

Helping New Zealanders Build & Modify Safe Vehicles



CHASSIS MODIFICATION & CONSTRUCTION

New LVV Standard, and Updated NZ Car Construction Manual Chapter

► Introduction

LVVTA has developed a new LVV Standard 40-00(00) (Chassis Modification & Construction), and updated the New Zealand Car Construction Manual (NZCCM) Chapter 5 (Chassis Modification & Construction).

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.

► New LVV Standard 40-00(00) (Chassis Modification & Construction)

This is a freshly developed LVV standard; there are no highlighted amendments as the entire document is new.

LVV Standard 40-00(00) (Chassis Modification & Construction) 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 5 (Chassis Modification & Construction) which contains the actual technical requirements that the LVV Certifier inspects against.

► Update of NZCCM Chapter 5 (Chassis Modification & Construction)

With the introduction of the new LVV Standard 40-00(00) (Chassis Modification & Construction), NZCCM Chapter 5 (Chassis Modification & Construction) 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 5, along with a number of clarifications and pieces of useful information.

There are a number of updates to NZCCM Chapter 5 (Chassis Modification & Construction); 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 5 (Chassis Modification & Construction) are listed below:

- 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.

- Paragraph 5.1.1: Production chassis joining requirements have been expanded to cover both lengthening and shortening modifications, and to provide details for joint reinforcement in all cases. In essence, the requirements say that the reinforcement must:
 - in the case of a lengthened chassis, or a chassis constructed of material less than 3 mm thick, extend beyond each side of the joint by at least twice the distance of the height of the chassis; or
 - in all other cases, including shortening a chassis, meet the same joint reinforcement requirements (for example, fish-plates) specified for a custom ladder chassis in 5.10.1.
- Paragraph 5.1.2: Requirements around GVM have been clarified; chassis upgrades to increase a vehicle's GVM must now be approved individually by LVVTA on a case-by-case basis. This is because increasing a vehicle's load-carrying capacity over its original GVM places extra stress on all vehicle components, not just the chassis. While a vehicle's chassis may be strengthened to withstand the extra load, other components (such as suspension and brakes) also need to be determined as being capable of withstanding the additional stress caused by this type of modification.
- The requirements for welding high-tensile steel have been expanded (throughout the chapter), with additional specifications which provide details relating to the complex welding processes for more modern higher-strength steels. The re-worded requirement now states:
 - *Welding of any steels in a low volume vehicle which have an ultimate tensile strength exceeding 440MPa must, in addition to meeting the welding requirements specified in 'Chapter 18 - Attachment Systems', incorporate a welding process that is compatible with high-tensile steel.*

When presented with a vehicle for LVV certification which has an ultra-high-strength chassis with welded modifications, the LVV Certifier now requires evidence that the correct welding process has been followed. This situation is becoming more and more common as modern vehicles (especially commercial vehicles) now use steel of at least 440MPa in the construction of their chassis, and incorrect welding procedures can result in structural failure due to the effects of the welding process on the parent metals in the heat-affected zones.

- Paragraph 5.3: Additional clarification has been added to the requirements relating to production chassis 'c-notch' modifications.
- Paragraph 5.4.1: Cross-member attachment requirements have been reviewed to allow a cross-member that is only supporting the weight of a component (and not taking any torsional chassis loads) to use mounts that do not span the full height of the chassis rails it attaches to.
- Paragraph 5.5.1: A requirement has been added to clarify the expectations of torsional stiffness in a chassis where a non-original body has been fitted, which says:
 - *A production chassis in a low volume vehicle that is fitted with a non-standard body must be properly assessed to ensure that the combination of the chassis and non-factory body exhibits not less than the same amount of torsional strength as the donor vehicle from which the body is sourced.*

The need for this new requirement originated in part from concerns about an early Ford pickup body fitted to a Holden one-tonne chassis, which exhibited excessive chassis flex. Extra reinforcing was needed to reinstate the torsional stiffness provided by the OE Holden cab, due to the differences in construction between the two donor vehicles. There have also been torsional stiffness requirements added within paragraphs 5.16, 5.17, and 5.20 (which refer to custom ladder, spaceframe, and composite chassis design requirements).

- Paragraph 5.6: Additional clarification has been added to requirements relating to production chassis frontal impact protection.
- Paragraph 5.12.2: Frontal impact collapsibility requirements have been clarified by a side-bar note explaining what a 'forward-most suspension attachment point' in a custom vehicle chassis means. This now states:
 - *A 'forward-most front suspension attachment point', for the purpose of this requirement, means a primary suspension component which is used to locate the hub assembly.*

The previous wording indicated that in the case of a vehicle fitted with a forward-mounted sway bar, essentially all the collapsibility would have to occur forward of the radiator. In practice, this made it difficult to achieve a reasonable degree of frontal collapsibility.

- Sub-sections 5.18 to 5.23: The requirements relating to composite chassis construction have been expanded to provide better clarity for the modification of vehicles containing a composite chassis, or where composite materials are used as part of the modification. Specifically, this information includes:
 - paragraph 5.18.1: A side-bar note has been added about composite chassis wording, which has been expanded to include highly-loaded sections of a composite monocoque or unitary-constructed vehicle; and
 - paragraph 5.23.1(b): A side-bar note has been added to clarify requirements regarding representative samples from the bonding process of composite materials, which are required for all connections of any composite materials.
- Paragraph 5.22.4: Drive-shaft safety-loop requirements have been removed, and are now relocated in NZCCM Chapter 9 (Engine and Drive-train).
- Information relating to cross-members and their attachment, and torsional testing of vehicle chassis has been added to the 'Useful Information' section.

► Finally

The new LVV Standard 40-00(00) (Chassis Modification & Construction), and the updated NZCCM Chapter 5 (Chassis Modification & Construction) are both available to download free of charge from <https://www.lvvta.org.nz/>.



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