

Low Volume Vehicle Technical Association Incorporated

Low Volume Vehicle Standard

155-30(02)

(Frontal Impact)

This Low Volume Vehicle Standard corresponds with: Land Transport Rule 32006/1 (Frontal Impact)

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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.lvvta.org.nz

Further information on the availability of the low volume vehicle standards may be obtained by contacting the LVVTA at info@lvvta.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 January-July 2014 Issue 49	Page 10 Change to Airbag Removal Requirements
• NZ Car Construction Manual	Chapter 5 Chassis Modifications
• NZ Car Construction Manual	Chapter 7 Steering Systems
• NZ Car Construction Manual	Chapter 8 Braking Systems
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Note that all documents referred to in this table, with the exception of the NZ Car Construction Manual, can be accessed from www.lvvta.org.nz free of charge. For information on obtaining the NZ Car Construction Manual, contact info@lvvta.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.lvvta.org.nz/standards.html

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Frontal Impact

(185-40[02])

Purpose of this standard

The purpose of this low volume vehicle standard is to specify vehicle crashworthiness requirements in order to reduce injuries to occupants in frontal crashes.

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 are:

- (a) modified on or after 1 March 1999 in such a way that the performance of any frontal impact protection systems may, directly or indirectly, be affected; or
- (b) scratch-built on or after 1 April 2003.

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, LD, or LE; 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 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 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 June 2002), 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: Certification of a vehicle to the *Low Volume Vehicle Code* for the removal of airbags, that was carried out prior to the date upon which this standard takes effect (1 June 2002), and where a valid low volume vehicle certification plate is fitted, may remain in the configuration described on the certification plate.

Section 2 Technical requirements of this standard

2.1 General safety requirements

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.

2.1(2) Subject to 2.3(2), 2.3(3) and 2.3(4), the performance of a motor vehicle in relation to protecting occupants in a frontal impact collision must not be reduced below a safe tolerance of its state when manufactured or modified, by any factors, including corrosion, structural damage, material degradation, inadequate repair, the fitting of additional equipment, or the removal of equipment.

2.1(3) In assessing whether the general safety requirements in 2.1(2) have been complied with, a low volume vehicle certifier may take into account:

- (a) the function of the additional equipment fitted to the motor vehicle after manufacture, and the measures taken to minimise the risk of injury from the equipment; and
- (b) evidence that the motor vehicle is within the manufacturer's operating limits.

NOTE: The requirements specified in 2.1(2) and 2.1(3) are the applicable general safety requirements from 2.2 of *Land Transport Rule: Frontal Impact 2001(Rule 32006/1)*, reproduced here in the interest of convenience.

2.2 Technical requirements for modifications, additions, and construction

Modification requirements for production low volume vehicles

2.2(1) A production low volume vehicle that is less than 14 years of age must not feature any modifications to any crumple zones or other energy-absorbing measure incorporated by the vehicle manufacturer within the frontal impact protection system.

2.2(2) A production low volume vehicle that has reached 14 years of age or more may feature modifications that could affect any crumple zones or other energy-absorbing measure incorporated by the vehicle manufacturer within the frontal impact protection system, provided that:

- (a) any removal of material from, or modification to, any crumple zone areas or other energy-absorbing measure, or areas forward of those crumple zones or other energy-absorbing measures, is minimal; and
- (b) any chassis rail or sub-frame rail bridging components provided by the vehicle manufacturer (such as structural tie-bars behind the front bumper) are not removed or significantly modified.

NOTE 1: A degree of tolerance for minor structural modifications for vehicles older than 14 years old is acceptable because vehicles prior to around 2000 featured (very generally speaking) airbag triggering systems which were far less complex and sensitive than more modern systems, and are therefore less easily influenced by modifications to the vehicle structure. With the advancement of the '14-year rule' into more complex systems as time rolls by, this position may need to be reconsidered into the future.

NOTE 2: The type of modifications that 2.2(2) is intended to allow is such modification work as very minor 'trimming' of front sections of front sub-frame rails to allow installation of front-mounted intercoolers, and for holes to be cut into radiator support panels and inner guards in order to allow intercooler pipes to pass through.

2.2(3) A modification to a production low volume vehicle must be carried out in such a way as to:

- (a) except as specified in 2.2(2), minimise any longitudinal stiffening of the vehicle structure forward of the occupant cell; and
- (b) minimise the risk of deformation of the occupant cell during a frontal impact; and
- (c) minimise the likelihood of penetration of the engine or transmission into the occupant cell during a frontal impact; and

- (d) meet the relevant design and construction requirements contained within the relevant frontal impact requirement sub-sections of *Chapter 5* of the *New Zealand Car Construction Manual*.

Additional equipment fitted to production low volume vehicles

2.2(4)

A modified production low volume vehicle that is retrofitted with a forward-facing auxiliary bar and is required to comply with a frontal impact occupant protection standard, must be fitted only with an auxiliary bar that, when fitted to the make and model of vehicle in question, does not prevent the vehicle from continuing to comply with that frontal impact standard.

NOTE 1: In order to meet the requirements of 2.2(4), documented evidence must be provided to the certifier to show that the make and model of vehicle to which the bar is fitted has been tested with the bar fitted, and continues to comply with the approved frontal impact standard to which the vehicle was originally manufactured.

NOTE 2: For clarification, the following vehicles with a GVM of 2500 kg or less are required to comply with a frontal impact occupant protection standard:

- 1) a class MA motor vehicle manufactured from 1 March 1999, or
- 2) a class MA motor vehicle that was less than 20 years old when it was first registered in New Zealand on or after 1 April 2002, or
- 3) a class MB or MC motor vehicle manufactured from 1 October 2003.

Construction requirements for scratch-built low volume vehicles

2.2(5)

A scratch-built low volume vehicle must be constructed in such a way as to:

- (a) minimise the likelihood of penetration of the engine, transmission, suspension, body structure or parts into the occupant cell as a result of a frontal collision; and:
- (b) maximise the likelihood that the section of the vehicle forward of the occupant cell will progressively absorb impact energy without significant deformation of the occupant cell, either by:
 - (i) featuring design characteristics forward of the occupant cell consistent with those expected of contemporary high volume production vehicles; or
 - (ii) following relevant design and construction requirements contained within the relevant frontal impact requirement sub-sections of *Chapter 5* of the *New Zealand Car Construction Manual*.

2.2(6)

A production vehicle chassis incorporated within a scratch-built low volume vehicle must not feature any modifications that increase the longitudinal stiffness of the section of the chassis forward of the occupant cell.

Seatbelt requirements for scratch-built low volume vehicles

2.2(7)

A scratch-built low volume vehicle, other than one to which 2.2(8) applies, must be fitted, in the driver's and front outboard occupant's seating positions, with an approved multiple-sensitive emergency-locking retractor lap-and-diagonal seat belt incorporating a web clamp retractor.

2.2(8)

A scratch-built low volume vehicle may be fitted with, as part of a complete alternative frontal impact protection system, a four-point 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 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) all controls, both essential and non-essential to the driving operation of the vehicle, can be operated by the driver whilst in the normal driving position and with the seatbelt correctly adjusted; and
- (d) a rear-view mirror is fitted to the interior of the vehicle, and one rear-view mirror is fitted externally to each side of the vehicle, all of which comply with the applicable requirements of *LVVTA Low Volume Vehicle Standard 200-30 (Rear-view Mirrors)*; and
- (e) a head restraint is fitted for each seating position that complies with the applicable requirements of *LVVTA Low Volume Vehicle Standard 185-40 (Head Restraints)*; and
- (f) the interior fittings, controls, and surfaces of the vehicle comply with the applicable requirements of *LVVTA Low Volume Vehicle Standard 155-40 (Interior Impact)*; and
- (g) the seatbelt anchorages comply with the applicable requirements of *LVVTA Low Volume Vehicle Standard 175-00 (Seatbelt Anchorages)*.

2.3

Technical requirements for removal, temporary disablement, and semi-permanent disablement of airbags

2.3(1)

Except as provided for in 2.3(2), 2.3(3), and 2.3(4), a frontal impact airbag fitted as original equipment by the vehicle manufacturer must not be removed or disabled.

Removal of airbags

2.3(2)

A vehicle fitted by the vehicle manufacturer with an airbag may have the airbag removed, provided that:

- (a) that the vehicle has reached 14 years of age or more; and
 - (b) only the airbag that is directly affected is disabled, bypassed or removed, and that the remaining airbags and related occupant protection system, including warning lights, remain functional; and
 - (c) the affected airbag is bypassed, removed or disabled, and the associated control system modified by a person who can provide assurance to the low volume vehicle certifier that he or she possesses the necessary skills and experience to carry out the work correctly; and
 - (d) each seating position affected by the removal of an airbag has the seatbelt replaced by a new seatbelt that meets one or more of the approved standards specified in *Schedule 2 of the Land Transport Rule: Seatbelts and Seatbelt Anchorages 2002 (Rule 32011)* that is appropriate for use in a seating position not equipped with an airbag; and
 - (e) any cavity left by the removal of the airbag is filled with a high-density energy-absorbing material; and
 - (f) the removal of the airbag is indicated to the occupant in the affected seating positions by means of:
 - (i) a label which is permanently attached in a prominent location where it is clearly visible to any occupant in the seating position previously protected by the airbag; and
 - (ii) in the case of factory-installed dashboard warning lights or any other symbol which indicates the presence of an airbag or airbags, disabling or removal of the warning light or symbol;
- and
- (g) the current owner, or authorised representative of the owner, has requested that this action take place by completing the *Airbag Removal/Disablement Request Form* of the *Low Volume Vehicle Technical Association Incorporated*.

NOTE 1: An airbag must not be removed or disabled as an alternative to replacement when damaged, or potentially damaged by water immersion or deployment during a collision, unless the vehicle is fourteen years of age or older, as provided for in 2.3(2).

NOTE 2: Where information relating to the removal of an airbag and its related systems is available from the vehicle manufacturer, or representative of the manufacturer, that information must be taken into consideration during the removal process.

NOTE 3: In relation to 2.3(2)(d) a pre-tensioner or 'rip-stitch' type seatbelt may not be suitable for use without an airbag and a web-clamp type seatbelt must be installed instead. If a suitable web-clamp seatbelt is not available for the make and model of vehicle in question, a dual-sensitive inertia reel seatbelt belt may be used instead.

Temporary disablement of airbags

2.3(3)

A vehicle fitted by the vehicle manufacturer with an airbag may be modified to allow the airbag to be temporarily disabled for special circumstances or needs of the vehicle operator or passengers, provided that:

- (a) the temporary disablement is controlled by a system that either:
 - (i) incorporates a manually-operated switch, either key-operated or with a protective cover, or a system that replicates a system provided by a high volume manufacturer, which when activated switches off only the airbag that is required to be deactivated, the remaining airbags and related occupant protection system, including warning lights, remain functional; or
 - (ii) in the case of a four-wheel drive vehicle equipped with a manually-selectable choice of high and low gear ratios, is automatically switched to a disabled position when the low ratio is engaged, and remains disabled for the period during which the low ratio remains engaged;
- and
- (b) the airbag and its related systems and components are temporarily disabled by a person who can provide assurance to the low volume vehicle certifier that he or she possesses the necessary skills and experience to carry out the work correctly; and
- (c) a warning light is fitted that is clearly visible and indicates the temporary disablement of the airbag to the occupant in the affected seating position; and
- (d) the current owner, or authorised representative of the owner, has requested that this action take place by completing the *Airbag Removal/Disablement Request Form* of the *Low Volume Vehicle Technical Association Incorporated*.

NOTE 1: The concession provided by 2.3(3) is to allow a permanent modification to be carried out to a motor vehicle for people who have particular circumstances such as transporting small children, pregnancy, or the need to use the vehicle in rough off-road conditions, and as a result, choose to be able to disable one or more airbags as and when required.

NOTE 2: Where information relating to the disabling of an airbag and its related systems is available from the vehicle manufacturer, or representative of the manufacturer, that information must be taken into consideration during the disabling process.

Semi-permanent disablement of airbags

2.3(4)

A vehicle fitted by the vehicle manufacturer with an airbag may have the airbag semi-permanently disabled if the airbag disablement is required by a person with a medical disability or physical condition, who could be placed at risk of sustaining a higher degree of injury in the event of an airbag deployment as a result of the disability or condition or where the vehicle disability modifications necessitate airbag removal, provided that:

- (a) a letter is provided from an appropriate health professional or medical expert, which declares the airbag disablement is necessary for the person with the disability or condition; and
- (b) only the airbag that is directly affected is disabled, and the remaining airbags and related occupant protection system, including warning lights, remain functional; and
- (c) the airbag and its related systems and components are disabled by a person who can provide assurance that he or she possesses the necessary skills and experience to carry out the work correctly; and
- (d) the disablement of the airbag is indicated and is clearly visible to the occupant in the affected seating position by means of a label which is attached in a prominent location; and
- (e) the current owner, or authorised representative of the owner, has requested that this action take place by completing the *Airbag Removal/Disablement Request Form* of the *Low Volume Vehicle Technical Association Incorporated*.

NOTE 1: Semi-permanent disablement of an airbag may only occur for the duration in which the vehicle is operated, or travelled in, by the person with the medical disability or physical condition. When the vehicle is sold, it must be reinstated back to its original condition, or sold to another person who has the same requirements and meets the same criteria.

NOTE 2: Where information relating to the disabling of an airbag and its related systems is available from the vehicle manufacturer, or representative of the manufacturer, that information must be taken into consideration during the disabling process.

NOTE 3: In the case of the installation of an adaptive hand control for a disabled person, which, in order for the adaptive hand control to be safely operated the removal of a knee airbag is necessary, a declaration from an appropriate health professional or medical expert as required by 2.3(4)(a) is not required.

Section 3 Exclusions to this standard

3.1 LVVTA-approved authority card exclusions

3.1(1) A low volume vehicle, for which a valid *Low Volume Vehicle Authority Card* is issued by an LVVTA-approved organisation, that specifies '*Removal of a manufacturer-installed occupant protection system*', is not required to comply with section 2.

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. Examples of this are vehicles that are designed primarily to meet motor-sporting regulations.

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

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

A vehicle is not required to be certified to this standard, if the vehicle was either:

- 4.2(1)**
- (a) modified before 1 March 1999 in such a way that the performance of any frontal impact protection system may, directly or indirectly, be affected, and the frontal impact protection system present on the vehicle is the same as that fitted at the time of the vehicle's modification; or
 - (b) scratch-built before 1 March 1999, and the frontal impact protection system present on the vehicle is the same as that fitted at the time of the vehicle's construction.

4.3**Modifications that do not require certification**

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 the fitment of any one or more of the following

(a) replacement panels or accessories made from fibreglass or other materials, provided that:

the vehicle structure; or

or

(b) bumper bar removal and change (either the structural plastic bumper or a complete metal bumper as used on older vehicles), provided that the vehicle is not required to comply with a frontal impact occupant protection standard; or

(c) fibreglass replacement panels (that are substituted for OE panels), provided that:

(i) the OE panels being replaced do not contribute to the strength of the vehicle structure, including side impact resistance; or

(ii) the replacement panels use OE attachment points;

or

(d) auxiliary bars (including bull-bars, nudge-bars, external roll cages or similar), provided either that:

(i) the vehicle is not required to comply with a frontal impact occupant protection standard; or

(ii) the vehicle is required to comply with a frontal impact occupant protection standard and the auxiliary bar is a vehicle manufacturer-supplied component for that vehicle; or

UPDATE
Due to recent updates to the NZTA VIRM Threshold please visit https://www.lvvta.org.nz/documents/supplementary_information/LVVTA_LVV_Cert_Threshold.pdf to confirm which modifications do not require LVV Certification

- (iii) the bar has been certified by the auxiliary bar manufacturer as frontal impact compliant (as may be indicated by a label);

or

front-mounted intercoolers, provided that:

structure of the vehicle has not been modified, and the structure is unaltered (cosmetic changes are

forward-facing external

or

- (f) auxiliary winches, provided that the winch end

- (i) does not protrude forward of the front face of the bumper;

- (ii) does project forward of the bumper line, but is fitted with 'pedestrian-friendly' shrouds to reduce trapping risk and present a larger forward-facing surface area;

or

- (g) aftermarket sunroofs or roof vents/hatches, provided that in-service requirements for condition and performance are met; or

- (h) tow-bars and roof racks, provided that in-service requirements for condition and performance are met.

Section 5

Terms and definitions within this standard

Airbag

means a supplementary occupant protection device together with its associated equipment, fitted forward of the front seating positions, that deploys upon impact during a collision and provides an inflatable cushion to protect the occupants from injury as a result of contacting the vehicle structure, fittings, controls, and surfaces.

Auxiliary bar	means a bar that is fitted to a vehicle which is addition to the external equipment provided by the vehicle manufacturer, and typically includes bull bars, nudge bars, and side bars.
Non-rigid energy absorbing material	means a material that is not rigid, but provides impact protection for motor vehicle occupants by absorbing energy, or pressure, without allowing direct contact with the solid surface positioned behind the material.
Occupant cell	means the passenger compartment area of a vehicle in which all vehicle occupants are seated whilst the vehicle is in operation.

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*.