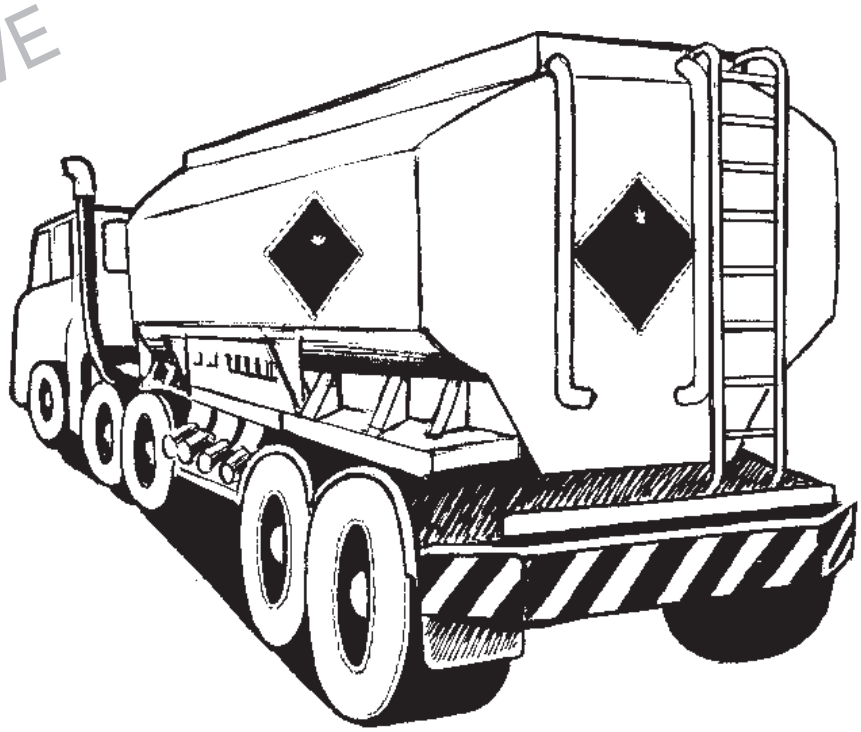

Flammable Liquids Tankwagon Code

BULK TRANSPORT OF CLASS 3A DANGEROUS GOODS BY ROAD

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Flammable Liquids Tankwagon Code

BULK TRANSPORT OF CLASS 3A DANGEROUS GOODS BY ROAD

A code of practice for the design and construction of road vehicles for the bulk transportation of Class 3A dangerous goods

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SECTION 1 — SCOPE AND GENERAL

1.1 Scope

1.1.1 This code of practice applies to any vehicle used for the transportation of Class 3(a) flammable liquids in bulk by road.

1.1.2 Tanks, tank fittings, and attachments for use under this code shall be designed and constructed according to the requirements of the Dangerous Goods (Class 3(a) - Flammable Liquids) Regulations 1985 and any subsequent amendments.

This code includes requirements for the design, construction and operation of vehicles carrying such tanks.

1.1.3 This code shall apply to any tank wagon which enters service after the date of introduction of this code.

1.2 Definitions

The following definitions of terms apply throughout this Code. Where any term used is not defined below, the meaning of that term shall be that defined by the Dangerous Goods Act and Regulations.

1.2.1 Approved Type

Means that the item referred to is of a type approved by the Chief Inspector of Dangerous Goods for the use to which it is to be put.

1.2.2 Class 3(a) Flammable Liquids

Liquids, mixtures of liquids, and liquids containing solids in solution and suspension, which in each case has a flash point lower than 23^0C, and nitrocellulose with, by mass, a nitrogen content not exceeding 12.6% wetted with, by mass, not less than 45 % flammable liquids with a flashpoint less than 23^0C. A few examples of some such liquids are petrol, acetone, methanol, and ethanol. The last two have lower ignition energy and higher flash point and, under some circumstances, compartment sizes may be increased.

1.2.3 Tank

A vessel exceeding 250 litres water capacity used for transport or storage of Class 3(a) flammable liquids in bulk. Tanks may be of the following types:

(a) Fixed Tank — A tank which is permanently mounted on a vehicle chassis. Includes permanent pipework, valving, etc.

(b) Demountable Tank (Multi-modal tank) — A tank designed to convey Class 3(a) flammable liquids by road or rail. Generally approved for bulk transport only. (Nominally full or empty)

(c) Skid Tank — A tank designed for temporary storage of Class 3(a) flammable liquids, and suitable for transportation from one location to another.

1.2.4 Tank Wagon

Any vehicle used for the carriage of Class 3(a) flammable liquids in bulk in a fixed tank or tanks. Tank wagons may be of one of the following types.

(a) Tank Truck (rigid) — A single vehicle having its own means of propulsion.

(b) Tank Semi-trailer — A vehicle, including a prime mover, constructed so that, when drawn through a fifth wheel or turntable connection, part of the load rests on the towing vehicle (includes B trains).

(c) Tank Trailer — A vehicle which does not have its own means of propulsion, but does not include an tank semi-trailer.

1.2.5 Ullage

The ullage of a container is the air space left when the container is nominally full so that any expansion of the liquid will not cause overflow or excessive hydraulic pres sure.

The ullage space is to be measured at 15 degrees Celsius.

1.3 Maximum capacities

For maximum capacities refer to Section 3.1.1. All capacities quoted are water capacity (tank full) at standard temperature and pressure.

SECTION 2 — VEHICLE DESIGN AND EQUIPMENT REQUIREMENTS

2.1 General

2.1.1 The vehicle shall be strongly constructed, as far as practicable, of fire resisting materials. The design of the vehicle shall provide an integration of the tank supporting members and the vehicle chassis. The means of securing the tank to the chassis, and in the case of tank trailers or tank semi-trailers, the means of attaching the prime mover to the trailer or semi-trailer shall be designed to withstand the design loads of this code.

2.1.2 The total mass of the fully laden vehicle shall not exceed the vehicle manufacturer's stated gross vehicle mass. The maximum load carried on each tyre shall not exceed the load rating of the tyre as recommended by the tyre manufacturer at the specified inflation pressure and for the operational speed of the vehicle. Where a manufacturer's rating is not available the load ratings recommended by the Tyre and Rim Association, Australia shall apply. The inflation pressure used to carry the load imposed on by the tyre manufacturer, or by the Tyre and Rim Association, Australia (as appropriate), and in no case shall the inflation pressure exceed that permitted by Heavy Motor Vehicle Regulation 1974 and any subsequent amendments.

2.1.3 The maximum load imposed on any axle shall not exceed that allowed, for the axle type and road classification, by the Heavy Motor Vehicle Regulations 1974 (see Appendix B).

2.1.4 The dimensions and loadings of any tank wagon shall not exceed those allowed by the Traffic Regulations 1976 and any subsequent amendments for normal operations. (See Appendix A).

2.2 Road Clearance

2.2.1 Tank components and protection devices located between any two adjacent axles of a vehicle or vehicle combination shall have not less than 40 mm ground clearance for each metre between such axle centres, and the ground clearance shall be not less than 350 mm when unladen.

2.2.2 Tank filling and discharge connections which are rigidly attached to the tank shall not extend lower than 40 mm below the plane through the centre line of the axles.

2.3 Rear Bumper Requirements

2.3.1 Every tank wagon shall be provided with a rear bumper to protect the tank, piping and fittings in the event of a rear end collision and to minimise the possibility of any part of the colliding vehicle striking the tank or its fittings.

2.3.2 The bumper shall be located at least 150 mm behind a vertical projection of the rearmost part of the tank, and there shall be at least 150 mm between the inner surface of the bumper and any vehicle component which is used for loading and unloading purposes, or which may contain fluid whilst in transit. The width of the bumper shall be not less than the maximum width of the tank.

- can use collision bumper as 1.5 m wide section with additional full width bumper to carry lights, etc. and satisfy underrun requirements;
- mount for trailer towing connection may intrude the 150mm clearance if there is adequate vertical clearance to any fitting.

2.3.3 The bumper shall not be attached directly to the tank. The bumper shall be attached to the subframe of the tanker or chassis of the vehicle.

2.3.4 The bumper and its fixings shall be designed to withstand a load equal to twice the mass of the fully laden tank wagon uniformly distributed across the central 1.5 m long section of the bumper from the longitudinal axis of the vehicle. In these load circumstances the maximum stress in any member of the bumper shall not exceed the yield stress of the material involved:

Tankwagons built specifically to refuel aircraft are exempt Clause 2.3.4.

Full trailer bumpers shall be designed to a minimum design load equal to twice the weight of the trailer.

Maximum bumper design load in all cases is 40 tonne.

2.3.5 If the rear tyres are more than 600 mm from the impact surface, and the clearance under the bumper is greater than 600 mm then under-run protection shall be provided (a minimum width of 1.5 m is preferred).

2.3.6 An energy absorbing bumper may be used providing it is of an approved type for the vehicle involved and provided that its deformation under full deflection would not result in any damage to the tank or its fittings.

2.4 Electrical Wiring

Electrical wiring shall comply with the following requirements and shall be of good design suitable for the electrical loads.

2.4.1 The nominal voltage shall not exceed 24 volts.

2.4.2 The battery shall be secured in front of the fire resistant shield, but if this is not practicable it may be carried in a steel box or secured in a steel frame as close to the cab as is practicable. The battery terminals shall, by means of an effective acid resisting insulation cover held securely in place, be prevented from accidental shorting.

2.4.3 Except in the case of switches approved by the Chief Inspector of Dangerous Goods both as regards design and location (e.g. see 2.4.4) the generator, switches and fuses shall be carried in front of the fire resistant shield.

2.4.4 A means of cutting off the current by means of a double pole switch or other approved method shall be provided in a readily accessible position as close to the battery as is practicable, and shall be clearly labelled as to its position. The switch should be adjacent to the battery and preferably no further than 600 from it.

Electrical supply may be maintained to certain vehicle accessories (e.g. operation recorder, computer, radios, clocks) which cannot be shut off provided the instrumentation is within the cab and each device is protected by a circuit breaker or fuse.

2.4.5 Electrical wiring shall be heavily insulated from the chassis and the wiring shall be supported and protected from mechanical injury, chafing and exposure to contact with oil, grease, or petroleum products, and shall be so located as to avoid damage to insulation from heat.

It is recommended that wiring outside and to the rear of the cab or on a trailer is carried in conduit.

2.4.6 Any electrical equipment that may be required to be active during product transfer and that is located within a hazardous zone shall be suitable for that zone. The following hazardous zones are deemed to exist during product transfer and for 5 minutes afterwards:

(a) within l m of external valve or transfer connection and area inside top coaming and to 100 mm above coaming shall be zone 1 (area where explosive gas likely to occur during normal operation).

(b) whole area aft of the rear wall of the cab shall be zone 2 (area where explosive gas not likely to occur during normal operation).

2. 5 Fire Extinguishing Equipment

Each tank wagon shall be provided with fire extinguishers in accordance with the following requirements.

2.5.1 Tankwagons shall carry at least two hand fire extinguishers, one of any type plus one of type (iii) 8 kg or (iv) 7 kg, and tank trailers are required to carry at least one of type (iii) 8 kg or (iv) 7 kg from the list as follows:

(i) Vapourising type extinguishers employing as the extinguishing agent a substance such as bromotrifluoromethane, bromodichlorofluoromethane (BCF) or other similar agent contained under pressure of a capacity of at least 1.8 kg.

(ii) Foam producing extinguishers which can be applied to blanket the surface of blanket the surface of burning liquids or substances of a capacity of not less than 8 kg.

(iii) Dry powder extinguishers which expel a powder such as specially treated sodium bicarbonate by means of a stream of nitrogen, carbon dioxide or other approved inert gas of a capacity of at least 2 kg of powder.

(iv) Fractionising dry powder extinguishers which expel a powder such as specially treated decrepatating potassium salt by means of a stream of nitrogen, carbon dioxide or other approved inert gas of a capacity of at least 2 kg of powder.

Where a trailer is attached to a towing vehicle that is not a tankwagon, a second extinguisher shall be carried on the towing vehicle.

Provided that where a fixed fire extinguishing system is installed in a petrol powered tankwagon (controlled by the driver) and with a nozzle(s) discharging immediately above the carburettor(s), only one Type (ii) unit need be installed.

2.5.2 Where different types of extinguishing agents are provided, and hence may be used together in an emergency, they shall be of types which are compatible.

2.5.3 The fire extinguishing medium shall be compatible with the intended cargo.

2.5.4 Gas container types of dry chemical extinguisher shall not be used.

2.5.5 Fire extinguishers shall comply with NZS 4506, 4507, and 4551 as applicable.

2.5.6 The fire extinguishers shall be installed so that:

(i) they are mounted securely by means of a quick release type of attachment;

(ii) they are located so as to be readily accessible for use, but remote from hose connection points; and

(iii) where two fire extinguishers are required for any tankwagon, they are to be placed on opposite ends of the vehicle.

2.6 Vehicle Inspection

Regular inspections of tankwagons shall be carried out by a tradesman automotive engineer (motor mechanic) at intervals not exceeding 3 months, in accordance with part 3(ii) of Appendix D. Records of inspection and any necessary rectifications shall be kept by the vehicle operator and owner for inspection. Alternative approved inspection procedures and frequencies may be used.

2.7 Tank Truck or Prime Mover Equipment

2.7.1 The vehicle shall be powered by an internal combustion engine.

2.7.2 Fire Resisting Shields.

2.7.2.1 Spark Ignition Engines.

The engine shall be screened from the load tank by a fire resisting shield (which may be the rear wall of the cab) carried down at least to the level of the bottom of the load tank or chassis (whichever is lower) and up to at least the level of the top of the tank or, if the roof of the cab is of approved fire-resisting construction and without opening, to the level of the top of the cab.

2.7.2.2 Compression Ignition Engines.

Where the engine is not fully covered by the cab, and the cab rear wall is the fire-resisting shield, the engine shall be protected from vertical spillage from the load tank by a fire-resisting shield situated not less than 50 mm from the engine and this must be in place at all times during operation.

Note: fibreglass is considered fire-resistant.

2.7.3 Cab Rear Windows.

Windows fitted in the rear wall of the cab shall be securely clipped or fitted with fire resistant framing, fitted with wired glass or other approved type of heat resisting material, and shall not be capable of being opened. Curved corner windows in vehicle cabs further than 2 m from the load tank are not considered as being in the rear wall of the cab. Roof vents, if capable of being opened, to be fitted with 500 micron nominal aperature gauze.

2.7.4 Fuel Tanks.

2.7.4.1 The fuel tank of the vehicle shall be so located as to minimise mechanical damage and the spread of fire and all piping shall enter through the top of the tank or other approved location.

2.7.4.2 If mounted in a vulnerable position, the fuel tank shall be protected from mechanical damage by stout metal guards and shall have its filling hole fitted with a secure closure. If alloy tank shell thickness is less than 5mm thick or steel tank shell thickness less than 3mm thick, then an approved guard to

be fitted unles tank otherwise approved as having equivalent protection (see Appendix G). Guard to take form of metal plate of above minimum thicknesses covering vulnerable vertical surface projection of tank and securely attached to vehicle, not tank.

2.7.4.3 For spark ignition engines, a clearly indicated and readily accessible means of cutting off the fuel supply to the engine shall be fitted where the fuel is supplied to the engine by gravity.

2 7.5 Exhaust and Intake

2.7.5.1 For spark ignition engines, exhaust shall discharge horizontally in front of the front wheels.

2.7.5.2 For compression ignition engines the exhaust may dishcarge horizontally in front of the front wheels or vertically behind the cab roof. If the exhaust is located behind the cab roof then:

(a) If it is closer than 800 mm horizontally to the load tank, it shall be shielded to prevent spillage onto the exhaust system. The shield shall be at least nominally 50 mm away from any hot part of the exhaust system and at least nominally 100 mm away from the load tank. Any openings or perforations for ventilation shall be located on the side remote from the tank;

(b) If it is closer than 2 m to any opening to the load tank, it shall terminate at least 75 mm above the valance.

2.7.5.3 The exhaust system shall be free from leaks and shall be located so as to minimise the accumulation of oil or grease, and shall be so designed as to inhibit the ejection of sparks.

Note: Turbocharges under normal conditions are considered to inhibit sparks.

2.7.5.4 Air intakes behind the cab of compression ignition engines shall terminate above the level of the cab. Air intakes in front of the cab are free as regards position but the opening shall not be lower to the ground than 1.5 m.

2.7.6 Deleted

2.7.7 Brake Equipment

2.7.7.1 Each vehicle shall be fitted with braking equipment meeting the requirements of the Traffic Regulations 1976, and of the Goods Service Vehicle Construction Regulations 1936, including current amendments.

2.7.7.2 Tank trucks and prime movers should preferably be fitted with a braking system of the fast acting type, (such as braking systems which comply with Australian Design Rules, United States Federal Motor Vehicle Safety Standards or EEC Directives).

2.7.8 Illumination

2.7.8.1 At least one certified flame-proof battery-operated torch shall be carried in the cab. This may be driver issue.

2.8 Tank Trailer and Tank Semi-trailer Requirements

2.8.1 A tank trailer of more than 2000 litres capacity shall have not fewer than 2 axles,

which shall not be in line transversely. Any trailer having fewer than 2 axles shall be equipped with means of stabilising it when detached from the towing vehicle.

2.8.2 Drawbars and drawbar connections for tank trailers shall be designed and constructed in accordance with NZS 5446: 1987 *Code of Practice for Heavy Motor Vehicle Towing Connections: Drawbar Trailers.*

2.8.3 Tank trailers and tank semi-trailers are to be designed by and constructed under the supervision of a suitable qualified person, e.g. Registered Engineer, or Registered Engineering Associate, who has demonstrated expertise within the Dangerous Goods transport industry.

2.8.4 Plans for any tank trailer or tank semi-trailer shall be deposited with the Chief Inspector of Dangerous Goods as per Appendix D part 1.

2.8.5 The suspension system for tank trailers and tank semi-trailers shall be chosen such that the roll stiffness of the suspension is maximised consistent with providing adequate dynamic performance of the suspension. The correct selection of a suspension system depends on the following:

(i) Spring rate (a high spring rate improves roll stiffness).

(ii) Transverse distance between springs, which should be maximised.

(iii) Anti-roll devices incorporated in the suspension which improve roll stiffness.

2.8.9 Tank Semi-trailer Fifth Wheels

2.8.9.1 Fifth wheel couplings for tank semi-trailers shall be of a type which transmit a portion of the roll motion of the semi-trailer to the prime mover (under normal road operations). In particular, unrestricted double oscillating fifth wheels shall not be used. Also refer NZS DZ 5451.

2.8.9.2 The fifth wheel shall have a drawbar pull rating of at least 1.25 times the weight of the fully laden semi-trailer, and a vertical load rating of at least 1.25 times the vertical load imposed on the coupling.

2.8.10 Brake Equipment Requirements

2.8.10.1 Brake equipment on tank trailers or tank semi-trailers shall comply with the requirements of section 2.7.7.1 of this code.

2.8.10.2 It is preferred that tank trailer and tank semi-trailer brake systems be arranged to ensure full brake balance between the prime mover and the trailer under all conditions of load. This balance should be achieved by the intrinsic properties of the prime mover and trailer or semi-trailer brake systems. The driver should not be provided with any means of altering the intrinsic brake system balance.

2.8.10.3 Tank trailer or semi-trailer brake systems shall be provided with a remote air-operated emergency release system, having an independent air system.

2.9 Tank Wagon Tank Mounting Requirements

2.9.1 A clearance of not less than 100 mm shall be provided between the back of the cabin and the tank and only approved fittings may be carried in this space. For articulated vehicles, the clearance shall be achieved at all angular positions.

2.9.2 The electrical resistance between the tank and the tractor chassis, prime mover chassis, or trailer under carriage and between the tank and connection of tanker pipe work to the delivery hose shall not exceed 10 ohms. The resistance between all other

conductive parts of the vehicle and the tank shall not exceed 1 Megaohm.

2.9.3 At least one means of bonding the load tank or vehicle to any container, to or from which transfer of liquid is made, shall be provided. It shall be located as far from flammable vapour emergence points as practicable, and in a convenient location for the operator. Additional connection points are permissible.

2.9.4 The mountings on the tank wagon chassis shall be designed and constructed to withstand the following loads, acting independently at the mounts, where the stresses due to these loads shall not exceed the yield stress of the material involved divided by 1.7.

(i) Longitudinally, in each direction loads of twice the all-up weight of the fully loaded tank and its fittings.

(ii) Vertically downwards, loads of twice the all-up weight of the fully loaded tank and its fittings.

(iii) Vertically upwards and transversely, loads equal to the all up weight of the fully loaded tank and its fittings.

The lading weight shall be taken as the density of the cargo or 1000 kg/m^3, which ever is the greater.

2.9.5 Due consideration for fatigue of the tank wagon chassis mountings shall be included in the design of the tank wagon (i.e. by reducing areas of stress concentration).

2.9.6 If tank wagon tank mountings are provided solely by twist locks and the twist locks are used to provide vertical restraint, then they shall be selected to meet the proof strength requirements noted below, and to withstand the design loadings of this code. Twist locks are to be of a type where the twist lock can be mechanically held in the locked position. Non-retractable twist locks should be used. Twist lock assemblies shall be subjected to a proof load, vertically upwards of twice that specified in section 2.9.4 (iii) of this code, at the time of assembly of the twist lock onto the tankwagon chassis. Thereafter twist lock assemblies shall be subjected to vertical proof loads of 1.25 that specified in Section 2.9.4 (iii) at 12-monthly intervals. Records of such testing shall be kept for inspection as required by the Chief Inspector of Dangerous Goods.

2.9.7 Conversion of demountable tanks to fixed tanks entails:

(a) the installation of a secondary locking which cannot be removed except in a workshop;

(b) pipework, valves, etc. to conform fully with this code.

2.9.8 Suitable corrosion protection shall be provided for the mounting system.

2.10 Stability of Tank Wagons

2.10.1 The geometric centre of a cross section of the tank or tanks, taken in a vertical plane midway along the length of the tank(s), shall fall within an isosceles triangle having a base length at ground level equal to the overall width between the outside walls of the tyres of the major load axle or axles of the vehicle, and base angles as follows, with the tank(s) unladen.

(a) trailers — 60^0

(b) semi-trailers — 62^0

(c) Rigids — 62^0

2.10.2 As an alternative to 2.10.1 the entire tankwagon, including the prime mover in the case of a tank semi-trailer, shall be demonstrated to be capable of being statically tilted to an angle representing a transverse loading of 0.33 times the all up weight of the tankwagon and its load (under all conditions of load) acting at the centre of gravity of the loaded tankwagon without rollover occurring.

2.10.2.1 As an alternative to physical demonstration of compliance with paragraph 2.10.2, compliance may be claimed by production of calculations to the satisfaction of the Chief Inspector of Dangerous Goods showing that the tankwagon would meet the requirements of paragraph 2.10.2 if so tested.

2.11 Overseas Designs

2.11.1 If the use of tank wagons designed and built overseas is contemplated, or if the building of overseas designs in New Zealand is contemplated, details of the proposal are to be submitted to the Chief Inspector of Dangerous Goods, who will rule as to their acceptability for use in New Zealand.

2.12 Other Requirements

2.12.1 In addition to this Code, tankwagons must conform fully to the regulations made under the Transport Act 1962 and carry a valid Certificate of Fitness.

2.12.2 Tankwagons that transport dangerous goods by sea (e.g. across Cook Strait) are required to comply with the requirements of the Marine Division, Ministry of Transport.

SECTION 3 — TANK, ACCESSORIES AND COMPONENTS

3.1 General

3.1.1 When carrying the maximum capacity, the tankwagon shall have a minimum ullage of 2% and a maximum ullage of 5%. All tanks for use on public roads must not have compartments with a water capacity greater than 7350 litres, which includes an allowance of 5% for ullage, and no compartment shall carry more than 7,000 litres without special approval from the Chief Inspector of Dangerous Goods. Liquids which are less hazardous, such as methanol and ethanol, may be permitted by the Chief Inspector of Dangerous Goods to be carried in larger compartments if they are to be used only in the nominally full and nominally empty states.

Capacities are otherwise free for all tankwagons within the constraints of the Road Transport Regulations.

All tanks must be of a type approved by the Chief Inspector of Dangerous Goods.

3.1.2 The tank shall be made in accordance with best known and available practices in addition to the other applicable tank specification requirements.

3.1.3 The approved design will be allocated an approval number of the form “LAB XXX”. If this design is to be used for other vehicles, these shall be designated “LAB XXXA” for the first and “LAB XXXB” etc. for subsequent vehicles.

3.1.4 Internal bulkheads should be welded from both sides to minimise fatigue damage as well as bending strength in an accident (sealing rings are not preferred).

3.2 Materials

3.2.1 Aluminium Alloys — Thicknesses specified of aluminium alloy sheet are based on aluminium alloy 5454 in the H32 temper condition. This has a tensile strength of 248 MPa unwelded, and a welded tensile strength of 213 MPa. If other alloys with lower welded tensile strength are used, the temper shall be at least H32 or T6, and the shell thickness is to be increased in the ratio 213/welded tensile strength of the alloy used. If the alloys used have a higher welded tensile strength than that of alloy 5454, the thickness may not be decreased, but tempers may be lower than H32, provided that the tensile strength is at least 248 MPa.

3.2.2 Steel — Steel shall be of a quality suitable for the conditions in which it is used, being compatible with adjacent materials and with the cargo. Steel shall be to AS 1204, AS 1205, AS 1449, or equivalent material specification.

3.3 Tank Design and Construction

3.3.1 Design Loads

The tank, its supports and connections shall be designed in accordance with AS 1250 (for steel) or AS 1664 (for Aluminium) taking into account the loadings below. Where applicable a vector sum of these loads shall be taken.

(a) The tank and its attachments shall be designed to withstand a minimum loading of twice that due to the tank and accessory mass including the maximum cargo mass. The density of the cargo or a value of 1000 kg/m^3, whichever is the greater, shall be used for calculations.

(b) Stresses due to internal pressures caused by liquid head, plus vapour pressures of 20 kPa, shall be added to the static loading stresses.

(c) Loadings caused by the weight of equipment, the reaction at supports, and thermal gradients shall be taken into account.

(d) Unless fatigue resistance has been demonstrated by field experience or supervised tests, fatigue stresses shall be calculated and added to the stress calculated for the stationary vehicle. The calculation shall be based on the following values at constant amptitude:

(i) vertical + 0.3 g

(ii) longitudinal ± 0.2 g

(iii) lateral ± 0.2 g

(e) The thickness of the shell, heads, bulkheads and baffles shall be not less than that specified on table 3.1.

3.3.2 Stiffening of Heads, Bulkheads and Baffles — Unless a proven equivalent form of stiffening is provided then heads, bulkheads and baffles shall be dished to a depth, exclusive of any flange, of not less than 80 mm per metre of depth of the minor axis of the tank cross-section, but in any case not less than 100 mm. Dished bulkheads should be placed with the convex facing forwards, to minimise the effect of braking loads.

3.3.3 Circumferential Reinforcement — The tank shall be reinforced circumferentially by stiffeners, bulkheads or baffles (or in any combination) in accordance with the

following requirements:

(i) Reinforcements shall be located so that the maximum unreinforced length shall not exceed that specified for the particular shell thickness in Table 3.1. except that where two or more full-length underframe members of an aggregate section modulus of at least 180 x 103 mm^3, and a shell thickness of at least that for an unreinforced length over 1.4 m and up and including 1.5 m of table 3.1 are provided, reinforcements may be up to 2.5 m apart.

Section modulus of underframe members does not include any section of the shell and is to be calculated using the maximum distance from the neutral axis.

If the tank is fully supported over its entire length (e.g. by a vehicle or trailer chassis) the minimum section modulus does not apply.

(ii) Reinforcements shall be located within 25 mm of points where the longitudinal alignment of shell sheets changes direction by more than 10^0, unless otherwise reinforced sufficiently to keep stresses within the specified limits.

TABLE 3.1

MINIMUM PLATE THICKNESS

Minimum Nominal Thickness, mm

Rated capacity in litres per metre of tank length	Maximum shell radius (m)	Unreinforced length of shell (m)									Head, bulkhead and baffle thickness mm		
		0.9 or less			Over 0.9 and up to and including 1.4			Over 1.4 and up to and including 1.5					
		MS	HSLA SS	AL	MS	HSLA SS	AL	MS	SS	AL	MS	HSLA SS	AL
1400 or less e/m	1.8	2.0	1.6	2.2	2.0	1.6	2.2	2.0	1.8	2.4	2.0	1.8	2.4
	1.8 2.3	2.0	1.6	2.2	2.0	1.8	2.4	2.4	2.0	2.8			
	2.3 3.2	2.0	1.8	2.4	2.4	2.0	2.8	2.8	2.4	3.0			
	3.2	2.4	2.0	2.8	2.8	2.4	3.0	3.0	3.8	3.8			
Over 1400 up to and including 2100 e/m	1.8	2.0	1.6	2.2	2.0	1.8	2.4	2.4	2.0	2.8	2.4	2.0	2.8
	1.8 2.3	2.0	1.8	2.4	2.4	2.0	2.8	2.8	2.4	3.0			
	3.2	2.4	2.0	2.8	2.8	2.4	3.0	3.0	2.8	3.8			
		2.8	2.4	3.0	3.0	2.8	3.8	3.5	3.0	4.4			
Over 2100 up to and including 2700 e/m	1.8	2.0	1.8	2.4	2.4	2.0	2.8	2.8	2.4	3.0	2.8	2.4	3.0
	1.8 2.3	2.4	2.0	2.8	2.8	2.4	3.0	3.0	2.8	3.8			
	3.2	2.8	2.4	3.0	3.0	2.8	3.8	3.5	3.2	4.4			
		3.0	2.8	3.8	3.5	3.0	4.4	4.0	3.5	5.0			
Over 2700 e/m	1.8	2.4	2.0	2.8	2.8	2.4	3.0	3.0	2.8	3.8	3.2	2.8	3.8
	1.8 2.3	2.8	2.4	3.0	3.0	2.8	3.8	3.5	3.0	4.4			
	3.2	3.0	2.8	3.8	3.5	3.0	4.4	4.0	3.5	5.0			
		3.5	3.0	4.4	4.0	3.5	5.0	4.0	4.0	5.5			

Legend

MS = Mild Steel
HSLA = High Strength Low Alloy Steel
SS = Austenitic Stainless steel
AL = Aluminium Alloy

(iii) Ring stiffeners shall be continuous, and shall have a section modulus about the neutral axis of the ring section parallel to the shell not less than that determined from the following formula:

$$I/C = K\ W\ L$$

where

I/C = section modulus, in cubic millimetres

K = 0.0069 for all steels

= 0.01186 for all aluminium alloys

W = tank width or diameter, in millimetres

L = ring spacing, i.e. the maximum distance from the midpoint of the unsupported shell on one side of the ring stiffener to the midpoint of the unsupported shell on the opposite side of the ring stiffener, in millimetres.

Where a ring stiffener is welded to the shell in accordance with Clause 3.3.3 (iv) the maximum portion of the shell which may be used as part of the ring for computing the section modulus shall be as described in Table 3.2.

TABLE 3.2 PARTS OF SHELL IN RING STIFFENER

Number of circumferential ring stiffener to tank shell welds	Distance between parallel circumferential ring stiffener to shell welds	Maximum shell section credit
1		20 t
2	Less than 20 t	d = 20 t
2	20 t or more	40 t

Legend: t = shell thickness
d = distance between parallel circumferential ring stiffener to shell weld

(iv) The welding which attaches stiffening members shall not be less than 50% of the total circumference, and no unwelded length of the joint shall exceed 40 times the shell thickness.

(v) Flat shell sections are allowed between the valence at the top of the tank only under the following conditions:

(a) stiffeners of the same material as the shell are welded across the tank for the full width of the flat section. Recommended size is 75 mm deep by 5 mm thick and spaced such that unsupported shell length does not exceed 700 mm. In this case this section of the shell will not be considered in minimum shell thickness determination.

(b) with no stiffeners the shell is considered as having infinite radius at that section for minimum thickness determination (ie. shell radius > 3.2m).

(c) it is shown that the flat section has stiffness equal to a stiffened plate or curved plate (equivalent radius).

3.3.4 Access through Baffles — A baffle shall have a manhole sized opening where no other means exists for gaining access to tank space on both sides of the baffle.

3.3.5 Distribution of Loads — The loads from supports should be taken on stiffening members and should be distributed as widely as possible through pads, gussets and the like.

3.3.6 Separation of Liquids — Tanks designed to transport different commodities which if combined during transit will cause a dangerous condition or evolution of heat or gas shall be provided with:

(i) a double wall bulkhead; or

(ii) a single wall bulkhead with a cleaning ring.

3.3.7 Enclosed Air Spaces — The air spaces between double bulkheads, or within cleaning rings or internal or external ring stiffeners, shall be provided with screwed openings for venting and draining. Any such openings on the upper surface of the tank shall be plugged.

3.3.8 Component Attachment — The attachment of auxiliary components and accessories should be to the subframe or skirting wherever practicable. Where attachment to the tank shell is unavoidable, the following requirements shall apply;

(i) The design of the component and/or its method of attachment shall be such that the component will break away before damage is caused to the shell.

(ii) The attachment shall be to a mounting pad welded to the tank.

(iii) A mounting pad shall be no thicker than the shell at that point, and shall extend at least 25 mm beyond the perimeter of the component attachment, and shall be shaped to avoid concentrations at sharp corners.

(iv) The means of attachment shall avoid pockets which could initiate corrosion. The welding of the pad to the tank shall be continuous except for a drainage provision at the bottom, or a plugged tell-tale hole shall be provided.

3.3.9 Roll-over Protection — Every tank shall be provided with roll-over protection which shall comply with the following requirements:

(i) A guard in the form of inverted U coamings, the space between which is closed by valances level with the top of the coamings at the front, and at least 50 mm high at the rear.

(ii) Any guard shall project at least 20 mm above the top of the fittings which it protects.

(iii) The material of the guard shall be compatible with the tank shell.

(iv) The thickness of the material of the U coamings and valences shall not be less than 5 mm for aluminium, 3 mm for mild steel, 2.5 mm for high strength low alloy steel or stainless steel.

(v) Any air space enclosed inside a coaming or guard shall have openings to permit draining and purging before repair. When the enclosed space is used to transfer vapour, the openings shall be plugged.

(vi) The tank coaming shall be fitted with drains to prevent liquid from collecting on top of the tank. Drains shall discharge clear of and below the engine and exhaust system.

3 3.10 Welding

3.3.10.1 All welding of components for structural or pressure purposes in building any new or in modifying any existing vehicle for use as a tankwagon shall be carried out in accordance with recognised good practice

including recognised welding codes and inspection codes.

3.3.10.2 All welding of mild steel components shall conform with NZS 4701 including welder qualification to NZS 47.11.

3.3.10.3 All welding of aluminium components shall comply with AS 1665 (SAA Aluminium Welding Code) with procedures qualified under BS 4870 Pt 2 (Approval Testing of Welding Procedures) and approval of welders under BS 4871 Pt 2 *Approval Testing of Welders Working to Approved Welding Procedures*.

3.3.10.4 Inspection of the welding shall be carried out in accordance with the welding specification generally as follows:

(a) verification of material

(b) verification of filler material

(c) qualification of welding procedures

(d) qualification of welders to the above procedures

(e) inspection of production welds (this is generally visual) including a minimum of 5% x-ray.

3.3.10.5 Inspection is to be carried out by properly qualified personnel. In particular, testing laboratory registration under the TELARC system is required with personnel qualified under the CBIP scheme (Certification Board for Inspection Personnel).

3.3.10.6 As part of the approval of each unit, certification that this testing has been carried out and passed is to be sent to the Department of Labour.

The documents from the above inspections are to be available for inspection at any time.

The Department reserves the right to utilise an independent inspector or inspection agency at the cost of the vehicle owner to check the welding or construction if he considers that some aspects does not conform to the requirements as specified in this Code.

3.4 Manholes, Valves, Vents

3.4.1 Every opening to the liquid space of a tank shall be provided with an effective means of closure in accordance with one of the requirements of this Clause 3.4 as appropriate.

3.4.2 Manholes — Each compartment shall be accessible through a manhole and fitted with a closure capable of passing the tank pressure test.

3.4.3 Valves — Each liquid discharge opening shall be provided with an internal shut-off valve and an external shut-off valve, suitable for service at the piping design pressure.

3.4.3.1 The internal shut off valve shall comply with the following requirements:

(i) The valve seat shall be located inside the tank or within the tank flange or its companion flange. The remainder of the valve may be either inside or outside the tank shell, provided that in the event of accidental damage to any associated external fittings the safe functioning of the internal valve is not impaired.

(ii) An internal shut-off valve which is bottom-operated shall incorporate, in addition to the normal means of closure, an automatic heat-actuated

closing device which will become effective at a temperature arranged to respond to a fire in the vicinity of the tank outlets.

(iii) A tank designed for bottom loading shall incorporate an effective liquid flow deflector above the internal shut-off valve, and a provision to minimise the possibility that loose foreign objects within the tank might prevent the closure of the valve. Any such protective provision shall be designed to avoid the spraying of liquid during filling.

(iv) The valve shall be capable of being manually closed from a position remote from the delivery hose connection.

3.4.3.2 The external shut-off valve shall be a quick-shut type approved by the Chief Inspector fitted in a readily accessable position and fitted with an approved cap.

External delivery pipes and valves shall in all cases be protected from damage in an approved manner.

3.4.4 Vents — Each tank compartment shall be provided with normal venting in accordance with Clause 3.4.5 and emergency venting in accordance with Clause 3.4.6 to relieve product vapour. The vents shall be of an approved type and they and their installation shall comply with the following requirements:

(i) Each vent shall be marked with the manufacturer's name, model identification, discharge capacity and related pressure.

(ii) The discharge capacity of each model and type of vent shall be determined before use.

(iii) Vents shall be designed and installed to prevent leakage of liquid past the vent in the event of surge or vehicle overturn.

(iv) The exit of a vent except an emergency vent shall be covered with wire gauze of 500 micro-metres nominal aperture.

(v) Each vent shall communicate with the vapour space.

(vi) Shut-off valves shall not be installed between the tank opening and the vent.

(vii) Vents shall be mounted, shielded, or drained, so as to prevent the accummulation of water in such a manner that freezing could impair the operation of the vent.

3.4.5 Normal Venting — The normal venting provision shall consist of a pressure vent and a vacuum vent, generally in accordance with the following requirements:

(i) The clear area through any pressure or vacuum vent shall be not less than 280 mm^2. The pressure opening setting shall not exceed 17 kPa and the vacuum vent opening setting shall not be less than 7kPa vacuum.

(ii) When tilted to any angle exceeding 90^0 from the vertical, the pressure vent shall open at a minimum of 30 kPa or shall lock shut.

3.4.6 Emergency Venting — The emergency venting provision for protection against fire exposure which may be incorporated into the vent valve shall comprise a pressure vent which complies with the following requirements:

(i) The emergency vent shall start to open at a pressure no higher than 30 kPa and be fully open at 45 kPa.

(ii) The total emergency venting capacity of each tank compartment shall be not less than that specified in Table 3.5. Flow rating pressure shall be the "vent fully open" value of 45 kPa.

Exposed area of tank compartment m^2	Minimum emergency vent capacity m^3 free air/h*	Exposed area of tank compartment m^2	Minimum emergency vent capacity m^3 free air/h*
2	480	30	6650
3	720	35	7260
4	960	40	7830
5	1200	45	8370
6	1440	50	8880
7	1680	55	9370
8	1920	60	9840
9	2160	65	10300
10	2400	70	10700
12	2880	75	11200
14	3360	80	11600
16	3840	85	12000
18	4320	90	12400
20	4800	95	12800
25	6000	100	13200

* Free air measured under IGU standard conditions.
NOTE: Interpolate for intermediate sizes.

3.4.7 Loading and Unloading Protection — All tanks except as otherwise approved shall be loaded or unloaded with the hatch covers closed and shall be provided with sufficient liquid-venting capacity to discharge the whole of the liquid delivery rate of the pump, and with sufficient air inflow capacity to match the liquid withdrawal rate. The pressure and vacuum limits of 45 kPa and 7 kPa (negative) shall not be exceeded unless otherwise approved.

3.4.8 Filling Provisions. The provisions for filling the tank shall comply with the following requirements:

The fill tube of a top-filled tank shall terminate not more than 50 mm nor less than 35 mm from the bottom of the tank, and shall be stayed. The fill tube shall be connected to the vapour space of the tank by a pressure equalizing hole not less than 3 mm diameter or the equivalent in area, and which shall be fitted with gauze as required by Clause 3.4.9(a). The vent shall be shrouded to re-direct liquid down the fill pipe. The bottom end of the tube shall be cut square and the flow of liquid from the pipe shall be directed away from any objects which might cause the liquid to spray.

3.4.9 Dip Stick — A dip indicating system shall be installed and shall comply with the following requirements:

(a) A dip stick which measures by contacting the bottom of the tank shall be provided with a tubular dip tube. A pressure equalizing hole shall connect the upper end of the dip tube with the upper tank space. The hole shall be covered by an anti-flash gauze of 500 micro-metres nominal aperture.

(b) A durable striker pad of a thickness not less than that of the tank shell or 5 mm, whichever is the greater, and of the same material as the shell shall be welded to the tank bottom below the dip opening.

(c) The dip tube shall terminate not more than 50 mm from the bottom of the tank and shall be stayed.

3.5 Pipework and Pipe Fittings

3.5.1 Strength of Piping — Piping and associated fittings shall be designed for the pressure to which they may be subjected in service, and shall be designed and supported to allow for expansion, contraction and vibration. Unrestrained slip joints shall not be used for this purpose.

3.5.2 Discharge Piping — Discharge piping shall be located so that it is protected from damage that could occur in the normal operation of the tanker.

3.5.3 Hoses and Hose Couplings

3.5.3.1 Hoses shall not be used in that section of piping which is between the tank's internal valve and the first valve outside the tank.

3.5.3.2 Any hose or coupling used shall be designed for a working pressure not less than 20% in excess of the design pressure of the system and shall be so designed that there will be no leakage when connected.

3.5.3.3 Where unloading by pressure is permitted, hoses shall be designed for a bursting pressure of 690 kPa, or two times the maximum pressure it could be subject to in use, whichever is the greater. Hoses to be properly maintained and checked frequently.

3.6 Pumps

3.6.1 Approval — Except for farm tankwagons, discharging by pumping requires the specific approval of the Chief Inspector. Farm tankwagons is a category separately approved solely to distribute to above ground tanks on farm premises.

3.6.2 Suitability — A pump intended for handling the tanker's cargo shall be suitable for use with that cargo, and for the required flow rates and pressures.

3.6.3 Pressure Regulation — A pumping system shall be provided with automatic means to ensure that the design pressure of any component is not exceeded.

3.6.4 Electric Pump Motors — An electric motor driving a pump shall be certified suitable for use in Class 1, Zone 1, hazardous areas.

3.6.5 Pump-driving Engines — A spark-ignition engine shall not be used for pumping. Auxiliary engine powered pumps shall not be used without specific approval, and any such engine shall not be fitted with any electrical equipment. A compression-ignition propulsion engine of the tanker may be used to drive a pump, provided that it complies with the following requirements.

An approved strangler shall be fitted to the air intake (see Note).

NOTE:

A strangler may take the form of a valve which closes the air intake passage to the engine. In such case, account must be taken of the effects of vacuum on the intake piping and of other passages (such as pump breather pipes) through which air may pass to the air intake of the engine. A BCF or $C0_2$ fire extinguisher of not less than 2.7 kg may be used as a strangler, provided that the extinguisher is a 100% discharge type and is arrange to discharge into the air intake close to the intake manifold.

3.6.6 Protection of Auxiliary Engines — Auxiliary engines shall be located or shielded so as to comply with Clause 2.7.5.

3.6.7 Location of Controls — Power driven pumps shall be provided with controls which shall comply with the following requirements:

(a) Controls shall be clearly marked, easily accessible, and located in a position remote from the pump.

(b) A strangler-operating device or an emergency stop for the engine or motor shall be provided with dual controls, operable from inside the cab and at a point remote from the cab. All such devices shall be clearly identified and easily accessible.

3.6.8 Shielding of Pump Shaft — The pump shaft between the pump and the engine shall be shielded to prevent leakage from the pump seal from dripping or being thrown onto hot parts of the engine. Materials used in the shielding shall be of a type will not create sparks when struck.

3.7 Testing

3.7.1 Tanks — A tank or an individual tank compartment shall not leak, distort, or show evidence of impending failure when filled with water the temperature of which does not exceed 38^0C and hydrostatically pressurised to the design pressure. Each compartment shall be tested individually with adjacent compartments empty and at atmospheric pressure. Relief devices which could prevent the test pressure being reached shall be made inoperative during testing.

A coaming which is part of a vapour-recovery transfer system shall not leak when subjected to a pressure of 35 kPa.

3.7.2 Piping — Piping systems shall be tested in accordance with the following:

(a) A piping system subject to pumping pressure shall be tested to a pressure 1.5 times the maximum working pressure.

(b) Piping and in-line valves shall be tested at a pressure of 200 kPa before attachment to the tank.

SECTION 4 — REPAIRS

4.1 Major Repairs to Tankwagons

4.1.1 Major modifications or repairs affecting the structural integrity of any tank or its fittings used for conveying Class 3(a) Dangerous Goods in bulk shall be carried out fittings only with written authority from an Inspector of Dangerous Goods.

A major repair or modification is defined as affecting the subframe, tank or pipework and includes remounting of tanks, changing tank design etc, and includes work that is generally considered hot work (i.e. operations that could cause a spark or dangerous rise in temperature).

4.1.2 Repairs shall be carried out as above only when the tank has been rendered free of flammable liquid and gas by a method approved by the Chief Inspector of Dangerous Goods.

4.2 Repairs and Servicing of Tankwagons

4.2.1 Tankwagons that are gas-freed may be serviced at any location or in any building, subject only to Clause 4.1 above.

4.2.2 Tankwagons that are not gas-freed may be taken into a building for repairs or servicing, including maintenance, but not hot work, only if:

(a) building is approved by an Inspector conforming but not limited to the following requirements:

(i) room to be well vented to outside of building;

(ii) electrical wiring and fittings to be in accordance with requirements for use in hazardous areas;

(iii) building to have acceptable fire resistance or an installed sprinkler or alarm system.

(b) Alternatively:

(i) tank is drained and valves closed or sealed;

(ii) No source of ignition is permitted within 8m (electrical fittings or wiring not considered a source of ignition when disconnected).

4.2.3 Tankwagons may be serviced outside a building if no source of ignition is permitted within 8m (electrical fittings or wiring is not considered a source of ignition when disconnected).

4.3 Emergency Repairs

4.3.1 Emergency repairs not involving the load tank may be carried out in a building if:

(a) it is impractical to do work otherwise;

(b) vehicle remains in building for minimum period of time

(c) vehicle does not remain in building overnight;

(d) person in charge of building to be given written notice of presence of Dangerous Goods in building.

4.3.2 Emergency repairs or operations (where the tankwagon cannot be moved) may be carried out at other locations provided no source of ignition is permitted within 8 m.

4.4 Re-testing

See Appendix D Section 3(iv).

4.5 Accidents and incidents

All accidents and incidents involving tankwagons transporting dangerous goods to be reported to an Inspector. No repairs to be attempted without the approval of an Inspector.

Refer Sections 33 and 34 of the Dangerous Goods Act 1974.

SECTION 5 — MARKINGS

5.1 The tank shall be marked on the rear and both sides with labels in accordance with Appendix C in readily visible positions.

5.2 A certification plate, of a compatible material to the tank not subject to corrosion shall be permanently fixed to the tank or tank runners and bear the following minimum information:

(i) The tank manufacturer's name;

(ii) The tank design approval number LAB XXX as issued by the Chief Inspector of Dangerous Goods;

(iii) The serial number of the tank;

(iv) Date of manufacture;

(v) Date of pressure test;

(vi) Tank capacity (litres) by compartments, front to rear; and

(vii) Test pressure.

This plate shall be affixed in a place readily accessible for inspection, preferably on the true left side near the front of the tank. The information shall be stamped, embossed, or applied by other suitable means, into the material of the plate in characters at least 5 mm high. The plate shall not be painted so as to obscure the marking thereon.

The tank serial number shall also be stamped on a substantial part of the tank structure.

5.3 The approval number LAB XXX is also to be permanently painted on the tank in letters and numerals 75 mm high, preferrably on the front right hand side of the tank.

APPENDIX A

MAXIMUM PERMITTED VEHICLE DIMENSIONS

The following are the maximum dimensions of motor vehicles permitted by Regulation 48 Traffic Regulations 1976. Where two conflicting dimensions are shown the vehicle must not exceed the lesser of the two, i.e. the most restrictive of the two measurements.

WIDTH

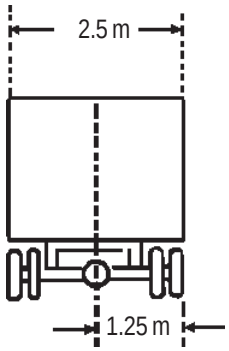
48(1) No person shall operate any vehicle, if the vehicle or its load or both exceed 2.5 metre in width or extend more than 1.25 metres from the longitudinal centre-line of the vehicle. The provisions of this subclause shall not apply to any agricultural trailer or agricultural machine, where —

(a) The vehicle does not exceed 3.7 metre in widths; and

(b) The vehicle is not operated during the hours of darkness; and

(c) The vehicle is not driven at a speed exceeding 25 kilometres an hour; and

(d) The extreme right-hand front edge of the vehicle is indicated by a flag of the type specified by regulation 50 hereof to indicate excess dimensions.



Except:

Agricultural vehicles up to 3.7 metres in width travelling no faster than 75 km/h in daylight.

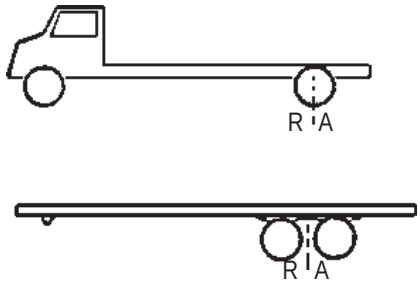
(2) For the purposes of subclause (1) of this regulation, any mirrors, side marker lights, or direction indicators shall be deemed not to be part of the vehicle or its load.

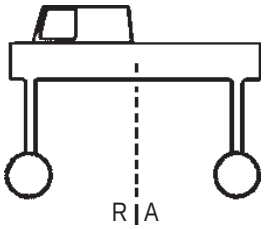
DEFINITION — NEAR AXIS

(a) In relation to a vehicle with only one non-steering axle, means that axle:

(b) In relation to a vehicle with 2 or more non-steering axles, means a horizontal line, at right angles to the longitudinal centreline of the vehicle and midway between the first and last non-steering axles:

(c) In relation to a vehicle with no non-steering axle, means a horizontal line at right angles to the longitudinal centreline of the vehicle at a point to be determined by the Secretary:



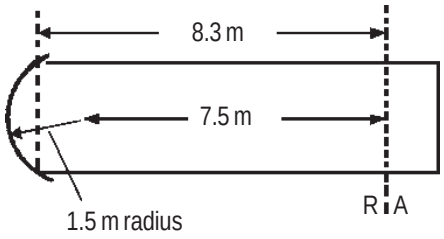


DISTANCE AHEAD OF REAR AXIS

48(3) No person shall operate any vehicle if any part of the vehicle or its load extends more than 8.3 metres ahead of the rear axis of the vehicle. Provided that this subclause shall not apply -

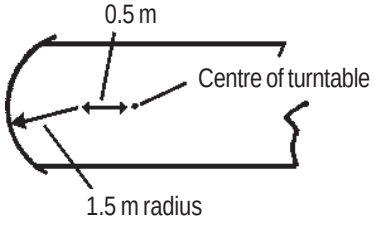
(a) In the use of any trailing unit to its towbar or to any load the forward and of which is supported by the towing vehicles;

(b) In the use of a vehicle the load of which does not extend forward of the body, provided no part of the body of the vehicle extends forward beyond the arc of a circle of 1.5 metres radius with its centre on the vehicle centre line 7.5 metres ahead of the rear axis.



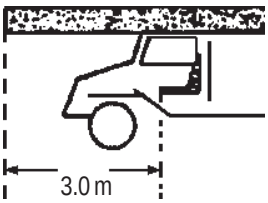
DISTANCE AHEAD OF KINGPIN OR TURNTABLE

48(4) go person shall operate any articulated vehicle if any part of the trailing unit or its load extends forward beyond the are of a circle of 1.5 metres radius with its centre on the vehicle centre line 0.5 metres ahead of the centre of the turntable or kingpin on which the trailing unit is hinged.



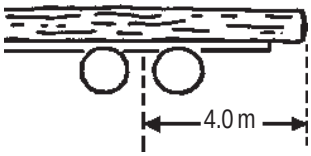
FRONT OVERHANG

48(5) No person shall operate any vehicle other than a trailer it the vehicle or its load extends more than 3 metres forward from the front edge of the driver's seat.



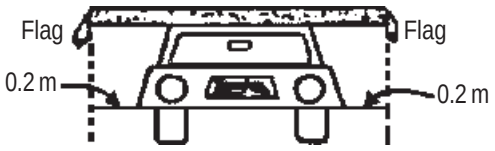
REAR OVERHANG

48(6) No person shall operate any vehicle if the vehicle or its load extends backward more than 4 metres from the rear axis.



FLAGSTO INDICATE EXCESS DIMENSIONS

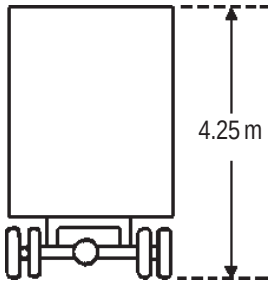
50(1) No person shall operate a motor vehicle under a pemission given under regulation 49 hereof, or any motor vehicle the load of which projects more than 1 metre backward from the body of the vehicle or more than 1 metre forward from the body of the vehicle or more than 200 mm out from the side of the body of the vehicle, unless the projecting load or the excess dimensions of the vehicle are suitably indicated by means of a clean white flag or a red or orange or yellow fluorescent flag. Such flags shall be at least 400 mm long and 300 mm wide.



(2) For the purposes of this regulation any rear vision mirror or direction indicator shall be deemed not to form part of the vehicle.

HEIGHT

48(7) No person shall operate any vehicle if the vehicle or its load or both rise to such a height as to be liable to damage any construction or wires lawfully over the roadway used by the vehicle, or in any case to a height exceeding 4.25 metres from the ground.



DEFINITION OF FORWARD LENGTH

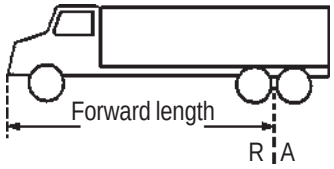
(a) In relation to a motor vehicle other than a trailing unit, means the distance from the rear axle to the foremost part of the vehicle or its load, whichever is the greater:

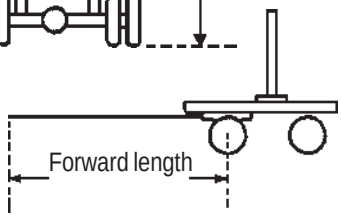
(b) In relation to a trailing unit the front axle of which is steered by the towbar, means the greater of the following distances:

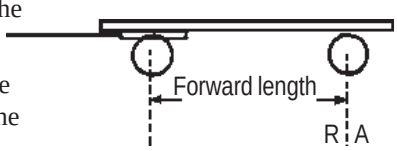
(i) From the front axle of trailing unit to the point of attachment of the tow-bar to the towing vehicle;

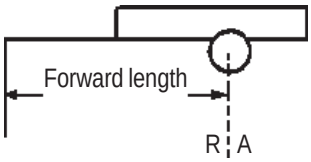
(ii) From the rear axis of the trailing unit to the front axle:

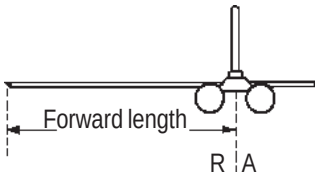
(c) In relation to any other trailing unit, the distance from the rear axis of the trailing unit to the point of attachment to the towing vehicle











FORWARD LENGTH (VEHICLE COMBINATIONS)

48(10) No person shall operate any combination of vehicles if the forward length of that vehicle in the combination with the greatest forward length -

(a) Exceeds 7.4 metre; or

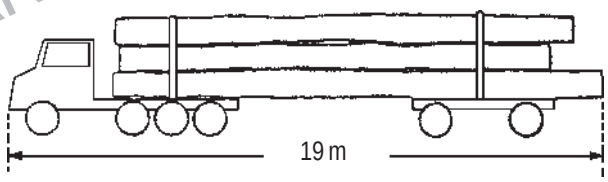
(b) Exceeds 6.8 metres if the combination includes another vehicle with a forward length exceeding 4.7 metres; or

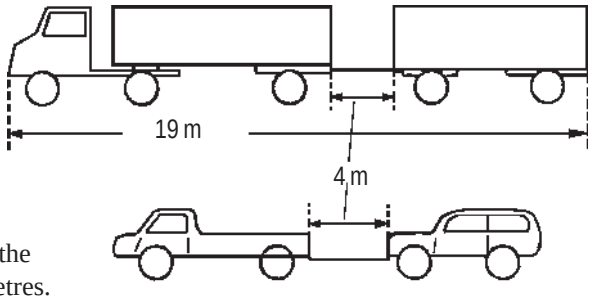
(c) Exceeds 6.2 metres if the combination includes another vehicle with a forward length eceeding 5.5 metres.

Acceptable Combinations of Forward Length
7.4 metres with 4.7 metres
6.8 metres with 5.5 metres
6.2 metres with 6.2 metres

0VERALL LENGTH

48(11) No person shall operate any combination of vehicles if the total length of the combination together with it. load exceeds 19 metres.



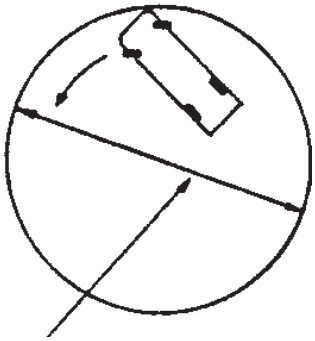


LENGTH BETWEEN VEHICLES BEING TOWED

48(12) No person shall operate any combination of vehicles if the space between any 2 vehicles in the combination exceeds 4 metres. For the purposes of this subclause, any towbar, rope, wire, or chain used to connect 2 vehicles together shall be deemed not to be part of either vehicle. Provided that this subclause shall not apply to 2 vehicles which are designed or being used to support a common load.

TURNING CIRCLE

48(13) Except in the case of a vehicle first registered before the lst of January 1971, no person shall operate any motor vehicle or combination of motor vehicles if the vehicle or combination is not capable of completing a 360^0 turn without projecting outside the circumference of a circle of 25 metre diameter.



25 m diameter maximum

OVERDIMENSION VEHICLES AND LOADS

Vehicles or loads which exceed these dimensions may not travel on New Zealand roads unless they have a permit from the Secretary for Transport, Chief Traffic Officer or other authorised person and unless they abide strictly by all the conditions on the permit.

APPENDIX B

MAXIMUM VEHICLE AND AXLE WEIGHTS

METRIC KILOGRAMS

AXLES	Class I	Class II
(S)	5400	5000
(T)	8200	7300
(4)	9500	8200

Single tyred Axle — two single tyres

Twin tyred axle — four types or two tyres larger than 1300 x 24 or 1400 x 20

Oscillating axle — four separate wheels

WHEELS

(S) and (T) ½ axle limit + 500 kg

(4) ¼ axle limit + 250 kg

GROSS and maxima for any grouping of axles

Distance from first to last axle of any group (Metres)	Maximum sum of axle weights	
	Class I	Class II
16.0 or more	39 000	39 000
14.4 or more	38 000	38 000
13.0 or more	37 000	37 000
11.8 or more	36 000	36 000
10.8 or more	35 000	35 000
10.0 or more	34 000	34 000
9.4 or more	33 000	33 000
8.8 or more	32 000	32 000
8.2 or more	31 000	31 000
7.6 or more	30 000	30 000
7.0 or more	29 000	29 000
6.4 or more	28 000	27 000
5.2 or more	26 000	23 000
3.6 or more	21 500	19 000
2.4 or more	17 500	15 000
1.8 or more	15 500	13 500
1.0* or more	14 500	12 500
Less than 1.0	Limits as for one axle	

BRIDGE LIMITS (Gross and maxima for any grouping of axles)

Percentage of Class I						
90%	80%	70%	60%	50%	40%	30%
35 100	31 200	27 300	23 400	19 500	15 600	11 700
34 200	30 400	26 600	22 800	19 000	15 200	11 400
33 300	29 600	25 900	22 200	18 500	14 800	11 100
32 400	28 800	25 200	21 600	18 000	14 400	10 800
31 500	28 000	24 500	21 000	17 500	14 000	10 500
30 600	27 200	23 800	20 400	17 000	13 600	10 200
29 700	26 400	23 100	19 800	16 500	13 200	9 900
28 800	25 600	22 400	19 200	16 000	12 800	9 600
27 900	24 800	21 700	18 600	15 500	12 400	9 300
27 000	24 000	21 000	18 600	15 000	12 000	9 000
26 100	23 200	20 300	17 400	14 500	11 600	8 700
25 200	22 400	19 600	16 800	14 000	11 200	8 400
23 400	20 800	18 200	15 600	13 000	10 400	7 800
19 400	17 200	15 100	12 900	10 800	8 600	6 500
15 800	14 000	12 300	10 500	8 800	7 000	5 300
14 000	12 400	10 900	9 300	7 800	6 200	4 700
13 100	11 600	10 200	8 700	7 300	5 800	4 400

NOTE: If axles in this distance include a single tyred axled paired with a twin tyred or oscillating axle, special limits apply

	Class I	Class II
(S) (T)	12 000	11 000
(S) (4)	13 000	12 000

(Also the maximum weight permitted on a pair of single tyred axles within this distance is the sum of the individual weights allowed on each axle.)

APPENDIX C

Size: Minimum of 400 mm x 400 mm measured along the sides of the diamond.

Colour: Black lettering and symbol on red background.

In all other respects the label shall comply with the requirements of New Zealand Standard NZS 5427: 1980

APPENDIX D

MEANS OF COMPLIANCE WITH CODE

The following are the actions to be undertaken by a vehicle owner or the owner's agent to comply with this code.

1. The design of any new tankwagon, or the assessment of any existing vehicle which is undergoing major modification, for use under this code is to be carried out by a qualified person with relevant experience in the road transport industry. Completed designs and assessments are to be forwarded, via District Inspectors of Dangerous Goods, to the Chief Inspector of Dangerous Goods who will rule on the acceptability of the design and determine the conditions of approval.

   The person seeking the approval of the Chief Inspector will be expected to provide the following information:

   (a) Two copies of the general assembly drawing of the tankwagon for which approval is sought INCLUDING, where appropriate, the anticipated prime mover to be used. This drawing shall show all major dimensions.

   (b) In the case of new designs two copies of the working drawings to be used in the construction of the tank wagon. In the case of assessments of existing designs, a copy of the assessment report and two copies of any drawing showing any modifications to be made before the tankwagon enters service.

   (c) The design calculations for the rear bumper.

   (d) The design calculations for the tank mounting arrangements.

   (e) The roll stability criteria assessment.

(f) If available the registration number and fleet number of the vehicle concerned.

(g) The identification of the qualified person responsible for the design or assessments.

(h) The identification of the qualified person to be responsible for the supervision of construction of the tankwagon.

In lieu of design checking by the Department, Certification by a qualified person with relevant experience in the road transport industry (preferably a registered engineer) will be accepted with the approval of the Chief Inspector of Dangerous Goods. The certificate and support information to be forwarded to the Department for validation.

2. After the Chief Inspector of Dangerous Goods has indicated his acceptance of the design, or modification, and issued an approval number construction may proceed under the supervision of a qualified person.

   Before the tankwagon enters service, it will be inspected by Dangerous Goods Inspectors for compliance with the Dangerous Goods (Class 3(a) — Flammable Liquids) Regulation 1985 and with the requirements of this code. This inspection will include:

   (a) The obtaining of a written declaration from the manufacturer responsible for the supervision and construction of the tank wagon that the tank wagon stating has been constructed according to the approved design and drawings and is in accordance with this code.

   (b) A check for compliance with Dangerous Goods regulations and this code.

   Alternatively this inspection (a) and (b) above, may be carried out and certified by a qualified person with the approval of the Chief Inspector of Dangerous Goods. The certificate and Inspection Sheets to be forwarded to the Department for validation.

3. The vehicle shall be operated and inspected in accordance with the requirements of this Code, and all records of inspection required by this code shall be kept by the vehicle owner or owner's agent for inspection as required by the Chief Inspector of Dangerous Goods. The inspections required are:

   (i) Every three months — the tank wagon shall be inspected by a tradesman automotive engineer for continued compliance with Section 2 of this Appendix, including:

      (a) Inspect any flexible hose used in the transfer system for damage and wear and for electrical conductivity (if applicable).

      (b) Inspect any earthing straps for continuity and serviceability.

   (ii) Every six months — present the vehicle to the Ministry of Transport Automotive Survey Section for its Certificate of Fitness inspection.

   (iii) If there is any reason to suspect a leak or the vehicle is involved in any significant accident or if repairs are carried out on the tank, it shall be tested as follows:

      Either: each affected compartment shall be pressurised to the design pressure with inert gas (unless tank has been gas-freed) while the adjacent compartments are empty and at atmospheric pressure. The air pressure shall be held for at least five minutes with the entire surface of all joints under pressure coated with a solution of soap and water, heavy oil, or other material suitable for the purpose, foaming or bubbling of which indicates the presence of leaks.

      or: pressurised as specified in Section 3.7.1. Any pressure relief devices which could prevent the test pressure being attained shall be rendered inoperative during testing.

   (iv) The tank shall also be tested on request from the Chief Inspector of Dangerous Goods, by one of the methods described above.

(v) Tanks failing the above tests shall be suitably repaired, and the above described tests shall be continued until no leaks are discovered before any cargo tank is put into service.

Alternative inspection procedures approved by the Chief Inspector may be used.

4. Finally the vehicle is required to undergo regular inspection (generally as 2(b) above) by an Inspector for compliance with this code and the Regulations. Maximum period between inspections is two years.

ENGINEERS CERTIFICATE
FLAMMABLE LIQUID TANKWAGONS

I . . . . . .

a Registered Engineer and holder of a current Annual Practising Certificate certify that I have design checked/inspected the following:

Vehicle:	Reg No:
Owner:	Fleet No:
Type of Vehicle:	Tank No:
Products:	Capacity:
	Drawings:

(fill in as appropriate) and made such detailed examinations and checks as I considered necessary and it is my opinion that:

- the design is in accordance with the *Flammable Liquids Tankwagon Code*.
- the construction is in accordance with good and widely accepted engineering practice and the design as shown on the drawing list attached.
- the inspection has been carried out in accordance with the requirements of the design code.
- I have witnessed and/or verified non-destructive testing/hydrotesting.
- this tankwagon is subject to additional conditions as follows:

(delete and/or amend as appropriate)

Therefore I recommend that this tankwagon be approved for transport of Class 3A/3B/3C (delete) dangerous goods under the Dangerous Goods (Class 3 — Flammable Liquids) Regulations 1985.

... .

Signed

. . . . . .

Registration No. if applicable

for and on behalf of . . . . . .

APPENDIX E

SMALL TANK WAGONS

TW1: Tankwagons up to 400 Litres

This applies to tankwagons with tank water capacity exceeding 250 litres but less than 400 litres.

1. The tank is to be designed and constructed to sound engineering principles.
2. The tank is to be fixed to a self-propelled vehicle chassis such that under normal operating conditions and in a roll-over the tank will remain attached to the chassis.
3. All tank appurtenances and fittings are to be protected from damage in an accident, i.e. by coamings or shields.
4. Tank outlet pipes to be fitted with shut-off valves as close as practical to the tank. Valve(s) to be readily operable in an emergency.
5. No electrical wiring or fittings to be attached to the tank. All wiring to be installed and protected to preclude damage and sparking.
6. Vehicle exhaust to be positioned so as to avoid impingement by any spillage which may emanate from the tank or its fittings.
7. The tank to be marked or labelled conspicuously as follows:

   Danger Flammable Liquid

   No sources of ignition within 8 metres
8. A 2.25 kg halon or dry powder fire extinguisher to be carried in the vehicle.
9. Vehicle must not be parked within 8 metres of a public place.

TW2: Tankwagons up to 2000 Litres

This applies to tankwagons with tank water capacity exceeding 400 litres but less than 2000 litres.

1. The tank is to be designed and constructed to sound engineering principles.
2. The tank is to be fixed to a self-propelled vehicle chassis such that under foreseeable operating conditions the tank will remain attached to the chassis.
3. All tank appurtenances and fittings are to be protected from damage in an accident, i.e. by coamings or shields.
4. Tank outlet pipes to have shut-off valves fitted as close as practical to the tank. Valve(s) to be readily operable in an emergency.
5. No electrical wiring or fittings to be attached to the tank. All wiring to be installed and protected to preclude damage and sparking. Vehicle to be fitted with electrical cut-out switch fitted as close as practical to battery.
6. Vehicle exhaust to be positioned so as to avoid impingement by any spillage which may emanate from the tank or its fittings. In no case shall exhaust terminate closer than 2 m from tank or any tank opening unless effectively screened from spillage.
7. The tank to be marked or labelled conspicuously as follows:

   Danger Flammable Liquid

   No sources of ignition within 8 metres.
8. A 2.25 kg halon or dry powder fire extinguisher to be carried in the vehicle.
9. Vehicle must not be parked within 8 metres of a public place.

APPENDIX F

TANKWAGONS FOR OTHER FLAMMABLE LIQUIDS

This Appendix covers tankwagons carrying dangerous goods of Class 3B (e.g. kerosene, turpentine, etc.) and Class 3C (fuel oil e.g. diesel).

The tankwagons are to be constructed as. follows:

1. Tank design to be generally in accordance with Section 3 of this Code with the following comments:
   (a) tank capacity and compartment size are free;
   (b) it is recommended that the design loads are used;
   (c) tankwagon stability to be in accordance with this code;
   (d) pumping requirements (Section 3.6) do not apply.
2. It is recommended that the following requirements are complied with:
   (a) tank mounting loads (Clause 2.9);
   (b) trailer requirements (Clause 2.8), noting that there is a maximum trailer capacity when it is being towed behind a tankwagon containing Class 3A dangerous goods;
   (c) fifth wheels (Clause 2.8.9);
   (d) rear bumper requirements (Clause 2.3);
   (e) venting of compartments — for normal and emergency requirements.
3. Vehicle requirements as for 3A (wired glass rear window, engine shield, fuel tank protection, exhaust and inlet limitation) are not required.
4. For Class 3B tankwagons only, provision is required to prevent the accumulation of static electricity (see Clauses 2.9.2 and 2.9.3).
5. Repairs to Class 3B tankwagons to be carried out in accordance with Section 4 of this Code.
6. Delivery of product with a flashpoint of less than 35°C shall be by gravity only unless otherwise approved by the Chief Inspector.

It is not a requirement that these tankwagons are approved or inspected but they shall be, in the opinion of a Dangerous Goods Inspector, acceptable for the required duty.

APPENDIX G

FUEL TANK CONSTRUCTION AND TESTING

This Appendix outlines the conditions under which a vehicle fuel tank may be tested as alternative to providing a protection guard (see Clause 2.7.4.2). These requirements are based on those of the USA Federal Highway Administration (Section 393.67) and only apply to side-mounted vehicle fuel tanks containing vehicle fuel (diesel and petrol) at normal atmospheric pressure and temperature.

A. Construction Requirements

1. All joints to be closed by welding such that they are sealed.
2. Drains and bottom fittings shall not project more than 25 mm from the bottom of the tank
3. All fittings to be installed via flanges, nozzles or spuds welded into the tank.
4. A fuel tank with a capacity greater than 100 litres shall have a vent to prevent overpressurisation during a fire.
5. Tank to be equiped with a non-spill airvent.
6. Tank to be marked with liquid capacity, date of manufacture and indication of acceptance under this Code.

B. Testing Requirements

1. Pressure test — tank and fittings to be capable of withstanding a pressure of 150% of a minimum of the pressure reached during venting or 500 kPa without leakage.
2. Leak test — tank to be filled, with feed outlet sealed, and rotated about any axis without any leakage.
3. Drop test — fill tank with quantity of water having a weight equal to the weight of the fuel load.
   (a) drop tank from a minimum height of 9 m onto unyielding surface such that it lands squarely on one corner. Tank and fittings to be leak free.
   (b) drop tank from a minimum height of 3 m onto unyielding surface such that it lands squarely on its fill pipe. Tank and fittings to be leakfree.

   Construction and/or testing may be certified by a qualified person with the approval of the Chief Inspector of Dangerous Goods. Certificate and supporting information to be forwarded to this Department of verification.

ED10/Pl27/200/1988