150 kilograms, which greatly exceeds the 80 kilogram mass upon which *LVV Standard 175-00* is based.

2.7(5) An anchorage for a wheelchair that is incorporated directly within, and is an integral part of, a wheelchair hoist, must not be used.

NOTE 1: An anchorage system described in 2.7(5), with the exception of that detailed in NOTE 2 below, cannot be used because the engineering involved in the manufacture of such systems would not meet the necessary loading requirements. Additionally, the positioning of such wheelchair anchorages is usually outside of the wheelchair anchorage permitted area requirements specified in 2.7(10) or 2.7(11). Such systems are typically found in some used Japanese-import vehicles.

NOTE 2: An exception to the requirement of 2.7(5) has been approved by the LVVTA Technical Advisory Committee, which is the Toyota Hiace Welcab H200 and variants thereof (including the TRH200, KDH200, TRH214, and KDH214), which have wheelchair restraints and a 3-point seatbelt attached to the hoist.

Other anchorage attachment requirements

2.7(6) A fastener used in the attachment of an anchorage for a wheelchair into the structure of a low volume vehicle, must, where attaching through a hollow section such as a sub-frame or cross-member, pass through a packer so as to enable correct tightening of the fastener without causing deformation of the section through which the fastener passes.

2.7(7) A packer specified in 2.7(6) must:

- (a) be constructed from a non-compressible material such as aluminium or mild steel material; and
- (b) be coated, together with the structure or surface to which the packer attaches, with a permanent anti-corrosive protection such as paint or zinc plating; and
- (c) provide a metal-to-metal contact throughout the span of the fastener's attachment.

NOTE 1: 2.7(6) and 2.7(7) refers to a 'packer', rather than a 'crush-tube'. This is because, whilst a crush-tube works well in applications where the chassis or sub-frame section above and below the crush-tube is made from a heavy wall material such as 2.0 mm or 3.0 mm rectangular hollow section or similar, most wheelchair restraint system anchorage installations are into modern vehicles constructed from very thin-section panel steel, which will be likely to 'tear' around a heavy-wall crush-tube. Therefore, a 'packer' is better suited to these applications.

NOTE 2: The area of a packer specified in 2.7(6) and 2.7(7) should be at least the same area as the footprint of the anchorage itself.

2.7(8) The surface of the area of a low volume vehicle to which an anchorage for a wheelchair attaches must be free from any sound deadening or other compressible material to ensure that a full steel-to-steel contact is made.

Restraint of unoccupied wheelchairs

2.7(9) A wheelchair that is not in use whilst in the vehicle must be attached to the vehicle structure by a secure attachment system that is capable of withstanding a collision force of:

- (a) in the forward direction, 20 times the weight of the wheelchair; and
- (b) in the rearward direction, 10 times the weight of the wheelchair; and
- (c) in the sideways direction, 15 times the weight of the wheelchair.

NOTE 1: The process of assessing the requirements specified in 2.7(9) should take into consideration the centre of gravity of the wheelchair.

NOTE 2: Compliance with this low volume vehicle standard requires that a wheelchair will be as well restrained in a frontal collision as an OE seat installation. Where any doubt exists, or further guidance is required during the application of this LVV Standard, the LVV Certifier should ensure that a wheelchair will provide the greatest level of safety as could be reasonably expected, subject to the type of wheelchair being used.

Positioning of anchorages for wheelchair restraint straps

2.7(10) An anchorage for a wheelchair must be positioned within a low volume vehicle, either:

- (a) in accordance with the written positioning instructions of the wheelchair anchorage manufacturer; or
- (b) in the case of an anchorage for which no instructions are available, in accordance with the instructions of a manufacturer of a similar wheelchair anchorage.

2.7(11) In the case of where no instructions are available either for the wheelchair anchorage in use or from the manufacturer of a similar anchorage as specified in 2.7(10), the wheelchair anchorages within a low volume vehicle must be positioned **symmetrically and** as closely as possible to each outboard corner of the wheelchair, and:

- (a) in side view:
 - (i) at the front of the wheelchair, at an angle of between 40 degrees and 60 degrees, angled outward from the wheelchair (see diagram 2.1); and
 - (ii) at the rear of the wheelchair, at an angle of between 30 degrees and 45 degrees, angled outward from the wheelchair; (see diagram 2.1)

and

(b) in front view, within an area:

- (i) no closer to the longitudinal centerline of the seating position than 150 mm (*see diagram 2.2*); and
- (ii) no further outward from the vertical centerline of the wheelchair restraint strap attachment point than 25 degrees (*see diagram 2.2*);

and

(c) in rear view, within an area:

- (i) no closer to the longitudinal centerline of the seating position than 150 mm (*see diagram 2.2*); and
- (ii) no further outward from the vertical centerline of the wheelchair restraint strap attachment point than 10 degrees. (*see diagram 2.2*)

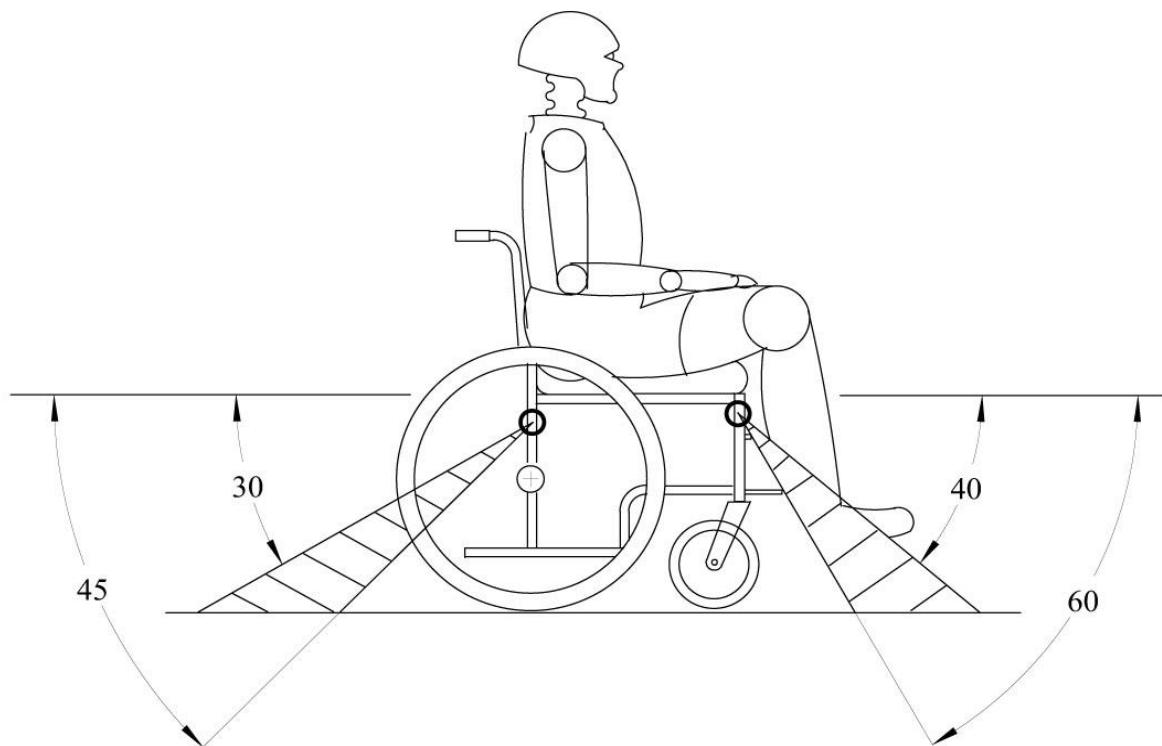


Diagram courtesy of Braiden International Ltd

Diagram 2.1 Wheelchair restraint positioning in side view

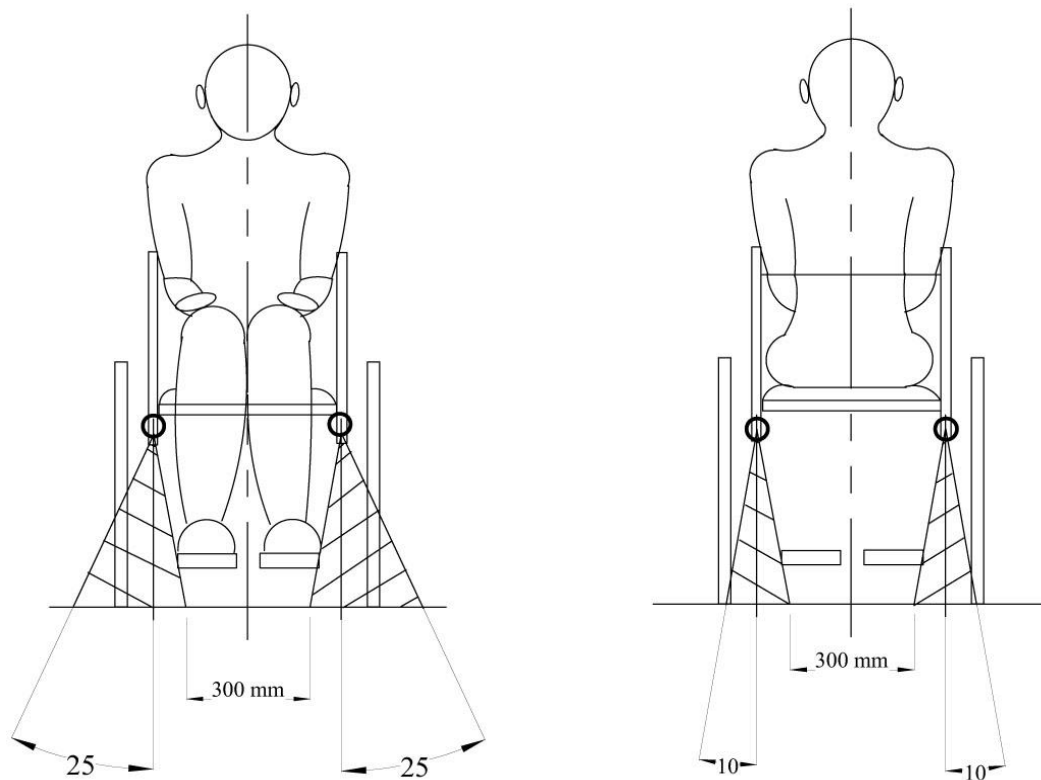


Diagram courtesy of Braiden International Ltd

Diagram 2.2 Wheelchair restraint positioning front and rear views

NOTE: In the absence of a wheelchair from which to provide reference points, a figure of between 380 mm and 420 mm from the vehicle floor should be used as a datum for the positioning of wheelchair restraint straps.

2.8

Wheelchair restraint strap requirements

Wheelchair restraint strap design and manufacture

2.8(1)

A wheelchair restraint strap attaching a wheelchair into a low volume vehicle must:

- (a) be, including its straps and buckles, purpose-designed for restraining wheelchairs; and
- (b) be professionally manufactured; and
- (c) incorporate non-slip tightening adjusters; and
- (d) comprise components that:
 - (i) have a smooth finish with no sharp edges or corners that may cause injury or discomfort to either the wheelchair occupant or the care-giver;

- (ii) are protected from corrosion; and

and

- (e) comply with one or more of the following approved standards for the restraint of wheelchairs:

- (i) SAE J2249 WTORS Std;
- (ii) ISO 10542 WTORS Parts 1 to 5;
- (iii) CSA Z605 MASORS;
- (iv) AS 2942;
- (v) AS/NZS 10542.1:2009 Parts 1 and 2.

2.8(2) A wheelchair restraint strap fitted to a low volume vehicle must be clearly marked with its safe working load rating, by either:

- (a) a permanent marking affixed by the restraint strap manufacturer; or
- (b) a securely-fixed safe working load rating tag supplied by LVVTA.

NOTE 1: The safe working load rating tag referred to in 2.8(2) is provided to the LVV Certifier by LVVTA, based on information provided by the LVV Certifier, and is affixed to the restraint strap by the LVV Certifier.

NOTE 2: Due to the differing needs and constraints of families and care-givers, and the wide variation in wheelchair weights, there must be some flexibility provided as to the type and safe working load ratings of wheelchair restraint straps used in vehicles that are not used in passenger service, so as to enable a family or care-giver to use wheelchair restraint straps that meet their specific needs. Rather than specifying a minimum safe working load rating of a wheelchair restraint strap fitted to a (non-PSV) low volume vehicle, this LVV standard requires only that the minimum safe working load rating of wheelchair restraint straps is established, and that compliance with an approved standard for wheelchair restraint straps is verified.

NOTE 3: Related to NOTE 2 above, all wheelchair restraint straps must be present at the time of LVV certification inspection, and the LVV Certifier must record on the LVV certification form-set the make, model, and safe working load rating of the wheelchair restraint straps. Critical to this process is that the LVV Certifier inspects and understands the strap system(s) in question, in order to correctly establish the safe working load rating of the straps. Most wheelchair restraint strap manufacturers provide safe working load rating, information and standards compliance information on their websites.

NOTE 4: The reference to 'non-slip tightening adjusters' in 2.8(1)(c) excludes cam-lock adjusters from being used to restrain the rear of a wheelchair, because they can slip under minor loads.

NOTE 5: Straps that are damaged or frayed may not be repaired under any circumstances.

NOTE 6: A vehicle modified for the purpose of transporting disabled persons cannot undergo an LVV certification inspection if it does not have its restraint system(s) present and fitted.

NOTE 7: In relation to standards compliance, as referred to in 2.8(1)(e), a 'CE label' may be voluntarily fitted by a goods or product manufacturer to indicate that the product in question complies with one or more applicable or relevant manufacturing standards. However, due to evidence that some manufacturers have applied CE labels incorrectly (ie where a product clearly does not comply with the applicable standards), the presence of a CE label should not be relied upon as sole evidence of compliance with a applicable manufacturing standard.

2.8(3) A set of wheelchair restraint straps attaching a wheelchair into a low volume vehicle must:

- (a) incorporate not less than 4 separate straps; and
- (b) incorporate straps that are part of a matched set; and
- (c) be accompanied by information relating to the use of the restraint straps on a plate or label, either written in English, or with clear and comprehensive illustrations, positioned in such a place that it can be easily found and read by any user.

NOTE: The reference to 'a matched set' in 2.8(3)(b) means that the front and rear straps must be a matched set.

Wheelchair restraint strap fitting and use

2.8(4) A wheelchair restraint strap fitted to a low volume vehicle must be fitted and used in such a way as to prevent:

- (a) the force of the wheelchair being transferred onto the occupant in the event of a collision; or
- (b) the occupant's seatbelt being used as a partial or complete means of restraining the wheelchair.

2.8(5) A wheelchair restraint strap fitted to a low volume vehicle must prevent a wheelchair from obstructing an emergency exit.

NOTE: When restrained, a wheelchair should not be able to move in any direction, when a force equivalent to the combined mass of the wheelchair and wheelchair occupant is applied.

Wheelchair restraint strap attachment and removal

2.8(6) A wheelchair restraint strap fitted to a low volume vehicle must be:

- (a) installed in accordance with the attachment instructions of the wheelchair restraint strap manufacturer; and
- (b) designed and attached so as to allow the securing and removal of a wheelchair to and from the wheelchair restraint strap anchorages without the use of tools; and

- (c) designed and attached in such a way that it cannot be partially or incorrectly engaged; and
- (d) able to be easily attached, secured, adjusted, and removed, both in normal and emergency situations, by:
 - (i) the care-giver; and
 - (ii) in the case where a wheelchair occupant is the driver of the vehicle, the wheelchair occupant.

2.8(7) A low volume vehicle fitted with wheelchair restraint straps must incorporate written guidance on the safe and correct use of the wheelchair restraint straps, either:

- (a) prominently displayed on a label, affixed to a side window adjacent to each wheelchair position where it can be easily seen by each wheelchair occupant and the care-giver; or
- (b) on a laminated card that can be easily accessed by the care-giver.

NOTE 1: Wheelchair restraint strap brands which are in common use in New Zealand, that have been tested to an international standard and are recognised as being suitable for the purpose of restraining wheelchairs into motor vehicles, include Q-Straint, Unwin, and Amsafe brands. Approved straps can be identified by the labelling sewn onto the strap webbing. Other brands may also be suitable, but the LVV Certifier must in every case be responsible for establishing their suitability. LVVTA should be consulted if the LVV Certifier is in any doubt.

NOTE 2: Where a professional manufacturer of wheelchair restraint straps provides an attachment system for a wheelchair anchorage track system that does not incorporate multiple clips, it may be that the restraint strap will not be suitable. In such circumstances, the LVV Certifier should contact the restraint strap manufacturer for guidance.

2.8(8) A wheelchair restraint strap attaching a wheelchair into a low volume vehicle must not:

- (a) use ratchet mechanisms as a means of adjustment; nor
- (b) be able to come into contact with any other part of the vehicle or wheelchair that could cause chafing or fraying when the wheelchair is secured into position; nor
- (c) allow any part of a restraint strap to pass between the spokes of the wheelchair, or apply any load to a wheel.

NOTE: 2.8(8)(a) precludes the use of typical general-purpose load-binders from being used as wheelchair restraints, as many small commonly-available load-binders do not have the safe working load rating necessary for the safe restraint of a wheelchair.

Wheelchair restraint straps for multiple wheelchairs

- 2.8(9) In the case where different sizes or types of wheelchair restraint straps are used to attach one or more wheelchairs into a low volume vehicle, each set of straps must have instructions clearly displayed in a prominent location within the vehicle, so that the differing systems cannot be mixed up.

NOTE: As a general operational requirement, vehicle operators should ensure that restraint straps are removed from the floor and stored when not in use (to prevent damage from being run-over by wheelchairs), and stored in such a way as to prevent restraint strap sets being mixed up and re-fitted in the wrong positions.

2.9 Seatbelt requirements for wheelchair occupants

General seatbelt requirements

- 2.9(1) Other than in the case of those seatbelts provided for by exclusions specified in *Section 3*, a seatbelt worn by a wheelchair occupant must meet all seatbelt type and standards-compliance requirements specified in the *NZTA In-service Vehicle Inspection Requirements Manual*.

NOTE 1: A person seated in a wheelchair must be provided with a type of seatbelt (for example, lap and diagonal seatbelt) that is no less safe than that which is required by Land Transport Rule 32011 - Seatbelts and Seatbelt Anchorages 2002 for a person seated in a normal motor vehicle seat.

Although lap seatbelts are allowed at present for wheelchair occupants, shoulder belts (static or inertia reel) should always be used in conjunction with the lap belts wherever upper seatbelt anchorages enable this to occur.

NOTE 2: Most quick-release-type seatbelt systems are designed specifically for the restraint of wheelchairs, and occupants within wheelchairs, and in many cases incorporate seatbelts that do not meet an approved standard for seatbelts.

These seatbelts are able to be used in this situation, allowed for by 2.4(13) of the Land Transport Rule 32011 - Seatbelts and Seatbelt Anchorages 2002.

NOTE 3: A wheelchair occupant seatbelt is not to be confused with a 'postural support belt', which is only to help support those people who need additional postural support.

- 2.9(2) A seatbelt fitted to a low volume vehicle, that is not one approved for general use by *Land Transport Rule 32011 - Seatbelts and Seatbelt Anchorages 2002*, must comply with one or more of the following approved standards specified for the restraint of wheelchair occupants:

- (a) SAE J2249 WTORS Std;
- (b) ISO 10542 WTORS Parts 1 to 5;
- (c) FMVSS 209 or 210;
- (d) CMVSS 209 or 210;
- (e) CSA Z605 MASORS;
- (f) AS 2942;

- (g) AS/NZS 2596;
- (h) AS/NZS 10542.1:2009 Parts 1 and 2;
- (i) EU Directive 77/541/EEC.

NOTE: In relation to standards compliance, as referred to in 2.9(2), a 'CE label' may be voluntarily fitted by a goods or product manufacturer to indicate that the product in question complies with one or more applicable or relevant manufacturing standards.

However, due to evidence that some manufacturers have applied CE labels incorrectly (ie where a product clearly does not comply with the applicable standards), the presence of a CE label should not be relied upon as sole evidence of compliance with a applicable manufacturing standard.

Seatbelt anchorage requirements

- 2.9(3) A seatbelt anchorage used by a person in a wheelchair in a low volume vehicle, must either:
- (a) be an integral and unmodified part of a wheelchair that has been designed and manufactured for automotive use, and that meets a recognised international standard; or
 - (b) be independent of the wheelchair, and meet all applicable technical requirements, except for the positioning requirements, specified in 2.3 and 2.4 of *LVV Standard 175-00 (Seatbelt Anchorages)*.

- 2.9(4) A seatbelt fitted to a low volume vehicle for the use of a wheelchair occupant, may be designed and attached to its anchorage so as to allow the securing and removal of the seatbelt from the anchorage without the use of tools.

Seatbelt anchorage permitted areas

- 2.9(5) A seatbelt anchorage for a person in a wheelchair must be positioned within a low volume vehicle, either:
- (a) in accordance with the written positioning instructions of the seatbelt manufacturer; or
 - (b) in the case of where no written positioning instructions are available from the seatbelt manufacturer, as specified in 2.9(6).
- 2.9(6) A seatbelt anchorage for a person in a wheelchair, other than one specified in 2.9(5)(a), must be positioned within a low volume vehicle:
- (a) in the case of an upper seatbelt anchorage, as closely as can be practicably achieved to the permitted area specified for seatbelt anchorage positioning in 2.4 of *LVVTA Low Volume Vehicle Standard 175-00 (Seatbelt Anchorages)*; and

- (b) in the case of a lower seatbelt anchorage, measured from the H-point, using an LVVTA H-frame or LVVTA H-point template as shown in *Diagram 2.3(1)* of LVVTA Low Volume Vehicle Standard 175-00 (Seatbelt Anchorages):
- (i) in side view, at an angle of between 30 degrees and 75 degrees, angled rearward from the wheelchair (see *diagram 2.3*); and
 - (ii) in rear view, within an area no closer to the longitudinal centerline of the seating position than 150 mm, and no further outward from the vertical centerline of the wheelchair frame than 15 degrees. (see *diagram 2.4*)

NOTE: In the event that no wheelchair is present during the LVV certification inspection, an LVV Certifier should use a nominal figure of 600 mm from the vehicle floor as a datum, instead of the H-point specified in 2.9(6)(b).

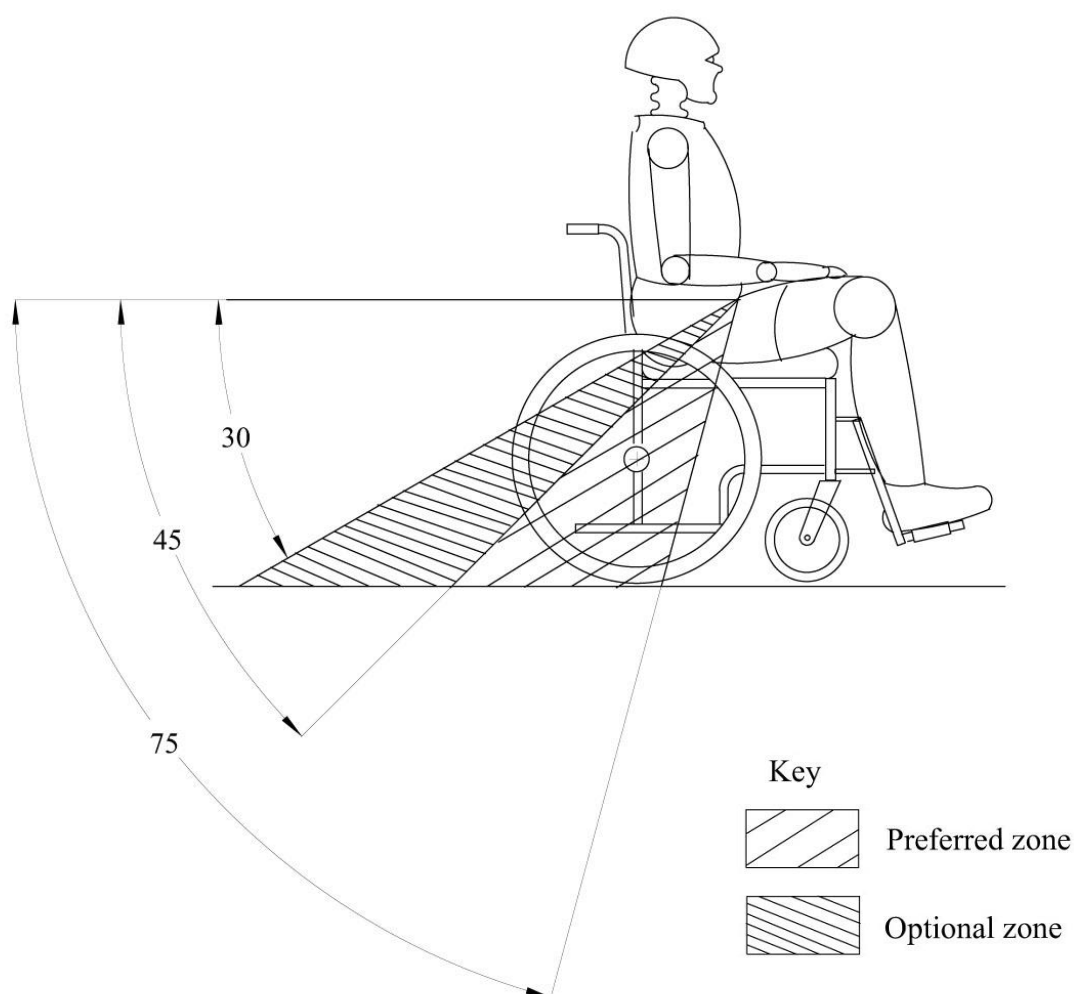


Diagram courtesy of Braiden International Ltd

Diagram 2.3 Wheelchair occupant seatbelt anchorage permitted area in side view

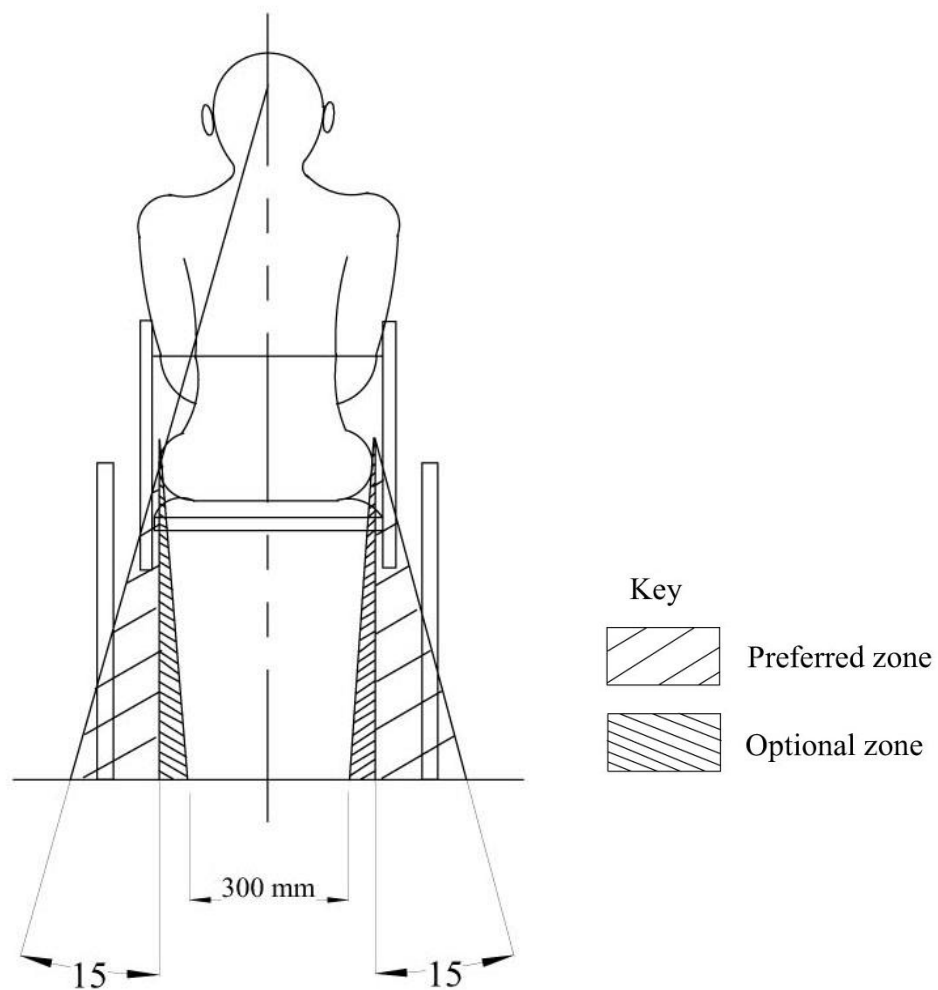


Diagram courtesy of Braiden International Ltd

Diagram 2.4 Wheelchair occupant seatbelt anchorage permitted area in rear view

Combined wheelchair and occupant restraint systems

2.9(7)

A wheelchair restraint strap used to attach a wheelchair into a low volume vehicle must not incorporate a seatbelt for the wheelchair occupant, unless the wheelchair restraint strap either:

- (a) complies with one or more approved standards for the restraint of wheelchair occupants specified in 2.9(2); or
- (b) can be proven to meet all applicable loading requirements, by calculation, testing, or documented evidence from the restraint strap manufacturer.

NOTE: Compliance with this LVV Standard requires that a seatbelt for a wheelchair occupant will provide effective restraint in a frontal collision, comparable to what would be expected from an OE seatbelt. Where any doubt exists, or further guidance is required during the application of this LVV Standard, an LVV Certifier should use the *LVVTA Low Volume Vehicle Standard 175-00 (Seatbelt Anchorages)* to ensure that a wheelchair occupant's seatbelt will provide the same level of safety as would be reasonably expected for all other seating positions within the vehicle.

- 2.9(8) In the case of where the combined mass of the occupant and the wheelchair is likely to exceed 112 Kg, either:
- (a) an additional wheelchair restraint strap that meets the requirements of 2.8 must be used to secure the rear of the wheelchair, using its own wheelchair restraint anchorage that meets the requirements specified in 2.7; or
 - (b) the wheelchair occupant's seatbelt must be removed from the wheelchair and attached to seatbelt anchorages within the vehicle structure that are independent of the wheelchair restraint system, and which meet the applicable requirements of 2.9; or
 - (c) documented evidence must be provided by the restraint system manufacturer to verify that the wheelchair restraint is capable of restraining the increased mass.

NOTE: The figure of 112 Kg specified in 2.9(8) is set as a typical weight, based on international standards, for the combination of a person of a normal mass, plus a non-powered wheelchair.

2.10 Wheelchair restraint docking devices

Wheelchair restraint docking device requirements

- 2.10(1) A wheelchair restraint docking device attaching a wheelchair into a low volume vehicle must:
- (a) be a system that is purpose-designed for restraining wheelchairs, and be suited for the restraint of the type of wheelchair being used; and
 - (b) be professionally manufactured; and
 - (c) comply with one or more approved standards for the anchorage of wheelchairs specified in 2.7(2); and
 - (d) incorporate a mechanical means by which to prevent the wheelchair from being able to significantly rotate in a side impact, or tilt in a frontal impact; and

- (e) be attached to the vehicle structure in accordance with the written attachment instructions of the wheelchair restraint docking device manufacturer.

NOTE: In relation to 2.10(1)(a), it is recognised that in many cases an LVV Certifier will not have the benefit of the user or the user's wheelchair being present, in which case, complying with item (a) will be difficult if not impossible. The LVV Certifier should, where practical, try to establish the approximate weight of the wheelchair occupant and the type and weight of wheelchair being used.

- 2.10(2) A wheelchair restraint docking device must not be used to secure a wheelchair into a passenger service vehicle.

NOTE: A wheelchair restraint docking device cannot be used to secure a wheelchair in a vehicle used in passenger service, because such a device is set up to meet the specific needs of each wheelchair occupant.

2.11 Self-drive system requirements

Wheelchair used as a driver's seat

- 2.11(1) A wheelchair that is used as a driver's seat in a low volume vehicle must:

- (a) provide sufficient lateral support and comfort for the driver to safely operate the vehicle; and
- (b) allow the driver to comfortably reach and operate all of the vehicle's primary and secondary operating controls; and
- (c) allow the driver to reach, buckle, and comfortably wear the seatbelt.

NOTE: It is recognised that, because most self-drive tetraplegics are not able to buckle the lap and diagonal sections of a seatbelt together, a seatbelt system is commonly used for such people where the seatbelt stays buckled and in position, and the wheelchair occupant moves forward into the seatbelt. In the case of a self-drive wheelchair occupant who is not able to buckle a seatbelt, the system described herein is deemed to meet the requirements of 2.11(1)(c).

2.12 Welding requirements

- 2.12(1) Welding of any components or systems in relation to the installation of disability transportation equipment into a low volume vehicle, may only be carried out by a person who either:

- (a) holds a relevant current qualification or trade certification for the type of welding being undertaken; or
- (b) has demonstrated to an LVV Certifier a satisfactory level of competence in the method of welding being undertaken.

2.13 **Other requirements**

- 2.13(1) A low volume vehicle that is fitted with disability transportation equipment or systems must also, in order to comply with this standard:
- (a) comply with any relevant requirements specified in *LVVTA Low Volume Vehicle Standard 35-00 (Braking Systems)*; and
 - (b) undergo a road-test that is sufficient to ensure that any additional weight in the vehicle, such as a rear-mounted wheelchair hoist, does not adversely affect the safe handling characteristics of the vehicle in its unmodified condition.
- 2.13(2) Any person seated in a wheelchair within a low volume vehicle must be provided with a ready means of egress, which has an operable door handle from inside the vehicle.

NOTE: 2.13(2) would not allow a wheelchair occupant to be seated in an area immediately in front of a tailgate that does not have an interior door handle, for example, unless there is an alternative egress path through another door available to the wheelchair occupant.

Section 3 **Exclusions to this standard**

3.1 **Special restraints (seatbelts)**

- 3.1(1) A low volume vehicle is not required to comply with the requirements of 2.9(1) relating to seatbelts for a seating position in which a special restraint is fitted to accommodate the needs of a person with a disability, provided that the restraint:
- (a) is designed and constructed specifically for the purpose of restraining a person with a disability in a motor vehicle; and
 - (b) is strong, secure, in sound condition and in good working order; and
 - (c) has buckles or tongues (for special restraints that are fitted with buckles and tongues) that can be:
 - (i) latched securely and easily, and in a manner that makes it clear to the wearer or care-giver whether the restraint has been latched; and
 - (ii) unlatched easily by the wearer or care-giver;

and

- (d) has webbing or other means of attachment that is strong and securely attached to the fittings that secure the restraint to the seatbelt anchorage; and
- (e) has clear instructions that are easily visible from the seating position to which the restraint is fitted, if the restraint is other than a simple single-action buckle assembly; and
- (f) is fitted to seatbelt anchorages that either:
 - (i) comply with the requirements for seatbelt anchorages in *Low Volume Vehicle Standard 175-00 (Seatbelt Anchorages)*; or
 - (ii) are part of a specialist disability restraint system.

NOTE 1: The exclusion specified in 3.1(1) is selected from *Land Transport Rule 32011 (Seatbelts and Seatbelt Anchorages)*, reproduced here in the interest of convenience.

NOTE 2: For further clarification, a specialist seatbelt that does not meet an approved standard for seatbelts specified in *Schedule 2 of Land Transport Rule 32011 - Seatbelts and Seatbelt Anchorages 2002*, may be fitted to a low volume vehicle for the restraint of a person with a disability, provided that the specialist seatbelt is a known and reputable brand of professionally-manufactured seatbelt that is designed specifically for the purpose of restraining a person with a disability in a motor vehicle.

3.2 Seatbelt modifications

- 3.2(1) A low volume vehicle is not required to comply with the requirements of 2.9(1), and may be modified temporarily to accommodate the needs of a person with a disability while that person occupies the corresponding seating position, provided that the modification, including any accessory or device used in the modification:
- (a) does not adversely affect the operation of the seatbelt and its effectiveness to the person with a disability; and
 - (b) is not likely to cause injury to an occupant of the motor vehicle; and
 - (c) does not cause damage to the seatbelt.

NOTE 1: The exclusion specified in 3.2(1) is selected from *Land Transport Rule 32011 (Seatbelts and Seatbelt Anchorages)*, reproduced here in the interest of convenience.

NOTE 2: A common example of a temporary modification referred to in 3.2(1) is the use of a webbing extension piece coupled directly into the seatbelt to accommodate a particular disabled person, but otherwise not required.

Section 4 Vehicles not required to be certified to this standard

Vehicles not covered by this standard

A vehicle is not required to be certified to this low volume vehicle standard, where the only modification to the vehicle is the installation of a device that stows and deploys an unoccupied non-powered wheelchair, provided that the device:

4.2

4.2(1)

A light vehicle is not required to be certified to this low volume vehicle standard, if the vehicle was fitted with a device that stows and deploys an unoccupied non-powered wheelchair before 1 January 1992.

4.3

Modifications that do not require certification

4.3(1)

A vehicle is not required to be certified to this low volume vehicle standard, where the only modification to the vehicle is the installation of a device that stows and deploys an unoccupied non-powered wheelchair, provided that the device:

- (a) is securely attached to the vehicle structure; and
- (b) folds and locks in position outside of the vehicle's passenger compartment; and
- (c) has no exposed edges with a radius less than 3 mm; and
- (d) does not compromise the safe performance of the vehicle.

Section 5 Terms and definitions within this standard

Disabled person

means, within the context of this low volume vehicle standard and in the interest of brevity, a person who is sufficiently physically or mentally disabled or aged to such an extent that their mobility is impaired in some way.

Edge barrier	means a barrier attached to the side edges of a platform or ramp extending above the surface of the platform or ramp.
Energy-absorbing material	means a deformable high-density material that provides impact protection to vehicle occupants by absorbing energy, and preventing direct contact with any solid surfaces or objects positioned beneath the material in the event of contact. (Energy-absorbing material should not be able to be compressed by more than approximately 30% under firm thumb pressure.)
GVM or Gross vehicle mass	means the combination of a vehicle's tare, and the payload which the vehicle manufacturer certifies that the vehicle is capable of carrying.
Hand-holds	means a device by which a wheelchair occupant can provide him or herself with support and stability, during the process of being raised or lowered on a wheelchair hoist to or from a vehicle.
Hoist	means an appliance that is attached to a vehicle and used to raise or lower wheelchairs and wheelchair occupants into and out of the vehicle.
Interlock	means a method of connecting two mechanisms so that one of them may be prevented from operating, or a device used to prevent a mechanism from operating independently or unsafely.
Kg	means an abbreviation for kilograms.
Momentary switch	means a switch that is designed so as to require constant depression to actuate, and which when released, will immediately cease actuation.
N	means an abbreviation for newtons, which is the amount of force required to accelerate a 1 kilogram mass by 1 metre per second per second.
Passenger service vehicle	means: <ul style="list-style-type: none">(a) a motor vehicle used or available for use in a passenger service for the carriage of passengers; or(b) a motor vehicle with more than 12 seating positions.
Personal transfer device	means a device positioned inside a vehicle that enables a disabled person to transfer between a wheelchair and a vehicle seating position, and includes swing-out seats, power lifters, and seats with detaching or lowering wheels.
Primary controls	means those vehicle controls used to operate the vehicle's braking, steering, and accelerator systems.

Posture restraint belt	means a belt system attached to a wheelchair frame that assists a disabled person to maintain a comfortable seating position.
Professionally manufactured	means manufactured to a high industry standard, by a person or company whose principle business is the manufacturing of such products or equipment.
PSV	means an abbreviation for a passenger service vehicle.
Roll-stop	means a barrier located at the front and rear edges of a wheelchair hoist platform, that is intended to prevent the wheelchair from unintentionally rolling off the platform.
RHS	means an abbreviation for rectangular hollow section, a common profile of steel tube used in light engineering.
Seating position	means a seat or part of a seat that is of a suitable size and shape for one person.
Secondary controls	means control systems that are not directly related to the steering, braking, and accelerator operations of the vehicle, and include those control systems that operate the windscreen wipers, lighting equipment, horn, and direction indicators.
Tare	means the unladen weight of a motor vehicle.
Wheelchair	means a wheeled chair for the purposes of mobility for a disabled person, which can include manual or electric power.
Wheelchair crane and winch	means a device that is used to lift an unoccupied wheelchair into and out of a vehicle.
Wheelchair ramp	means, within the context of this standard, one which is permanently attached to the vehicle structure, and cannot be readily removed.
Wheelchair restraint docking device	means a system by which a wheelchair is secured into a motor vehicle, using a system similar in principle to a fifth wheel locking device. 'Ez-lock' is a commonly-used brand of wheelchair restraint docking device.

NOTE: The terms and definitions found in section 5 are limited to those terms and definitions that are unique to this low volume vehicle standard, and are not necessarily contained within the terms and definitions section of the Low Volume Vehicle Code.