GUIDELINES FOR SAFE ABOVE GROUND FUEL STORAGE ON FARMS AND INDUSTRIAL SITES

AIP GL12 - 2003

Australian Institute of Petroleum

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GUIDELINES FOR SAFE ABOVE GROUND FUEL STORAGE ON FARMS AND INDUSTRIAL SITES

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SECTION 1: SCOPE AND PURPOSE

1.1 Scope

This Guideline covers overhead storage tanks for petroleum fuels raised above ground level on support structures such as metal legs, situated on premises other than those belonging to the fuel supplier, and not exceeding 10000 litre capacity. Typically, such tanks will be located on premises such as farms and light commercial sites.

In this Guideline, these tanks are referred to as Above Ground Tanks.

1.2 Purpose of the Guideline

The purpose of this guideline is to assist the owners of Above Ground Tanks, and people associated with fuel delivery, to evaluate Above Ground Tank fuel storage systems to ensure the systems are sound and can be supplied safely.

Inadequate attention to the manner in which fuel is stored and poor access for delivery drivers to safely fill Above Ground Tanks may lead to risk of serious injury or serious environmental harm. The purpose of the Guideline is to minimise these risks.

1.3 Legal Obligations

Workplace injury and environmental harm can have a devastating and costly impact on employers and the community. Each State in Australia has introduced legislation in the form of Acts and Regulations for Occupational Health & Safety (OH&S) and for protection of the environment. Both owners of Above Ground Tanks and fuel suppliers have obligations under the respective State legislation, breaches of which may carry heavy penalties.

In complying with the requirements of the OH&S legislation the fuel supply company must not place their delivery drivers in a situation that compromises safety, in order to deliver fuel to an unsafe facility. In meeting the requirements of the environmental legislation it is the owner's responsibility to ensure that the Above Ground Tank does not cause environmental harm.

The procedures and practices outlined in this guideline will assist owners of Above Ground tanks to meet their "*duty of care*" obligations under State OH&S and Environmental legislation for fuel storage.

However, it cannot advise on all aspects covered by legislation, and owners of tanks should ensure that they are aware of all these aspects.

1.4 Referenced Standards

The following are referenced in this Guideline:

The Australian Dangerous Goods Code

Standards Australia
AS 1692 Tanks for flammable and combustible liquids

AS 1940 The storage and handling of flammable and combustible liquids

AS 1657 Fixed platforms, walkways, stairways and ladders – Design, construction and installation

1.5 Format of the Guideline

The Guideline is composed of a checklist for Above Ground Tanks, followed by explanatory text on the hazards outlined in the checklist.

SECTION 2: FACILITY CHECKLIST

2.1 The Use of the Checklist

Owners of Above Ground Tanks can use the checklist contained in this Section, and the supporting commentary, prior to ordering a fuel delivery, to ensure that their fuel storage facility meets the required standard to enable a fuel delivery to proceed. It is suggested that owners keep a copy of the completed checklist on file.

The Fuel Supply Company will carry out a check of a fuel storage facility using this checklist and guideline to assess the suitability of the tank for filling. Tanks need to be assessed in terms of:

- Structural safety of the tank, support structure, foundation, ladders and fittings;
- Hazards associated with storing flammable and combustible liquids (especially regarding isolation distances and the environment); and
- Safe access to the fuel storage facility.

This guideline provides additional information for delivery drivers when determining if a fuel storage facility is of an appropriate standard for them to make a delivery. Fuel should not be delivered to a facility that does not meet the required standard.

2.2 Particular Hazards with Above Ground Tanks

Above Ground Tanks covered by this Guideline are mounted on stands so as to make use of gravity to feed the fuel. This can create hazards that require managing (e.g. when climbing the structures to fill the tanks, or through collapse of the fuel tank support structures). These hazards associated with overhead tanks can be summarised as follows:

- Access to the tank;
- The material from which the tank is constructed;
- The supporting structure of the tank;
- The foundations for the tank support;
- The ladder;
- Earthing of the tank;
- The hose and fittings; and
- Location of the tank to ignition sources and other Dangerous Goods

2.3 Procedure for Use of the Checklist

The following procedure overleaf is recommended for the use of the checklist by owners of Above Ground Tanks, and by Fuel Supply Companies.

Procedure for Evaluation of Farmer Owned Fuel Storage Systems	
1	The owner assesses the tank using the Above Ground Tank Fuel Storage Checklist before ordering a fuel delivery, and repairs any faults found (refer section 4.4 Repairs to Tanks).
2	The fuel supplier assesses the tank against the requirements in the Checklist for structural safety, isolation distances and access prior to delivering fuel: (a) If the tank meets the requirements — Fuel is delivered or (b) If the tank fails to meet the requirements — No fuel delivery.
3	The fuel supply company advises the farmer in writing of any reason for the tank failing to meet the required standards, and confirms which faults need to be repaired before supply can be made.
4	The owner either: (a) Repairs the faults — Fuel is delivered or (b) Does not repair the faults — No fuel delivery.

Safe Above Ground Tank Fuel Storage Checklist

	Yes	No	Comments
Site Access			
Q Is there safe access to the fuel storage facility? *Consider: access from public road, housekeeping, tripping hazards, vegetation, ground surface, other machinery, weight and size of tanker in respect of road access, bridges, irrigation channels, trees, overhead wires and work area around tanks*. (Page 6)	◯	◯	
Q Is the area under and around the tank stand free from equipment? *Consider: farm implements, accumulated rubbish, obsolete equipment*. (Page 6)	◯	◯	
Q Is there safe access to dip and fill points? *Consider ladders, handholds, platforms, visibility of fill points*	◯	◯	
Above Ground Storage Tanks			
Q Is the tank suitable for storage of flammable or combustible liquid and of sound construction? *Consider: tank material and construction, physical condition of tank (corrosion), product labelling, hazchem signage, venting, filling location, valves, liquid level gauging*. (Page 7)	◯	◯	
Q Are fittings, pumps and dispensing equipment free from leaks and undamaged? (Page 10)	◯	◯	
Structural Safety of Tank Supports			
Q Is the tank supporting structure sound and stable? *Consider: corrosion, buckling, bent legs, bracing*. (Page 11)	◯	◯	
Q Are tank supports on a solid, level foundation? *Consider: stability and type of foundation, ponding of water, type of soil.* (Page 13)	◯	◯	
Q Is the ladder securely fixed to the tank, and providing safe access to tank dip and fill point? *Consider: corrosion, angle of ladder, hand holds, standing platform, height to first rung.* (Page 15)	◯	◯	
Hazards Associated with Flammable Liquids			
Q Are ignition sources 15 metres away from fuel storage? *Consider: naked flames, smoking, electrical equipment*. (Page 17)	◯	◯	
Q Are chemicals and fertilisers stored away from fuel? (Page 17)	◯	◯	
Health Risks			
Q Are handling methods designed to avoid inhalation or absorption of fuel? (Page 19)	◯	◯	
Emergency Procedures			
Q Have emergency procedures been established and is equipment available to deal with an emergency? (Page 19)	◯	◯	
Training and Supervision			
Q Is there adequate knowledge of the hazards that exist and precautions to be taken? (Page 20)	◯	◯	

SECTION 3: POTENTIAL HAZARDS

3.1 Access to the Fuel Storage Facility

Q ***Is there safe access to the fuel storage facility?***

There are four aspects to safe access for fuel delivery to farm or commercial/industrial premises:

3.1.1 Access to the Premises from a Public Road

The delivery tanker must be able to safely enter the property from a public road.

3.1.2 Access to the Site of the Fuel Storage Facility via the Road on the Premises

Consider all-weather capability, overhanging trees, powerlines, the strength of bridges and culverts, turnarounds

Access to the tank must be safe for the delivery vehicle being used by the fuel supplier. The access track should be constructed so that it can be used in all weathers and be in a state of good repair with all overhanging trees trimmed back to avoid damage to the delivery tanker. Consideration will need to be made for overhead powerlines when positioning the fuel tank.

Any culverts or bridges on the road must be able to take the weight of a fully laden fuel delivery tanker. Owners have a duty of care to provide safe access for persons required to enter their properties, which includes ensuring bridges, culverts, etc. can safely be negotiated by the fuel tanker. If there is any doubt, the owner may be asked to supply appropriate evidence that the structures can hold the vehicles required to use the access.

Consideration should be given to providing turnarounds so that the delivery tanker does not have to reverse to the site of the fuel tank, thus minimising the necessity for difficult or dangerous manoeuvring.

3.1.3 Access around the Above Ground Tank

Q ***Is the area under and around the tank stand free from equipment?***

The area between the delivery tanker and the filling point of the fuel tank must have adequate clearway — it should be free of all rubbish, obstacles, machinery, junk, etc. within 3m of the legs, so that the driver can safely move between the truck and the ladder to the fill point. The area beneath the fuel storage tank is not to be used as a storage area for equipment or obsolete machinery.

The area within 3 m of the tank must be free of all obstacles.

3.1.4 Access to Dip and Fill Points

Q ***Is there safe access to dip and fill points of the tank?***

The tank delivery fill point must be clear of anything that prevents the nozzle of the delivery hose being totally inserted. If the dip and fill points are above ground level, they should be able to be accessed and opened from a ladder without requiring excessive reaching. Hand-holds must be in place to prevent the delivery driver falling whilst dipping or filling the tank.

Accessing the dip and fill points should not require the driver to climb off the ladder on to the tank or other structures, unless using a correctly constructed access platform. Ladders and platforms should be constructed to meet the Australian Standard AS1657. The driver should be able to clearly see into the fill point from the ladder while refueling the tank.

No excessive reaching, handholds in place, ladders and platforms to AS1657, visibility of fill point

3.2 The Tank

Q ***Is the tank suitable for storage of flammable or combustible liquid and of sound construction?***

3.2.1 Design and construction

Tanks used for the storage of petroleum fuels are to be constructed to the Australian Standard "Tanks for Flammable and Combustible Liquids" AS1692 which specifies the requirements for design and construction.

The tank must meet AS 1692, have a vent, a measurement of the liquid level, a fill point, and product identification

It is a requirement of delivery drivers to ascertain the liquid level before and after filling the tank and to record this in their documentation. The tank must therefore have a suitable means of ascertaining the liquid level, as outlined in AS 1940.

This may be in the form of:

- Mechanical level gauge, operating on a float system or product pressure; or
- Dip stick, calibrated in litres; or
- Sight glass with adjacent calibration in litres. This should be fitted with an isolation valve on an entry to the tank lower than the possible minimum liquid level.

Guidelines for Liquid Level Measurement on Tanks
• Requirements of AS 1940, Section 5.3.4, must be met. • The monitor or gauge should show the maximum safe fill capacity of the tank in litres. • The gauging system must be in good working order.

The tank must be able to adequately vent during filling or drawing from the tank so as not to cause structural damage to the tank.

Vents of suitable size, checked regularly to ensure clear

The tank needs to have a vent suitably sized for the rate at which product is to pumped into the tank or drawn from the tank, and to allow the tank to "breathe" as changes in temperature occur. Refer to AS1940, Section 5.5 for further details. Tank vents need to be checked periodically to ensure that they have not become blocked (e.g. by mud wasp nests).

Guidelines for Venting of Fuel Tanks
• Each tank must be fitted with a vent appropriate for the product being stored (free vent for diesel or a Pressure Vacuum vent may be used for motor spirits to reduce losses from vaporisation). • Tank vents must vent to the exterior of any building. • The size of any free vent or PV vent should be such that pressure or vacuum resulting from filling, emptying, or atmospheric temperature change will not cause the maximum allowable stress for the tank to be exceeded (vent size will be determined at manufacture according to AS1692 and AS1940). • Vents outlets should be 4m above ground level (for flammable liquids) and a minimum of 150 mm above the top of the tank shell.

Safe ladder access for dipping and filling the tank must be provided (refer page 16). Bottom fill equipment and liquid level gauging eliminates the hazard of a person accessing the top of the tank. Any bottom fill equipment must have an isolation valve and dry-break fitting with a dust cap fitted when not in use.

Safe ladder access, bottom fill equipment to have isolation valve and dry-break fitting with dust cap

205 litre drums (or other comparable size drums) are not acceptable as tanks, and should not be filled due to associated safety risks which could result in an explosion.

3.2.2 Tank Soundness

Tanks must be of sound construction and suitable for filling with petroleum products. This means that there are no signs of leaks, or major deformations of shape (cracks, dents). These deformations will move the tank's center of gravity and also will establish stress points where corrosion will occur more rapidly, or stress the supporting framework.

All fittings on the tank must be in good condition and free from leaks. If a dispensing hose and nozzle is fitted it should have an isolation valve at the tank outlet.

Tanks must meet AS1692, have no signs of leaks, major dents, cracks or corrosion. Fittings must be sound, with no leaks

There must be no corrosion that could materially affect the tank's integrity. As with supporting structures, rust can have a major impact on the soundness of a fuel tank. The degree of damage caused by rust is dependent on the thickness of the steel used in the tank's manufacture, and the depth of the rust has penetrated. AS1692 outlines the minimum thickness of plate used in tank construction with which current manufacturers of fuel tanks comply.

Areas at particular risk of rust damage are:

- Top of tanks, especially if they are cylindrical tanks mounted vertically (on end);
- Underside of tanks;
- Fill point, outlet and drain plug;
- Welded seams; and
- Surfaces and joints between the tank and the support structure.

Guidelines Regarding Rust on Tanks
• Tanks should have a good paint coating as protection from corrosion. • Any rust present on tanks should be dry surface rust only with no pitting that may impact on the tank's structural integrity. • If there is evidence of pitting deeper than one third of the metal thickness, then the tank should be inspected by a qualified fuel tank repairer. • Any "wet" rust (fuel is leaking through the rusted area) is totally unacceptable. • Regular draining of water from tanks will help to prevent tanks corroding internally and to maintain fuel quality.

Tank Signage

Petrol is a flammable liquid, classed as a Dangerous Good under the Australian Dangerous Good Code. Diesel is a Combustible Liquid.

Tanks to have Hazchem signage,product identification, No Smoking signs,and DG Class Diamond if appropriate

Tanks used for the storage of fuel should have appropriate signage, including Hazchem signage when appropriate, No Smoking warnings, and identification of the product contained in the tank.

Generally, petroleum fuels carry the Hazchem code 3[Y]E. Tanks containing petrol or other flammable goods are to be labelled with the placarding requirements of the relevant State or Territory legislation covering the storage and handling of dangerous goods. See Section 4.3

3.2.3 Fittings, Pumps and Hoses

Q ***Are fittings, pumps and hoses free from leaks and undamaged?***

The most likely environmental and safety risks associated with fuel tanks are from leaks, or from careless overflows during fuel transfers (either at filling or when using fuel from the tank).

Pumps, fittings and hoses require periodic inspection, and if found to be in poor condition should be fixed immediately. Equipment that is allowed to go on leaking will cause contamination to soil, create an unsafe situation and create unnecessary costs for the owner over a period of time.

The Cost of a Drip

A valve leaking one drip every 6 seconds equals 4.3 litres every day or about 1600 litres every year. Each dripping line could be costing the owner over $1000 per year

Pumps, fittings and hoses need regular checks, repair if in poor condition

In addition to the damage to the environment and the safety issues, fuel leaks can cost the owner of the tank a great deal of money over a period of time. See Section 4.1

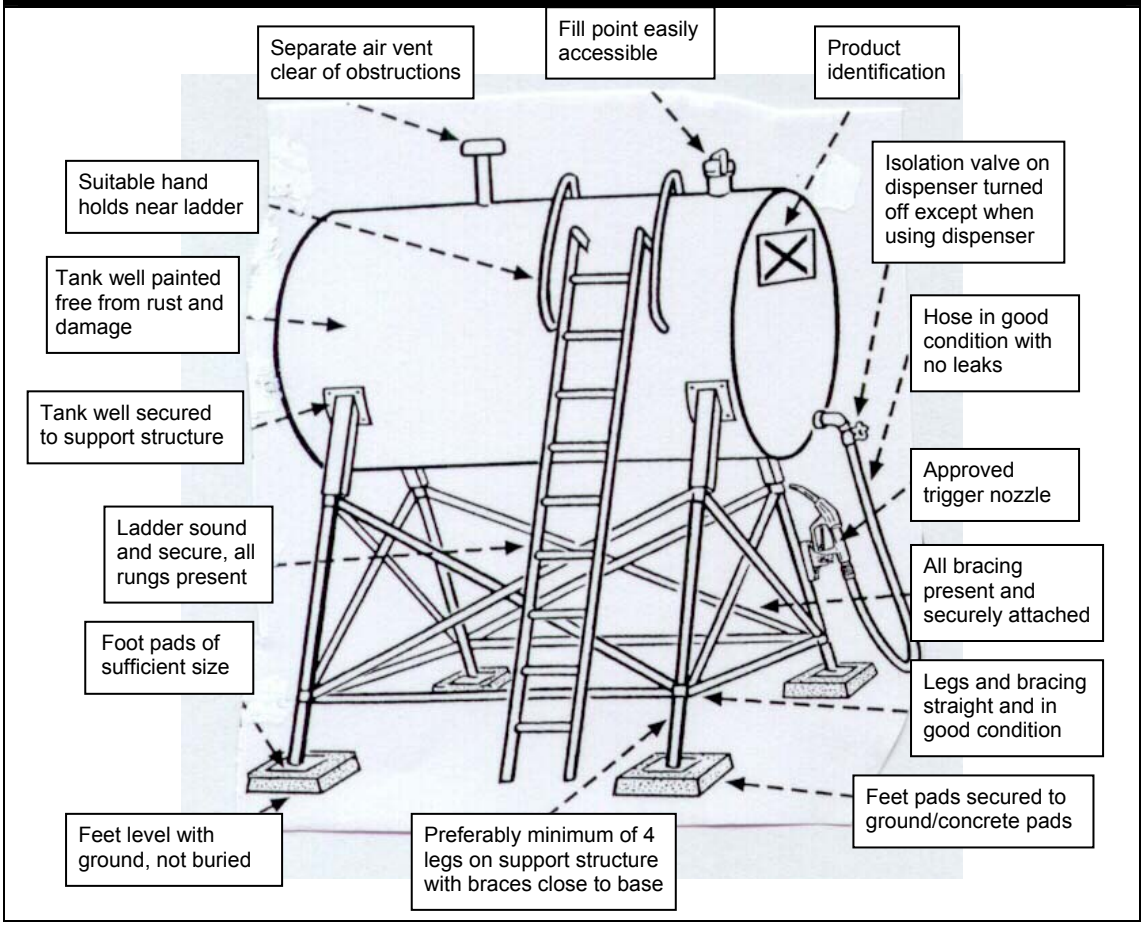
Guidelines for Hoses, Pumps and Fittings on Fuel Tanks

- Dispenser hoses must be an approved fuel type hose with an internal bonding wire capable of dissipating any static electricity charge generated during dispensing. The hose must be in good condition and free from perishing.
- There must be an isolation valve on the tank outlet before the dispensing hose to ensure there is a means to isolate the tank contents should the dispensing hose or nozzle develop a leak. The isolation valve should be made of steel and be able to be locked to prevent unauthorised release of product.
- The hose must be fitted with an approved fuel dispensing nozzle with a trigger valve mechanism.
- All fittings, pumps, valves and hoses must be free from any leaks, or be repaired or replaced if not correctly functioning.
- Pumps must be of an approved type for the pumping of fuel.

3.3 Structural Safety of Tank Supports

Q ***Is the tank supporting structure sound and stable?***

Characteristics of a Safe Above-Ground Overhead Fuel Tank



3.3.1 Potential Problems

There are a number of reasons why a tank and its support structure may be unstable:

- Basic design problems of the support structure;
- Unstable foundations;
- Parts of the support structure missing (e.g. lack of braces, bolts, etc.);
- Poor attachment between the tank and the legs, sometimes due to joints breaking;
- Lack of maintenance, often associated with serious rusting; or
- Legs not being tied to the ground (with overhead tanks, each leg of the support structure should be secured to the ground).

3.3.2 Effect of Rust on the Soundness of the Supporting Structure

Rust (corrosion) can have a major effect on the strength of both the supporting structure and the tank.

Rust or damage to braces can weaken the supporting structure and allow the tank to topple. Remove rust and repaint.

The key to preventing damage through rust is maintaining an effective maintenance regime. Rust should be

removed as soon as it appears by use of a wire brush, and the metal repainted using a rust-inhibiting undercoat and top coat (refer to section 4.4 Repair to Tanks).

The main areas on the supporting structure where rust may be a concern are:

- The connections, bolts, welded points and main contact support to the tank itself;
- All welded joints, especially between the ladder rungs and the legs;
- Welded sleeves used on some stands to fit legs or braces;
- The joint between feet and legs, especially if the feet have become buried.

3.3.3 Attachment of the Fuel Tank to the Structure

Tank must be soundly attached to support structure

The tank must be soundly attached to the support structure so that there is no danger of the tank falling off the stand. Where legs of the support structure are slotted into a sleeve on the tank, the legs should be pinned or bolted into the sleeve so that there is no danger of the legs pulling out from the stand support.

Guidelines for the Supporting Structure
• While minor surface rust is acceptable, any rust pitting will have an effect on the strength of the legs, and of the strength of the attachments. Rust should be removed as soon as it appears, and the metal repainted using a rust inhibiting paint.
• The tank should be securely attached (either pinned or bolted) to the supports.
• Bracing connections to the leg base must be located as close to the tank stand footing as practical.
• The supporting structure must be rigid with no movement when shaken and have no missing bolts or braces.

3.3.4 Soundness of the Bracing of the Supporting Structure

The structural integrity of the support structure is maintained through bracing. Examples of possible bracing are:

- Diagonal leg bracing to prevent racking or twisting;
- Horizontal leg bracing designed to prevent the spreading of the legs (spreaders). This bracing should be as close to the footing as practical as it is usually working under tension; and
- Support bracing between the tank and the support structure.

It is important that all legs are adequately braced to prevent distortion or collapse of the support structure.

Legs should be adequately braced. Particular attention should be paid to bent legs and bracing, and modifications to the support structure

The legs and bracing of fuel tank stands are often bent, usually as a result of being hit by machinery. Any bending of the support structure will decrease its strength and the ability to support the tank, especially when the tank is full. Distortion of the supporting structure can be a hazard during the refilling operation because of the different stresses that are being exerted on the stand. A bend in either a leg or in the bracing may indicate unequal loading on legs.

Modifications to the tank support structure, such as extending the legs, mounting the legs on blocks or putting tanks on platforms so as to raise the head of the tank, can result in decreased stability of the support structure and increase the risk of the tank tipping over.

Guidelines for Bracing and Stability of the Supporting Structure

- All leg bracing fitted to the support structure must be present and attached.
- The tank supporting structure legs and braces must not be twisted or buckled.
- Physical damage of the legs or leg bracing is not acceptable, if damage occurs the legs or braces should be repaired or replaced.
- If rod and sleeve system used to attach the supporting structure to the tank, the rods should be pinned or bolted at the sleeve.
- Any modifications to the support structure must not decrease the stability of the tank.
- Where tank support structures are modified, modifications must meet the requirements for the supporting structure guidelines.
- All modification to height must meet state legislative requirements for working at height with proper access provided.
- The tank must not sway when a person applies a moderate force to a leg of the supporting frame at approximate shoulder height.
- Refer to AS 1940, Section 5.10, for more details.

3.3.5 Foundations to the Support Structure

Q ***Are tank supports on solid, level foundation?***

Tank supports must have suitable foundations to take into account the weight of the tank when full and to prevent subsidence in all weather conditions. This is best achieved by mounting the tank legs on a concrete pad, or on concrete footings (the recommended minimum size for footings is 600mm x 600mm x 300mm). Alternatively, the tank stand should be on a solid foundation (such as compacted ground) that is well drained and will not become boggy when wet.

The legs must have sufficient size pads or feet to distribute the weight of a full tank of product without undue settlement of the ground. It is important that the feet of the support structure are attached to the foundation or the ground so that the structure will not tip when being climbed. This can be achieved through the use of anchor bolts on the concrete footing, or where concrete is not being used, by pinning the feet to the ground. Care should be taken if using a stake to ensure additional hazards are not introduced, e.g. the risk of someone falling on the stake. Timber footings do not provide a good footing as they are prone to white ant infestation or rotting which may not be detected until the tank topples.

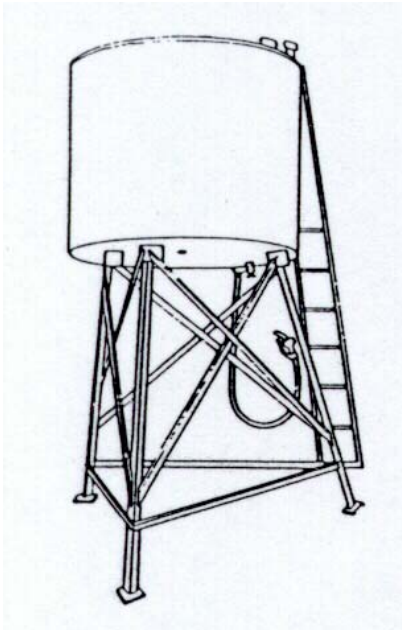
Tank foundations must be able to take the weight of the tank when full, without ground subsidence. Feet must be of a suitable size, level, attached to the foundation, and not buried

The leg feet must be level, and on top of the ground or concrete. The feet must not be buried. Otherwise rapid corrosion can occur, which cannot easily be identified.

Guidelines for Tank Supporting Footings

- The tank footings must be located on a solid level site, either compacted material or concrete where there is no danger of the tank toppling due to subsidence of the ground or uneven support of the legs.
- If plough disks are used as footings they should be firmly founded into solid ground.
- All feet must be level.
- All feet must be pinned or attached on top of the foundation or ground, and not buried.
- No water ponding should be able to occur around the footings.
- The legs must have sufficient size pads or feet to distribute the weight of a full tank of product without undue settlement of the ground.

3.3.6 Tripod Supporting Structures



Tripod supporting structures are the least desirable for fuel storage tanks due to their inherent instability. Tripod stands are not to be used on tanks greater than 2200 litre capacity. Particular attention needs to be paid to tripod tank supports to ensure that they are in sound structural condition and that they have adequate footings (as above).

The risks when using tripod stands can be reduced provided that the standards specified in this guideline are adhered to, especially with regard to:

- Ensuring that the tripod stand is firmly attached both to the tank and to the ground;
- Ensuring that all bracing is present, and that the legs and bracing are straight; and
- Ensuring that effective maintenance is carried out.

If tripod stands cannot be maintained to the standard outlined in this Guideline, they should not be filled by a fuel supply company.

Guidelines for Tripod Tank Supporting Structures
• The tank must be located on a solid level site, either compacted material or concrete where there is no danger of the tank toppling due to subsidence of the ground or uneven support of the legs. • If plough disks are used as footings they must be firmly founded into firm ground. • All feet must be firmly attached on top of the foundation or ground, they shall not be buried. • The legs must have sufficient size pads or feet to distribute the weight of a full tank of product without undue settlement of the ground. • All feet must be level. • The supporting stand must be in good order with no bending or buckling of legs or bracing and horizontal bracing will be as close to the base pads as practical. • The tank will be such that it cannot topple while it is being filled.

3.3.7 Access Ladder

Q ***Is the ladder securely fixed to tank and provide safe access?***

Access to overhead tanks is usually through the use of a ladder which must be securely attached to the structure. Access to the top of many tanks means that the delivery driver will be "working at height". Each State has the requirements for working at height specified in the OH&S legislation. This means that there must be sufficient controls in place to prevent a person working at height from falling. AS1657,the Australian Standard for Fixed Platforms, Walkways, Stairways and Ladders, is the reference used to determine whether a ladder is safe. The use of portable ladders for accessing the top of overhead tanks is not suitable as they are not sufficiently secure and may move or slide along the tank during use permitting a delivery driver to fall.

Ladders must be safe, fixed, and meet AS1657 standards. Handholds and platforms should be provided.

Guidelines for Use of Ladders on Fuel Storage Tanks
• The ladder must meet the requirements of AS1657 • The ladder to access the top of the tank must be in sound condition with no rust pitting on the rungs, stiles, welds or fastening brackets. • The ladder must be securely attached to the tank and/or supporting structure to ensure no movement in the ladder when climbed. • The ladder should be sufficiently long to provide access to dip and fill points without leaving the ladder or over-reaching. • A platform and adequate handholds should be provided at the top of the ladder. • The ladder should start within 300mm of the ground and be at least 300 mm wide. • The ladder should be at an angle of between 70 and 75 degrees (4 vertical to 1 horizontal).

3.4 Hazards Associated with Flammable Liquids

Q ***Are ignition sources 15 metres away from fuel storage?***

Q ***Are chemicals and fertilisers stored away from fuel?***

The hazards associated with the storage of flammable liquids (petrol) and combustible liquids (diesel) are slightly different.

Petrol is a highly flammable liquid which readily gives off vapour and therefore is classed as a flammable liquid. The vapour is heavier than air and can travel a long way from the fuel storage tank. Vapour will accumulate in low areas like drains and pits, especially in cooler, still weather. Because of this high degree of hazard, extreme caution must be taken to separate petrol storage from any ignition source. There must be no ignition sources within 15 metres of petrol storage tanks.

Fuel tanks must be separated from ignition sources, combustible vegetation, protected works, boundaries, overhead powerlines , chemicals and fertilisers. Consideration must be given to the direction of any spills.

Diesel is not as volatile as petrol and is classed as a combustible liquid (flash point above 60.5^{o}C). The separation distance from an ignition source must be 8 metres. However dangers still exist with diesel and these should not be ignored.

In addition to separation of fuel storage tanks from ignition sources, there are other separation requirements Some of these vary with the volume of the tank, and for more detail on this refer to AS1940. The following is provided as a guide:

- Tanks should be located in such a way that spills will not flow within 15 metres of an ignition source, or reach a protected works, watercourse or property boundary. See Section 4.1
- The ground around the tank should be kept clear of any combustible vegetation or refuse within 3 metres;
- There should be no protected works or a boundary within 15 metres of the tanks. Protected works can be described as a dwelling, public building or place where people may be accustomed to assemble.
- Powerlines can present a particular hazard. There must be no powerlines within 5 metres of the tank.

Storage on land which has an area exceeding 2 ha and is intended for agricultural, horticultural, floricultural or pastoral purposes, and not for resale, is deemed as minor storage (AS1940). This means that, where two or more storage tanks are separated by more than 100 metres, each storage may contain up to 5000 litres for flammable liquids (petrol) and 10000 litres for combustible liquids (diesel) without the need to fully comply with the requirements of AS1940. However for safety, it is recommended that the storage should comply with this standard.

The mixture of some chemicals and fertilizers with fuels can lead to the spontaneous combustion of the mixture or the production of deadly gases. All fuel storage must therefore be more than 8 metres from fertilizers or chemicals.

Unless complying with the minor storage clauses, storage must meet the requirements of AS1940 and the Australian Dangerous Good Code. If there is uncertainty regarding these, the following guidelines on separation distances may be useful for design and installation of tanks. It should be noted that these are generally more conservative than the requirements of AS1940.

Guidelines for Isolation of Flammable and Combustible Liquids

- Petrol storage tanks located more than 15 metres from any ignition source.
- Diesel storage tanks located more than 8 metres from any ignition source.
- All fuel storage at least:
  - 3 metres from combustible vegetation
  - 15 metres from the boundary of the property
  - 15 metres from protected works (eg. dwelling, workshop, an accumulation of combustible materials)
  - 5 metres from overhead wires
- Fuel storage tanks positioned so that a spill cannot flow to within 15 metres of an ignition source or contact a watercourse, protected works or property boundary (streams, lakes waterways).
- Fuel storage tanks positioned so as to avoid accidental collision by vehicles.
- All fuel storage more than 8 metres from fertilizers or chemicals.
- Adjacent horizontal tanks at least 600 mm apart.

- **Ignition sources** include anything that could ignite vapour from the fuel storage area.

Examples are:

Naked flames	These include fires or incinerators, gas lights, oxy cutting and electric arc welding. It also includes smoking.
Electrical Appliances	These include non-flameproof electric motors, electrical switches, lights, extension cords, radios, any electrically powered tools or machines and electric fence controllers.
Running Engines	These include compressors, freezer motors, portable petrol engines on powerpacks or pumps. Vehicle engines shall be switched off when delivering to or decanting from the storage tank, with the exception of approved fuel dispensing equipment or delivery tanker PTO pump.
Static Electricity	A sufficiently large build-up of static electricity will cause a spark when discharged, and if this happens in an area containing flammable vapours fire or explosion could occur. It is therefore important to have tanks earthed through the metal support structure and an earthing stake. Each time product is moved into or out of the tank a bonding wire should be used between the tank and the delivery tanker (a delivery driver could explain this to you if in doubt).

3.5 Health Risks

Q ***Are handling methods designed to avoid inhalation or absorption of fuel?***

Petroleum products contain amounts of aromatic hydrocarbons that can be smelled in the vapours. Inhaling hydrocarbon vapours should be avoided. The OH&S legislation details requirements for the storing and handling of hazardous substances. There is a requirement that an employer or self-employed person has an MSDS (material safety data sheet) for each hazardous substance, which can be obtained upon request from the fuel supplier.

Filling and dispensing procedures should minimise the risk of inhaling fuel vapours, and should be in line with the MSDS.

The acute effects of hydrocarbon vapours may be dizziness, nausea, headache and vomiting. Anyone suffering from the effects of hydrocarbon vapours should remove themselves from the area and avoid activities such as driving vehicles or operating machinery until fully recovered. In severe cases of hydrocarbon vapour inhalation medical advice should be sought as soon as possible.

Petrol should not be used to remove oil, grease, paint or glue from skin as it may be absorbed into the body system. Prolonged contact with the skin may also cause dermatitis or rashes. In the event of skin contact, the affected area should be washed with soap and water immediately. Further advice may be obtained from the MSDS.

3.6 Emergency Procedures

Q ***Have emergency procedures been established and is equipment available to deal with an emergency?***

Both the owner of the fuel tank and the fuel delivery organisation must have in place emergency procedures to deal with situations such as fuel spillage, fuel leakage or fire. These should include having available an appropriate spill kit for the fuel being stored and a fire extinguisher. See Section 4.2. The emergency procedures should include the telephone number of the fuel supplier (for advice), emergency services and local council. Most councils have an emergency pollution hotline.

Emergency procedures and equipment must be in place. The prime concern is the safety of any persons near the emergency. The remedial action is to control, contain,clean up

In the case of a fuel spill or leak, the immediate remedial action is to:

- Control – stop the spillage or leakage at source, then:
- Contain – stop the product escaping to drains or waterways by damming the product. Mound up soil or sand into a dam from where the product can be recovered.

- Clean up – if it safe to do so, recover the product into liquid tight containers for further disposal by an authorised waste disposal organisation. It may require the use of approved absorbents in the clean up. It may also require removal and replacement of contaminated soil. Any storage of contaminated soil must be on a membrane to prevent further soil contamination.
- Contact the fuel supplier or local council for advice/assistance with the clean up and disposal of the contaminated materials.

The local council should be advised of any sizable fuel spill, especially if it endangers any waterway.

With petrol spillage, special care must be taken to avoid any action that could cause ignition of the petrol vapours. All sources of ignition should be kept away, which includes not using communications equipment within the vicinity if it is not certified intrinsically safe.

In the case of a fire, raise the alarm – phone the Fire Brigade on 000.

- Fight the fire only if it is safe to do so. Use dry chemical or fire fighting foam. **Do not use water on a flammable liquids fire**.
- Ensure all people are in a safe area.
- Do not put yourself at risk.

3.7 Training and Supervision

Q ***Is there adequate knowledge of the hazards that exist and precautions to be taken?***

People who are involved with the handling and storage of fuels must either have adequate knowledge and experience, or be supervised by a person with adequate knowledge and experience, and be adequately trained to work safely with the fuel storage facilities.

Adequate knowledge of fuels, fuel storage, the hazards of fuel storage, and training in managing those the storage and the hazards, is essential

Owners of fuel tanks must ensure that anyone who is required to use the fuel storage system on their site has been properly trained in:

- The safe use of the fuel storage facility;
- The potential hazards when using the fuel storage system, and the precautions to be taken, including the use of protective clothing and equipment;
- What to do in the case of an emergency, e.g. a fire or a fuel spill.

SECTION 4 GENERAL INFORMATION

4.1 Environmental Considerations

While these guidelines on fuel storage mainly focus on the health and safety hazards, the environment also needs to be considered. The relevant requirements for protection of the environment will be known by the local council and contact should be made with them to obtain this information.

Under the environmental laws administered by the EPA in each state (delegation of which may be through local council), unauthorized discharge of contaminants to land or water attracts large penalties. This includes allowing leakage from fuel storage vessels.

Prosecution for contamination of the soil or waterways as a result of leakage or spillage of fuel includes costs of cleaning up the contamination. Owners of fuel tanks should therefore be careful to ensure that fuel tanks are both used and maintained so that no ground contamination below the tanks occurs. Consideration must be made when locating a suitable site for a fuel storage tank of the environmental impact it could have to ground water or waterways. In some cases it may be necessary to bund a fuel storage tank.

Bunding is not required for minor storage on farms, however it may be required if quantities exceed the minor storage threshold or there is a possibility of environmental harm in the event of leakage.

4.2 Spill Kits

Basic spill kits should be kept where spillage or leakage from the fuel tank may lead to the contents flowing to a water course. The spill kit may consist of a load of sand, or some fuel absorbent material that could soak up small spills before they cause any harm to the environment. Fuel suppliers can provide information on commercial spill kits, including absorbent pads or booms.

4.3 Signage & Notices

Fuel delivery drivers must be able to identify the contents of a tank before filling to ensure the correct fuel is pumped into the right tank. All fuel storage tanks are to be labelled with the contents of the tank. The product identification should be clearly placed on the tank so as to be easily read from ground level. Additional signage required to be displayed shall include a ***"DANGER – NO SMOKING, NO NAKED FLAMES"*** sign prominently displayed around fuel dispensing equipment.

A fuel tank that is storing flammable liquids must also have correct placarding required by State or Territory legislation covering storage and handling of dangerous goods attached to the tank.

4.4 Repairs to Tanks

Before carrying out any repairs to tanks or the support structure, the hazards associated with the work need to be carefully assessed. It is strongly advised that repairs should be carried out by an authorised fuel tank repairer.

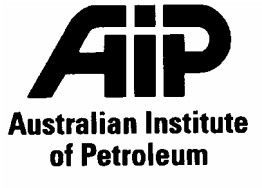
4.5 Tank Colour and Location

The colour of the above ground tank, and whether it is in the shade or not, will have a major effect on how much fuel is lost through evaporation. This especially relates to petrol storage.

As an example, a 1200 litre petrol storage tank in a moderate climate could be expected to have losses as follows:

- 30 litre loss per month from a red tank with no shade.
- 24 litres loss per month from a silver/white tank with no shade.
- 10 litres loss per month from a silver/white tank in the shade.

Where possible, petrol tanks should be located in a shaded area (not under trees), and painted in a light colour. A good position, for example, may be on the eastern side adjacent to a high walled shed.



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