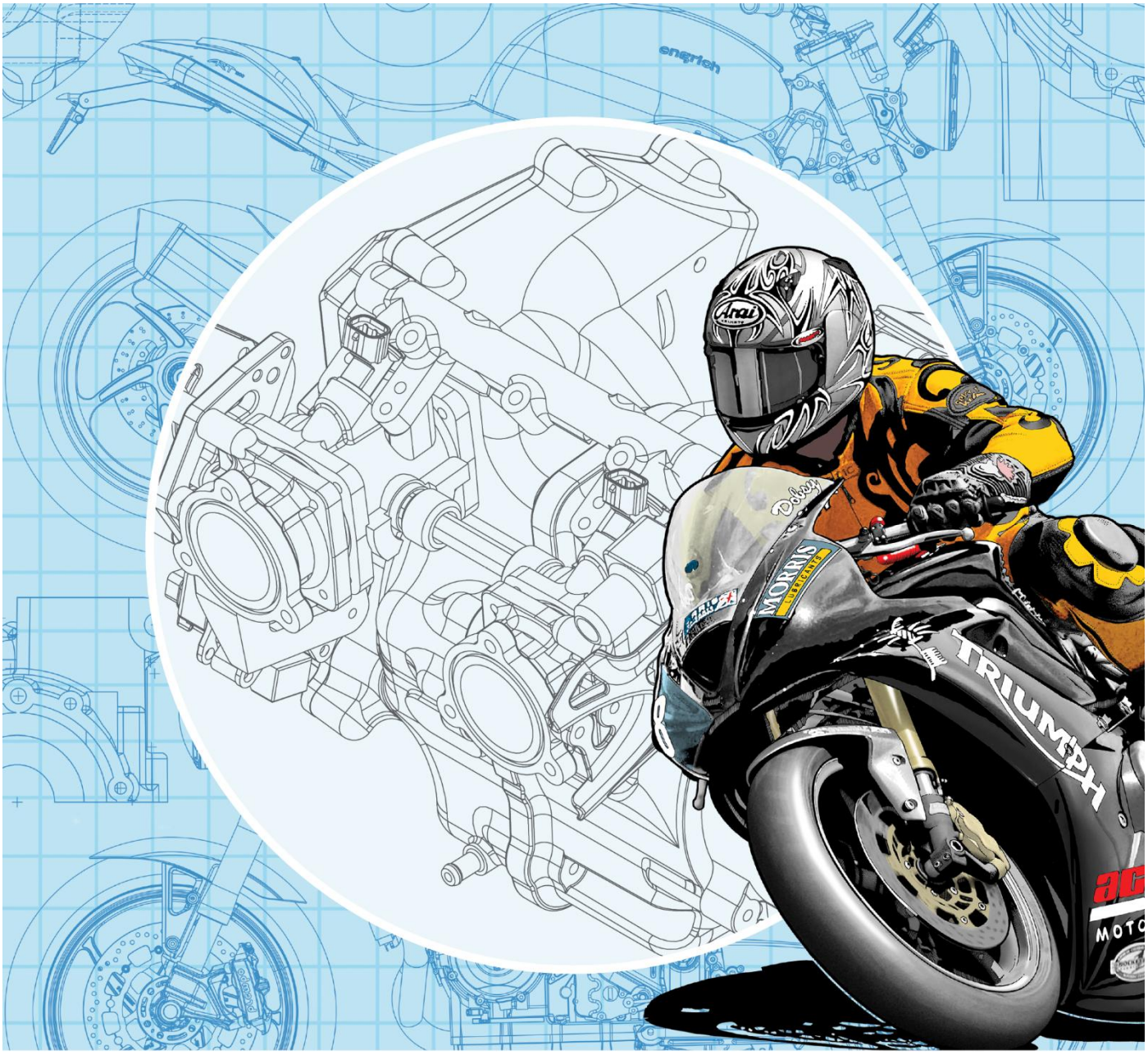
Low Volume Vehicle Technical Association (inc)

Helping New Zealanders Build & Modify Safe Vehicles

New Zealand Motorcycle Construction Manual

Chapter 10
Fuel Systems

Version 1 | Effective from 1 January 2026



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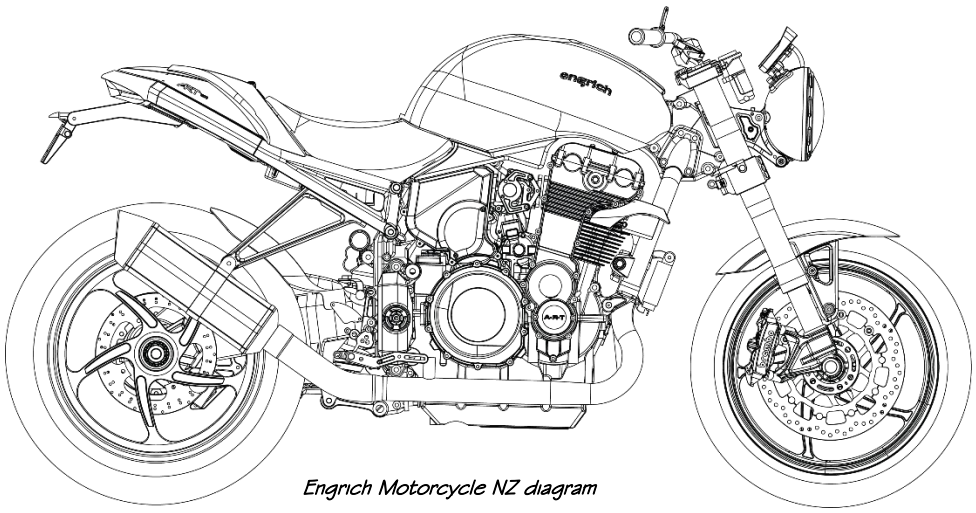

Engrich Motorcycle NZ diagram

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

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About Motorcycle Construction Manual Chapters

NZ Motorcycle Construction Manual Chapters (the chapters) provide the necessary detailed technical requirements, and helpful information, to enable a modified or scratch-built motorcycle 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 a modified or scratch-built motorcycle which requires LVV certification.

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 motor 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.

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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/nzmcm and is all free of charge.

Legal Status & Copyright

This chapter supports *LVV Standard 145-40: Fuel Systems - Motorcycles*, 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

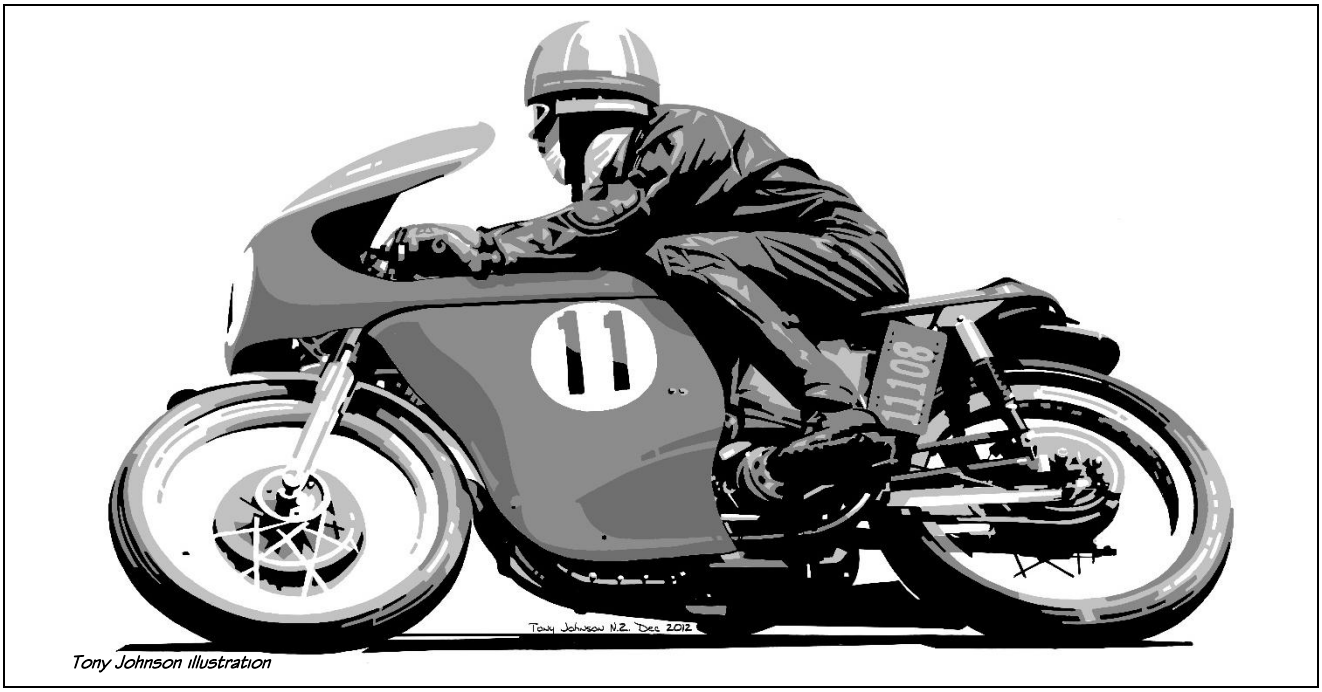
LVVTA acknowledges the following contributors for their assistance in the development of this chapter:

- Technical content: Kiwi Trikers' Social Club (Inc), LVVTA Technical Advisory Committee, LVVTA technical staff
- Cover & page 2 CAD diagram: Engrich Motorcycle New Zealand
- Motorcycle illustrations on the cover, and on pages 4 and 6: Tony Johnson

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

Normal type:	Provisions of the NZ Motorcycle Construction Manual for all motorcycles.
Italicised type:	Used when referencing external documents that are not part of this chapter.
Normal type in shaded box:	Special provisions of the NZ Motorcycle Construction Manual for motorcycles 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 highlit 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 10 Contents



Tony Johnson illustration

CHAPTER 10: FUEL SYSTEMS

Introduction

The purpose of this chapter is to specify sound design, and practical engineering principles, relating to the modification and construction of motorcycle fuel systems.

A motorcycle's fuel system is important in terms of safety, performance, and reliability. A good fuel system in a motorcycle is dependent on the correct selection or construction of the tank, tank location within and attachment to the motorcycle, correct venting, and careful attention to details like fuel hoses and fittings.

Note that where a production motorcycle is fitted with its original fuel tank or other fuel system components in their original locations, the requirements in this chapter do not apply. Note also that this chapter does not apply to components associated with compressible fuel types such as CNG, LPG, or hydrogen, all of which require a separate alternative fuels certification.

Italics are used throughout this chapter when referencing '*external documents*' that are not part of this chapter.

For conciseness, all references to 'motorcycle' in this chapter mean a motorcycle that, due to being modified or scratch-built, is legally classified as a low volume vehicle.

General Safety Requirements

10.0 Requirements Applicable to all Motorcycles

10.0.1

A motorcycle 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.

10.0.1

This is from *2.3* of *Part 2* of the *Low Volume Vehicle Code* (slightly amended for clarity), which makes it clear that, regardless of what technical requirements are or are not in place, every vehicle certified to the *LVV Code* must be fit for its purpose, and must be safe.

10.0.2

Fuel tanks, fuel lines and associated components in a motorcycle must be:

(a) securely mounted; and

(b) made of suitable materials; and

(c) in good condition; and

(d) free from significant leaks; and

(e) positioned so that the risk of mechanical damage or heat gain is minimised.

10.0.2

These are the applicable general safety requirements from the *Land Transport Rule 32017 Vehicle Equipment 2004* (slightly amended for clarity), which are required as part of this chapter, and are reproduced here in the interest of convenience.

10.0.2(d)

An LVV Certifier is likely to treat any fuel leak as 'significant'.

Fuel Tank Requirements

10.1 Fuel Tank Construction

10.1.1

A custom or aftermarket fuel tank may be fitted to a motorcycle as an alternative to a fuel tank from a mass-produced motorcycle, provided that the tank is constructed from fuel-resistant and corrosion-resistant materials, with a minimum thickness of:

(a) in the case of aluminium, 1.6 mm (16-gauge); or

(b) in the case of stainless steel, 1.0 mm (20-gauge); or

(c) in the case of 'electro-galv' mild steel, 1.2 mm (18-gauge).

Where a motorcycle built or modified before 1 January 2026 has a fuel tank that does not comply with 10.1.1, the tank may be retained provided that in the opinion of the LVV Certifier the tank has demonstrated through the test of time that it is still in good condition and is fit for its purpose.

10.1.1

A permanently corrosion-protected material is regarded as being corrosion-resistant.

If steel is used, it should be specifically 'electro-galv' steel, such as the 'zintec' brand.

If using 'electro-galv', the tank should be sealed internally with a proper fuel tank sealant after welding to prevent corrosion of weld joints.

10.1.2

The sections of a custom or aftermarket fuel tank fitted to a motorcycle made from materials specified in 10.1.1 must be either gas or electric-welded.

10.1.2

Soldering must not be used for joining fuel tank sections, or attaching mounting points, but may be used for the attachment of fuel tank fittings.

10.1.3

A custom or aftermarket fuel tank fitted to a motorcycle that is constructed from materials specified in 10.1.1 may be modified, provided that the strength of the tank is not reduced.

10.1.4

A fuel tank that is constructed from a material which is not listed in 10.1.1 may be fitted to a motorcycle, provided that the tank is either:

(a) sourced from a mass-produced motorcycle; or

(b) manufactured by a recognised manufacturer of motor sport, automotive, or marine fuel tanks or fuel cells; or

(c) manufactured by someone other than that specified in 10.1.4 (a) or (b) but is individually approved in writing by the Technical Advisory Committee of LVVTA.

10.1.5

A fuel tank fitted to a motorcycle that is constructed from a material which is not listed in 10.1.1, must not be modified in any way by any person or company other than a person or company specified in 10.1.4(c).

10.1.5

Plastic tanks in particular should never be modified or repaired due to the types of materials used in the construction of these tanks.

10.1.6

A fuel tank fitted to a motorcycle must incorporate a mechanical fuel shut-off valve if the fuel system is:

(a) mechanical; and

(b) gravity-fed.

10.2 Fuel Tank Location & Protection

10.2.1

A fuel tank fitted to a motorcycle must be suitably protected from road debris or other potential damage occurring during normal operation.

10.2.1

This requirement is aimed at motorcycles that have a low-mounted or auxiliary fuel tank, rather than one mounted in the usual position forward of the seat, which has inherent protection from damage due to its position.

10.2.2

An aftermarket or custom fuel tank fitted to a motorcycle, if not fitted in the normal location, must be positioned within the wheelbase so as to provide optimum fore-aft and side-to-side balance.

10.2.3

No part of a fuel tank fitted to a motorcycle may be located forward of the steering head.

10.2.3

Consideration should be given to the effects that the increased weight of a larger fuel tank will have on the balance and handling characteristics of a motorcycle.

10.2.4

A fuel tank fitted to a motorcycle must be protected from any exhaust heat by either:

(a) the inter-positioning of a suitably fabricated and mounted heat-shield between the fuel tank and the exhaust system; or

(b) either:

(i) in the case of a fuel tank which is specified in 10.1.1, be positioned so that there is a minimum clearance between the fuel tank and the exhaust system of 25 mm; or

(ii) in the case of a fuel tank that is constructed from a material which is not listed in 10.1.1, be positioned so that there is a minimum clearance between the fuel tank and the exhaust system of 50 mm.

10.3 Fuel Tank Attachment

10.3.1

A fuel tank must be attached to a motorcycle using an attachment method that:

(a) is suitable for the type and size of the tank; and

(b) uses components and materials that are equivalent to or greater than that used by a mass-produced motorcycle using a similar tank location and capacity.

10.3.2

A replacement fuel tank that is of a substantially greater capacity than that originally fitted to a mass-produced motorcycle must either:

(a) have an attachment system that has a greater load-carrying ability than that provided by the original motorcycle manufacturer; or

(b) incorporate additional support to supplement the attachment system provided by the original motorcycle manufacturer.

10.3.2

If a much larger than standard fuel tank has been fitted to a mass-produced motorcycle, additional supports or mounts may be required.

10.3.3

A fuel tank fitted to a motorcycle that may be affected by engine vibration must incorporate a flexible bush or vibration isolator within the fuel tank mounting system.

10.4 Fuel Tank Filling

10.4.1

A fuel tank fitted to a motorcycle must incorporate a correctly fitting filler cap which:

(a) prevents fuel from leaking out of the fuel tank as a result of fuel surge during cornering, braking, or acceleration; and

(b) incorporates a venting system in the filler cap.

10.4.2

The fuel tank venting system of a motorcycle that is fitted with a carbon-vent canister must purge to the engine intake system in the same way as they are originally designed to do.

Fuel Pipe and Hose Requirements

10.5 Fuel Pipes and Hoses

10.5.1

Fuel pipes and hoses, and their fittings, fitted to a motorcycle, must be:

(a) designed for automotive fuel-carrying applications; and

(b) suitably matched to the operating pressure of the fuel system being used.

10.5.2

A push-on join between a flexible fuel hose and a rigid fuel pipe or fitting on a motorcycle must be secured with a suitable hose-clamp or clip to prevent unintended disconnection due to fuel delivery pressure or vehicle vibration.

10.5.3

A motorcycle must incorporate a flexible fuel connection between any components which have movement as a result of a flexible mounting system.

10.6 Flexible Fuel Hoses

10.6.1

Flexible fuel hoses used within a fuel system in a motorcycle must be manufactured from a reinforced synthetic fuel-resistant rubber, or other fuel-resistant non-hardening flexible material, designed for automotive fuel-carrying applications.

10.7 Rigid Fuel Pipes

10.7.1

Rigid fuel pipes fitted to a motorcycle must be manufactured from either tubular steel, aluminium, copper, or stainless-steel.

10.8 Fuel Pipe and Hose Location and Attachment

10.8.1

Rigid fuel pipes and flexible fuel hoses fitted to a motorcycle must not be positioned:

(a) where damage from road debris or jacking could occur; or

(b) adjacent to exposed electrical connections, fittings, or wires, unless suitably protected from potential fuel leakages; or

10.5.1

Fuel-injection systems run very high fuel pressures, and special care must be taken to ensure that the best quality hoses and fittings are used.

10.5.2

'Swaged' pipe ends are highly recommended in all pipe-to-hose connections.

'Push-lock' hose is a common type of hose that is suitable for use as fuel hose. Push-lock fittings have multiple barbs which are designed to grip the hose sufficiently as to not need a clamp. Note that push-lock hose can be damaged if a clamp is used with a push-lock fitting.

10.5.3

This means that, for example, there must be a flexible fuel system connection to allow for movement between a rubber-mounted fuel tank and the engine. While coiled solid fuel pipe can meet this requirement, flexible fuel hose is preferred.

10.6.1

This can include premium quality stainless-steel braided fuel hose.

10.7.1

Fuel pipe can be manufactured from seamed or seamless material.

(c) adjacent to any moving mechanical components including chains, sprockets, fans, or supercharger drive systems, unless suitably protected.

10.8.2

Rigid fuel pipes and flexible fuel hoses fitted to a motorcycle must either:

(a) be protected from any exhaust heat by the inter-positioning of a suitably fabricated and mounted heat-shield; or

(b) be provided with no less clearance from the exhaust system than that designed by a typical motorcycle manufacturer; or

(c) be positioned so that there is a minimum clearance between the component and the exhaust system of:

(i) in the case of any part of the exhaust system other than a catalytic converter, 50 mm; or

(ii) in the case of a catalytic converter, 100 mm.

10.8.3

Rigid fuel pipes and flexible fuel hoses fitted to a motorcycle must be secured firmly against the frame or structure, at intervals of no more than:

(a) in the case of a modified production motorcycle with standard pipes and hoses, as the original manufacturer provided; or

(b) in the case of a scratch-built motorcycle or a non-original fuel system on a modified production motorcycle, 300 mm.

10.8.4

A flexible fuel hose must, where passing through an opening in a frame section in a motorcycle, be secured or protected to prevent chafing or rubbing against any hard or sharp edges.

10.5 - 10.8

See the Useful Information section at the back of this chapter for more information on fuel hoses.

10.8.3

Fuel pipes and hoses can be run inside frame sections, but if so, must still be secured, as pipes and hoses can rub and chafe if left loose. An approved alternative is for fuel pipes and hoses to pass through a well-secured tubular section, known as a 'service tube', provided that the fuel pipes and hoses are suitably supported, and cannot whip or flex.

Other Requirements

10.9 Fuel Supply and Delivery

10.9.1

A motorcycle fitted with a gravity-fed fuel system must incorporate an effective fuel shut-off valve at the tank.

10.9.2

A mechanical or electrical fuel pump fitted to a motorcycle must be protected from exhaust heat by either:

(a) being positioned at a safe distance away from the exhaust system; or

(b) being protected by the inter-positioning of a suitably fabricated and mounted heat-shield.

10.9.3

A fuel pump that supplies a fuel injection system in a motorcycle, must be prevented from being able to be operated when:

(a) there is no fuel in the fuel tank; or

(b) the engine is not running.

10.9.3

Wiring of internally mounted fuel pumps, auxiliary fuel pumps, or transfer pumps, is a specialised field, and should only be undertaken by auto electrical experts.

10.9.3(a)

Dry electric fuel pumps are a major ignition source.

10.9.3(b)

Note that this is not intended to prevent the fuel pump from being able to prime the fuel system briefly when the ignition is first switched on.

10.10 Alternative Fuels

10.10.1

An alternative fuel system, including CNG and LPG, must be located and attached within a motorcycle in accordance with the requirements specified for alternative fuels within *Land Transport Rule 32017 Vehicle Equipment 2004*.

10.10.2

A motorcycle fitted with a nitrous oxide system must meet the requirements for nitrous oxide systems specified in *MCM Chapter 9: Engine & Drive-train.*

10.10.1

The presence of a valid alternative fuel certificate meets this requirement.

10.11 Fasteners

10.11.1

All fasteners incorporated within the installation or modification of a motorcycle fuel system must meet all fastening requirements specified from *18.2* to *18.6* in *MCM Chapter 18: Attachment Systems.*

10.12 Welding

10.12.1

All welding incorporated within the installation or modification of a motorcycle fuel system must meet all welding requirements specified in *18.7* and *18.8* in *MCM Chapter 18: Attachment Systems.*

Exclusions

No exclusions apply to this chapter.

Useful Information

Fuel Hoses

Not all fuel hoses are created equal, and while not a particularly exciting topic, choosing the wrong kind of hose for the job can have potentially catastrophic consequences – a burst fuel hose and the resulting sudden fuel fire is one of the worst things that can happen to a motorcycle. There is a myriad of fuel hoses available, and not all are up to the task. Poor quality aftermarket hose is available very cheaply from overseas retailers, and it's not always what the label states it to be – and even if it is, often the material is of a lesser quality. This is particularly relevant to stainless-braided AN hose, much of which doesn't have the same resistance to damage as could be expected from a reputable name-brand braided hose. There are many anecdotal tales of a cheap, unbranded stainless braided hose splitting internally and leaking after being twisted during assembly or disassembly.

The type of hose can be distinguished by the details printed on it, which should include the manufacturer of the hose and the SAE standard that the hose meets. There are three main types of fuel hose available - nitrile hose, nylon tube, and braided hose. Nitrile hose is the typical 'rubber fuel hose' used for time immemorial, and consists of a nitrile rubber inner layer, a spiral wound textile intermediate layer, and an outer sheath made of neoprene.

- Advantages to nitrile hose are its flexibility, availability, and ease of clamping it at each end to create a sealed connection. However, it doesn't have the same resistance to damage as braided hose, or resistance to evaporative emissions as nylon tubing.

- Nylon tubing has become the choice of OEMs – in addition to its ability to be shaped to be routed around components (yet remain somewhat flexible for disassembly), it usually incorporates quick-connect fittings swaged on at each end, which makes assembly of the bike in the factory faster and easier. The tough nylon tube is resistant to damage; however, it is not as flexible as nitrile fuel hose, and the quick-connect fittings are easily damaged by rough treatment during assembly or disassembly.

- Braided hose consists of a braided outer sheath around a PTFE or nitrile inner hose, and is normally used with AN fittings or swaged ends. It is more resistant to physical damage or abrasion, and is generally used where very high pressures are required (but flexibility is also needed). It is more expensive to produce though, and requires specialised connections. The outer braided sheath also makes it hard to inspect the inner for damage or degradation, meaning that it is harder to spot a damaged hose before it fails.

Other things to consider when choosing the type of fuel hose for a particular application are the type of fuel being used and the pressure it is under. For example, SAE 30R6 or 30R7 hose is normally rated to 50 psi, so is not suitable for modern fuel injection systems. Fuel injection-rated hose will state its maximum rated pressure on the hose, and that it is intended to be used with fuel injection systems. Because it is generally made of tougher materials, it can be a worthwhile upgrade for a non-fuel injection system.

The environment the hose is in also needs to be taken into account – standard nitrile fuel hose is not suitable for being submerged in fuel, while submersible hose is very susceptible to heat damage, so cannot be used outside of a fuel tank. Note also that while most hoses are manufactured from a material that is resistant to hydrocarbons, specialised hose is often required where ethanol-based fuels are used, as these can react with certain kinds of nitrile material.

Terms & Definitions for Chapter 10

Aftermarket	means a component or system made by a manufacturer, other than a high-volume motor vehicle manufacturer, who produces catalogued components or systems on a production-run basis for the mass-market.

AN hose	means a flexible hose that uses AN fittings to connect the hose to metal tubing, to carry fluids including hydraulic fluid, coolant, fuel, and oil.
AN (fittings)	is an acronym for 'Army-Navy', so named because the type of fittings were originally developed during World War II.
Carbon-vent canister	means an activated carbon canister which is used to capture hydrocarbon vapor emissions from a fuel tank as part of an evaporative emission control system.
CCM	(*NZ Car Construction Manual*) means LVVTA's detailed technical standards, incorporated by reference under the *LVV Code*, which must be met to enable an LVV to comply with applicable requirements. The *CCM* is referred to by the corresponding *LVV Standard*.
Custom	means a component or system fabricated by an individual person or small company on a one-off or limited-run basis, and is not intended as a high volume catalogued aftermarket part.
Electro-galv	is an abbreviation for electro-galvanizing, which is a process in which a layer of zinc is bonded to steel in order to protect against corrosion. The process involves running a current of electricity through a saline/zinc solution with a zinc anode and steel conductor.
Fuel surge	is the effect of fuel being pushed away from the pick-up point of a fuel system, usually during hard cornering or acceleration, resulting in air pockets in the fuel lines.
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.
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.
Low volume motorcycle	means, in simplest terms, a motorcycle that is built or modified in small numbers, and includes individual home-built or modified motorcycles. See the full low volume vehicle definition contained in the *Low Volume Vehicle Code*.
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 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.
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 Certification	(Low Volume Vehicle Certification) means the process specified by the *LVV Code*, by which the design of an LVV is determined to comply with any applicable requirements, and, in recognition of which, an LVV EDP is affixed.
LVV Certify	(Low Volume Vehicle Certify) means the same as LVV certification.

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*.
LVVTA TAC	(LVVTA Technical Advisory Committee) is an LVVTA-appointed panel of industry expert-level technical specialists, established to provide LVVTA with a very high level of technical support and direction on all technical matters relevant to the LVV certification system.
Mass-produced (motorcycle)	(also known as production vehicle, or high-volume vehicle) means a vehicle which is manufactured in quantities of more than 500 at any one location in any one year for the mass market.
MCM	(*NZ Motorcycle Construction Manual*) means LVVTA's detailed technical standards, incorporated by reference under the *LVV Code*, which must be met to enable an LVV to comply with applicable requirements. The *MCM* is referred to by the corresponding *LVV Standard*.
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*.
Neoprene	is a form of synthetic rubber, used in a variety of applications where flexibility is required, from wetsuits to hoses.
Nitrile	means, in the context of this chapter, a synthetic rubber which is fuel and oil-resistant, semi-rigid, and used for manufacturing hoses and O-rings.
NOS	(Nitrous Oxide) is a liquid chemical composition of one part of nitrogen and two parts of oxygen, which when introduced with the fuel mixture entering an internal combustion engine, converts to a gas and may increase the oxygen content in the combustion chamber producing a momentary increase in power output.
NZTA	(New Zealand Transport Agency) is a Crown entity responsible for managing New Zealand's land transport system.
OE	is an abbreviation for 'original equipment', which, in this context, are the parts and equipment used in the assembly process of a mass-produced vehicle.
OEM	is an abbreviation for 'original equipment manufacturer', which, in this context, is a company that produces parts and equipment used in the assembly process of mass-produced vehicles.
PTFE	is an abbreviation for Polytetrafluoroethylene, a synthetic material used for lining hoses, fittings, and many objects where a non-stick and non-reactive surface is required.

Push-lock	means a type of hose and fitting system that enables the hose to be easily pushed on, however because of the design of the male fitting, the hose grips against the male fitting such that its removal is very difficult.
SAE	is an acronym for the Society of Automotive Engineers.
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.
Soldering	is the process of joining two materials by using heat, and melting in a third filler material so as to join the two materials together.
Swaged	means a type of permanently deformable hose end fitting, which involves compressing a collar over the hose and fitting with a hydraulic press and die (a process known as 'swaging').
Wheelbase	means the distance between the centre points of the front and rear axles.
Zintec	is the trade name given to cold-rolled and coiled mild steel sheet that has been electrolytically coated with a thin layer of zinc as part of the manufacturing process.