

Helping New Zealanders Build & Modify Safe Vehicles



WHEELS & TYRES

Updated LVV Standard and NZ Car Construction Manual Chapter

► Introduction

LVVTA has updated the *New Zealand Car Construction Manual (NZCCM) Chapter 12 (Wheels & Tyres)*, and *LVV Standard 205-00(03) (Wheels & Tyres)*.

As detailed within *LVVTA Information Sheet # 02-2021 (Explanation of 'Next-generation' LVVTA Technical Documents)*, the main reason for the LVVTA technical document system overhaul is to create a clear distinction between the purpose of the LVV standards and the corresponding NZCCM chapters. While the LVV standards and NZCCM chapters will still be related, this distinction will reduce duplication, minimise the frequency of LVV standards amendments, and enable either the LVV standards or the NZCCM chapters to be amended independently of each other.

From the end user's perspective, the structure of the 'Next-generation' LVVTA technical documents reduces the function of the LVV standards to laying out the legal framework for vehicle modification and construction requirements, and uses the NZCCM chapters to show modifiers and builders how compliance with the LVV standards can be met in a practical and achievable manner.

► Update of LVV Standard 205-00(03) (Wheels & Tyres)

The *LVV Standard 205-00(03)* has been updated to reflect the new layout of the 'Next-generation' LVVTA technical documents, with all detailed technical requirements moved to *NZCCM Chapter 12 (Wheels & Tyres)*. *LVV Standard 205-00(03)* provides:

- information that sets out which vehicles the standard applies to, and when the standard takes effect; and
- relevant General Safety Requirements reproduced from the NZ Transport Agency's associated *Land Transport Rule 'Vehicle Equipment 2004'*; and
- necessary procedural requirements from the *LVV Code*; and
- a series of overarching technical requirements which refer to the corresponding *NZCCM Chapter 12 (Wheels & Tyres)* which contains the actual technical requirements that the LVV Certifier inspects against.

► Update of NZCCM Chapter 12 (Wheels & Tyres)

As part of the 'Next-generation' document format, *NZCCM Chapter 12 (Wheels & Tyres)* has been developed into a more user-friendly technical document which includes new information about modifications, components, and safety-related requirements which have arisen since the last update of *Chapter 12*, along with a number of clarifications and pieces of useful information.

There are a number of updates to *NZCCM Chapter 12 (Wheels & Tyres)*; as usual, wording and format changes are indicated in **dark-grey shade**, and grey vertical strokes have been added where there are new or changed sections.

The more significant changes to *NZCCM Chapter 12 (Wheels & Tyres)* are listed below:

- **Sub-section 12.0 (and associated side-bar notes):** General Safety Requirements that all vehicles must meet from the *Land Transport Rule 'Vehicle Equipment 2004'* have been added to the start of the chapter. This includes tyre condition, construction, and tread depth requirements reproduced from the Warrant of Fitness VIRM.

- **Sub-section 12.2:** This section has been expanded to include wheel design, with an additional paragraph (12.2.4) stating:
 - *A multi-fit wheel fitted to a low volume vehicle must incorporate sufficient parent material between every wheel stud or bolt hole.*

The addition of this paragraph is due to issues with aftermarket wheel designs featuring multi-fit holes where only a partial taper contact is achieved, which can also cause poor strength around the wheel mounting face due to the lack of suitable material left in that area. A diagram and sidebar note has also been added to help explain this.

- **Paragraph 12.3.2:** A requirement has been added stating that a wheel fitted to a low volume vehicle must be of sufficient diameter to meet the scrub-line requirements of *Chapter 7 (Steering Systems)*. Increasing or decreasing the size (radius) of a wheel can affect the vehicle's scrub-line, so a requirement has been added to capture this.
- **Paragraph 12.4.1:** Track measurement requirements have been clarified by a sidebar note stating that in the case of a dual-wheeled vehicle, the track should be measured from the centreline of the dual-wheel assembly (not the centre of the inner or outer tyre).
- **Paragraph 12.9.2 (and side bars):** The requirements around re-drilling of wheel hubs for a different stud pattern have been outlined here with the addition of a requirement stating:
 - *A wheel hub fitted to a low volume vehicle may be re-drilled to accommodate a different wheel stud pattern, provided that:*
 - (a) *there is a space of at least one stud hole diameter between any original stud hole and any new stud hole; and*
 - (b) *the sections of wheel through which the repositioned studs pass, are sections which were designed by the wheel manufacturer to be clamped against the hub surface.*

The need for this originates with wheels LVV staff have seen re-drilled for a different stud pattern, where the new stud holes are drilled through recesses in a wheel hub or the wheel has featured newly drilled stud holes overlapping the OE holes (particularly common with 4-to-5 stud conversions). This has meant that poor taper contact and material weaknesses in the wheel hub have resulted.

- **Sub-section 12.11 (and associated side-bars):** Bead-lock wheel requirements have been clarified to state that conversion of wheels to a bead-lock setup is only possible with a pressed steel wheel.

Additional concerns around bead-lock wheels means that there has been a side-bar note added, explaining that aftermarket bead-lock wheels do not generally have the required number of bolts to secure the bead lock ring and usually do not have an approved rim profile, so in many cases cannot be LVV certified.

It should also be noted that to date, no aftermarket alloy bead-lock wheel has been identified as being purpose designed for automotive road use, so alloy bead-lock wheels cannot be LVV certified.

- **Paragraph 12.12.1:** A requirement has been added stating that in addition to meeting *Chapter 18* requirements, an LVV Certifier must also be satisfied from a visual examination that a weld to a modified steel wheel is acceptable.

Further to this, a side-bar note has been added explaining that while an aluminium wheel may not be modified by welding, welding may be carried out as part of a repair providing that this meets the requirements specified for wheel repairs within the *Land Transport Rule: Wheels and Tyres 2001*. This has been added due to the current wording prohibiting all welding for modification, which was not originally intended to disallow wheel repairs.

- **Paragraph 12.14.1:** A requirement has been added to the wheel hub and assembly compatibility requirements, that a wheel on a low volume vehicle must:
 - *12.14.1(e): where the vehicle originally incorporated a centre spigot or other system that centred the wheel in relation to the hub, incorporate a centering system.*

This is to ensure that a wheel fitted to a low volume vehicle has the same level of spigoting and attachment as the vehicle's OEM fitment. There is also a sidebar note explaining that some aftermarket wheels (such as Cragar SS mags) do not incorporate a centering system, and so careful attention must be paid to torquing the wheel nuts correctly.

- **Paragraph 12.15.3(c):** There is an extra clause added regarding the amount of stud or bolt engagement through a nut or hub, that states:
 - *in the case of an unmodified hub assembly, not less than that originally provided for the fitment by the original vehicle manufacturer.*

This is to allow for vehicles with an unmodified hub assembly being used in an OE position that would not otherwise meet the requirements of 12.15.3.

- **Paragraph 12.16.1(b):** A clause has been added to state that a wheel stud, nut, or bolt must incorporate threads that are correctly formed and compatible with its counterpart. This is because of several instances of cheap and poorly made aftermarket wheel nuts being presented to LVV staff, where excessive play and poor thread engagement were noted when the nut was fitted to a vehicle.
- **Paragraph 12.16.1(c):** Additionally, there has been a clause inserted stating that aluminium wheel nuts must not be fitted to any vehicle, unless fitted as original equipment by a high-volume vehicle manufacturer.

There has been an LVV Safety Alert issued (03-2018) which outlines the risks to do with poor quality aluminium wheel nuts, which are commonly available online. This clause has been added as a result of NZ Police Serious Crash Unit investigations, and further research by LVVTA technical staff into the performance of aluminium wheel nuts.

- **Paragraphs 12.19 and 12.22:** Spacer and adapter requirements have been expanded to allow non-commercially made adapters and spacers to be fitted to a low volume vehicle, providing that the LVV Certifier has confidence that the person manufacturing the spacer or adapter uses the correct material, is competent and experienced in the type of work being undertaken, and uses the correct equipment to construct the parts. To avoid confusion about suitable materials, there is also a side-bar note suggesting that spacers and adapters be made of 6061 T6 alloy.
- **Paragraph 12.19.1:** Changes have been made to clarify wheel spacer requirements, and there has been a sidebar note added stating that:
 - *a single dust shield fitted between the wheel and hub, made of sheet metal less than 2mm thick and that can be removed without causing a clearance issue is not considered a spacer.*

The need for this clarification comes from vehicles that have been presented for certification in the past, with a factory-fitted dust shield fitted between the hub and the wheel. This being said though, there has also been a note added that multiple "dust shields" may not be fitted in place of a wheel spacer.

In the same manner, 12.19.1(h) states that a wheel spacer fitted to a low volume vehicle:

- *may not be fitted in conjunction with any other wheel spacer or adapter.*

While this may seem obvious, a few instances of wheel adapters and spacers fitted to the same hub have meant this requirement needed to be added.

- **Paragraph 12.22.1 (d):** There has been an extra clause added explicitly stating that an adapter may not be of a design that enables the adaption of more than one pitch circle diameter fitment. This prohibits the fitment of "multi-fit" adapters.
- **Sub-section 12.25:** This allows the re-drilling of a vehicle hub to a different PCD, providing that there is a space of at least one stud hole diameter between any original hole and any new hole, and that the sections of hub utilised for new wheel studs have at least as much material thickness as the OE stud position had.

This was not previously captured by the wording of the requirements.

- **Paragraph 12.26.2 (a):** This requirement has been broadened from a motorsport vehicle only context to allow any vehicle to have tyres of differing carcass construction between front and rear axles, providing that the vehicle is over 30 years old, or replicates a vehicle that is over 30 years old.
- **Sub-section 12.29:** Mudguard requirements have been changed to state that:
 - 12.29.2: *Except where 12.31.1 applies, the tread section of a tyre fitted to a low volume vehicle must not extend beyond the original or modified body panels or guard extension.*
 - 12.29.3: *Except where 12.31.1 applies, a low volume vehicle must:*
 - (a) *maintain similar mudguard effectiveness and coverage of the tyre tread when compared to OE; or*
 - (b) *be fitted with a mudguard over each wheel and tyre that covers not less than 33% of the tyre circumference, with the rear edge positioned no higher than the centre-line of the wheel.*

There are also side-bar notes added explaining these requirements, including that mudguards on raised vehicles (such as lifted four-wheel drives) need to have a similar amount of tyre coverage to an unmodified variant. These requirements are intended to clarify tyre coverage expectations for both off-road style vehicles and sports cars with cycle fenders.

- **Sub-section 12.30:** Requirements have been added relating to tyre valves and inner tubes, outlining the accessibility required of tyre valves and compatibility requirements of inner tubes.
- Diagrams of common wheel nuts and wheel bolts have been added to the 'Useful Information' section.
- Terms and Definitions have been added in a glossary format to the end of the chapter.

Finally

The updated *LVV Standard 205-00(03) (Wheels & Tyres)*, and *NZCCM Chapter 12 (Wheels & Tyres)* are both available to download free of charge from <https://www.lvvta.org.nz/>.

If you have any questions or you would like clarification on any of the changes, please contact your LVV Certifier, or a member of the LVVTA technical staff by emailing tech@lvvta.org.nz.



FOR FURTHER INFORMATION PLEASE CONTACT YOUR LVV CERTIFIER, OR LVVTA.