

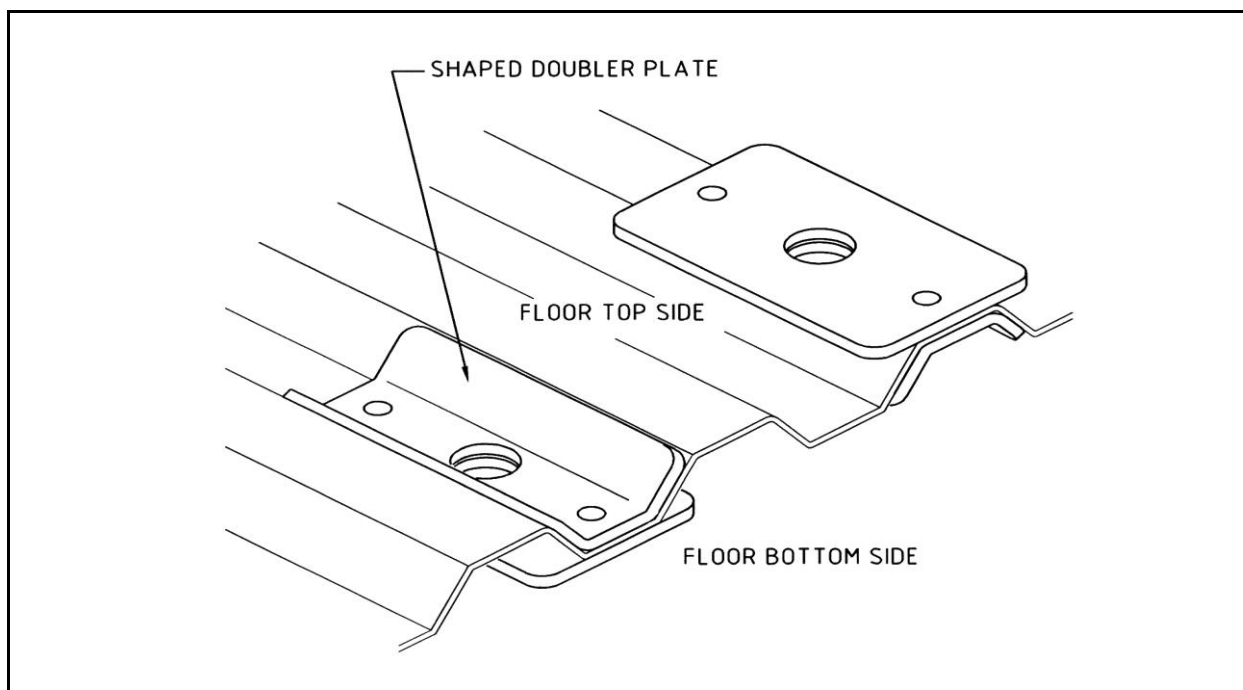
Low Volume Vehicle Technical Association Incorporated

Low Volume Vehicle Standard

175-00(03)

(Seatbelt Anchorages)

This Low Volume Vehicle Standard corresponds with: Land Transport Rule 32011 (Seatbelts and Seatbelt Anchorages)



3rd Amendment – effective from: 25 October 2016

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 of 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 Newsletters	
• LVVTA News October-December 2013 Issue 48	Page 5 Testing of Under-spec Doubler Plates
• LVVTA News August-December 2014 Issue 50	Page 3 Non-compliant Doubler Plates on Market
• LVVTA News August-December 2014 Issue 50	Page 4 Seatbelts in Scratch-built Vehicles
• LVVTA News August-December 2014 Issue 50	Page 9 Counterfeit Full-harness Seatbelts
• LVVTA News August-December 2014 Issue 50	Page 10 Seatbelt Anchorage Permitted Area for Scratch-builts
• LVVTA News January-April 2015 Issue 51	Page 5 Counterfeit Full-harness Seatbelts (Part 2)
• LVVTA News May-July 2015 Issue 52	Page 5 Testing of Integrated Seatbelt Anchorages in a Fiberglass Body

• LVVTA News May-July 2015 Issue 52	Page 8 New Model Toyota Hiace Seating
LVVTA Information Sheets	
• LVV Information Sheet # 08-2000	Seatbelt Anchorage Clarification
• LVV Information Sheet # 04-2001	Frontal Impact Occupant Protection
• LVV Information Sheet # 02-2002	LVV Seatbelt Anchorage Standard Release
• LVV Information Sheet # 03-2004	Nissan Terrano Rear Seatbelt Anchorages
• LVV Information Sheet # 02-2005	Nissan Mistral Rear Seatbelt Anchorages
• LVV Information Sheet # 11-2005	Rear Shelf Speaker Aperture Modifications
• LVV Information Sheet # 01-2006	Seatbelt Anchorage Request Forms
• LVV Information Sheet # 03-2006	Seats and Seatbelts in Motorhomes
• LVV Information Sheet # 09-2008	Stretchers and Restraints in PSVs
• LVV Information Sheet # 02-2012	Aftermarket Sports Seats – General information
• LVV Information Sheet # 03-2012	Motorhome Seats – General Information
• LVV Information Sheet # 07-2012	Child Seating
LVVTA Low Volume Vehicle Standards	
• LVV Standard 185-00 (Seats & Seat Anchorages)	All relevant requirements
• LVV Standard 155-40 (Interior Impact)	All relevant requirements
• LVV Standard 45-60 (Disability Transportation Systems)	All relevant requirements
LVVTA Supporting Documents	
• NZ Car Construction Manual	Chapter 14 Seats, Seatbelts, and Anchorages
• LVV Operating Requirements Schedule	Section 7.1 Scratch-built Sub-category Seatbelt Requirements
• LVV Component Approval Certificate	'Pro-bar'-brand Seatbelt Anchorage Window Bar
Other Documents	
• NZTA Vehicle Inspection Requirements Manual	Section 7-1 Seatbelt Requirements
<p>Note that all documents referred to in this table, with the exception of the NZ Car Construction Manual, can be accessed from www.lvta.org.nz free of charge. For information on obtaining the NZ Car Construction Manual, contact info@lvta.org.nz</p> <p>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.lvta.org.nz/standards.html</p>	

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Seatbelt Anchorages

(175-00[03])

Purpose of this standard

The purpose of this low volume vehicle standard is to specify requirements with which light vehicles must comply, in order to be operated on the road, when either retro-fitted with seatbelt anchorages, modified in such a way that seatbelt anchorages may be affected, or scratch-built. These requirements ensure that seatbelt anchorages are positioned and attached to vehicle structures in such a way that the anchorages will be located correctly, and attached with sufficient strength to minimise the likelihood of injury to vehicle occupants during a collision.

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:
 - (i) retro-fitted with seatbelt anchorages on or after 1 January 1992; or
 - (ii) modified on or after 1 January 1992 in such a way that any seatbelt anchorages may, directly or indirectly, be affected; or
 - (iii) scratch-built on or after 1 January 1992;

or

- (b) more than 9 seating positions, and are:
 - (i) retro-fitted with seatbelt anchorages on or after 1 March 1999; or
 - (ii) modified on or after 1 March 1999 in such a way that any seatbelt anchorages may, directly or indirectly, be affected; or
 - (iii) scratch-built on or after 1 March 1999.

NOTE 1: The retro-fitting referred to in 1.1(1) includes replacement of a static lap and diagonal seatbelt with an inertia reel retractor seatbelt, involving the retro-fitting of an additional seatbelt anchorage or a modification that may affect an existing seatbelt anchorage, in order to accommodate the replacement seatbelt.

NOTE 2: The requirement for LVV certification in the case of seatbelt anchorages was triggered by the introduction of the Transport (Vehicle Standards) Regulations 1990 (VSRs), which was subsequently carried over into the New Zealand Transport Agency's Rules programme. Specifically, the VSR for seatbelt anchorages set an application date of 1 January 1992 for vehicles with 9 seats or less, and an application date of 1 March 1999 for vehicles with more than 9 seats, hence the implementation dates specified in 1.1(1).

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*.

NOTE: Some Class-LE trikes are fitted with seatbelts, and so this low volume vehicle standard must be used to confirm compliance for seatbelt installations.

1.2 Application of this standard

1.2(1) A light vehicle that is retro-fitted, modified or scratch-built 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 specified in *section 2* of this low volume vehicle standard.

NOTE: 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 January 1992 or 1 March 1999), an LVV Certifier must ensure that the vehicle meets the general safety requirements contained in 2.2 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.

1.2(2) A modification associated with a seatbelt anchorage that is not provided for within this standard, must comply with either:

- (a) in the case of a light vehicle that has a retro-fitted seatbelt system that attaches directly to a seat frame instead of, or in addition to, the vehicle structure, the loading requirements specified in the *LVVTA Low Volume Vehicle Standard 185-00 (Seats and Seat Anchorages)*; or

- (b) in the case of a light vehicle that has specialised seatbelt anchorages to accommodate the needs of a person with a disability, the applicable requirements specified within either:

- (i) the LVVTA Low Volume Vehicle Standard 45-60 (Disability Transportation Systems); or
- (ii) the Australian Standard AS2942-1994, Wheelchair occupant restraint assemblies for motor vehicles; or
- (iii) the Australian Standard/New Zealand Standard 4370:1996, Restraint of children with disabilities in motor vehicles;

or

- (c) in the case of an older or more specialised vehicle, the applicable requirements specified in Chapter 14 Seats, Seatbelts, and Anchorages of the New Zealand Car Construction Manual.

1.3

Methods of compliance with this standard

1.3(1)

A low volume vehicle must comply with the technical requirements of this standard by meeting either:

- (a) the best-practice designs provided by this standard as referred to in 1.3(2); or
- (b) as a variation to best practice designs specified in 1.3(2), either:
 - (i) an alternative system which is proven in part by practical testing, as referred to 1.3(3); or
 - (ii) an alternative system which is proven in part by calculation, as referred to in 1.3(4).

Best-practice designs specified by this standard

1.3(2)

The technical requirements of this standard may be complied with by meeting all applicable requirements specified in 2.2 to 2.10.

Alternative systems proven by practical testing

1.3(3)

The technical requirements of this standard may be complied with, where a specific design solution is required as an alternative to 1.3(2), by:

- (a) meeting all applicable requirements specified in *section 2*, other than those in 2.5 to 2.9; and
 - (b) instead of complying with 2.5 to 2.9, completion of a practical test process of the alternative seatbelt anchorage system, to demonstrate that either:
 - (i) the applicable specific loading requirements contained in 2.1 have been achieved; or
 - (ii) results directly equivalent to those required by one of the approved standards specified in *Schedule 3* of the **Land Transport Rule 32011: Seatbelts and Seatbelt Anchorages 2001** have been achieved;
- and
- (c) provision of a copy of an approval certificate for the alternative seatbelt anchorage system issued by LVVTA that verifies to the LVV Certifier that the test results required by **1.3(3)(b)** have been achieved.

Alternative systems proven by calculation

1.3(4)

The technical requirements of this standard may be complied with, where a specific design solution is required as an alternative to **1.3(2)**, by:

- (a) meeting all applicable requirements specified in *section 2*, other than those in 2.5 to 2.9; and
- (b) instead of complying with 2.5 to 2.9, completion of engineering calculations of the alternative seatbelt anchorage system, to confirm that the applicable specific loading requirements contained in 2.1 have been achieved; and
- (c) provision of a copy of an approval certificate for the alternative seatbelt anchorage system issued by LVVTA that verifies to the LVV Certifier that the calculation process required by **1.3(4)(b)** has been carried out.

NOTE 1: The requirements contained in **1.3(3)(c)** and **1.3(4)(c)** means that any alternative seatbelt anchorage systems that are a variation to those designs specified in this standard, must be pre-approved by the LVVTA, with a certificate issued, a copy of which must be provided to the LVV Certifier. Modifiers are required to consult with LVVTA to agree the most appropriate test method or calculation parameters prior to commencing any modification work or verification processes, particularly where any complex or unusual modification or construction work is being undertaken.

NOTE 2: If seatbelt anchorages are part of the seat, the applicable requirements for testing or calculation from *LVV Standard 185-00 (Seats and Seat Anchorages)* must be applied instead of **1.3(3)(c)** and **1.3(4)(c)**.

NOTE 3: Modifiers should be aware that it is inappropriate to apply simple hand (engineering) calculations to any panel steel structure, particularly when the area is shaped or is multi-layered. In such cases, practical testing is the appropriate assessment method, or as a minimum standard, finite element analysis calculations.

NOTE 4: Modifiers should also be aware that where practical testing or calculation is used to prove an alternative specific design solution, any remaining requirements in 2.5 to 2.9 not specifically proven by the testing or calculation process, must be assessed as a best-practice design as required by 1.3(2).

For example, a test process may verify that a doubler plate system made from an alternative material meets the loading requirements specified in 2.1, however if the attachment of the plates to the vehicle structure does not form part of the testing process, then the attachment of the plates must be in accordance with the relevant requirements specified in section 2.

NOTE 5: Vehicle-specific testing or calculations may not be applied to other vehicle makes or models, unless further tests or calculations have been carried out to verify that the requirements will be met for any subsequent makes and models of vehicles.

NOTE 6: A production vehicle that has been type-tested under Seatbelt Anchorage Specification MoT St 31391, and has undergone a structural failure as a result of that test process, must not be certified under the Low Volume Vehicle Code, except by special written arrangement with LVVTA.

Section 2 Technical requirements of this standard

2.1 Loading requirements for seatbelt anchorages

Specific loading requirements

2.1(1) In the case of a retro-fitted seatbelt anchorage system being proven by practical testing or calculation as in 1.3(3) or 1.3(4), a retro-fitted seatbelt anchorage in a low volume vehicle must be designed to withstand a force that may deform the surrounding structure but not result in ultimate failure, applied in the approximate direction of force that could be applied on the seatbelt anchorage by the vehicle occupant during a frontal collision, of:

- (a) in the case of a lap and diagonal seatbelt fitted to forward-facing seats;
 - (i) for the upper seatbelt anchorage with a static seatbelt, 14 kN; and
 - (ii) for the upper seatbelt anchorage with a retractor seatbelt, where the retractor is directly mounted to the upper anchorage, or in another location where only a single loading is applied to the upper anchorage, 14 kN; and
 - (iii) for the upper seatbelt anchorage with a retractor seatbelt, where the retractor is mounted independently of the upper seatbelt anchorage position, resulting in a combination of loads on the upper seatbelt anchorage, 22 kN; and
 - (iv) for the lower seatbelt anchorage that does not have the seatbelt buckle attached, 10 kN; and
 - (v) for the lower seatbelt anchorage that does have the seatbelt buckle attached, 15 kN;

and

- (b) in the case of a lap seatbelt fitted to a forward-facing seat, for each lower seatbelt anchorage, 15 kN; and
- (c) in the case of a rearward-facing seat, approximately 40% of the loads specified in 2.4(1)(a) and (b), for the corresponding type of anchorage in a forward-facing seating position.

2.1(2)

In the case of a retro-fitted seatbelt anchorage system being proven by practical testing or calculation as in 1.3(3) or 1.3(4), a retro-fitted seatbelt system in a low volume vehicle using a retractor that is mounted independently of the upper seatbelt anchorage position must incorporate an anchorage position for the retractor unit that is designed to withstand a load of no less than 13.6 kN in the direction of the upper seatbelt anchorage webbing guide.

NOTE:

The specific loading requirements in 2.1 may appear to differ from loading requirements contained within approved international standards. This is because the loads specified in this standard are the likely maximum loads distributed into each individual seatbelt anchorage by a standard 27 kN load, being applied through a body block, applied in the approximate direction of force that could be applied on the seatbelt anchorage by the vehicle occupant during a frontal collision.

General loading requirements

2.1(3)

The section or structure of a low volume vehicle to which any retro-fitted seatbelt anchorage is attached must be sufficiently strong to withstand the same loading requirements specified in this standard for the seatbelt anchorage itself.

2.1(4)

Two or more retro-fitted seatbelt anchorages in a low volume vehicle, which could be loaded simultaneously in the same direction by the occupants during a frontal collision, must not be positioned at a distance relative to each other that could result in overloading the structure to which the anchorages are positioned, unless the structure is appropriately strengthened.

NOTE:

Sub-section 2.9 should be referred to for the relevant specifications of the structural reinforcement that may be necessitated by the requirements of 2.1(4).

2.2

General safety requirements

2.2(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 2.2(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.

2.2(2) Seatbelts fitted to a low volume vehicle must:

- (a) comply with one or more of the approved standards for seatbelts listed in *Schedule 2* of the *Land Transport Rule 32011: Seatbelts and Seatbelt Anchorages 2001*; and
- (b) be of a type appropriate for the vehicle class and age, and location within the vehicle, as specified in the seatbelt requirement in *Tables 2.1 to 2.4* of the *Land Transport Rule 32011: Seatbelts and Seatbelt Anchorages 2001*.

NOTE: This standard does not go into the detail of which type of seatbelt is required for each seating position in all light vehicle types, as there are many variations and exceptions. Refer to *Land Transport Rule 32011*, or *section 7-1* of the *NZTA Vehicle Inspection Requirements Manual (VIRM)*, available at www.nzta.govt.nz/virms. *Chapter 14* of the *New Zealand Car Construction Manual* also includes requirements for older vehicles that are significantly modified, and alternative seatbelt types.

2.2(3) A seatbelt anchorage and its mounting location:

- (a) must be of a strength appropriate to both the motor vehicle and the attached seatbelt; and
- (b) must be structurally sound and free of corrosion; and
- (c) must not be damaged or distorted.

2.2(4) When a seatbelt or part of a seatbelt is attached to a seat, the seat and the seat anchorages must be compatible in strength with the seatbelt or with that part of the seatbelt attached to the seat.

NOTE 1: The requirements specified in 2.2(3) and 2.2(4) are the applicable general safety requirements for seatbelt anchorages from *section 2* of the *Land Transport Rule 32011: Seatbelts and Seatbelt Anchorages*, reproduced here in the interest of convenience.

NOTE 2: Paragraph 2.2(3)(c) refers to damage or distortion as a result of previous loading (usually as a result of impact energy).

2.3 Positioning requirements for upper seatbelt anchorages

Permitted area for upper anchorages (vehicles with roof structure)

2.3(1) An upper seatbelt anchorage position in a low volume vehicle with a permanent roof structure, must be either:

- (a) a position incorporated by the original vehicle manufacturer, provided that:
- (i) the structural integrity of the vehicle has not been compromised by the removal of any part of the original vehicle structure critical to the strength of the seatbelt anchorage; and
 - (ii) the seat is mounted in the same position as it was in the original vehicle, relative to the original seatbelt anchorage positions;

or

- (b) where no position was provided by the original vehicle manufacturer, retro-fitted to a position within the area specified in 2.3(2), determined by either:
- (i) an LVVTA Body H-Frame; or
 - (ii) measured from an LVVTA H-point template, as shown in diagram 2.3(1).

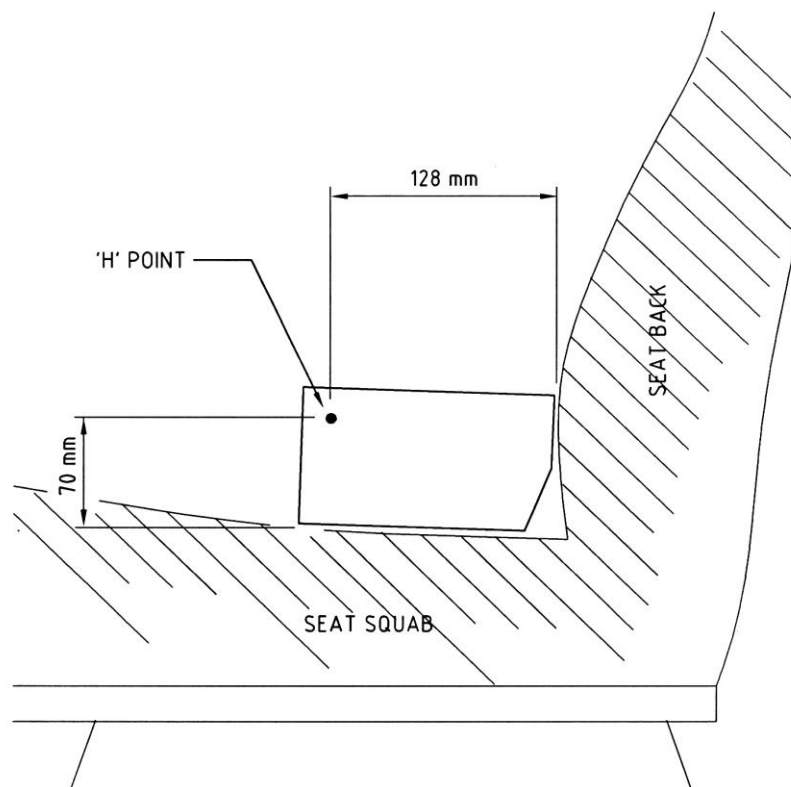


Diagram 2.3(1) LVVTA H-point template

2.3(2)

With the seat at the mid-point of its fore-aft extension and the seat-back reclined to a normal driving position, a retro-fitted upper seatbelt anchorage in a low volume vehicle must be positioned:

- (a) in the fore-aft direction, no further forward than a line that follows the front face of the seat back; and
- (b) at a width of between 140 mm and 500 mm, from the longitudinal centreline of the seat [see diagram 2.3(2)(a)]; and
- (c) at a height of between 460 mm and 710 mm, measured from the H-point, following the front face of the seat back [see diagram 2.3(2)(b)]; and
- (d) in such a way that the retracted seatbelt is within reach of a normally seated occupant.

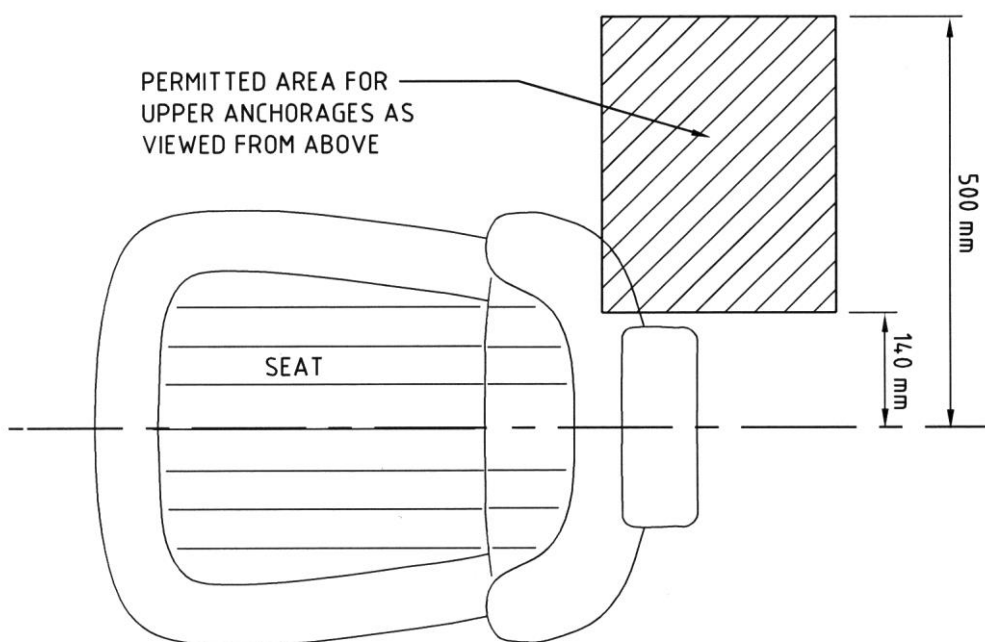


Diagram 2.3(2)(a) Permitted area for upper anchorages (top view)

NOTE: Chapter 14 Seats, Seatbelts, and Anchorages of the [New Zealand Car Construction Manual](#) has further information for the positioning of seatbelts in older vehicles.

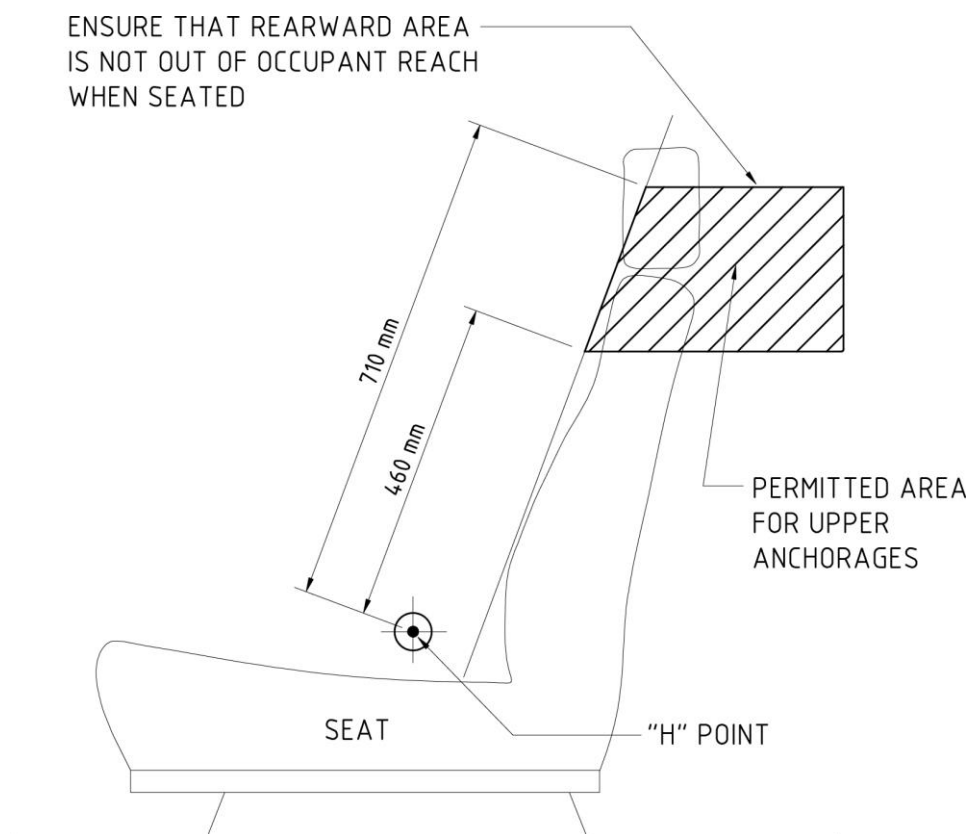


Diagram 2.3(2)(b) Permitted area for upper anchorages (side view)

- NOTE 1:** Where a seatbelt features a 'drop hanger', the upper seatbelt anchorage is to be measured at the point where the seatbelt webbing loops up and over the lower end of the drop hanger.
- NOTE 2:** When the upper anchorage is a comparatively long distance from the seat centreline, the upper seatbelt anchorage needs to be positioned as far back as possible while the seatbelt is still in reach. This ensures that the seatbelt is in the right position relative to the shoulder, and will therefore restrain the occupant during an impact.
- NOTE 3:** A seatbelt that is at the extreme ends of the permitted area may not provide a comfortable fitment for all wearers. Users should ensure that the positioning of the seatbelt does not sit across the user's neck.

Permitted area for upper anchorages (vehicles with no roof structure)

2.3(3)

An upper seatbelt anchorage position in a low volume vehicle that does not have a permanent roof structure, must be either:

- (a) a position incorporated by the original vehicle manufacturer, provided that:
 - (i) the structural integrity of the vehicle has not been compromised by the removal of any part of the original vehicle structure critical to the strength of the seatbelt anchorage; and

- (ii) the seated position of the occupant is the same position as it was in the original vehicle relative to the original seatbelt anchorage positions;

or

- (b) where no position was provided by the original vehicle manufacturer, retro-fitted to a position as close as practicable to the area specified in 2.3(2); or
- (c) in the case of a scratch-built vehicle, fitted to a position that meets all requirements in 2.3(2).

NOTE: The location of the upper anchorage must be carefully considered, as there is the possibility of spinal compression if the upper anchorage is installed too low down below the shoulder. Some vehicles may need additional structure to achieve a position that is fit for purpose and safe.

Permitted area for upper anchorages for rearward-facing seats

- 2.3(4) A low volume vehicle with rearward-facing seats must have retro-fitted upper seatbelt anchorages installed within the same permitted areas relative to the seat as forward-facing seats.

NOTE: Seating positions that are provided for children must use the same permitted area for upper seatbelt anchorages as those provided for adults, except where the seats are clearly and permanently labelled as being for the use of persons under 10 years old. NZ law requires that an appropriate child restraint is used for children up to 7 years old.

Permitted area for upper anchorages positioned over glazing

- 2.3(5) Where a retro-fitted upper seatbelt anchorage is required in a low volume vehicle, and glazing is positioned within the permitted area specified for an upper seatbelt anchorage in this standard, a seatbelt anchorage must be installed to enable the positioning of the upper seatbelt anchorage within the permitted area as specified in this standard, on either:

- (a) a cant rail that was designed by the vehicle manufacturer as a structural member, which supports an approved retractor lap and diagonal seatbelt and cant rail dropper system that meets the attachment requirements for cant rail droppers specified in 2.5(3); or
- (b) a window bar assembly, together with its manufacturer-supplied mounting and fastening system, which supports approved static or retractor lap and diagonal seatbelts, that:
 - (i) is designed for a specific make and model of vehicle to meet the applicable loading requirements specified in 2.1, and is accompanied by a copy of an approval certificate for the window bar assembly issued by LVVTA, that is verified by the LVV Certifier as meeting the specified loading requirements; and

- (ii) meets the attachment requirements for window bars specified in 2.5(4).

NOTE 1: The requirements contained in 2.3(5)(b)(i) means that any window bar assemblies must be pre-approved by the LVVTA, with a certificate issued, a copy of which must be verified by the LVV Certifier. An approved window bar must be permanently marked with the window bar manufacturer and part number, which matches that described in the approval certificate for the specific make and model of vehicle to which the window bar is fitted.

NOTE 2: The doubler plate mounting system provided by the manufacturer of the window bar assembly cannot be substituted for any other doubler plates.

NOTE 3: For older vehicles that have a B-pillar further forward than the permitted area, the relevant section of Chapter 14 of the *New Zealand Car Construction Manual* should be referred to.

Upper seatbelt anchorage positioning onto rear shelves

2.3(6) Where a retro-fitted upper seatbelt anchorage is positioned onto a rear shelf of a low volume vehicle:

(a) the rear shelf must:

- (i) be of a comparable shape, width, design, and material specification so as to be at least as strong as a rear shelf which a high volume vehicle manufacturer installs seatbelt anchorages into as original equipment; and
- (ii) be supported at each side by a load-bearing structural member or section of the vehicle;

and

(b) the upper seatbelt anchorages fitted to the shelf must either:

- (i) in the case of two outer upper seatbelt anchorages attached to the rear shelf, be attached within 100 mm of a load-bearing structural member or section of the vehicle; or
- (ii) in the case of a seatbelt anchorage attached to the rear shelf that is not within 100mm of structure, such as that provided for a center seating position, the shelf must be suitably reinforced in order to withstand the loads that could be applied by the centre upper seatbelt.

NOTE 1: Seatbelt fitments in older vehicles that pre-date the introduction of seatbelt anchorage standards should not be used as a reference point for the comparison referred to in 2.3(6)(a)(i).

NOTE 2: An example of a reinforcement for a rear shelf is a steel beam, stitch-welded all along the rear shelf, and attached securely to a structural part of the vehicle at each outside end.

Upper seatbelt anchorages on centre seating positions

2.3(7)

Where a retro-fitted upper seatbelt anchorage is required in a centre seating position within a low volume vehicle, the retro-fitted upper seatbelt anchorage must, together with the structure to which it is attached, either:

- (a) be designed to meet the applicable loading requirements specified in 2.1, and is accompanied either by engineering calculations or documented practical test results to substantiate to the LVV Certifier that the loading requirements will be met; or
- (b) meet the appropriate best practice solutions for upper seatbelt anchorages contained within Chapter 14 Seats, Seatbelts, and Anchorages of the New Zealand Car Construction Manual.

Upper seatbelt anchorage positioning for full-harness seatbelts

2.3(8)

In the case where it is not practicable to apply 2.3(1) to 2.3(3) because a four-point or five-point full harness seatbelt is fitted, the full-harness seatbelt must be positioned within the area specified by the applicable technical requirements of either MotorSport New Zealand or the New Zealand Drag Racing Association, as appropriate to the type of vehicle to which the full harness is fitted.

Upper seatbelt anchorage positioning onto sidewalls

2.3(9)

Where a retro-fitted upper seatbelt anchorage is positioned onto a side-wall of a low volume vehicle, including a pillar-section:

- (a) the sidewall or pillar-section must meet the strength requirements specified in 2.2(3); and
- (b) the sidewall or pillar-section must be securely attached to the roof and to the floor, and where necessary, be reinforced as specified in 2.9(1); and
- (c) the upper seatbelt anchorage hole centre must not be positioned within 50 mm of a hole or cutaway section, unless the upper seatbelt anchorage position, and the structure around it, is identical to that provided by the vehicle manufacturer.

2.4

Positioning requirements for lower seatbelt anchorages

Permitted area for lower seatbelt anchorages

2.4(1)

A lower seatbelt anchorage position in a low volume vehicle must be either:

- (a) a position incorporated by the original vehicle manufacturer, provided that:
 - (i) the structural integrity of the vehicle has not been compromised by the removal of any part of the original vehicle structure critical to the strength of the seatbelt anchorage; and
 - (ii) the seated position of the occupant is in the same position as it was in the original vehicle, relative to the original seatbelt anchorage positions;

or

- (b) where no position was provided by the original vehicle manufacturer, retro-fitted to a position within the area specified in 2.4(2), determined by either:
 - (i) a LVVTA Body H-Frame; or
 - (ii) measured from a LVVTA H-point template, as shown in diagram 2.3(1).

2.4(2)

A retro-fitted lower seatbelt anchorage in a low volume vehicle must be positioned within an area, defined as, with the seat at the mid-point of its fore-aft extension and the seat-back reclined to a normal driving position:

- (a) on the longitudinal plane, rearwards from the H-point by between 17% and 100% of the distance between the H-point and the floor directly below the H-point [see diagram 2.4(2)(a)]; and
- (b) across the width of the vehicle, no closer to each side of the centre-line of each seating position than 175 mm, or in the case of seats provided specifically for children, 162 mm, and no further from each side of the centre-line of each seating position than 250 mm [see diagram 2.4(2)(b)]; and
- (c) vertically, at least 100 mm below the H-point.

NOTE 1: Where seating is specifically provided for a child under the age of 10 years, the measurement in Diagram 2.4(2)(a) can be reduced to 162 mm. Any seat provided specifically for children must be permanently labelled as being for the use of persons under the age of 10 years.

NOTE 2: In multi-seat frames, the lower anchorage points need to be positioned far enough toward the rear of the permitted area to ensure against the lap seatbelt sections applying a downward load on the back of the seat frame, unless the frame is designed to withstand such loads.

NOTE 3: Anchorages should be positioned to reduce chances of foot entanglement within the seatbelts from rear seat occupants.

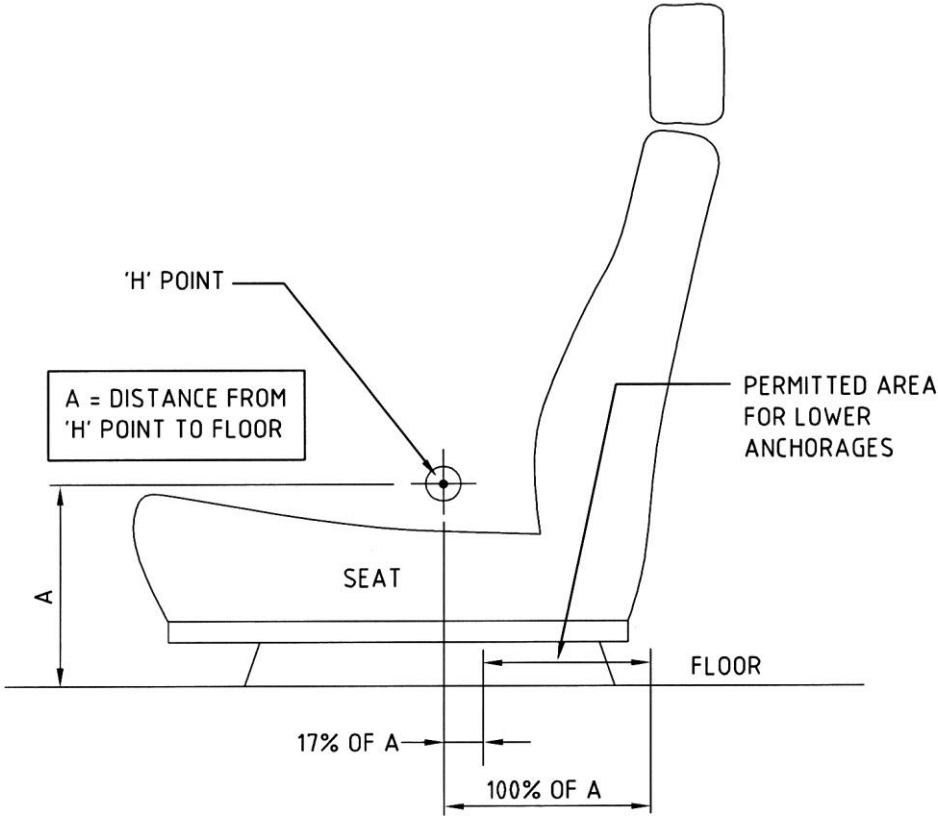


Diagram 2.4(2)(a) Permitted area for lower anchorages (side view)

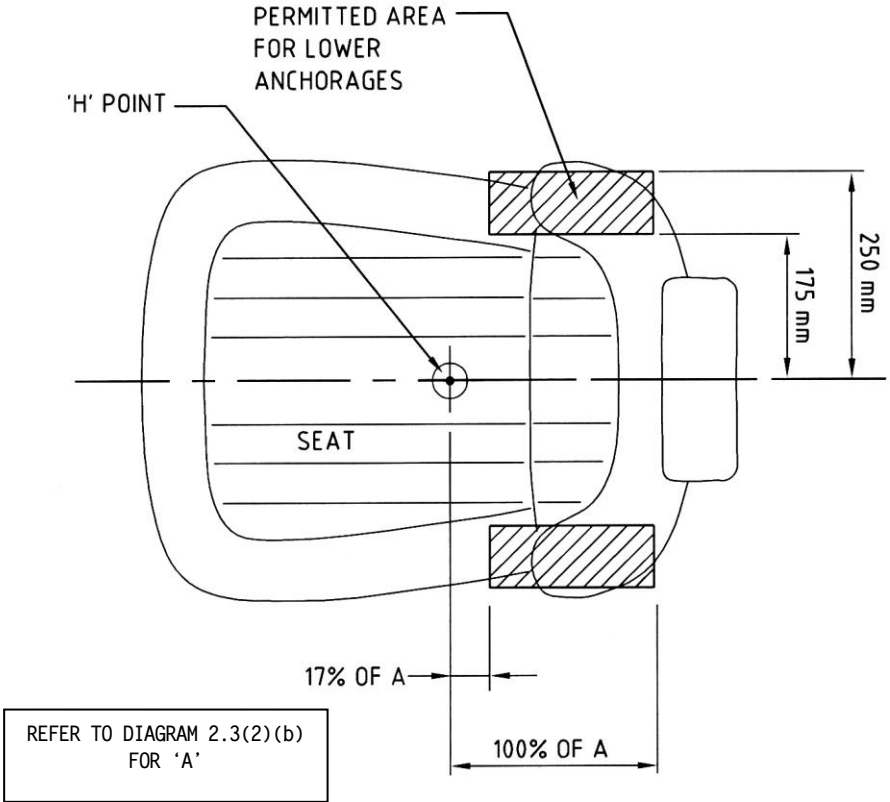


Diagram 2.4(2)(b) Permitted area for lower anchorages (top view)

- 2.4(3) A low volume vehicle with rearward-facing seats must have retro-fitted lower seatbelt anchorages installed within the same permitted areas relative to the seat as forward-facing seats.

Lower seatbelt anchorage positioning onto sidewalls

- 2.4(4) Where a retro-fitted lower outer seatbelt anchorage or seatbelt retractor is positioned onto a side-wall of a low volume vehicle, including a lower pillar section:

- (a) the sidewall section must meet the strength requirements specified in 2.2(3); and
- (b) the sidewall must be attached to a load-bearing floor section, and reinforced as specified in 2.9(1); and
- (c) the lower outer seatbelt anchorage must be positioned as closely as possible to the floor; and
- (d) the anchorage hole centre must not be positioned within 50 mm of a hole or cutaway section, unless the hole or cutaway section is provided by the vehicle manufacturer as a mounting position for a seatbelt retractor.

NOTE: Where a lower seatbelt anchorage and retractor share an anchorage on the sidewall, the requirements in 2.8(4) must be met.

Lower seatbelt anchorage positioning for full-harness seatbelts

- 2.4(5) In the case of where it is not practicable to apply 2.4(2) because a four-point or five-point full-harness seatbelt is fitted, the full-harness seatbelt must be positioned within the area specified by the applicable technical requirements of MotorSport New Zealand or the New Zealand Drag Racing Association, as appropriate to the type of vehicle to which the full harness is fitted.

2.5 Attachment requirements for all seatbelt anchorages

- 2.5(1) A seatbelt anchorage, other than a complete anchorage system where all components of the anchorage are provided, positioned, and installed by the vehicle manufacturer, including all associated hardware, fasteners, and reinforcements, must:
- (a) attach to a permanent part of the vehicle structure such as a pillar, floor section, or inner wheel arch; and
 - (b) incorporate doubler plates, and where applicable a crush-tube, tubular spacer, or solid packer, which are designed and attached as specified in 2.6 and 2.7; and

- (c) incorporate localised reinforcement, where applicable, as specified in 2.9; and
- (d) in the case of a window bar, be attached as specified in 2.5(4); and
- (e) not involve any modifications that could weaken the vehicle structure.

NOTE 1: Paragraph 2.5(1) allows for a seatbelt anchorage to replicate the original manufacturer's fitment in an identical vehicle, such as to add a seat and seatbelt that was a manufacturer option from new.

NOTE 2: The *New Zealand Car Construction Manual* provides for some designs that are an alternative to that specified in 2.5(1), such as the through-pillar bolt, and these alternative designs are intended for specific situations outside of the scope of this standard.

2.5(2) Air gaps between two floor or panel surfaces of a low volume vehicle to which a seatbelt anchorage is retro-fitted may not be modified by hammering, but must be eliminated by either the installation of a packer, or the two surfaces must be pulled firmly together.

Cant rail dropper assembly attachment

2.5(3) A cant rail dropper assembly retro-fitted to a low volume vehicle, to which an upper seatbelt anchorage is attached, must be:

- (a) the only cant rail dropper fitted to any one cant rail section between two pillars [see diagram 2.5(3)]; and
- (b) attached into a section of cant rail no further than 300 mm from a pillar [see diagram 2.5(3)].

Window bar assembly attachment

2.5(4) A window bar assembly retro-fitted to a low volume vehicle, to which an upper seatbelt anchorage is attached, must:

- (a) be attached at the cant rail and at the waist rail; and
- (b) be attached in accordance with the specifications and instructions supplied by the window bar manufacturer; and
- (c) be the only window bar fitted to any one cant rail section and waist rail section between two pillars [see diagram 2.5(3)]; and
- (d) attach into a section of cant rail and waist rail positioned:
 - (i) in the case of a static lap and diagonal seatbelt, anywhere within the glazed area; or

- (ii) in the case of a retractor lap and diagonal seatbelt, no further than 300 mm from a pillar [see diagram 2.5(3)], unless a greater distance is specifically stated by the window bar manufacturer, and supporting evidence of suitability is provided.

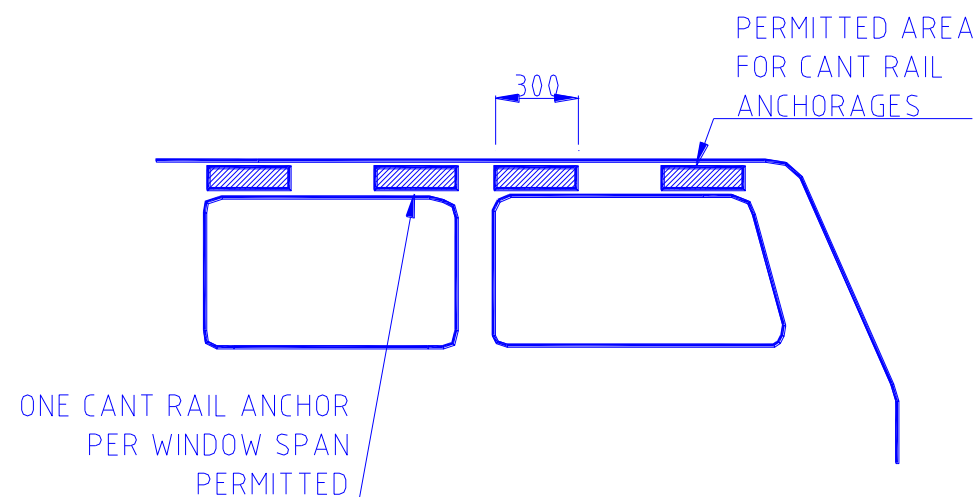


Diagram 2.5(3) Upper anchorages in cant rails and waist rails

NOTE: Whilst 2.3(5) requires all window bars to have been proven to be suitable for use either by physical testing or calculation based on an initial practical test, a window bar that supports a retractor lap and diagonal seatbelt must, due to the substantially higher loadings placed on the vehicle structure by a retractor seatbelt compared to a static seatbelt [22 kN vs 14 kN], be fitted within 300 mm of a pillar [as required by 2.5(4)(d)(ii)], unless the window bar has been proven to comply with the applicable loading requirements in 2.1 by being specifically tested elsewhere within the glazed area of the particular make and model of vehicle to which the window bar is fitted.

- 2.5(5) Any welding associated with the installation of a retro-fitted seatbelt anchorage in a low volume vehicle, or any reinforcement of any areas adjacent to a seatbelt anchorage installation must:
- (a) meet all welding requirements specified in 18.7 and 18.8 of Chapter 18 Attachment Systems of the New Zealand Car Construction Manual; and
 - (b) follow time-proven best-practice methods, and incorporate good design and construction techniques.
- 2.5(6) A retro-fitted seatbelt anchorage assembly must not be welded to a high-strength steel floor section, pillar, or any other structural part of a production vehicle made from high-strength steel, unless the welding is carried out in accordance with written specifications approved by the vehicle manufacturer.

Fastening requirements

2.5(7)

A fastener used for the attachment of a single seatbelt to a seatbelt anchorage in a low volume vehicle must be manufactured specifically for that purpose, and must be a fastener which is either:

- (a) supplied by the manufacturer of the seatbelt being fitted; or
- (b) of equal or greater size and strength than either:
 - (i) 7/16 inch UNF grade-5 imperial; or
 - (ii) 12 mm grade-8.8 metric.

NOTE: Metric fasteners manufactured specifically for the purpose of attaching seatbelt anchorages have a (world-wide) standardised pitch of 1.25 mm.

2.5(8)

A fastener used for the attachment of a seatbelt to a seatbelt anchorage in a low volume vehicle must:

- (a) be lightly coated with lubricant over the thread section; and
- (b) have its tensile strength grade identified in order to establish the correct torque setting for the fastener [see *table 2.5(8)*]; and
- (c) be tightened to the applicable torque setting specified in *table 2.5(8)*; and
- (d) protrude through the outer end of the nut to which it attaches by not less than two full threads.


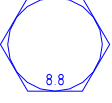
FASTENER GRADE	MARKING	SURFACE	TORQUE
Grade 5 imperial		un-plated	51 Nm (37 ft lb)
		plated	48 Nm (35 ft lb)
Grade 8.8 metric		un-plated	89 Nm (65 ft lb)
		plated	83 Nm (61 ft lb)

Table 2.5(8) Fastener grade and torque settings

Fastening through hollow sections

- 2.5(9) A retro-fitted seatbelt anchorage fastener that is required to be positioned through a hollow section such as a sub-frame or cross-member in a low volume vehicle, must incorporate a crush-tube to enable correct tightening of the anchorage fastener without causing deformation of the section through which the anchorage fastener passes, that:
- (a) is constructed from a mild steel material, with a nominal wall thickness of 3 mm; and
 - (b) is coated, together with the structure or surface to which the crush-tube attaches, with a permanent anti-corrosive protection such as paint or zinc plating; and
 - (c) provides a steel-to-steel contact throughout the span of the seatbelt anchorage fastener's attachment.

Quick-release seatbelt anchorage requirements

- 2.5(10) A retro-fitted seatbelt anchorage in a low volume vehicle must not be able to be removed from, and re-installed into, the vehicle structure without the use of tools, except for an anchorage that is used specifically for:
- (a) the restraint of a wheelchair, or the restraint of an occupant in a wheelchair; or
 - (b) a seating position that is designed to be removed or folded away to allow transportation of a wheelchair and a wheelchair occupant; or
 - (c) a rear-most row seating position that is required to be removed or folded away in order to provide temporary cargo space.

NOTE 1: Most quick-release-type seatbelt systems are designed for the restraint of wheelchairs, and occupants within wheelchairs, and in many cases have seatbelts that do not meet an approved standard. These can therefore only be used in the situation provided for in 2.5(10)(a), allowed for by a provision contained in the Land Transport Rule 32011: Seatbelts and Seatbelt Anchorages. For other applications such as those specified in (b) and (c), the LVVTA recommends the incorporation of approved seatbelts and seatbelt anchorages within the seat frame, where the seat is required to be temporarily removed or folded away.

NOTE 2: Fasteners that have an eyelet on the bolt head for attachment of a quick-release harness seatbelt for motorsport purposes may be used in place of a fastener specified in 2.5(7) for lower seatbelt anchorages, provided that the fastener is used as a direct replacement, is of the correct grade, and is suitable for use with the seatbelt being used.

- 2.5(11) A retro-fitted seatbelt anchorage in a low volume vehicle that is able to be removed from and re-installed into the vehicle structure without the use of tools, as provided for in 2.5(10), must:

- (a) be accompanied by documentation to show evidence of testing and compliance with the applicable loads specified in 2.1; and
- (b) not be able to:
 - (i) be removed without deliberate and specific effort; or
 - (ii) unless exclusion 3.1(1) applies, be re-installed outside of the permitted area for lower seatbelt anchorages specified in 2.4.

Other attachment requirements

2.5(12) In the case of where it is not practicable to apply 2.5(1) to 2.5(11) due to the vehicle constructional features, the seatbelt anchorage attachment system must meet the appropriate best practice solutions for special applications contained within Chapter 14 Seats, Seatbelts, and Anchorages of the New Zealand Car Construction Manual.

2.5(13) A nut or threaded insert that is smaller than 12mm or 7/16 inch, such as one provided by the vehicle manufacturer for a seat fitment, must not be drilled out and re-tapped for use as a seatbelt anchorage in a low volume vehicle.

NOTE: In the case of 2.5(13), drilling out a nut removes material and compromises the strength. The under-sized nut must be removed and replaced with suitable doubler plates.

2.6 Doubler plate requirements

Doubler plate specifications

- 2.6(1) For all panel steel applications, a doubler plate assembly must be used for the attachment of an individual retro-fitted seatbelt anchorage to a low volume vehicle, which must:
- (a) always consist of two plates, one on each side of the vehicle structure to which the anchorage is attached; and
 - (b) have each plate constructed in one piece from mild steel, with a nominal plate thickness of 3 mm; and
 - (c) have a hole within each plate to accommodate the seatbelt anchorage bolt, that:
 - (i) has a bolt clearance of no greater than 1 mm; and
 - (ii) is located as centrally as practicable on the plate surface;

and

- (d) incorporate on the plate on the opposite side of the vehicle structure to the seatbelt, to accept a fastener specified in 2.5(7), a permanently fixed nut or threaded section of steel material having a minimum full thread depth of 8 mm (or six threads), of equal or greater size than either:
- (i) 7/16 inch UNF imperial; or
 - (ii) 12 mm metric.

NOTE 1: When a drilling and tapping operation is carried out on a section of steel, a visual inspection must be undertaken by a low volume vehicle certifier prior to final fastener installation, to ensure that adequate thread form has been provided in the material.

NOTE 2: The doubler plate thickness of 3 mm allows some bending under load so that it can deform with the sheet steel of the body. Thicker plates may not deform to the same extent, and could be more likely to pierce the sheet steel, leading to earlier failure.

NOTE 3: Mounting of doubler plate systems to non-steel structures is possible, however should be dealt with on a case-by-case basis by consulting LVVTA prior to modification or construction.

NOTE 4: Panel steel is defined as up to 2.5 mm, whereas chassis or structural steel is defined as over 2.5 mm. Where clarification is required, the [New Zealand Car Construction Manual](#) should be referred to.

NOTE 5: Metric fasteners manufactured specifically for the purpose of attaching seatbelt anchorages have a (world-wide) standardised pitch of 1.25 mm.

Doubler plate mating surface area

2.6(2)

A doubler plate assembly used in the retro-fitting of a seatbelt anchorage to a low volume vehicle must be of a size and orientation that enables a minimum mating area to which both doubler plate surfaces contact, of:

- (a) in the case where the load is applied parallel to the plate surface, and the plates are primarily designed to be clamped in order to prevent slipping, such as where a retractor is mounted vertically in a pillar or sidewall, 2000 square mm, with not less than 30 mm in width, which include those plate mating areas specified in *table 2.6(2)(a)*; and

50 mm x 40 mm
70 mm x 30 mm
80 mm x 50 mm
100 mm x 30 mm
100 mm x 40 mm
140 mm x 40 mm

Table 2.6(2)(a) Doubler plate mating surface area (in shear)

- (b) in the case where the load is not applied parallel to the plate surface, such as a lower anchorage installed in a floor section or on a sidewall, 3000 square mm, with not less than 30 mm in width, which include those plate mating areas specified in *table 2.6(2)(b)*.

80 mm x 50 mm
100 mm x 30 mm
100 mm x 40 mm
140 mm x 40 mm

Table 2.6(2)(b) Doubler plate mating surface area (in tension)

Doubler plate preparation

- 2.6(3) A doubler plate used in the retro-fitting of a seatbelt anchorage to a low volume vehicle must:

- (a) have all corners rounded to a radius of no less than 5 mm; and
- (b) have all edges which contact the vehicle structure to which the doubler plate attaches rounded by the removal of no less than 0.1 mm; and
- (c) be coated, together with the structure or surface to which the doubler plate attaches, with a permanent anti-corrosive protection such as paint or zinc plating.

- 2.6(4) The surface of the area of a low volume vehicle to which a doubler plate assembly is used to attach a seatbelt anchorage must be free from any sound deadening or other compressible material to ensure that a full metal-to-metal contact is made.

Doubler plate attachment

- 2.6(5) A doubler plate assembly used in the retro-fitting of a seatbelt anchorage to a low volume vehicle must be attached by a mechanical means to the vehicle structure, using either:

- (a) two or more Monel rivets, which:
 - (i) are positioned in line with the direction of any loading to which the seatbelt anchorage may be subjected, or align as closely as practical to parallel to the longitudinal centre-line of the vehicle [see diagram 2.6(5)]; and
 - (ii) have a shank diameter of no less than 3.2 mm; and

- (iii) are no less than 5 mm longer than the combined thickness of the materials through which the rivet passes;

or

- (b) two or more 5 mm bolts and nuts.

NOTE: Monel is a common brand name of this hard nickel-copper alloy. The rivet numbering system, for example '4-6 73MS' is as follows:

- 4-6 denotes a no.4 rivet diameter and no.6 rivet grip range. A 4-6 rivet has a diameter of 3.2 mm and a 6-6 rivet has a diameter of 4.8 mm.
- A 6-6 rivet has a (uncompressed) length of 14.9 mm, with a grip range of 7.9 mm-9.5 mm (the thickness of material that can effectively be gripped).
- 73 denotes the rivet head style, and MS denotes a nickel copper alloy rivet with a grade 400 zinc plated steel stem. The high nickel content provides corrosion resistance.

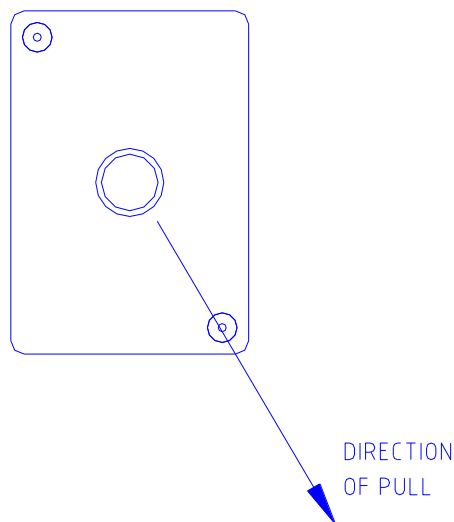


Diagram 2.6(5) Doubler plate orientation

NOTE: Where the construction features of a vehicle, such as a cross-member seam, do not allow rivets to be oriented in the correct direction of pull, rivets should be placed as closely as can be practically achieved.

2.6(6) A doubler plate assembly used in the retro-fitting of a seatbelt anchorage to a low volume vehicle must be attached in such a way as to:

- (a) be positioned in line with the direction of any loading to which the seatbelt anchorage may be subjected, or align as closely as practical to parallel to the longitudinal centre-line of the vehicle; and
- (b) be clamped as tightly as practicable; and

- (c) provide the maximum available clamping area over the required mating surface area, in no case less than 2000 square mm.

NOTE 1: The two plates don't have to mirror each other; – they can be of slightly different sizes and orientations, provided that the minimum area requirement for each plate is met, and the orientation requirements are met.

NOTE 2: The alignment of the doubler plates must be such that the likelihood of the direction of pull during loading being applied against a corner of the plate is minimised.

- 2.6(7) The installation and attachment of a doubler plate assembly used in the retro-fitting of a seatbelt anchorage to a low volume vehicle must not involve any associated modifications that could weaken the vehicle structure.

Doubler plate attachment on uneven surfaces

- 2.6(8) Where a doubler plate assembly is used to retro-fit a seatbelt anchorage to a low volume vehicle, where there is an uneven surface such as a floor-pan with corrugations that does not have a false floor, the doubler plate assembly must maintain the required mating surface area, by either:

- (a) where the doubler plate interferes with changes in the contour of the floor, the plate must be shaped to conform to the floor contour changes [see diagram 2.6(8)(a)]; or

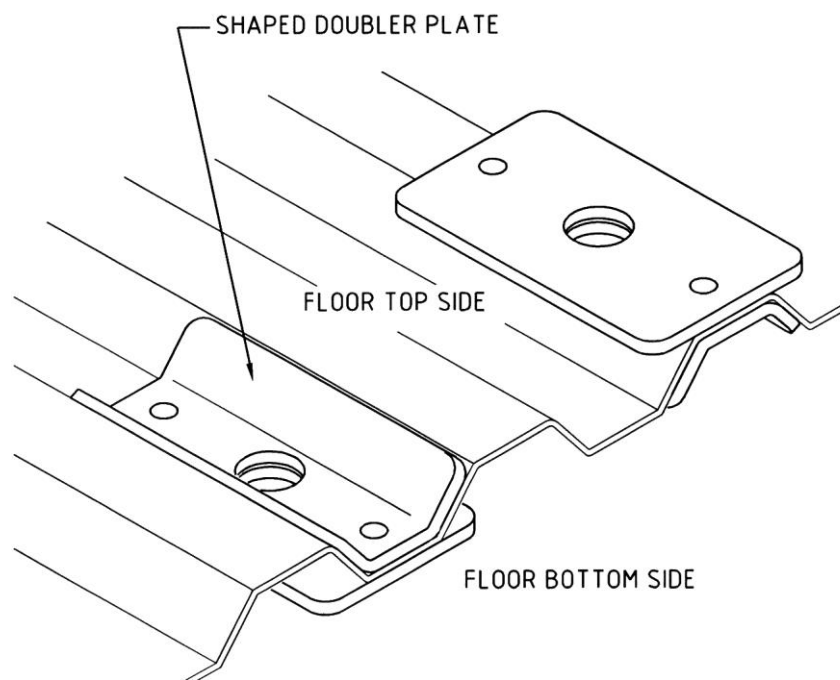


Diagram 2.6(8)(a): Doubler plates attached on uneven surfaces

- (b) be supported by a packer that meets the requirements specified in 2.7(2) through 2.7(6) inclusive, positioned between the floor surface and the doubler plates; or
- (c) where there is a localised area of uneven surface, minimal panel-beating of the surface to achieve the required mating surface area.

NOTE: As further explanation to diagram 2.6(8)(a), the top plate on a 'peak' section, and a bottom plate on a 'valley' section, are not required to follow the shape of the floor surface, provided that the minimum contact areas are maintained.

2.6(9) In the case of where it is not practicable to apply 2.6(1) to 2.6(8) due to vehicle constructional features, the seatbelt anchorage doubler plate system must meet the appropriate best practice solutions for special applications contained within Chapter 14 Seats, Seatbelts, and Anchorages of the New Zealand Car Construction Manual.

2.7 False floor requirements

Methods of seatbelt anchorage attachment to false floors

- 2.7(1)** A retro-fitted seatbelt anchorage must not be attached directly to a compressible false floor in a low volume vehicle without the use of either:
- (a) a solid packer, that meets the requirements specified in 2.7(2) to 2.7(6), positioned between the floor and the seatbelt mounting lug [see diagram 2.7(1)(a)]; or

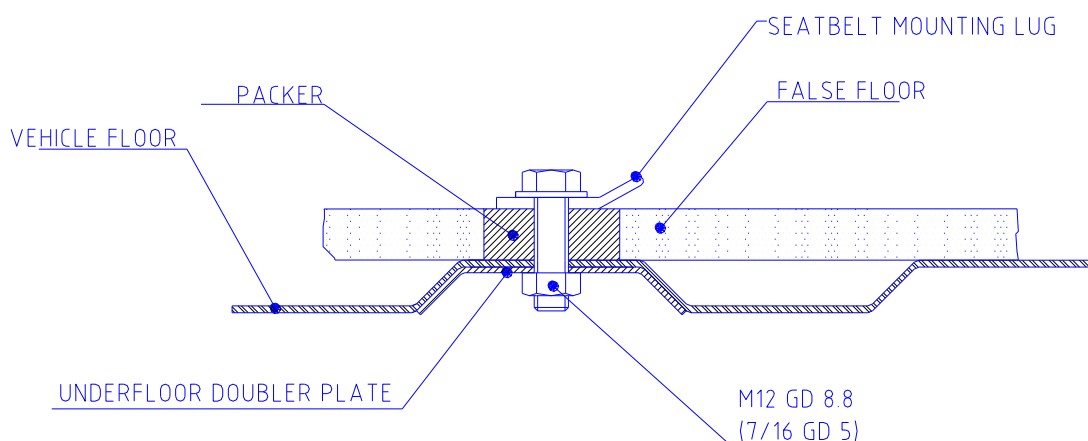


Diagram 2.7(1)(a) Solid packers with false floors

- (b) a tubular spacer that meets the requirements specified in 2.7(7), positioned between the topside doubler plate and the seatbelt mounting lug [see diagram 2.7(1)(b)]; or

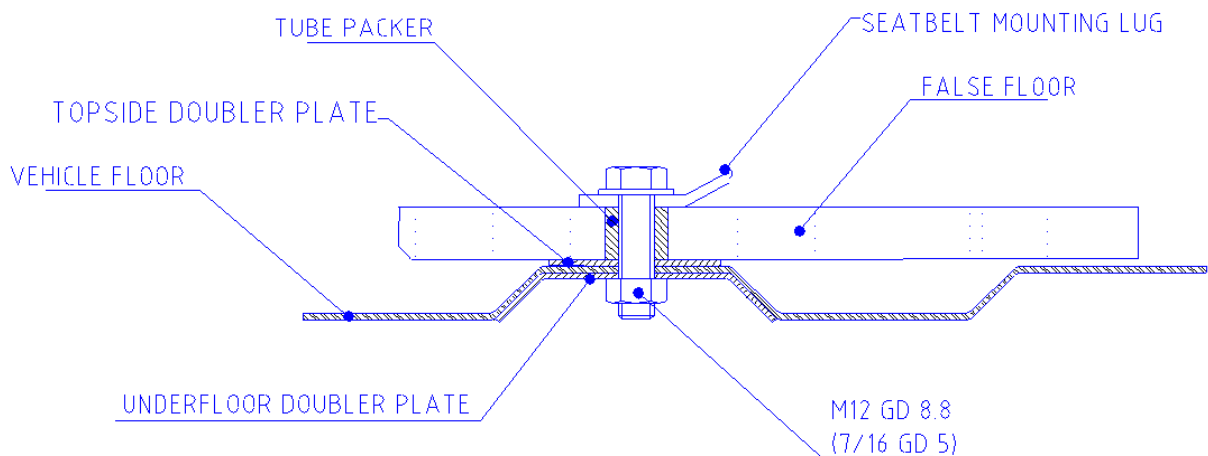


Diagram 2.7(1)(b) Tubular spacers with false floors

- (c) in the case of a false floor positioned above a corrugation within the original floor section, a combination of a solid packer that meets the requirements specified in 2.7(2) to 2.7(6), positioned beneath a tubular spacer that meets the requirements specified in 2.7(7), both positioned between the floor and the seatbelt mounting lug [see *diagram 2.7(1)(c)*].

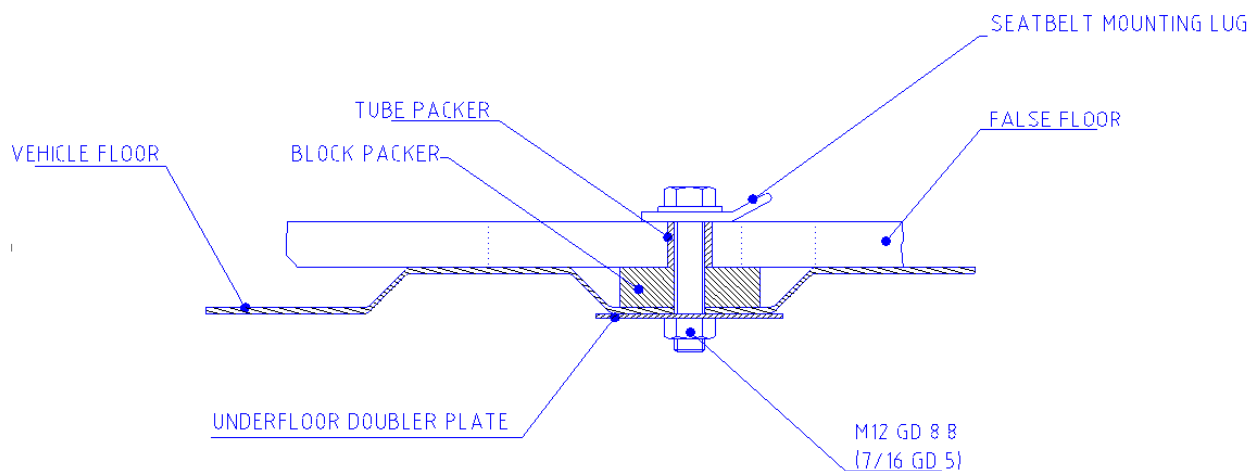


Diagram 2.7(1)(c) Solid packers and tubular spacers with false floors

NOTE: The principles detailed in 2.7(1) can also be applied in the situation of an anchorage in a pillar that has a plastic trim covering with an airgap behind it.

Solid packer specifications

- 2.7(2) A solid packer may be used to position a retro-fitted seatbelt mounting lug over a compressible false floor in a low volume vehicle, provided that the solid packer:
- (a) is constructed from mild steel or aluminium; and
 - (b) is of a thickness that is the same as the false floor; and

- (c) has a minimum surface contact area of 3000 square mm; and
- (d) is configured as closely to square as practicable; and
- (e) has a central hole that is the correct size for the seatbelt anchorage bolt; and
- (f) is prepared as specified in 2.7(4) to 2.7(6).

2.7(3) A solid packer used in the retro-fitting of a seatbelt anchorage to a low volume vehicle must not be positioned on the underside of any floor surface to which a seatbelt anchorage is attached, unless the solid packer is positioned between two floor surfaces.

Solid packer preparation

2.7(4) A solid packer used in the retro-fitting of a seatbelt anchorage to a low volume vehicle must:

- (a) have all corners rounded to a radius of no less than 3 mm; and
- (b) have all edges, which contact the vehicle structure to which the solid packers are attached, rounded to a radius of no less than 3 mm.

Tubular spacer specifications

2.7(5) A tubular spacer may be used to position a seatbelt mounting lug over a compressible false floor, provided that the tubular spacer:

- (a) has a central hole that is the correct size for the seatbelt anchorage bolt; and
- (b) is positioned on top of a doubler plate assembly that meets the applicable requirements specified in 2.6; and
- (c) has a nominal wall thickness of not less than 4 mm; and
- (d) is not more than 13 mm in length; and
- (e) has any edges rounded by not less than 1 mm.

Packer and spacer surface preparation

2.7(6) Where a solid packer or tubular spacer is used in the retro-fitting of a seatbelt anchorage to a low volume vehicle, a permanent anti-corrosive protection, such as paint or zinc plating, must be applied to:

- (a) where constructed from a mild steel material, the packer or spacer; and
- (b) the structure or surface to which the packer or spacer attaches.

2.7(7)

The surface of the area of a low volume vehicle to which a solid packer or spacer is used in the retro-fitting of a seatbelt anchorage must be free from any sound deadening or other compressible material, to ensure that a full contact is made.

2.8**Anchorage sharing requirements****Fasteners used for shared anchorages****2.8(1)**

Where two seatbelts are fitted to one original or retro-fitted seatbelt anchorage in a low volume vehicle, they must be attached using a fastener manufactured specifically for the purpose of attaching seatbelt anchorages, which must be of equal or greater size and strength than:

- (a) 7/16 inch UNF grade-5 imperial; or
- (b) 12 mm SAE grade-8.8 metric.

NOTE: Metric fasteners manufactured specifically for the purpose of attaching seatbelt anchorages have a (world-wide) standardised pitch of 1.25 mm.

Upper anchorage sharing**2.8(2)**

No more than one seatbelt may be fitted to any one original equipment or retro-fitted upper seatbelt anchorage in a low volume vehicle, unless 2.8(3) applies.

2.8(3)

A rearward-facing seat positioned immediately adjacent to a forward-facing seat in a low volume vehicle, that shares the seatbelt anchorages either supplied as original equipment or retro-fitted, installed for the forward-facing seats, must:

- (a) where practicable, have the seatbelt attachment for the forward-facing seat position nearer the pillar than the seatbelt attachment for the rearward-facing seat; and
- (b) incorporate spacers between pillar and seatbelt brackets that are of minimal thickness; and
- (c) be attached with fasteners as specified in 2.8(1).

NOTE: It is often not possible to attach a rear-facing seatbelt over the top of an OE upper seatbelt anchorage due to the bracket shape and plastic trim covering. In this case the rearward-facing anchorage can be placed between the pillar and forward-facing anchorage as long as the spacers used are of minimal thickness to ensure that the forward-facing anchorage is not cantilevered out from the pillar more than in the original manufacturer's location.

Lower anchorage sharing**2.8(4)**

A lower outer seatbelt and retractor reel are permitted to share the same anchorage provided that:

- (a) the anchorage was provided by the vehicle manufacturer for the anchorage of the lower outer seatbelt and retractor reel; or
- (b) in the case of a retro-fitted seatbelt anchorage, the minimum doubler plate assembly surface area is as specified in 2.6(2)(b).

NOTE:

The situation referred to in 2.8(4) is possible because the applied loads upon the retractor and lower anchorage, in the event of a crash, are not the in same direction.

2.8(5)

Two lower seatbelts must not be fitted to one seatbelt anchorage in a low volume vehicle that was provided by the vehicle manufacturer for the anchorage of a single seatbelt, unless 2.8(6) or 2.8(7) applies.

2.8(6)

Two lower seatbelts may be fitted to one original equipment or retro-fitted seatbelt anchorage in a low volume vehicle where a rearward-facing seat is positioned directly behind a forward-facing seat, provided that:

- (a) in the case of a retro-fitted seatbelt anchorage, the minimum doubler plate assembly surface area is as specified in 2.6(2)(b); and
- (b) the seatbelt attachment for the forward-facing seat position is nearer the floor surface than the seatbelt attachment for the rearward-facing seat; and
- (c) the seatbelts are attached with fasteners as specified in 2.8(1).

2.8(7)

Two lower seatbelts may be fitted to one retro-fitted seatbelt anchorage in a low volume vehicle in any situation other than that specified in 2.8(6), provided that:

- (a) the floor section to which the retro-fitted seatbelt anchorage attaches is fitted with a floor reinforcement plate that meets the requirements specified in 2.9(3); and
- (b) the seatbelts are attached with fasteners as specified in 2.8(1); and
- (c) a doubler plate assembly is used that meets all doubler plate requirements specified in 2.6, and in addition:
 - (i) has a minimum mating surface area of 5600 square mm, achieved by dimensions of not less than 140 mm by 40 mm; and
 - (ii) is positioned as closely as practicable to the centre of the floor reinforcement plate, or where this is not practicable, biased toward the adjacent load-bearing cross-member.

2.9 Reinforcement requirements for all seatbelt anchorages

Panel seam or join reinforcement

2.9(1)

A panel seam or join in the surrounding structure within 100 mm of the outside edge of a doubler plate assembly in any direction of a retro-fitted seatbelt anchorage in a low volume vehicle, must be reinforced at a spacing of between 30 mm and 40 mm either [see *diagram 2.9(1)*]:

- (a) by welds already provided by the vehicle manufacturer; or
- (b) where these have not been provided, either:
 - (i) plug welds of no less than 8 mm in diameter, through a hole of no less than 8 mm in diameter drilled in one skin only, followed by thorough corrosion-protection; or
 - (ii) rivets of a size and type that are able to withstand a shear loading of 3.5kN, and a tension loading of 4.4 kN.

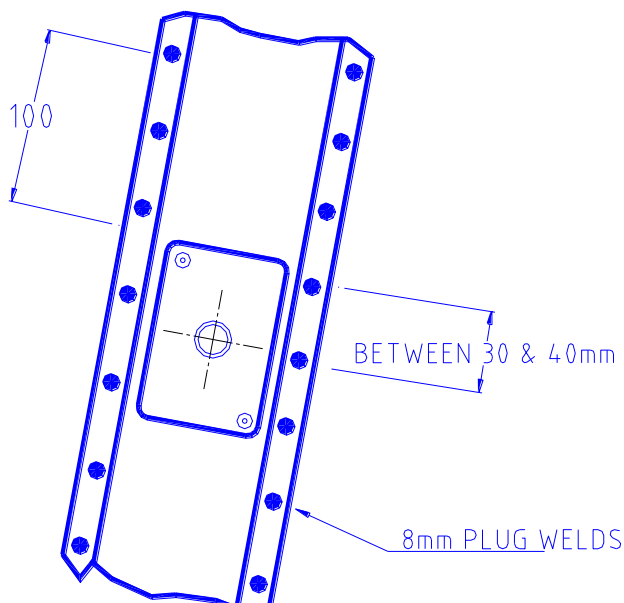


Diagram 2.9(1) Panel seam or join reinforcement

Floor reinforcement

2.9(2)

A floor section of a low volume vehicle to which a seatbelt anchorage is retro-fitted, which is manufactured from plain sheet panel steel with no stiffening ribs or swages, must be reinforced as specified in the applicable section of *Chapter 14 Seats, Seatbelts, and Anchorages of the New Zealand Car Construction Manual*.

Shared anchorage floor reinforcement

2.9(3)

A floor section of a low volume vehicle to which a single seatbelt anchorage is retro-fitted, which has two lower seatbelts attached, which could both be loaded simultaneously in the same direction in the event of a collision, must have a floor reinforcement plate fitted to reinforce the floor section, fitted to either the top or the bottom of the floor surface where the anchorage is positioned, that [see *diagram 2.9(3)*]:

- (a) is of approximately the same thickness as the floor surface to which it attaches; and
- (b) has a minimum mating surface area of 40,000 square mm, achieved by dimensions of as close as practicable to 200mm by 200 mm; and
- (c) meets the same preparation requirements specified for a doubler plate assembly in 2.6(3) and 2.6(4); and
- (d) is positioned as closely as practicable to a load-bearing cross-member, and where possible plug-welded directly into the flange of the load-bearing cross-member; and
- (e) conforms to the shape of the floor in the area where the doubler plates are positioned; and
- (f) is attached to the floor section by plug welds, of no less than 8 mm in diameter, through a hole of no less than 8 mm in diameter drilled in one skin only, spaced at between 30 mm and 40 mm.

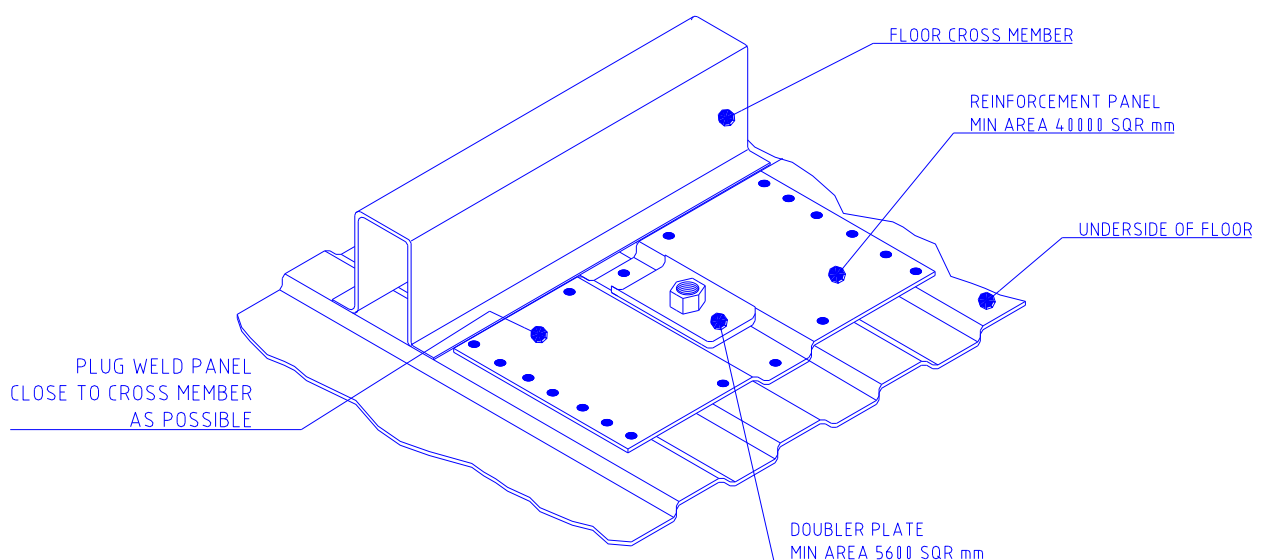


Diagram 2.9(3) Shared anchorage floor reinforcement

2.10 Other requirements

- 2.10(1) A retractor used within a seatbelt system retro-fitted to a low volume vehicle must be fitted in a position that is within the angular tolerance that is specified by the seatbelt manufacturer.

NOTE: The angular tolerance of some seatbelt retractor units provided by some retractor manufacturers is +/- 2 degrees.

- 2.10(2) A scratch-built low volume vehicle, other than one to which 2.10(3) applies, must be fitted with:

- (a) in the driver's and front outboard occupant's seating positions, an approved multiple-sensitive emergency-locking retractor lap-and-diagonal seat belt incorporating a web clamp retractor; and
- (b) in any other seating position, the applicable seatbelt type listed in *Land Transport Rule 32011 (Seatbelts and Seatbelt Anchorages)*.

- 2.10(3) A scratch-built low volume vehicle may be fitted with a four-point or five-point full-harness seatbelt that exceeds the performance requirements of an emergency locking retractor lap and diagonal seatbelt, for the use of the driver and passenger, provided that:

- (a) the vehicle has no more than one row of seats; and
- (b) the full-harness seatbelt meets one or more of the approved standards specified in *Schedule 2 of the Land Transport Rule: Seatbelts and Seatbelt Anchorages 2002 (Rule 32011)*; and
- (c) the installation complies with the applicable requirements of *LVVTA Low Volume Vehicle Standard 155-30(00) (Frontal Impact)*.

- 2.10(4) A seatbelt system retro-fitted to a low volume vehicle must be fitted in a position to ensure that, when operated by the seated occupant, the seatbelt webbing runs smoothly through the upper loop, without snagging or twisting.

- 2.10(5) The webbing of a seatbelt fitted to a low volume vehicle must be of sufficient length to fit comfortably around the occupant.

- 2.10(6) Interior trim surrounding seatbelt anchorages retro-fitted to a low volume vehicle must be modified where necessary so as to eliminate any rubbing or binding between the seatbelt and surrounding trim throughout all likely directions of pull of the seatbelt.

2.10(7) The seatbelt buckle of a seatbelt fitted to a low volume vehicle must be located so as to be able to be readily reached by the wearer, so that the seatbelt can be easily fastened or released, and on a lap and diagonal seatbelt, the buckle must be situated on or just below the hip area.

NOTE: A seat designed for use with a full harness has higher side bolsters that can impede fastening or releasing of a seatbelt, or prevent proper fit of the seatbelt to the occupant, and as such may not be suitable for use with a lap and diagonal seatbelt.

2.10(8) A seatbelt must maintain full contact with the occupant and must not be held away from the occupant by interior trim or the seat structure, such as the deep sides of a sports seat.

2.10(9) The following seatbelt designs are outside of the scope of this standard and in each case must meet the applicable technical requirements in *Chapter 14 Seats, Seatbelts, and Anchorages* in the *New Zealand Car Construction Manual*:

- (a) over-pillar upper seatbelt anchorage mounting plates; and
- (b) inside-pillar upper seatbelt anchorage mounting plates; and
- (c) through-pillar upper seatbelt anchorage systems; and
- (d) seatbelt anchorage support frames; and
- (e) seatbelt anchorages into chassis rails & cross-members; and
- (f) seatbelt anchorages into composite material.

2.10(10) The most suitable type of restraint system for an occupant on a stretcher may include a lap seatbelt or a full-harness seatbelt, however, regardless of which type of restraint system is used, the seatbelt anchorages in a low volume vehicle for an occupant on a stretcher is required to comply with the applicable technical requirements in this standard.

Section 3 Exclusions to this standard

3.1 Wheelchair restraint exclusions

3.1(1) A low volume vehicle that is used for the carriage of more than one type of wheelchair, more than one of which has a different restraint system and anchorage positions, is not required to comply with 2.5(11)(b)(ii), however must comply with the applicable requirements in *LVVTA Standard 45-60 (Disability Transportation Systems)*.

3.2 LVVTA-approved authority card exclusions

3.2(1) A low volume vehicle, for which a valid *Low Volume Vehicle Authority Card* is issued by an LVVTA-approved organisation, that specifies 'full-harness seatbelts':

- (a) may be retro-fitted with a four-point or five-point full-harness seatbelt which does not comply with one or more of the approved standards for seatbelts listed in *schedule 2* of the *Land Transport Rule: Seatbelts and Seatbelt Anchorages (Rule 32011)*; and
- (b) is not required to comply with the seatbelt anchorage requirements specified in this standard.

NOTE 1: A low volume vehicle authority card is only available for a vehicle that is modified for a particular purpose, in order to meet the specific needs of the person nominated on the authority card. An example of this is a vehicle that is modified to meet motor-sporting regulations.

NOTE 2: The operator of a vehicle for which a low volume vehicle authority card is issued, must, when requested by an enforcement officer or certifier, produce the authority card for that vehicle.

3.3 Vehicles with inadequate structure exclusions

3.3(1) A low volume vehicle manufactured before 1 October 2003 may be fitted with a lap seatbelt in any seating position, instead of the type of seatbelt that would be required in *Table 2.1*, *Table 2.2* or *Table 2.3* of the *Land Transport Rule: Seatbelts and Seatbelt Anchorages (Rule 32011)*, as applicable, if:

- (a) the vehicle has a permanent structure that ends less than 500 mm above the top of the appropriate part of the uncompressed seat cushion (measured from a point 150 mm forward of the lowest part of the back cushion); and
- (b) original equipment upper seatbelt anchorages are not fitted.

3.3(2) A low volume vehicle of Class MA or MC manufactured before 1 October 2003 may be fitted with lap and diagonal seatbelts without retractors in the outer seating positions, instead of any other specified type of seatbelt that would be otherwise required in *Table 2.1*, *Table 2.2* or *Table 2.3* of the *Land Transport Rule: Seatbelts and Seatbelt Anchorages (Rule 32011)*, as applicable, if the vehicle has a permanent structure that ends less than 500 mm above the top of the appropriate uncompressed seat cushion (measured from a point 150 mm forward of the lowest part of the back cushion).

3.3(3) A motor vehicle of Class MA or Class MC first registered outside New Zealand before 1 November 1979 that does not have B-pillars, and does not have seatbelts or seatbelt anchorages fitted for the front outer seating positions, may be retrofitted with lap seatbelts in these seating positions, instead of any other specified type, if:

(a) for vehicles with front lower seatbelt anchorages retrofitted before 1 April 2002:

- (i) a vehicle inspector or inspecting organisation has determined that it is not practicable for front upper seatbelt anchorages, for use with lap-and-diagonal seatbelts without retractors, to be retrofitted in accordance with *Seatbelt Anchorage Specification LTSA St 120395* or the *Low Volume Vehicle Code*, whichever is applicable; and
- (ii) the front lower seatbelt anchorages are certified in accordance with *Seatbelt Anchorage Specification LTSA St 120395* or the *Low Volume Vehicle Code*;

or

(b) for vehicles with front lower seatbelt anchorages retrofitted on or after 1 April 2002:

- (i) a vehicle inspector or inspecting organisation has determined that it is not practicable for front upper seatbelt anchorages, for use with lap-and-diagonal seatbelts without retractors, to be retrofitted in accordance with the *Low Volume Vehicle Code*; and
- (ii) the front lower seatbelt anchorages are certified in accordance with the *Low Volume Vehicle Code*;

NOTE: The inadequate structure exclusions above are copied from *section 3* of the *Land Transport Rule 32011: Seatbelts and Seatbelt Anchorages*, reproduced here in the interest of convenience.

3.3(4)

In the case of a vehicle to which neither 3.3(1), 3.3(2), nor 3.3(3) applies, a light vehicle manufactured before 1 November 1979 may be fitted with a lap seatbelt in any outer seating position, instead of the type of seatbelt that would be required in *Table 2.1*, *Table 2.2* or *Table 2.3* of the *Land Transport Rule 32011: Seatbelts and Seatbelt Anchorages*, as applicable, if:

- (a) the vehicle model never had provision for original equipment upper seatbelt anchorages in the front outer seating positions; and
- (b) the vehicle has a fixed roof or other permanent structure that is capable of supporting a retro-fitted upper seatbelt anchorage, however that structure is of such dimensions or design as to make the correct installation of a retro-fitted seatbelt anchorage system (in accordance with the applicable requirements of either this standard or *Chapter 14* of the *New Zealand Car Construction Manual*) impractical; and
- (c) an *LVVTA FS012 Upper Seatbelt Anchorage Request Form* document, that is validated by the LVVTA, has been issued.

NOTE: The inadequate structure exclusion in 3.3(4) above must be supported by an LVVTA-endorsed declaration completed by an approved LVV certifier, which is the *FS012 Upper Seatbelt Anchorage Request Form*.

3.3(5) A 'Scratch-built Historic Replica' low volume vehicle may be fitted with a lap seatbelt in any outer seating positions, instead of the type of seatbelt that would be required in *Table 2.1*, *Table 2.2* or *Table 2.3* of the *Land Transport Rule 32011: Seatbelts and Seatbelt Anchorages*, as applicable.

NOTE: The definition of a 'Scratch-built Historic Replica' is documented in *section 7* of the *LVVTA Operating Requirements Schedule*.

Section 4 Vehicles not required to be certified to this standard

4.1 Vehicles not covered by this standard

4.1(1) A light vehicle is not required to be certified to this low volume vehicle standard, if the vehicle is modified for the purposes of law enforcement or the provision of emergency services.

4.1(2) A light vehicle is not required to be certified to this low volume vehicle standard, if the vehicle is identified as having been modified by a second-stage vehicle manufacturer, and complies with an approved overseas standard that is listed in *Annex 6* of the *Low Volume Vehicle Code*.

4.2 Vehicles that pre-date legal requirements

4.2(1) A light vehicle that is retro-fitted with seatbelt anchorages, modified in such a way that any seatbelt anchorages may, directly or indirectly, be affected, or scratch-built, is not required to be certified to this standard, if the vehicle has:

- (a) 9 seating positions or less and was retro-fitted, modified, or scratch-built before 1 January 1992; or
- (b) more than 9 seating positions or is an NA-Class vehicle and was retro-fitted, modified, or scratch-built before 1 March 1999.

4.3 Vehicles deemed to comply with approved standards

4.3(1) A light vehicle that is retro-fitted with seatbelt anchorages, and the make and model of that vehicle meets the UN/ECE Regulation No. 14, Uniform provisions concerning the approval of vehicles with regard to safety belt anchorages (E/ECE324-E/ECE/TRANS/505/Rev.1/Add.13), as determined by a type-test carried out by a facility approved by the *New Zealand Transport Agency*, is not required to be certified to this standard.

NOTE: The type-test process referred to in 4.3 only applies to vehicles that are tested prior to first registration in New Zealand, and the seatbelt anchorages being tested are retro-fitted only to existing seating positions installed by the original vehicle manufacturer.

4.4

Modifications that do not require certification

4.4(1)

A vehicle is not required to be certified to the *Low Volume Vehicle Code*, provided that the safe performance of the vehicle is not compromised, where the only modifications to the vehicle are any one or more of the following items:

(a) fitting of or modification to a seatbelt, provided that:

(i) the modification is approved by the seatbelt or vehicle

(ii) the accommodation of a child child restraint, to the

or

(b) camper conversions

(c) fitting of a top tether anchorage for a child restraint, that the installation is carried out in accordance with the seat or harness manufacturer; or

(d) fitting of retro-fitted type-tested rear seatbelt anchorages; or

(e) fitting of rear seatbelts to Class MD1, MD2, and NA vehicles before 1 March 1999; or

(f) removal of non-mandatory seatbelts (including full or partial removal of seatbelts in positions where seats have been removed); or

(g) replacing a type R1 or R2 seatbelt with a web-clamp R1 or R2 seatbelt (where NZTA Vehicle Inspection Requirements Manual Technical Bulletin 5 applies).

NOTE: In relation to 4.4(1)(a)(i), it is highly unlikely that a seatbelt or vehicle manufacturer will give approval to modify a seatbelt, and if this is claimed to be the case, proof of approval must be provided. The term 'modification' within 4.4(1)(a) also applies to the situation of dismantling a seatbelt retractor to feed a different tongue or upper anchorage loop on, or to fit replacement webbing. This practice is almost never approved by the seatbelt manufacturer and so is not permitted.

Section 5 Terms and definitions within this standard

Cant rail	means the interior roof structure sections in a vehicle with a fixed roof which run the length of a vehicle roof directly above the side windows.
Crush-tubes	means a section of non-compressible material that is positioned within a cavity through which fasteners are fitted, to prevent collapsing of the material surrounding the cavity, and consequential loosening of the fasteners.
Doubler plates	means plates that are positioned on each side of a surface to which a component or fitting is attached, to spread the load of the fastener over a larger area than that of the fastener itself.
kN	is an abbreviation for a kilo-Newton, which is equal to 1000 Newtons.
Lap seatbelt	means a seatbelt that passes solely across the front of the wearer's pelvic region.
Lap-and-diagonal seatbelt	means a seatbelt comprising a lap strap that passes across the front of the wearer's pelvic region, and a diagonal strap that passes across the front of the wearer's torso from one side of the pelvic region to the shoulder on the opposite side.
Longitudinal plane	refers to the direction from the front of car to the back. The lateral plane is from vehicle side to side.
LVVTA Body H-frame	means a frame designed and manufactured by the <i>Low Volume Vehicle Technical Association Incorporated</i> to identify certain critical measurements and positions for safety-related components and systems, and is also known as an LVVTA Body Frame or H-Frame.
Multiple-sensitive emergency-locking retractor	means a retractor that, during normal driving conditions, allows freedom of movement by the wearer of the seatbelt by means of length-adjusting components that automatically adjust the strap to the wearer, and that comprises two or more of the locking mechanisms specified for single-sensitive emergency-locking retractors, also referred to as an R2 retractor.
N	is an abbreviation for Newton, which is the amount of force required to accelerate a 1 kilogram mass by 1 metre per second per second.
Nominal wall thickness	means a thickness that is generally the declared size within commonly accepted tolerances, but can vary in some areas due to distortion from the manufacturing process.
Outer seating position	means a seating position next to a side wall where there is no more than 500 mm between the longitudinal centre of the seat and the side wall of the vehicle.

Packer	means a section of non-compressible material through which a fastener passes, that is positioned where a crushable material exists between a component and a solid part of the vehicle, to prevent collapsing of the crushable material, and consequential loosening of the fastener.
Permanent structure	means a non-removable structure capable of sustaining loads associated with seatbelts and seatbelt anchorages. A removable roll bar or roll cage that is sufficiently attached to the vehicle structure to meet the strength requirements for seatbelt support is, for this standard, considered to be a permanent structure.
Pillar	means the part of a vehicle structure which is positioned substantially vertically extending from the floor to support the upper body or roof structure.
Plug-weld	means a circumferential welding technique used to join two adjacent sections of material to each other, by welding around a hole drilled in the top section of material into the section positioned underneath.
Rear shelf	means a structure in the area inside a motor vehicle directly behind the top of the rear seat.
Retractor	means a device to accommodate parts, or all, of the webbing of a seatbelt.
Retro-fitted	in relation to a seat or seat anchorage in a motor vehicle, means to fit a seat or seat anchorage in a location where a seat or seat anchorage has not been fitted before.
Rivet	refers to a specific type of blind or 'pop' rivet made from alloy-based materials suitable for the attachment of doubler plates to motor vehicle structures. A structural rivet means a rivet that has a greater strength for use in structural applications.
Seat	means an assembly, or part of an assembly, intended to seat at least one person, that may or may not be integral to the vehicle structure.
Seatbelt	means an arrangement of straps with a securing buckle, adjusting devices and attachments that is capable of being anchored to the interior of a vehicle and is designed to diminish the risk of injury to its wearer in the event of a collision or abrupt deceleration of the vehicle by limiting the mobility of the wearer's body; and includes any device for absorbing energy or for retracting the webbing.
Seat anchorage	means the parts of the vehicle structure to which a seat is attached.
Seating position	means a seat or part of a seat that is of a suitable size and shape for one person.
Side-wall	means the section on the inside of a motor vehicle positioned vertically between the floor surface and the roof section.

Single-sensitive emergency locking retractor

also referred to as an R1 retractor, means a seatbelt retractor that, during normal driving conditions, does not restrict the freedom of movement by the seatbelt wearer by means of length adjusting components that automatically adjust the seatbelt to the wearer, and that comprises a locking mechanism actuated in an emergency by either:

- (a) deceleration of the vehicle; or
- (b) extraction of the strap from the retractor; or
- (c) other means.

Waist rail

means the strengthening section on the inside of a motor vehicle positioned horizontally immediately below the side windows, and includes the same strengthening section below an area where no window is present, but could be fitted.

Web-clamp

means a device forming part of a seatbelt that locks the seatbelt webbing outside the retractor for the purpose of reducing the forward movement of the seatbelt wearer.

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*.