

**GUIDANCE ON MANAGING THE RISKS
OF FIRE AND EXPLOSION
AT PETROL FILLING STATIONS
(DSEAR)**



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Introduction

Since the introduction of the Dangerous Substances and Explosive Atmospheres Regulations (Northern Ireland) 2003 (DSEAR), the conditions attached to petroleum licenses issued under the Petroleum (Consolidation) Act (Northern Ireland) 1929, have been significantly reduced.

DSEAR is a set of regulations that control the risk of fire and explosion in the workplace with the onus on the employer (or responsible person) to identify and assess the risks arising from the delivery, keeping and dispensing of petroleum spirit and other motor fuels such as LPG.

What is DSEAR?

DSEAR is a set of regulations to control the risk of fire and explosion in the workplace. A dangerous substance is one that could cause harm to people from fire or explosion due to its properties or use and includes petrol or LPG. An explosive atmosphere is an accumulation of flammable gas, mist, dust or vapour combined with air.

Where does DSEAR apply?

DSEAR applies at all workplaces where a dangerous substance is, or could be present and there is a consequent risk to employees or others. It will therefore apply at any workplace where petroleum spirit is kept, and on any premises where petrol is dispensed from a storage tank into the fuel tank of a vehicle. As this includes petrol filling stations, DSEAR is regulated alongside petroleum licensing by District Councils.

What does DSEAR require?

Under the DSEAR regulations the employer/responsible person must:

- Find out what dangerous substances are present in their workplace/premises and what the fire and explosion risks are;
- Put control measures in place to either remove those risks or, where this is not possible, to control them;
- Put controls in place to reduce the effects of any incidents involving dangerous substances;
- Prepare plans and procedures to deal with accidents, incidents and emergencies involving dangerous substances;
- Make sure that employees are properly informed and trained to control or deal with the risks from the dangerous substances;

- Identify and classify areas of the workplace/premises where explosive atmospheres may occur and avoid ignition sources (for example from unprotected equipment) in those areas;
- Provide a plan indicating where the hazardous zones are located on the premises;
- Carry out a risk assessment and provide a record of the significant findings of that assessment, including the measures that have been or will be taken by the employer/responsible person to control the risk.
- Keep a record of the risk assessment and significant findings available on the premises for inspection;
- Review the risk assessment periodically and following any significant changes.

What is a DSEAR Risk Assessment?

For the purposes of Petrol Filling Stations, a DSEAR Risk Assessment means a careful examination of how petrol could cause a fire and explosion. You do not have to remove the risk, in fact it is not possible to have 'zero' risk, but you must make sure it is as *low as is reasonably practicable*. Under DSEAR, employers must assess the risks from activities involving dangerous substances such as petrol to employees and members of the public and the significant findings of the assessment must be recorded. DSEAR also requires risk assessments to be reviewed as circumstances change.

Methods of Managing Risk

Fire and explosion risks at petrol stations can be managed by:

1. Engineering controls/physical safeguards such as the installation of an overfill prevention device.
2. Management controls, which minimize risk by using systems of work – for example, at a site where a tanker has to manoeuvre on site, a system of supervision will reduce the risk of collision and possible spill.
3. Commonly, a combination of both engineering and management controls.

If you have assessed the risks and decided that your current controls adequately ensure people's safety, then you might not need to introduce any further measure. *However*, if you conclude that current controls are inadequate, you must introduce further measures. If the risk is low, the overall costs of introducing engineering controls might be grossly disproportionate and effective management controls *might* be enough. *However*, if the risk is high, you may need to consider engineering controls, regardless of the overall cost. Remember that your ability to pay for additional measures is **not** a deciding factor as to whether they should be introduced.

Undertaking a DSEAR Risk Assessment

The following examples show a generic format for a suggested DSEAR risk assessment. They are in no way exhaustive, however, the layout may assist you to consider the measures you have in place at your site and to perform and complete a similar assessment that accurately reflects your working practices.

Assessing the Risks from Off-Loading and Venting

Firstly, consider the design and layout of the site and then look at the activities that are undertaken on the site. You will need to decide whether current precautions are enough to control risks, or if you need to do more. The example below shows one way you could go through this process. The control measures column gives some example precautions that could be taken to provide sufficient control to address the risk.

Activity	Risk	Control Measure	Findings/ Action	Target Date	Review Date
Tanker access	Collision whilst moving on site or during offloading.	Provide and maintain a dedicated clear route. Where possible, arrange that the tanker can be driven off the site in a forward direction. Locate tanker standing area away from other traffic. Cordon off the tanker standing area. Where necessary, provide supervision or assistance to the driver whilst the tanker is manoeuvring. Provide the delivery firm with advance information on site layout and systems, ensure adequate lighting when necessary. Take deliveries at quiet periods e.g. at night.			
Offloading process.	Leak from connection or rupture of hose.	Ensure staff are trained and the driver follows the correct procedures. Have emergency procedures in place.			
	Overfilling storage tank or compartment	Make sure fill points are clearly marked, suitable and maintained. Follow procedure for checking tank ullage. Siphon pipes are closed down during the delivery.			

Assessing the Risks from Storage

Firstly, consider the age and design of the storage tanks and then look at the leak detection methods you currently use. You will need to decide whether these precautions are enough to detect leaks, or if you need to do more. The example below shows one way you could go through this process. The control measures column gives some example precautions that could be taken to provide sufficient control to address the risk.

Activity	Risk	Control Measure	Findings/ Action	Target Date	Review Date
Petrol stored in underground tank.	Leak through tank wall.	Install a continuous inventory checking system. Install a suitable leak prevention or leak detection system and regularly maintain it. Install a tank liner.			

Assessing the Risks from Pipework

Consider the age and design of your pipework, then look at the leak detection methods you currently use and decide whether these precautions are enough or if more needs to be done. The example below shows one way you could go through this process. The control measures column gives some example precautions that could be taken to keep the risk as low as is reasonably practicable.

Activity	Risk	Control Measure	Findings/ Action	Target Date	Review Date
Petrol/vapour in pipework.	Leak through pipe wall.	Carry out visual examination of accessible parts. Carry out regular inventory checking. Install a constant monitoring device. Install a leak prevention system. Install a leak detection system.			

Assessing the Risks from Dispensing

When you assess the risks associated with dispensing operations you will need to take into account the way you operate your site and how spills could occur. You will also need to consider possible ways to prevent each event, measures to mitigate if it does happen and whether precautions are sufficient to control the risk. The example below shows one way you could go through this process. The control measures column gives some example precautions that could be taken to provide sufficient control to address the risk.

Activity	Risk	Control Measure	Findings/ Action	Target Date	Review Date
Vehicle access	Vehicle collision with petrol dispenser while manoeuvring on site.	<p>Provide impact check valves at the base of the dispensers using pressure delivery.</p> <p>Provide shear valves at the base of the pumps using suction delivery.</p> <p>Protect dispensers by mounting on properly designed plinths and/or provide safety barriers</p> <p>Provide, maintain and mark clear routes to, from and around dispensers.</p> <p>Ensure adequate light.</p> <p>Train staff to take appropriate action if collision occurs.</p> <p>Ensure that spills of petrol, diesel etc are cleared up promptly to reduce the risk of vehicles skidding.</p>			
Dispensers	Leak from damaged dispenser	<p>Check that dispensers are undamaged, working and are properly maintained.</p> <p>Do not allow damaged dispensers to be used/activated.</p>			
	Leak from	Use dispensers with volume			

	damaged hose or nozzle.	<p>or time limit cut-offs, or fit such devices to existing dispensers.</p> <p>Ensure that dispenser nozzles and couplings are regularly inspected and properly maintained.</p> <p>Do not allow dispensers with damaged hoses etc to be used.</p> <p>De-activate hold-open devices on the nozzles of dispensers.</p>			
	Petrol spilled during dispensing	<p>Draw up emergency procedures and train staff.</p> <p>Provide and maintain emergency equipment.</p> <p>Provide sand/spill kits to absorb small spills.</p> <p>Provide changing/washing facilities for customers/staff who are splashed with petrol.</p>			
	Member of public drives away during refuelling.	<p>Install breakaway couplings.</p> <p>Draw up procedures for emergency shutdown.</p>			
General		<p>Train staff to take appropriate action if a leak or spill occurs.</p> <p>Control ignition sources in hazardous area.</p> <p>Train staff not to activate dispensers when potential ignition sources are present.</p>			

Hazardous Area Classification - Control of Ignition Sources

DSEAR imposes a requirement to classify areas where explosive atmospheres may occur into zones based on their likelihood and persistence. Areas classified into designated zones (Zone 0, Zone 1, Zone 2) must be protected from sources of ignition by only utilising equipment and protective systems that meet the requirements of that particular zone.

Where employees work in zoned areas, they should be provided with appropriate work clothing that does not create a risk of an electrostatic discharge igniting the explosive atmosphere. In order to comply with this statutory duty, the work (on the forecourt) that staff are employed to undertake in the course of the day-to-day operation of the site or in accordance with the site's emergency procedure will have to be evaluated.

For instance, if the site receives driver assisted deliveries and the member of staff assisting the tanker driver is expected to dip the tanks, remove covers to access chambers or remove/replace fill pipe caps, then (like the tanker driver) they should be provided with anti-static footwear. Anti-static weatherproof or outer clothing will not normally be necessary for work activities carried out by forecourt staff provided they do not remove such (ordinary) clothing in any high risk areas.

Hazardous Zone Definitions:

Zone 0; That part of a hazardous area in which a flammable atmosphere is continuously present or present for long periods.

Zone 1; That part of a hazardous area in which a flammable atmosphere is likely to occur in normal operation.

Zone 2; That part of a hazardous area in which a flammable atmosphere is not likely to occur in normal operation and, if it occurs, will exist only for a short period.

Nominal Areas of Hazardous Zones to be indicated on the Hazardous Zone drawing:

Zone 0;

Within any access chamber or pit in which there are tanker delivery hose connection point(s).

Within an oil separator (petrol interceptor).

Zone 1;

1m radius around the road tanker delivery and vapour return hose connections extending down to ground level.

1m radius along the delivery hose route from the tanker connection point(s) to the tank connection point(s).

1m radius from a tank fill point (above ground)

1m radius from the edge the chamber if fill point is below ground.

Within petrol tank access chambers which do not have tank fill points.

2m radius around tank venting point(s) which do not have a stage 1b vapour recovery system.

1m radius around a venting point of an oil separator (petrol interceptor).
Within the access chamber of an oil separator (petrol interceptor).
Within a 4.1m radius of a petrol delivery hose connection on a dispenser (without stage 2 vapour recovery).

Zone 2;

4m radius of tanker delivery hose connection point(s).
4m radius of above ground off set fill connection(s).
1 m radius around vapour return hose connection point.
2m radius around tank venting points where the site has stage 1b vapour recovery installed.
2m radius from the edge of an oil separator (petrol interceptor) access chamber.
Within a 4.1m radius of a petrol delivery hose connection on a dispenser (with stage 2 vapour recovery in operation).

Note: additional hazardous zones are present and must be identified on sites where LPG or other highly flammable motor fuels are stored and dispensed.

EXAMPLE OF HAZARDOUS ZONE DRAWING REQUIRED FOR A TYPICAL PETROL FILLING STATION

