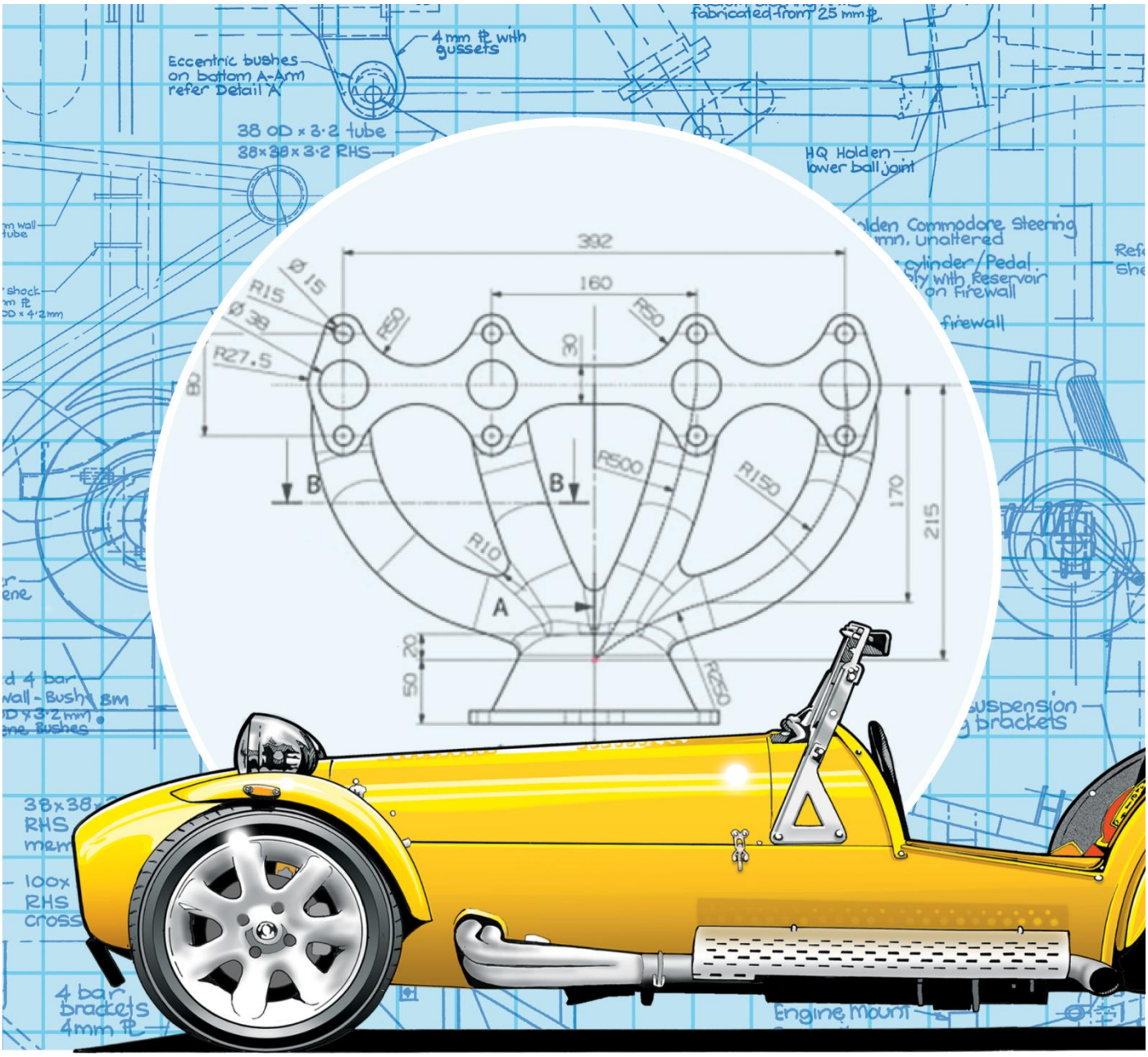
Low Volume Vehicle Technical Association (inc)

Helping New Zealanders Build & Modify Safe Vehicles

New Zealand Car Construction Manual

Chapter 11 (Part 1)
Exhaust Noise & Gas Emissions

Version 1 | Effective from 1 October 2025



Low Volume Vehicle Technical Association (inc)

Chapter 11 (Part 1)
Exhaust Noise & Gas Emissions

Tony Johnson Illustration

Approval Record

Signed in accordance with clause 1.3(5) of the *Low Volume Vehicle Code* of the LVVTA	
On (date)..... on behalf of	
New Zealand Transport Agency	Low Volume Vehicle Technical Association .....

Amendment Record

Amendment details	Version #	Issue date	Effect date
• CCM Chapter 11 – Original Issue	Version 1	26 August 2025	1 October 2025

About Car Construction Manual Chapters

NZ Car Construction Manual Chapters (the chapters) provide the necessary detailed technical requirements, and helpful information, to enable a low volume vehicle to comply with the corresponding low volume vehicle standards (LVV standards). The chapters provide modifiers and constructors with the same information that an LVV Certifier will use when inspecting and LVV certifying a modified or scratch-built vehicle.

Author, Publisher, & Owner

This chapter is authored, published, and owned by the Low Volume Vehicle Technical Association Incorporated (LVVTA). LVVTA is an incorporated society established in 1992, that represents a group of specialist automotive organisations (in turn representing approximately 150,000 members) who are dedicated to ensuring that vehicles, when scratch-built or modified, meet the highest practicable safety standards.

The information in this chapter has stemmed from work undertaken by LVVTA founding member organisations that commenced in 1989 and has been progressively developed as an integral part of the New Zealand Government's land transport regulatory system, by agreement and in consultation with the New Zealand Transport Agency (NZTA).

As a result, the considerable experience in applied safety engineering built up by LVVTA and its specialist automotive member groups over the past several decades can be of benefit to members of the New Zealand public who also wish to build or modify motor vehicles.

LVVTA's contact details are:

- Phone: +(00) 64 4 238 4343
- E-mail: info@lvvta.org.nz
- Postal address: P. O. Box 50-600, Porirua 5240, Wellington, New Zealand
- Website: www.lvvta.org.nz

Availability & Current Version

This chapter is printed and distributed by LVVTA, and is available to the public free of charge from the LVVTA website; www.lvvta.org.nz

Note that printed copies of this chapter, like any other printed LVVTA documents, may have been superseded by an amended version and become out of date. Therefore, this and all other LVVTA documents should not be relied upon without first ensuring that the Version # (on the right-hand side of the header above) is the current version – please visit www.lvvta.org.nz/nzccm to check that this chapter is in fact the latest version.

Users' Feedback

This chapter is constantly undergoing an evolutionary development process in order to keep pace with changing trends and technology. To assist in this, LVVTA invites users of this chapter to engage in an ongoing consultation process with us by making submissions for any changes, additions, or clarifications which might improve the chapter, at any time.

Any submissions made via this rolling consultation process will be thoroughly considered, and incorporated, where appropriate, at the next available amendment opportunity.

Submissions should be made to submission@lvvta.org.nz, with the name of this chapter in the Subject line.

Supporting Information

This chapter may be supported by other documents (referred to as 'supporting information') on the same subject, which could be helpful to someone using this chapter. Supporting information, if available, can be found at www.lvvta.org.nz/nzccm and is all free of charge.

Legal Status & Copyright

This chapter supports *LVV Standard 90-20 – Exhaust Noise Emissions*, which is incorporated within the *Low* Volume *Vehicle Code* (*LVV Code*). The *LVV Code* is, in turn, incorporated by reference within *Land Transport Rule: Vehicle Standards Compliance 2002*.

Disclaimer

LVVTA has made all reasonable efforts to provide sound and correct advice, based on the historical knowledge and best practice experiences of all parties involved in the development and production of this chapter.

However, no responsibility or liability is accepted by LVVTA for any error or omission, or any loss suffered by any person relying directly or indirectly on this chapter. Any person who builds or modifies a motor vehicle accepts that there may be some associated risks, and does so in the full knowledge of this, and accepts full responsibility for their own actions.

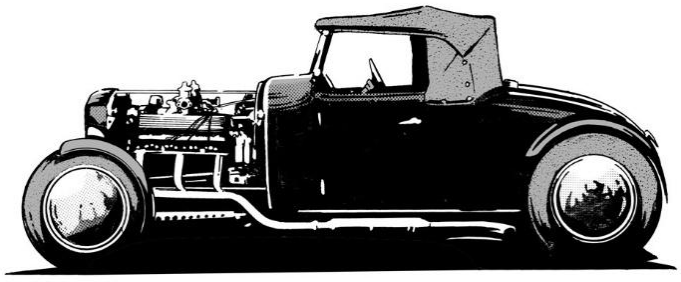
Credits

LVVTA acknowledges the following contributors for their assistance in the development of this chapter:

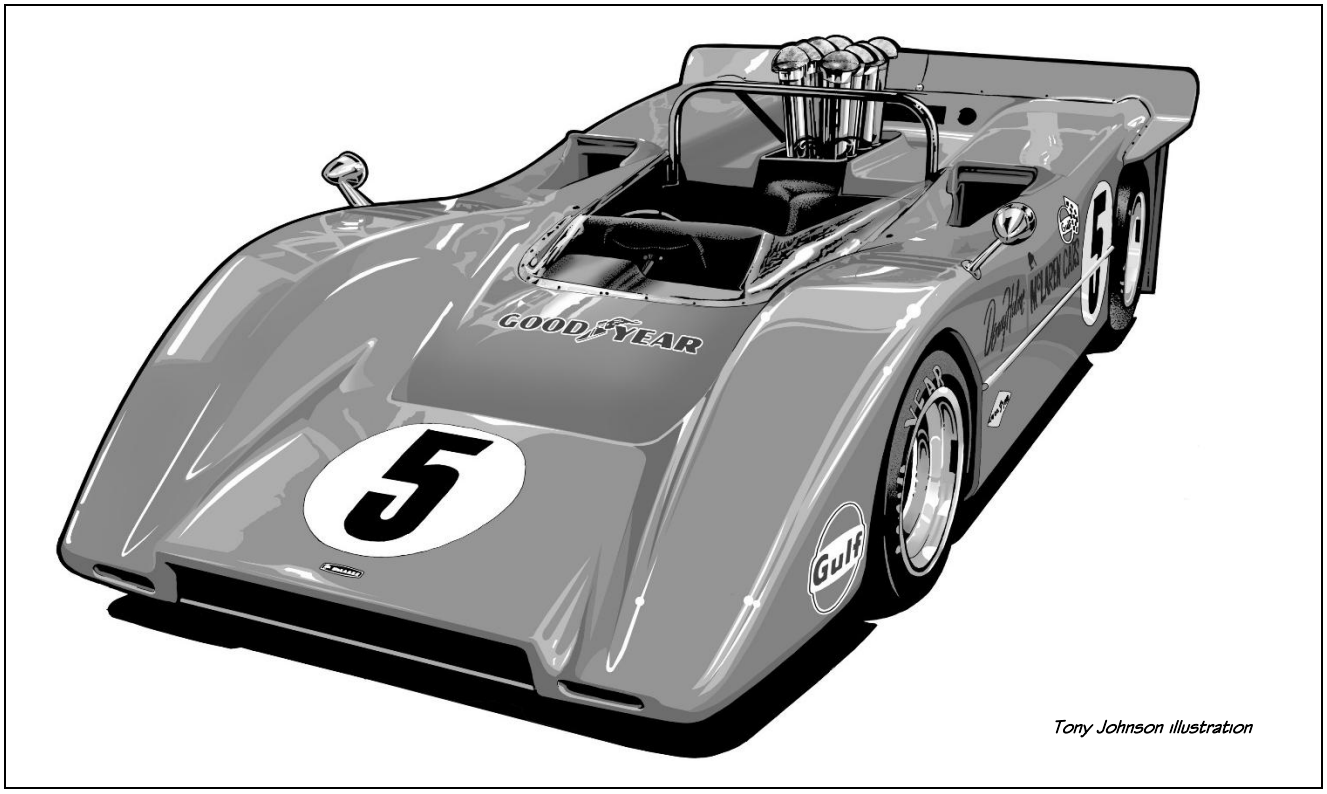
- Technical content: New Zealand Hot Rod Association, LVVTA Technical Advisory Committee, LVVTA technical staff
- Cover blueprint drawings: Graham Walls
- Cover central CAD diagram: CAD Wizard
- All car illustrations: Tony Johnson

Type Key (For full details of Type Key, refer to Chapter 2 – About this Manual)

Normal type	Provisions of the NZ Car Construction Manual for all vehicles.
Normal type in shaded box:	Special provisions of the NZ Car Construction Manual for vehicles built or modified before specified dates.
Script type:	Helpful hints, tips, explanations, clarifications, and interpretations.
Grey shaded text & grey vertical stroke in margin:	Latest amendments since previous version. Note that text which is high-lit in grey shows amendments that have been made since the document's previous version, and a grey vertical stroke to the left of the text denotes new or changed information which is important (rather than just a grammatical, formatting, or numbering change).



Chapter 11 (Part 1) Contents



CHAPTER 11 (PART 1): EXHAUST NOISE EMISSIONS

Introduction

The purpose of this chapter (Part 1) is to specify a set of technical requirements, together with an associated testing process, for measuring exhaust noise emissions – known as 'objective noise testing', or 'ONT'. The chapter provides a test method and procedure that has been developed by LVVTA, derived from international best-practice, which is applied in controlled conditions, and will result in accurate, repeatable, and legally defensible outcomes.

Note that where a vehicle is fitted with its original unmodified exhaust system, the requirements in this chapter do not apply, provided that the vehicle has not been 'green-stickered' or 'pink-stickered' for emitting excessive noise.

General Safety Requirements

11.0 Suitability and Condition

11.0.1

An exhaust system fitted to a low volume vehicle must be:

(a) of a good design using materials suitable for the purpose; and

(b) in good condition and free of leaks; and

(c) securely attached to the vehicle, using a mounting system that enables all necessary engine movement without stressing the exhaust system.

11.0.2

The body of a low volume vehicle must, in the areas adjacent to the vehicle's exhaust system, be sufficiently sealed so as to prevent the entry of any exhaust gases into the passenger compartment.

Exhaust System Design Requirements

11.1 Exhaust System Interference

11.1.1

An exhaust system fitted to a low volume vehicle must be designed, constructed, and fitted in such a way that:

(a) the exhaust system, or components within the exhaust system, cannot be removed, altered, or interfered with, without the use of hand tools; or

(b) the performance or operation of the exhaust system cannot be altered from inside the vehicle, or whilst the vehicle is in motion, in such a way that the decibel levels specified in 11.22 are exceeded, unless the vehicle is fitted with such a system as original equipment to the vehicle in question by a production vehicle manufacturer.

11.1.1(b)

This means that a multi-mode exhaust system cannot be designed into a scratch-built vehicle or retro-fitted into a modified production vehicle, unless the maximum permissible decibel levels in 11.22 are not exceeded in any available mode.

11.2 Exhaust System Protection & External Projections

11.2.1

Sections of an exhaust system which extend beyond the outer longitudinal extremity of the vehicle, or the outer sidewall of the tyres, must:

(a) not present any sections of open exhaust tubing or sharp edges facing toward the front of the vehicle; or

(b) have any sections of exposed exhaust adjacent to points of occupant entry and exit adequately heat-shielded, to prevent burn injuries in the event of being contacted by an occupant entering or exiting the vehicle.

11.3 Exhaust System Positioning

11.3.1

An exhaust system fitted to a low volume vehicle must be positioned so that it:

(a) is isolated from the passenger compartment; and

(b) terminates in a position where the outer end of the exhaust pipe is not directly underneath the passenger compartment.

Testing Requirements

11.4 Test Site Requirements

11.4.1

A test site used in the application of this chapter must be an open outdoor site that:

(a) is predominantly flat, particularly within the immediate test area; and

(b) incorporates within a radius of not less than 3 metres (10 feet) from the sound level meter microphone:

(i) a space free from large sound-reflecting surfaces including buildings, walls, billboards, vehicles, trees, or shrubs; and

(ii) a solid surface such as concrete or asphalt, free of any loose or sound-absorbing material.

11.4.2

Exhaust noise emission testing on a low volume vehicle may be carried out under a canopy, provided that no part of the canopy, including its supports, are within 3 metres (10 feet) of the sound level meter microphone.

11.4.1 & 11.4.2

Accurate and repeatable exhaust noise emission test results can only be obtained by using a large space with a solid ground surface like a big car park, with no sound reflecting surfaces.

11.5 Field Calibrator Requirements

11.5.1

A field calibrator used in the application of this chapter must be:

(a) specifically approved and issued for that purpose by LVVTA; and

(b) in good operating condition; and

(c) re-calibrated by an approved calibration laboratory at intervals specified by LVVTA.

11.5.1(c) & 11.6.1(c)

As a general rule, calibration intervals for field calibrators and sound level meters will be as specified by the equipment manufacturer, in accordance with ISO Standard 5130:2007.

The process of collection, re-calibration, and re-issue of the field calibrators and sound level meters will be arranged by LVVTA.

11.6 Sound Level Meter Requirements

11.6.1

A sound level meter used in the application of this chapter must be:

(a) a Class-1, Type-0 or Type-1 meter, specifically approved and issued for that purpose by LVVTA; and

(b) in good operating condition; and

11.6.2

The use of a Type-2 sound level meter is strictly limited to preliminary 'quick-check' work. This reduces costs and inconvenience to the vehicle owner leading up to the full test, so that the likelihood of a 'pass' when applying the full test is maximised.

(c) re-calibrated by an approved calibration laboratory at intervals specified by LVVTA.

11.6.2

An LVV Certifier may use a Type-2 sound level meter in conjunction with the test process prescribed by this chapter, provided that the Type-2 sound level meter is:

(a) used only for the purpose of establishing a vehicle's approximate exhaust noise level prior to a full test conducted in accordance with this chapter being carried out; and

(b) specifically approved and issued for that purpose by LVVTA; and

(c) in good operating condition.

11.6.2 (cont'd)

No written approval may be provided by an LVV Certifier through the use of a Type-2 meter, or a 'quick check' process, unless it is for the purpose of informing an Authorised Vehicle Inspector (AVI) that a vehicle which has failed a WoF for exhaust noise clearly passes.

11.7 Tachometer Requirements

11.7.1

A tachometer used in the application of this chapter must where practical, be proven by calibration to be within +/- 2% accuracy, and be:

(a) specifically approved and issued for that purpose by LVVTA; and

(b) in good operating condition.

11.7.1

An approved tachometer may be used either as a means by which to measure engine speed during the exhaust noise emission test, or as a means by which to verify the vehicle's original equipment tachometer.

11.7.2

A tachometer used in the application of this chapter may be either:

(a) a calibrated remote inductive pick-up tachometer issued by LVVTA; or

(b) where a tachometer specified in 11.7.1 will not enable a reliable engine speed reading to be received due to the type of ignition system used within the vehicle, a calibrated infra-red tachometer issued by LVVTA; or

(c) where neither tachometer specified in 11.7.1 nor 11.7.2 will enable a reliable reading to be received, the vehicle's original equipment tachometer or other trusted engine speed measurement device.

11.7.2(b)

An infra-red meter will almost always read the engine speed from a bold white marking or piece of reflective tape placed on the engine's crankshaft pulley. This option however, may necessitate an assistant to help the LVV Certifier.

11.7.2(c)

In cases where the supplied tachometers are not suitable and the vehicle is not equipped with a tachometer, in the interests of completing the test, the LVV Certifier may elect to use an alternative engine speed measurement device that is known to have good accuracy, such as a suitably equipped professional timing light or automotive multi-meter with inductive input.

Engine Speed Selection Requirements

11.8 Determining applicable engine speed

11.8.1

The applicable engine speed used during an exhaust noise emission test must be within a tolerance of +/- 5% of either:

(a) in the case of an engine that has a manufacturer's engine speed maximum power (ESMP) that is known to the LVV Certifier, 75% of that figure; or

(b) in the case of an engine that does not have a manufacturer's ESMP that is known to the LVV Certifier, or the manufacturer's ESMP has become irrelevant because the engine is now outside of its original specification:

(i) 4500 RPM if the engine is a rotary engine; or

(ii) 4000 RPM if the engine has five or less cylinders; or

(iii) 4800 RPM if the engine has five or less cylinders and is of a double over-head camshaft and variable valve timing engine design; or

(iv) 3200 RPM if the engine has six cylinders; or

(v) 3000 RPM if the engine has eight cylinders; or

(vi) 4000 RPM if the engine has more than eight cylinders; or

(vii) 2500 RPM if the engine is a diesel engine;

or

(c) in the case where an LVV Certifier believes the engine speeds specified in 11.8.1(b) are unreasonably high, taking into account the type and age of the engine, they may apply an engine speed for the purpose of the sound level test at which they believe is appropriate for the engine, and at which the engine may be safely operated.

Vehicle Preparation Requirements

11.9 Operating Temperature

11.9.1

The engine in a low volume vehicle which undergoes an exhaust noise emission test, must, prior to the commencement of the test, be brought up to normal operating temperature.

11.10 Positioning

11.10.1

A low volume vehicle which undergoes an exhaust noise emission test must be positioned centrally within a test site that meets the requirements specified in 11.4, and must:

(a) be stationary; and

(b) have the parking brake applied; and

(c) have the gear selector positioned either:

(i) in the case of a manual transmission-equipped vehicle, in neutral; or

(ii) in the case of an automatic transmission-equipped vehicle, in park;

and

(d) have the air conditioning system, if fitted, turned off; and

(e) have the engine hood, if fitted, closed.

11.10.1(c)(ii)

Where a vehicle has a built-in rev-limiter that does not allow the engine speed required in 11.8.1(b) to be reached in park, the shifter may need to be moved to the neutral position, or the vehicle may need to be put in a service or maintenance mode electronically.

11.11 External Noise Sources

11.11.1

In a case where it is believed that one or more noises emitted by the vehicle, other than exhaust outlet noise, is adversely influencing the total noise recorded, the exhaust outlet noise may be isolated from the other noise sources by using shielding around the vehicle, providing that the shielding material:

(a) is not within 50 mm of the exhaust outlet; and

(b) does not obstruct the clear path between exhaust outlet and microphone position.

11.11.1

Suitable shielding may include acoustic partitions, layers of fibre 'batts' insulation, or sand-bags. Care must be taken to avoid the risk of combustion of shielding material.

Test Procedure Requirements

11.12 Background Noise Testing

11.12.1

The combination of wind or other background noise present at an exhaust noise emission test, if any, must:

(a) be at least 10 dBA below the sound level of the vehicle being tested; and

(b) be measured both prior to, and after the completion of, the exhaust noise emission test process.

11.12.1

Wind can cause high readings to be displayed on a sound level meter, and consistent vehicle noise measurements cannot be made when wind is affecting the readings. By meeting the requirements specified in 11.12.1, any additional noise caused by wind and any other sources producing background noise will not adversely affect the exhaust noise emission testing outcome.

11.13 Field Calibration Checking

11.13.1

A sound level meter used in the application of this chapter must, before and after each exhaust noise emission test:

(a) undergo a field calibration check against a field calibrator issued by LVVTA; and

(b) record a difference between the two checks of not more than 0.5 dBA.

11.13.1

If more than 0.5 dBA difference is recorded between the two calibration checks, the test must be disregarded and carried out again.

11.14 Microphone Set-up and Positioning

11.14.1

The sound level meter microphone, when testing a low volume vehicle for exhaust noise emissions, in all cases, including those specified in 11.15.1 to 11.17.1, must:

(a) be protected by a foam wind-shield at all times during the noise emission test set-up and testing process; and

(b) be positioned at (see Diagrams 11.1 and 11.2):

(i) a distance from the exhaust outlet of 500 mm (+/- 10 mm), except where the vehicle meets the criteria specified in 11.16.2; and

(ii) an angle of 45 degrees (+/- 5 degrees) to the direction of gas flow, always using the position furthest from the vehicle's longitudinal centreline; and

(iii) the same height as the exhaust outlet, however not closer to the ground than 200 mm.

11.14.1

Where a vehicle's exhaust outlet is closer to the ground than 200 mm, the microphone must be positioned no lower than 200 mm from the ground. This is in order to avoid 'sound bounce' affecting the test results.

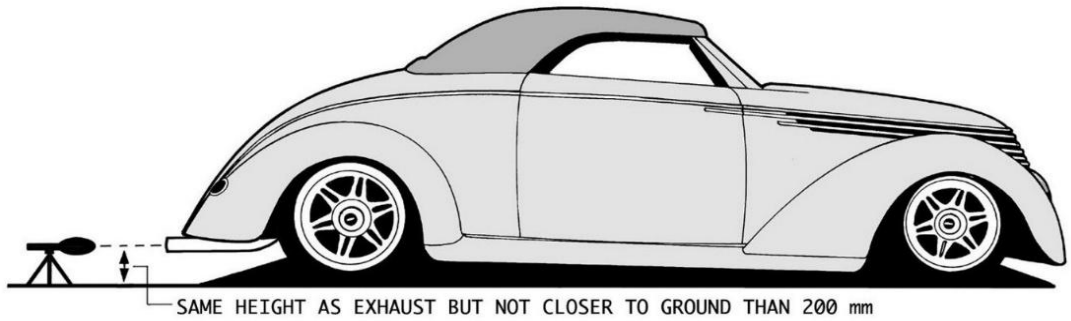


Diagram 11.1 Microphone Positioning for Single Exhaust Outlet (Side View)

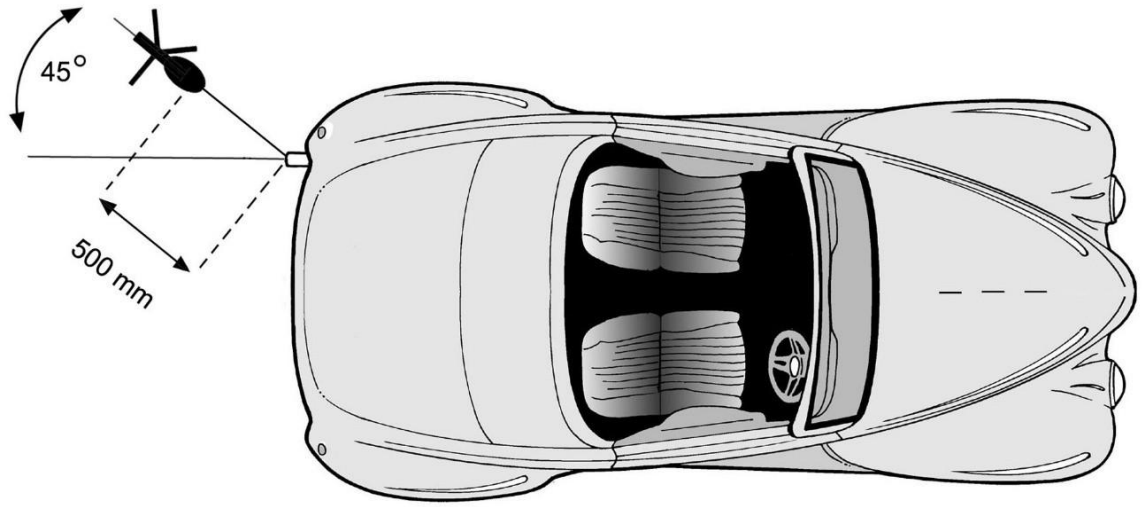


Diagram 11.2 Microphone Positioning for Single Exhaust Outlet (Plan View)

11.15 Microphone Positioning with Two Exhaust Outlets

11.15.1

In the case of a low volume vehicle with two exhaust outlets, and the two outlets are less than 300 mm apart, the outlets must be treated as one and measured together, with the sound level meter microphone positioned at the exhaust outlet that is furthest from the vehicle's longitudinal centreline.

11.15.2

In the case of a low volume vehicle with two exhaust outlets, and the two outlets are more than 300 mm apart (see Diagram 11.3), the outlets must be treated as two separate outlets and measured individually, with the figure from the loudest outlet taken as the result.

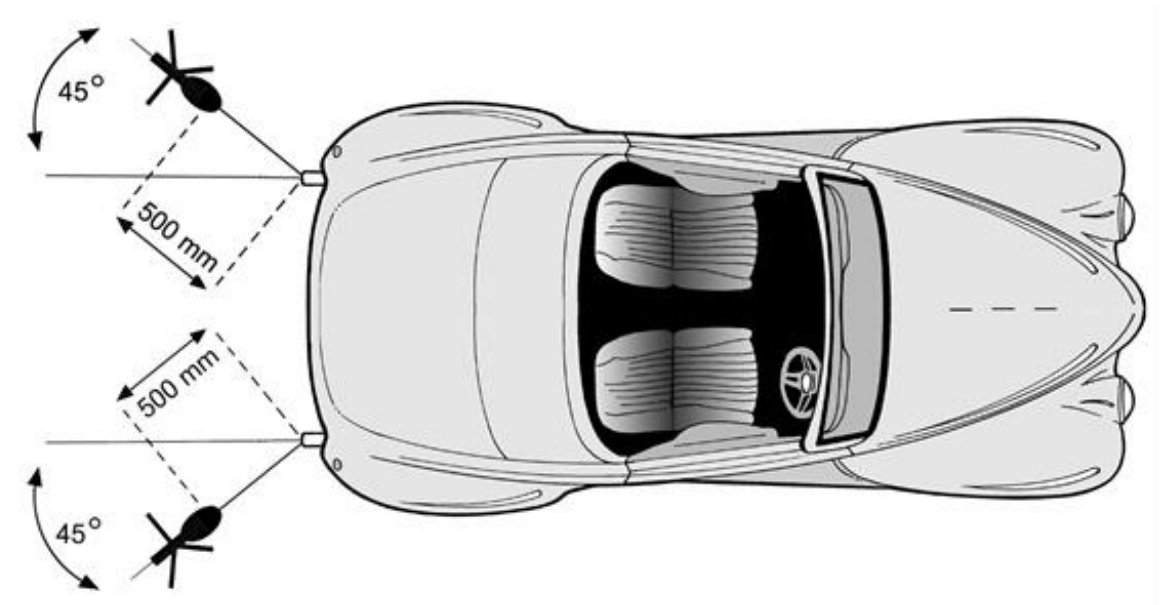


Diagram 11.3 Microphone Positioning for Twin Exhaust Outlets

11.16 Microphone Positioning with Other Unusual Outlets

11.16.1

In the case of a low volume vehicle that has an exhaust outlet located at an angle to the vehicle's longitudinal centreline, the sound level meter microphone must be positioned at the point which is furthest from the engine (see Diagram 11.4).

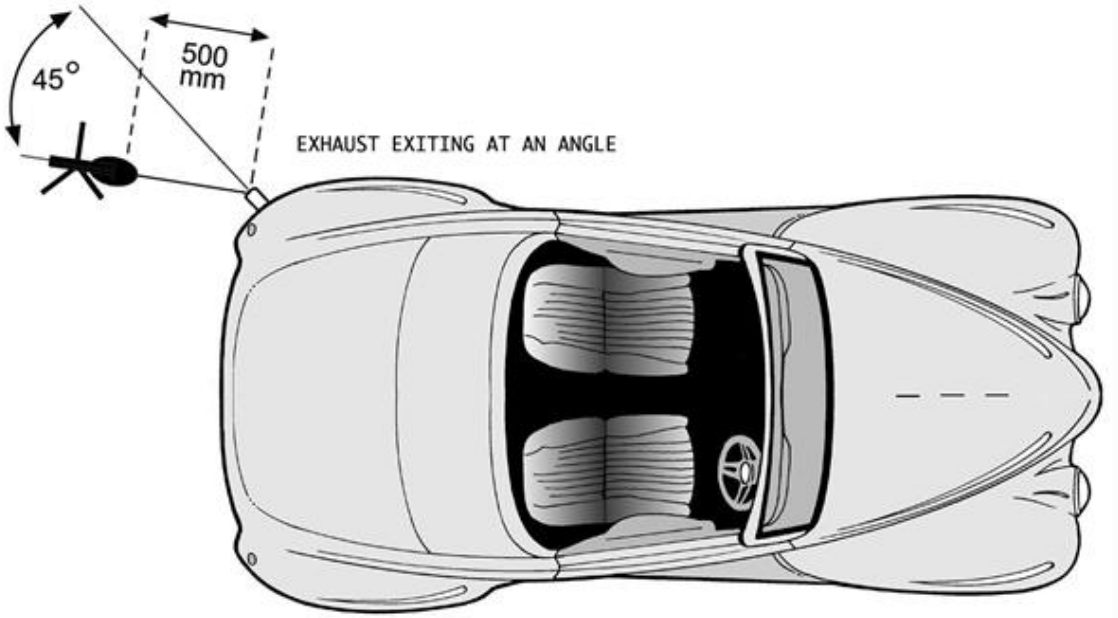


Diagram 11.4 Microphone Positioning for Angled Exhaust Outlets

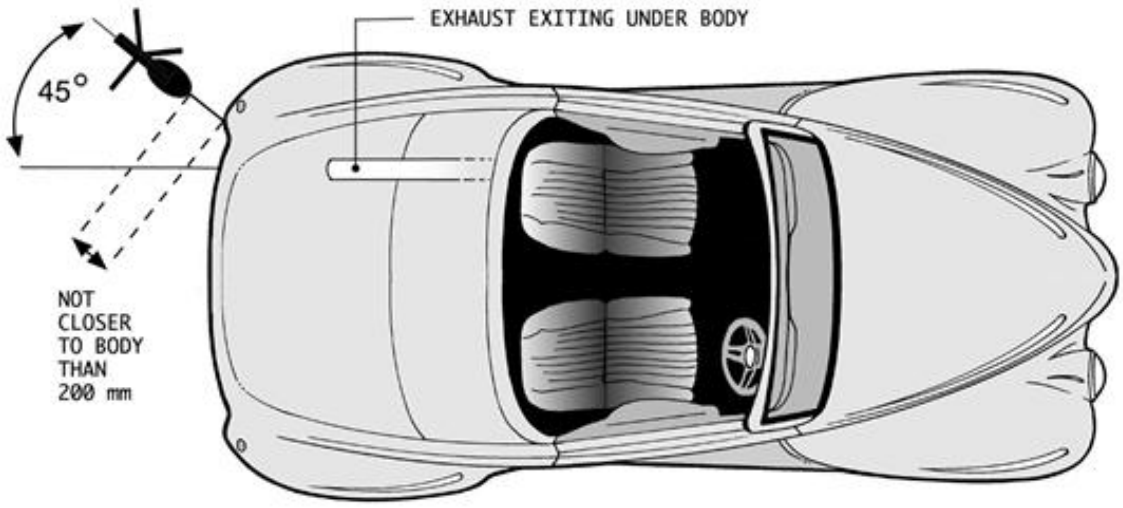


Diagram 11.5 Microphone Positioning for Exhaust Outlets that Terminate Under Vehicle Body

11.16.2

In the case of a low volume vehicle that has an exhaust outlet that terminates under the vehicle body, the sound level meter microphone must be positioned as closely as practical to the outlet, however the sound level meter microphone must not (see Diagram 11.5):

(a) be positioned any closer to the vehicle body than 200 mm; and

(b) have any part of the vehicle obstructing a clear path between it and the exhaust outlet, and may, in order to achieve a clear path, be positioned at less than 45 degrees to the direction of gas flow, provided that the sound level meter microphone is no closer to the exhaust outlet than 500 mm.

11.16.2

The microphone must never be positioned closer to the vehicle body than 200 mm. This is in order to avoid 'sound bounce' affecting the test results.

For other positions not described in this chapter, such as a vertical stack, an LVV Certifier should seek advice from LVVTA.

11.17 Testing Multi-mode Exhaust Systems

11.17.1

In the case of a low volume vehicle that is fitted with a multi-mode exhaust system and a manual exhaust control, the exhaust noise emission test must be carried out with the mode switch in all positions, with the highest sound level recorded taken as the test figure.

11.18 Sound Level Meter Setting

11.18.1

When testing a low volume vehicle for exhaust noise emissions:

(a) the sound level meter microphone must be self-supported; and

(b) the sound level meter must be set at:

(i) 'curve-A' or 'A-weighted' sound pressure level; and

(ii) 'fast response', or 'time weighting F'.

11.19 Sound Level Meter Activation and Recording

11.19.1

During exhaust noise emission testing on a low volume vehicle, no person may be present within a radius of 3 metres (10 feet) of the vehicle undergoing sound level testing, other than:

(a) the LVV Certifier; and

(b) if required, one additional person appointed by the LVV Certifier to assist with the exhaust noise emission test.

11.19.2

During exhaust noise emission testing of a low volume vehicle, the sound level meter must record the exhaust noise level held constantly for a period of not less than one second at the selected engine speed specified in 11.8.1(b) and throughout the deceleration period back to idle.

11.20 Interpretation of Sound Level Test Results

11.20.1

The figure recorded for each exhaust noise emission test of a low volume vehicle must be to one decimal point.

11.20.2

The result of an exhaust noise emission test of a low volume vehicle must be calculated from the average of three separate and consecutive measurements, each of which must be within 2 dBA of each other.

11.20.3

The final decibel figure established for a low volume vehicle after an exhaust noise emission test, and application of any applicable factoring specified in 11.22, must be rounded to the nearest whole dBA value.

11.20.4

An unusual or unrelated noise spike or peak that occurs when carrying out an exhaust noise emission sound level test on a low volume vehicle must not be taken into account as part of the test results, in which case the test must be repeated until a satisfactory result is achieved.

Decibel Level Requirements

11.21 Decibel Limits

11.21.1

The maximum permissible decibel level emitted by a low volume vehicle tested in accordance with this chapter, must not, except for in the case of where factoring must be applied for one or more of the situations specified in 11.22.1 to 11.22.3, exceed:

(a) in the case of an MA, MB, MC, MD1, MD2, or NA-class vehicle that was manufactured before 1 January 1985, 95 dBA; or

(b) in the case of an MA, MB, MC, MD1, MD2, or NA-class vehicle that was manufactured on or after 1 January 1985:

  (i) if first registered in New Zealand before 1 June 2008, 95 dBA; or

  (ii) if first registered in New Zealand on or after 1 June 2008, 90 dBA.

11.19.2

The standardised test process for sound level meter activation and recording must incorporate the following steps:

- adjust the throttle to bring the engine speed up to the selected level;
- begin recording noise output;
- hold the engine speed for at least one second;
- release the throttle and allow the engine speed to fall naturally back to idle;
- once at idle, stop recording noise output.

11.20.4

A noise spike or peak does not include an exhaust over-run 'boom', but rather is intended to apply to unusual or intermittent one-off sounds unrelated to the exhaust noise from the surrounding environment, such as a loud bang, aircraft flying past, or a barking dog.

Rattling noises such as those made at certain engine speeds by number plates or non-exhaust heat-shields during the test can also cause an unwanted spike or peak.

11.22 Decibel Factoring for Specific Situations

11.22.1

A factor of 4 dBA may be subtracted from the average decibel level recorded in 11.21.1, in order to compensate for the increased background noise caused by the close proximity of the engine to the exhaust outlet, in the case of a low volume vehicle that has either:

(a) the engine positioned to the rear of the driver; or

(b) the exhaust outlet positioned within 1.5 metres (5 feet) of the engine.

11.22.2

A factor of 2 dBA may be subtracted from the average decibel level recorded in 11.21.1 in the case of a low volume vehicle, other than one that has the factor specified in 11.22.1 already applied, which incorporates a particular type of engine, or engine equipment or components, that emits an unusually high level of mechanical sound, if the LVV Certifier believes that the exhaust noise emission figure may be influenced by that engine type, equipment, or components.

11.22.3

A factor of 5 dBA may be subtracted from the average decibel level recorded in 11.21.1, in the case of a scratch-built low volume vehicle of scratch-built sub-category 'Historic Replica', or scratch-built sub-category 'Reproduction', first registered in New Zealand on or after 1 June 2008, that is a replication or reproduction of a vehicle manufactured before 1 January 1985.

Reporting Requirements

11.23 Required Information

11.23.1

The information that must be recorded and provided when performing an exhaust noise emission test on a low volume vehicle is:

(a) the make, model, year, and VIN of the vehicle to which the exhaust noise emission test has been applied; and

(b) the location of the test site; and

(c) the make, model, and serial number of the sound level meter used; and

(d) the background noise level measured before and after the tests; and

11.21.1

These decibel figures are set by the Government, as specified in *Land Transport Rule: Vehicle Equipment 2004*, and may change from time to time as Government policy dictates. Any such changes will be reflected in an amendment to this chapter.

See the Terms & Definitions section at the back of this chapter for information about 'dB' and 'dBA.

11.22.1 & 11.22.2

In a case where shielding around the vehicle is used as described in 11.11.1, the decibel factoring noted in 11.22.1 and 11.22.2 cannot be applied.

11.22.2

A diesel engine or an air-cooled engine are typical examples, and the components or equipment referred to may include cooling fans, mechanical belt-driven superchargers, gear-driven camshafts and balance shafts, belt-driven primary drives, and dry clutches.

In order for such components to have an influence on the exhaust noise emission testing, it will generally either have no effective shielding surrounding it, or be positioned within two metres (six feet) of the sound level meter microphone.

(e) the selected engine operating speed used for the test; and

(f) the applicable decibel limit from 11.21.1 that applies to the vehicle for the test; and

(g) a clear indication of whether the subject vehicle has passed the test; and

(h) reference to this chapter; and

(i) a detailed description of the subject vehicle's exhaust system, which records the length, diameter, type, and material of the various components used within the system, and the basic shape, configuration, and positioning of the system.

11.24 Required Photographs

11.24.1

Clear, high-resolution photographs must be taken and provided when performing an exhaust noise emission test on a low volume vehicle of:

(a) the vehicle's exhaust system, including the components listed in 11.23.1(i); and

(b) the vehicle's manufacturer-assigned chassis number or NZTA-assigned VIN; and

(c) the LVV Electronic Data Plate once affixed to the vehicle, with its number clearly visible; and

(d) the LVV Electronic Data Plate, showing the location of its fitment on the vehicle.

11.24.1(a)

For the sake of clarity, the photographs are only intended to record the exhaust system as it was at the time the ONT was carried out, and to identify the location of the EDP on the vehicle. These do not imply any kind of assessment, approval, or LVV certification of any other modifications.

Exclusions

No exclusions apply to this chapter.

Useful Information

Challenges for older vehicles

The more modern a vehicle is, the greater the level of silencing technology that is incorporated within the vehicle, because:

- newer engines feature improved silencing technology within the engine design; including block, cylinder head, component materials, casting techniques, water-jacket positioning, induction system design, and cooling fan and ancillary equipment design;
- silencer technology has improved over time;
- the presence of catalytic converters in modern cars reduces exhaust noise emissions even further.

Applying modern decibel limits to old vehicles can be challenging for many reasons, including that:

- as noted above, older engines generally emit more mechanical noise;

- many older vehicles that are modified have larger capacity engines, which are inherently more difficult to silence;
- pre-1940s body styles are less effective at containing the engine noise, as they incorporate openings in the engine hoods and side-panels to assist with cooling, which has the effect of increasing the amount of engine noise that can be heard from outside the vehicle;
- some very old vehicles (especially 1920s and early 1930s vehicles) are unusually short, which provides less length for an exhaust system.

Terms & Definitions for Chapter 11 - Exhaust Noise Emissions

AVI	(Authorised Vehicle Inspector) means a person who carries out WoF inspections on behalf of NZTA.
A-weighted decibels	means an adjustment to measured or calculated sound pressure levels that accounts for the varying sensitivity of human hearing to sound at different frequencies.
Aftermarket	means a component or system made by a manufacturer, other than a high-volume motor vehicle manufacturer, who produces components or systems on a production-run basis for the mass-market.
Automatic transmission	means a type of gearbox, or transmission, which automatically varies the ratios between the input shaft and the output shaft to suit engine speeds automatically, without the driver having to physically select the gears.
Class	(also known as Type) in relation to a sound level meter, describes its accuracy as defined by the relevant international standards. The ANSI S1.4 and older IEC 60651 standards refer to the level of accuracy as 'Type', whereas the new standard IEC 61672 refers to the level of accuracy as 'Class'.
dB	(decibel) means a logarithmic measurement unit that describes a sound's relative loudness, though it can also be used to describe the relative difference between two power levels. In sound, decibels generally measure a scale from 0 (the threshold of hearing) to 120-140 dB (the threshold of pain). A 10 dB difference is required to double the subjective volume. Generally, if the distance from the noise source is doubled, the noise level will be 6 dB lower. A 2-3 dB difference over a broad frequency range is noticeable to most people.
dBA	(decibel) means A-weighted decibels, which is an adjustment process that takes into account the varying sensitivity of the human ear, to different decibel levels at different frequencies. Low frequency sounds are quieter to the human ear. The 'A' weighting curve primarily takes into account the 500-10,000 Hz frequency range.
ESMP	(Engine Speed at Maximum Power) means a specified engine speed applicable to the particular make and model of engine, when carrying out an ONT.
Heat shield	means a heat-resistant piece of material placed between a heat-generating component and a heat-sensitive component, to prevent or minimise heat transfer from one to the other.
Hz	(Hertz) means cycles per second.
L-class	is an NZTA classification, which means, in very simple terms, a two-wheeled motorcycle or three-wheeled motor vehicle with a GVM of under 1000 kg.

LVV	(Low Volume Vehicle) means, in simple terms, LVVs which are modified or scratch-built in small numbers, and includes individually modified or scratch-built LVVs. The full definition of an LVV is contained in the *LVV Code*.
LVV Certifier	(Low Volume Vehicle Certifier) means a person appointed by NZTA under the provisions of *Land Transport Rule: Vehicle Standards Compliance 2002*, to carry out low volume vehicle certification of modified and scratch-built LVVs, as specified by *Part 2* of the *LVV Code*.
LVV Code	(Low Volume Vehicle Code or the Code) means an LVVTA document which is incorporated by reference into the *Land Transport Rule: Vehicle Standards Compliance 2002*, and all applicable individual *Land Transport equipment rules*, that provides the legal framework to enable the LVV certification of modified and scratch-built LVVs in New Zealand.
LVVTA	(Low Volume Vehicle Technical Association) is an incorporated society comprised of specialist vehicle associations. Established in 1992, its objectives are to represent the interests of vehicle modifiers and builders in New Zealand, and to ensure high safety standards for modified and scratch-built LVVs. The LVVTA owns and administers the *LVV Code*.
Modification	is defined in *Land Transport Rule: Vehicle Standards Compliance 2002*) to change a vehicle from its original state by altering, substituting, adding or removing any structure, system, component or equipment, but does not include repair. 'Modified' and 'modification' have corresponding meanings.
Modified Production (LVV)	means, in simple terms, a vehicle which, while modified, maintains a sufficient percentage of body or chassis from one primary mass-produced vehicle that it can still be considered to be that vehicle. The full legal definition of a Modified Production LVV is complex and currently under review, and will be incorporated within the *LVV Code* once revised.
Motorcycle	means a vehicle of Table-A class LA, LB, LC, LD, and LE, as defined in *Land Transport Rule: Vehicle Standards Compliance 2002*.
Muffler	means a device for reducing the noise of the exhaust gases before they are released into the air through the tailpipe.
NZTA	(New Zealand Transport Agency) is a Crown entity responsible for managing New Zealand's land transport system.
Passenger compartment	means the part of a motor vehicle body that houses the passengers and driver.
RPM	(revolutions per minute) means the number of times an engine's reciprocating assembly turns in one minute.
Scratch-built (LVV)	means, in simple terms, an LVV which has been individually constructed from unrelated components, or a mass-produced vehicle which has been modified to such an extent that it can no longer be considered to be a modified mass-produced vehicle. The full legal definition of a scratch-built LVV is currently under review, and will be incorporated within the *LVV Code* once revised.
Scratch-built Historic Replica (LVV)	means a sub-category of scratch-built low volume vehicle, as defined in *Chapter 2 - LVV Classifications* of the *LVV Operating Requirements Schedule*.
Scratch-built Reproduction (LVV)	means a sub-category of scratch-built low volume vehicle, as defined in *Chapter 2 - LVV Classifications* of the *LVV Operating Requirements Schedule*.

Sound level meter	means a device for measuring the level of sound output, in decibels, when carrying out an ONT.
Tachometer	means an instrument by which the rotational speed of an engine is measured.
WoF	(Warrant of Fitness) means a safety inspection and approval process for in-service vehicle, issued by an NZTA-appointed AVI.