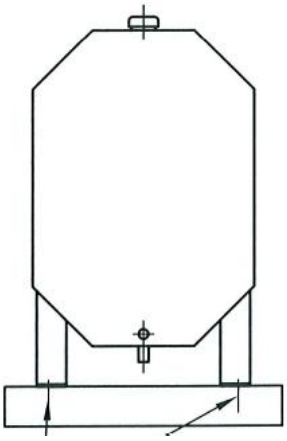
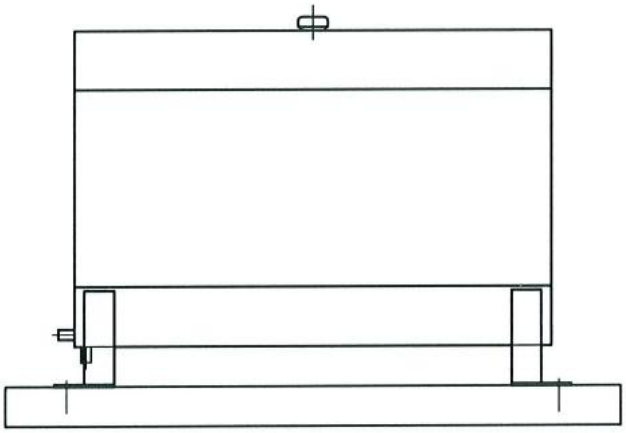
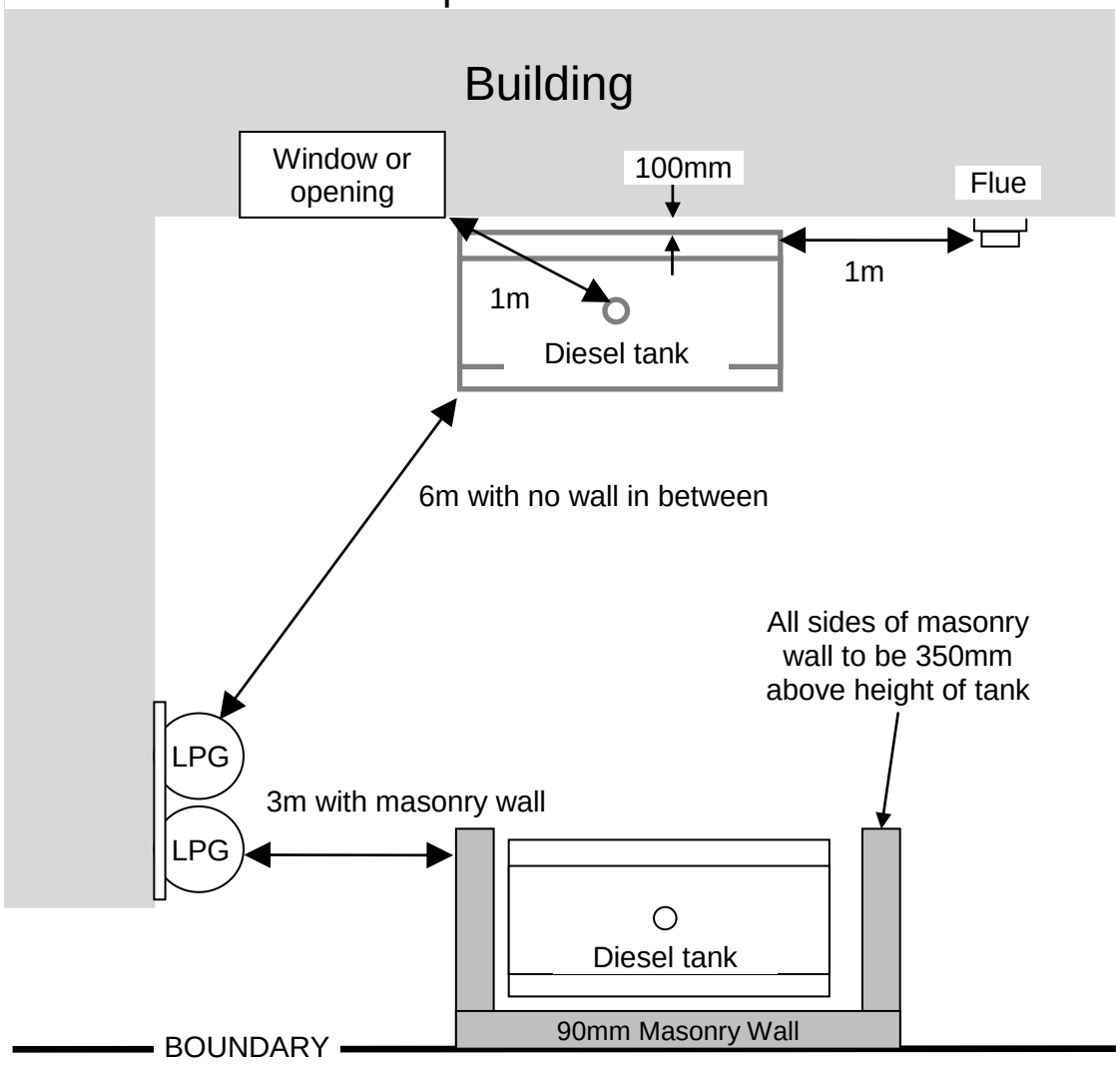
This document has been put together by CHNZ as a guide to the installer on where central heating diesel tanks can be placed. Much research and referencing of many documents has gone into this guide and is our interpretation of the minefield of documents. Whilst CHNZ cannot be held responsible for any third party installation, we are confident that the guidance here is accurate.

The main issues dealt with in this document are:





Basic minimum separation distances: not to scale



460 litre tank.
1358 mm long
559 mm wide
916 mm high
Empty weight 38kg
Full weight 410kg

Bund for 460 litre tank.
1485 mm long
630 mm wide
935 high

880 litre tank.
1358 mm long
700 mm wide
1282 mm high.
Empty weight 65kg
Full weight 810kg

Bund for 880 litre tank
1485 mm long
785 mm wide
1315 high

CHNZ diesel fuel tanks for use with diesel fired heating boilers are constructed out of aluminium to fuel tank construction standard AS/NZS 1692: 2006. Aluminium is preferred as it will not corrode like steel tanks and they are lighter and easier to handle on site.

Each tank is supplied with a threaded fuel cap and blanked off 1¼" hole to take a remote fuel gauge.

Bunds are made from galvanised steel and are made specifically for the diesel tanks.

1 Regulation referring to diesel storage tanks

The main documents relating to the installation and use of diesel tanks for diesel boiler fuel supply are:

A. NZ building Code, Verification method F3/VM1 – published by the Department of Building and Housing

B. Standard AS1691: 1985 Domestic oil fired appliances - Installation

C. Standard AS1692: 2006 Steel tanks for flammable and combustible liquids

D. Summary of Approvals of Substances transferred under the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 (As Amended) As at 15 December 2008. ERMA

E. Site and Storage Conditions for Class 3.1 Flammable liquids. ERMA

F. Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001 – Regulation 3 Reprinted as at 1 December 2008 ERMA

Heating diesel is a Class 3.1D hazardous substance and therefore the positioning of the tank relative to buildings and the design of the fuel line going to the boiler has to comply with ERMA regulations. The building code allows us to treat all forms of heating diesel, including alpine diesel as class 3.1D even though hazardous substances regulations classes alpine diesel as 3.1C for some regulations. This makes it easier to comply with the regulations.

Class 3.1D substances (diesel) do not need to be held at a ***hazardous substance location,*** *Reference: Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001 Regulation (77).*

Nor do they require the establishment of a ***hazardous atmosphere zone*** *Reference: Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001 Regulation (58).*

In the same regulations a ***controlled zone*** is defined as:-

controlled zone *means an area abutting a hazardous substance location that is regulated so that—*

(a) *within the zone, the adverse effects of a hazardous substance are reduced or prevented; and*

(b) *beyond the zone, members of the public are provided with reasonable protection from those adverse effects*

Therefore there is no need to establish a controlled zone around CHNZ diesel tanks and any rules applying to such locations and zones do not apply to CHNZ diesel tanks.

2 Secondary containment of leaking fuel, the bund

Most local Councils in New Zealand do not require secondary containment, also known as bunds, to contain any leaking fuel. However it is good practice to use a bund.

It should be noted that regulations do not require bunds to have a lid which means they can fill with water once it rains. As diesel fuel is less dense than water it would float and spill out of the bund if a leak should occur.

Therefore CHNZ bunds are supplied with watertight lids and a rubber seal around the filling spout to stop rainwater getting into the bund.

This seal means that any spilt fuel will not go into the bund unless the lid is removed befoe filling.

When fitting the bund it will be necessary to drill a hole for the fuel pipe to pass through. This hole should be sealed around the pipe with a suitable sealant to avoid potential degradation of the sealant by the fuel, or corrosion of the galvanised bund that could be caused by the use of non-neutral sealants. (ADOS Galvseal from CRC is recommended)

2.1 Fuel gauges or liquid level indicator

A liquid level indicator should be provided that shows the liquid level in relation to fill point.
Reference: Summary of approvals, Schedule 8, Clause 13

If an Apollo remote fuel gauge is to be used a hole will have to be cut through the bund above the fuel tank fuel gauge opening.

The gauge is attached to the tank with fittings provided and sealed then flashed to bund with butynol or similar.

Picture showing bunded tank with filling cap centre, with rubber seal, and fuel gauge right.

3 Support and stability of the fuel tank and bund

Most of the guidance for stability and support comes from Standard ***AS1691: 1985 Domestic oil fired appliances - Installation***

Section 3: Oil Fuel Tanks provides specific guidance on the positioning and support of the type of fuel tank supplied by CHNZ ltd.

It requires all tanks to be manufactured to standard AS 1692 which CHNZ diesel tanks comply with.

3.1 Support to carry the weight of a tank and maintain stability

The supporting structure of a tank should be able to carry the weight of the tank when full. The legs of the tank are integral to the tank which complies with the manufacturing standard. AS1691 requires clearance under the tank to be at least 150mm, however the CHNZ tanks only provide 100mm which complies with AS1692.

The area of the footings that rest on the earth should be at least $2cm^2$ for each litre of tank capacity

Tank capacity (L)	Weight when full (kg)	Minimum area of footings (m^2)	Recommended size of concrete pad*(mm)
460	410	0.096	1550 x 760 x 100
880	810	0.196	1550 x 850 x 100

* These dimensions allow sufficient margin for a bund, but not a boundary wall (add block thickness).

3.2 Attachment to a building for stability and support, including seismic support

AS1691 section 3.1.2(a) requires that the tank not be dependent on a building wall for support or stability. However this is contradicted by AS1691 section 3.1.4 which says where the height of the centre of gravity is twice the width of the support at its narrowest point you are required to fix the tank to a wall.

Section 3.1.4 doesn't apply to CHNZ tanks which have a centre of gravity height at only the same height as the width of the support.

3.2.1 Seismic Restraint

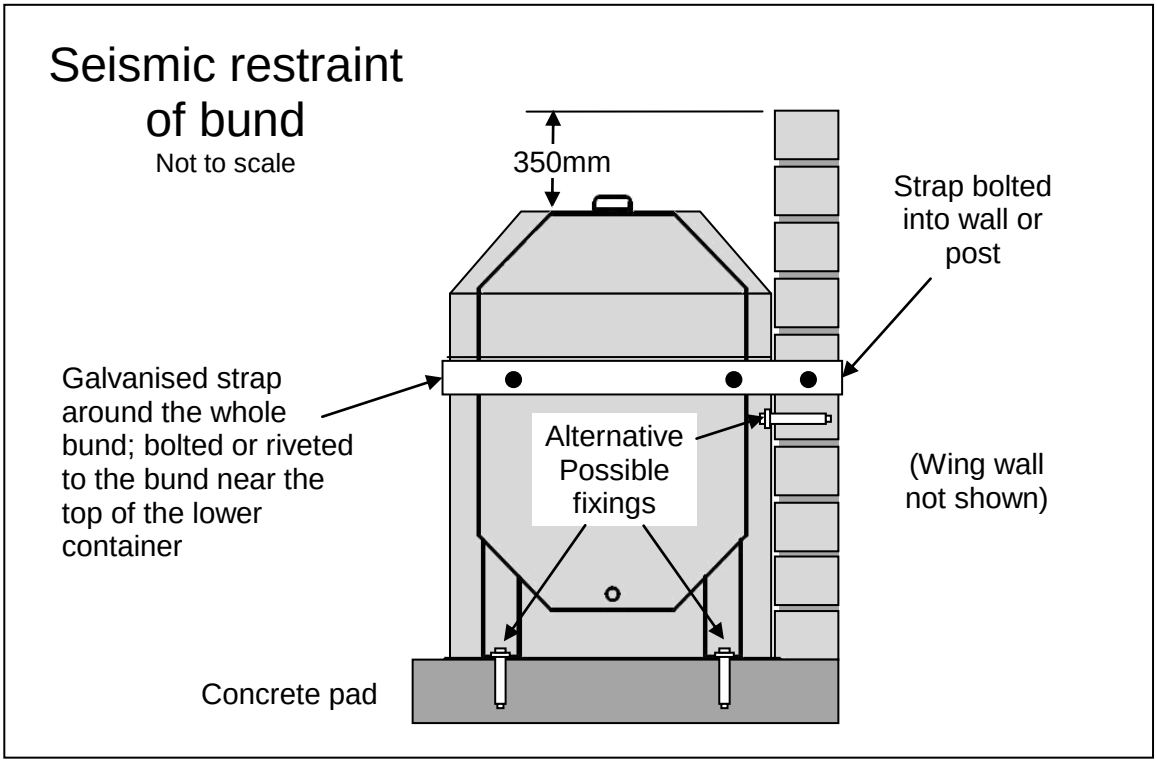
The New Zealand building code requires tanks to be restrained to prevent damage and leakage of fuel in the event of earthquakes.

No bund

If no bund is used the best method of restraint is to place the tank on a concrete pad as specified above and bolt the tank through the holes provided into the pad using M12 60mm Dynabolts.

With Bund

For seismic restraint of the bund it is possible to bolt the bund through the side near the top to a wall or post. Alternatively strap the bund like a DHW cylinder and fasten to a wall or posts.



4 Distance from an ignition source

An ignition source is defined in: *Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001 – Regulation 3 Reprinted as at 1 December 2008*

Ignition source—
(a) means any agency or agent (including any item, product, part of a facility structure, or piece of equipment) capable of igniting a flammable gas, vapour, or other form of combustible substance; and
(b) includes a fire, flame, or spark, or anything capable of producing a fire, flame, or spark

The rules applying to ignition sources apply to situations occurring within the normal operating situations of equipment. Therefore, under normal operation, there are no flammable fumes from the diesel nor is any fuel exposed to a flame or hot surface other than in the burner where it is intended to be burned.

The rules applying to any unintended ignition are mainly separation distances to reduce the damage caused by a burning fuel tank on nearby buildings or other fuel storage.

4.1 Ignition of a class 3.1D substance, diesel.

Diesel is not a volatile liquid, therefore there are no flammable vapours at ordinary temperatures that would make the atmosphere around it hazardous. This means there is no danger of ignition by spark from electrical equipment or from a nearby flame.

Diesel has a flashpoint of around 60°C which is the temperature at which it can form an ignitable mixture in air. It will still need an ignition source at flashpoint temperature to create a fire which may not be sustained when the ignition source is removed.

Diesel also has an auto-ignition temperature which is the temperature at which it will spontaneously burn in the oxygen present in air; this is around 200°C. If diesel liquid were to spill on any surface which exceeds that temperature a fire could occur. In this case the ignition source is the hot surface, which needs to be in air.

5 Location of the tank and separation distance from other objects

Both ERMA and AS1691 specify minimum distances from buildings. The ERMA regulations do not apply to CHNZ diesel tanks so the AS1691 distances are used.

5.1 Distance from buildings - ERMA

Reference: Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001 – Regulation 3 Reprinted as at 1 December 2008 ERMA
And
Reference: Summary of approvals, Schedule 8, Clause 64

ERMA regulations on minimum distance of buildings from diesel tanks do not apply to normal CHNZ diesel tank installations as the installations usually comply with clause 64 of Schedule 8 of the Summary of Approvals.

Clause 64 requires that the fuel tank not exceed 2500L; that it is installed outside; that the burner is fed by gravity; and that the fuel line reticulation complies with clause 58 of the summary of Approvals. Clause 58 refers to fuel line reticulation dealt with in a later section.

This exempts CHNZ diesel tanks from any minimum distances.

5.2 Distance from buildings AS1691

Standard AS1691: 1985 allows for a tank to be attached to a wall for stability purposes which would apply to any tank in New Zealand for the purposes of seismic restraint.

AS1691 requires that the closest the tanks can be mounted to a wall are:

Masonry or concrete wall	20mm
Timber walls	100mm

And that the closest to a building opening such as a door or window, including a fixed glazing window should be **1m**. (AS1691 3.2.4)

5.3 Distance to boundaries

ERMA do not require any minimum distances from boundaries as all ERMA regulations are concerned with the location of boundaries relative to controlled zones. Diesel tanks do not require a controlled zone so the only relevant regulations are from AS1691: 1985.

Section 3.2.7 of AS1691: 1985. A tank may intrude up to 620mm into the required minimum setback distance from any boundary other than the frontage without special conditions. Where the intrusion exceeds 620mm, the following requirements shall apply:

1. It should not be located on a street boundary without specific approval. *(AS1691 3.2.7(a))*
2. A solid masonry wall of not less than 90mm thick shall be provided between the tank and the boundary. The wall should extend at least 350mm above the top of the tank and returned at each end to conceal the tank. *(AS1691 3.2.7(b))*
3. A clear passageway past the tank at least 500m wide shall be provided. *(AS1691 3.2.7(c))*
4. The tank shall be at least 2.5m from any window of any habitable room or kitchen in any building on any adjoining property. *(AS1691 3.2.7(d))*

5.4 Distance of fuel tank from diesel boiler flue outlet

In normal operation diesel fuel will not be spilt onto the flue and so there is no danger of ignition. However it is recommended that there is a minimum distance of 1m between the nearest part of the fuel tank and the flue outlet; and that in no circumstances should the flue gases be allowed to directly impinge on the fuel tank.

5.5 Distance from other fuel storage

These distances are intended to reduce the effects if any fire should occur, which in the case of other fuel tanks is causing those to ignite as well.

5.5.1 Between diesel tanks

The distance between any stationary tanks containing class 3 substances should not be less than: (this means more than one diesel tank). *Reference: Summary of approvals, Schedule 8, Clause 19.* The exact distance between tanks is proportional to the exact size relative to the capacities specified in Clause 19.

Tanks size (L)	Minimum distance (m)
460	2.85
880	4.52

5.5.2 Distance between a diesel tank and an LPG cylinder

LPG is a class 2.1.1A hazardous substance.

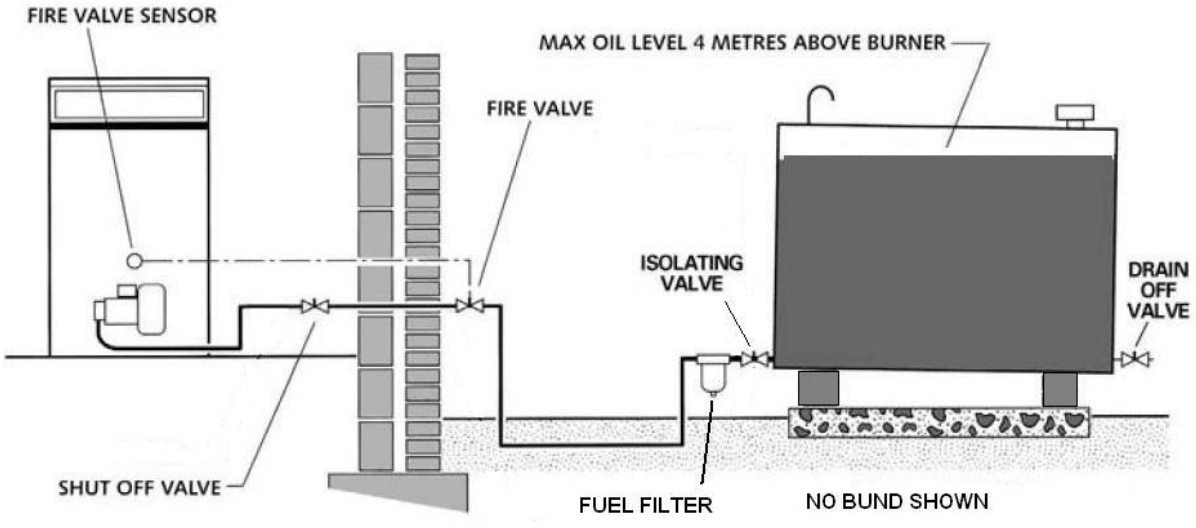
An above ground tank containing LPG must be separated from a diesel tank by not less than 6m. This clause applies up to a diesel tank size of 100,000 litres so is clearly overkill. *Reference: Summary of approvals, Schedule 8, Clause 21 (2)(a)(1)*

If there is a masonry wall separating the diesel tank from the LPG tank then the LPG tank can be 3m from the centre line of the wall. *Reference: Summary of approvals, Schedule 8, Clause 21 (2)(d)*

6 Fire fighting

Fire fighting facilities must be provided for a tank containing diesel if the tank is greater than 60m^3. Which is 60,000 litres, so that **doesn't apply to CHNZ diesel tanks**. *Reference: Summary of approvals, Schedule 8, Clause 41 (2) (c).*

7 Design and installation of fuel reticulation



Oil fuel reticulation is covered by Section 4 of AS1691 and by *Summary of Approvals, Schedule 8, Clause 58.*

Summary of approval requires pipework must be of fire resistant materials, corrosion resistant, installed securely and tested to 1.5 times working pressure of the pipework.

AS1691 also requires shut off valves at the tank outlet, so that the pipe can be isolated and the filter serviced. If the fuel tank is more than 3m from the building an additional isolating valve should be placed where the pipe enters the building.

One of these valves should be clearly labelled as an emergency shut off valve.

A filter should be provided that is accessible for cleaning. Is it preferable to have fuel taps and filters outside or inside the bund?

Summary of Approvals, Schedule 8, Clause 56 (2)(a)(vi) requires that the fuel is cut off if the air above the burner (inside the boiler) reaches 90°C. This can be achieved with a fire valve.

A fire valve should be located outside the building with its activation sensor being mounted inside the boiler casing. Fire valves from CHNZ are resettable.

8 Relevant Rules from the Summary of Approvals

Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001 – Regulation 3 Reprinted as at 1 December 2008 ERMA

77 Requirement to establish hazardous substance location

(1) The person in charge of a place where any class 2, 3, or 4 substance is located must establish in that place 1 or more hazardous substance locations where such substances are to be situated if the substance is present—

(a) in a quantity exceeding that specified for in it table 4 of Schedule 3; and

(b) for a period exceeding—

(i) 18 hours, in the case of a substance that is not subject to the tracking provisions of the Hazardous Substances (Tracking) Regulations 2001:

(ii) 2 hours, in the case of a substance subject to the tracking provisions of those regulations.

Table 4 of Schedule 3

HSNO classification	Quantity beyond which conditions apply for closed containers	Quantities for which conditions apply when use occurring in open containers
3.1A	20 L	20 L
3.1B	100 L in containers greater than 5L 250 L in containers up to and including 5L	50L
3.1C	500 L in containers greater than 5L 1,500 L in containers up to and including 5L	250L

58 Requirement to establish a hazardous atmosphere zone

At any place containing class 2.1.1A, 2.1.1B, 2.1.2A, 3.1A, 3.1B, or 3.1C substances in quantities in excess of those specified in table 3 of Schedule 3, the person in charge of the substances must ensure that a hazardous atmosphere zone is established that complies with

(a) AS/NZS 2430.3; or

(b) AS 2430.1: 1987 and NZS 6101.1: 1988; or

(c) a code of practice approved by the Authority that specifies hazardous atmosphere zones equivalent to the requirements specified in paragraphs (a) and (b) and takes into account

(Schedule 8 Dangerous Goods and Scheduled Toxic Substances Summary of Approvals)

Stationary container system used in connection with oil burning installations

56 Installation of stationary container system used in connection with oil burning installations

(1) This clause applies to every stationary container system that is—

(a) [Repealed

(b) used to contain a class 3.1 hazardous substance; and

(c) used to provide fuel to an internal combustion engine or burner.

[(1A) This clause does not apply to a stationary container system that-

(a) does not have a service tank; and

(b) has a capacity less than-

(i) 500 litres for class 3.1D substances supplying an internal combustion engine; or

(ii) 50 litres for class 3.1A, 3.1B and 3.1C substances supplying an internal combustion engine; or

(iii) 60 litres for class 3.1 substances supplying a burner.

(2) Every stationary container system to which this clause applies must be installed—

(a) to ensure that—

(i) the hazardous substance does not discharge or leak from any part of the stationary container system within the building in which the stationary container system is located; and

(ii) any transfer point used for filling the stationary container system with the hazardous substance is located outside the building in which the stationary container system is located; and

(iii) any vent pipe, relief valve, or overfill pipe that is part of the stationary container system terminates outside the building in which the stationary container system is located; and

(iv) exhaust fumes created as a result of using the hazardous substance are discharged into a safe place that is outside the building in which the stationary container system is located; and

(v) the flow of hazardous substance to the equipment of the stationary container system is modulated to match the capacity of the equipment; and

(vi) the supply of hazardous substance to the equipment of the stationary container system, or any pump used to supply the substance to that equipment, is cut off if the temperature [of the air above the engine reaches 90ºC; and

(vii) if the hazardous substance spills or leaks into the secondary containment system of the stationary container system, any pump that is part of the stationary container system is located so that it will not come into contact with the spilled substance; or

(b) in accordance with a code of practice approved by the Authority under section 79 of the Act that specifies requirements equivalent to the requirements in paragraph (a).

[(2A) Despite subclause (2)(a)(ii), a tank used to contain a class 3.1D substance may be directly filled from a nozzle if-

(a) there is spill containment capacity of 15 litres around the fill point; and

(b) the maximum tank size is no greater than 1,000 litres; and

(c) the requirements of sections 5.3.2(a) to (f) of AS 1940 are complied with; and

(d) the fill point is clearly identified.

[2B Despite subclause (2)(a)(ii), a tank used to contain a class 3.1D substance may be directly filled utilising a connection that is both liquid tight and vapour tight and which seals without spillage when disconnected (dry break coupling) if—

(a) the tank size is no greater than 15,000 litres; and

(b) the fill point is clearly identified; and

(c) there is a manual valve directly upstream of the coupling; and

(d) the requirements of sections 5.3.2(a) to (f), 5.3.3 (a) to (c) and 5.3.4 of AS 1940 are met.

(3) A stationary container system to which this clause applies must have means of preventing the substance from draining from any stationary tank that is part of the stationary container system in the event that pipework that is part of the stationary container system fails. Examples of the means that may be included are anti-siphoning devices, and non-return or other valves.

(4) The means of preventing the substance from draining referred to in subclause (3) must be fitted as close as practicable to each stationary tank that is part of the stationary container system to which this clause applies.

58 Requirements for pipework of stationary container system

(1) This clause applies to pipework that is part of a stationary container system to which clause 56 applies.

(2) Pipework to which this clause applies must—

(a) be—

(i) Constructed of materials that are fire-resistant; and

(ii) constructed of corrosion-resistant materials that do not react with the hazardous substance, or interact to significantly affect or weaken the pipework, so that the requirements of this Scheduleule cannot be complied with; and

(iii) installed securely; and

(iv) tested to ensure that the pipework does not leak at a pressure that is the greater of—

(A) 350kPa; or

(B) 1.5 times the maximum working pressure of that pipework; or

(b) be constructed, installed, and tested in accordance with a code of practice approved by the Authority under section 79 of the Act that specifies requirements equivalent to the requirements specified in paragraph (a).

(3) For the purposes of subclauses (2)(a)(i) and 2(a)(ii), pipework is constructed of a fire-resistant and corrosion-resistant material if it is constructed from—

(a) solid-drawn steel tubing; or

(b) mild-steel or wrought iron tubing; or

(c) solid-drawn copper tubing[; or We also sell plastic fuel line and we have said that this is fine below ground. Is this not the case?

[(d) short lengths (not longer than 500mm [unless it is impractical to use pipework of the type specified in subclauses 3(a) to 3(c) in which case not longer than 1 metre) of stainless steel [or high tensile steel braided hose.

(Scheduleule 8 Dangerous Goods and Scheduled Toxic Substances Summary of Approvals)

64 Supply of certain hazardous substances to domestic oil-burning installations

(1) This clause applies to a stationary container system to which clause 56 applies that is used to contain—

(a) a class 3.1C hazardous substance that has a flashpoint of not less than 50ºC; or

(b) a class 3.1D hazardous substance.

(2) Despite clauses 56 to 63, a stationary container system used to supply a domestic oil-burning installation may be installed **in a building** if—

(a) the stationary tank used to store the substance that is part of the stationary container system—

(i) does not exceed 2,500 litres in capacity; and

(ii) is installed **outside the building**; and

(iii) if the capacity of the stationary tank is greater than 1,200 litres, has a secondary containment system; and

(b) the burner of the stationary container system is fed by gravity; and

(c) any valves required by clause 56(3) are fitted outside the building; and

(d) any pipework that forms part of the stationary container system complies with clause 58.

Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001 – Regulation 3 Reprinted as at 1 December 2008 ERMA

Conditions Relating to the Unintended Ignition of Flammable Liquids not Located at Hazardous Substance Location

---

21 Person in charge of flammable liquid must comply with this Part

(1) The person in charge of a flammable liquid must ensure that the adverse effects of unintended ignition of the flammable liquid are controlled in accordance with this Part.
(2) Subclause (1) does not apply if a provision of these conditions states that a different person is responsible.

22 Separation of above ground stationary tank, transportable container or tank wagon containing a flammable liquid from areas of high and low intensity land use

(1) **This clause does not apply to—**

(a) a domestic oil-burning installation that—

(i) includes a stationary tank that has a capacity that does not exceed 1,200 L; and

(ii) complies with clause 64 of Schedule 8 of the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004; or

(b) a stationary tank that complies with clause 62(3)(b) of Schedule 8 of that notice.

(2) An above ground stationary tank or transportable container that complies with Chapter 6.7 of the UN Model Regulations, or a tank wagon, that contains a flammable liquid that is present in a location that is not a hazardous substance location, must be separated from—

(a) an area of high intensity land use by not less than the distance specified in whichever of column 2 (for 3.1A, 3.1B or 3.1C liquids) or column 3 (for 3.1D liquids) of Table 5 as shown opposite the capacity of the above ground stationary tank, or transportable container that complies with Chapter 6.7 of the UN Model Regulations or tank wagon, in column 1 of that table; or

(b) an area of low intensity land use by not less than the distance specified in column 4 of Table 5 as shown opposite the capacity of the above ground stationary tank, or transportable container that complies with Chapter 6.7 of the UN Model Regulations or tank wagon, in column 1 of that table.

(3) Where an above ground stationary tank, a transportable container or a tank wagon, having multiple compartments is installed, the separation distance to areas of high intensity land use and low intensity land use will be based on the aggregate volume of the compartments and the lowest flash point substance stored in any of the compartments.

Table 5. Calculation of distances (this table has been edited to only include distances relevant to class 3.1D and for the CHNZ tank sizes.)

Capacity (L)	**Area of high intensity land use (m)**
Column 1	**Column 3**
	3.1D
Up to 600	0
1,000	1.5