DSEAR 2002

(Dangerous Substances and Explosive Atmospheres Regulations)

Some finer details.

PRESENTED BY
Dawn Kenyon
The DSEAR Regulations 2002 set minimum requirements for the protection of workers from fire and explosion risks related to dangerous substances and potentially explosive atmospheres.

The primary purpose of DSEAR is to protect workers and others who may be at risk from dangerous substances that can cause a fire, explosion or similar energy-releasing event.

Other Regulations to consider when working in a DSEAR area are:

- COMAH (Control of Major Accident Hazards Regulations (2015)).
- ADR (Transport of Dangerous Goods via the Road 2019).
- Regulatory Reform (Fire Safety) Order 2005.

ATEX which covers two Directives:

The following activities and substances may be commonly found in the work place that would require a DSEAR Risk Assessment:

The list is not exhaustive, but merely offered as example:

• Storage of petrol as a fuel for cars, motor boats, horticultural machinery, etc
• Use of flammable gases, such as acetylene, for welding
• Handling and storage of waste dusts in woodwork shops
• Handling and storage of flammable wastes including fuel oils
• Hot work on tanks or drums that have contained flammable material
• Use of flammable solvents including solvent based paints etc
• Storage of flammable goods, such as paints, solvents etc
• Storage, use and handling of flammable gases, including LPG
• Transport of flammable liquids in containers around the workplace
• Chemical/gas manufacture, resulting from process or research experiment
• Spray painting

Amongst many others.
DSEAR is concerned with the harmful physical effects from burns, over-pressure-effects (blast injuries) and oxygen depletion effects (asphyxiation) arising from a fire or explosion amongst other risks.

So the first thing to do is to determine whether or not there are dangerous substances on your site. You do this by checking all of the areas where such substances are being used and how.

For the areas that are identified as having a flammable atmosphere or have explosible dusts then further investigation is required of each individual substance that is being used.

Additional regulations will help to determine if the substance is either, explosive, oxidising, extremely flammable, highly flammable or flammable which include the REACH Regulations and:

Classification, Labelling and Packaging of substances and mixtures (2009).
When dangerous/hazardous substances are supplied for use at work, suppliers must provide you with safety data sheets and the safety data sheet should identify whether the chemical is classified under the CLP Regulations as flammable, oxidising, etc.

SDS’s can then be used to help:

• Assess the physical and chemical properties of the substance or preparation,
• Assess the circumstances of the work that use this substance to see if that can create a safety, fire or explosion risk, especially if such a risk only arises as a result of a particular work process.

If the work process produces vapour, mist or gas then a DSEAR Risk Assessment will go on to determine the Zones which dictate the level of danger around that work process.

Wood, and many other dusts may be dangerous substances as well, depending on the circumstances of the work, as when the dust is mixed in a cloud with air it can, in certain circumstances, be ignited and explode. Work activities involving grinding or machining are particularly prone to this risk.
The SDS includes information such as:

- the properties of each chemical;
- the physical, health, and environmental health hazards;
- protective measures; and
- safety precautions for handling, storing, and transporting the chemical.

There are 16 sections in total.

So what information is relevant to DSEAR? - ALL of the above.

Section 9 – Physical and Chemical Properties - will hold the information that will help to determine the explosivity of the substance. Such information as the flashpoint and Lower and Upper Explosive Limits can be key to a DSEAR risk assessment.
The minimum required information consists of:
• Appearance (physical state, colour, etc.);
• Upper/lower flammability or explosive limits;
• Odour;
• Vapor pressure;
• Odour threshold;
• Vapor density;
• pH;
• Relative density;
• Melting point/freezing point;
• Solubility(ies);
• Initial boiling point and boiling range;
• Flash point;
• Evaporation rate;
• Flammability;
• Partition coefficient: n-octanol/water;
• Auto-ignition temperature;
• Decomposition temperature; and
• Viscosity.

• The SDS may not contain every item on this list because information may not be relevant or is not available. When this occurs, a notation to that effect must be made for that chemical property.

• Manufacturers may also add other relevant properties, such as the dust deflagration index (Kst) for combustible dust, used to evaluate a dust's explosive potential.
SDS that I was sent as the most up to date one:

**Material Safety Data Sheet**

Essar Commercial Diesel  
Version 2.0  
Effective Date 16.11.2011  
Regulation 1907/2006/EC

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

1.1 Product Identifier

<table>
<thead>
<tr>
<th>Material Name</th>
<th>Essar Commercial Diesel</th>
</tr>
</thead>
<tbody>
<tr>
<td>REACH Registration No.</td>
<td>01-2119484664-27-0089</td>
</tr>
<tr>
<td>Product Code</td>
<td>400000156</td>
</tr>
</tbody>
</table>
### 67/548/EEC or 1999/45/EC

<table>
<thead>
<tr>
<th>Hazard Characteristics</th>
<th>R-phrase(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmful. Dangerous for the environment.</td>
<td>R20; R38; R40; R51/53; R65</td>
</tr>
</tbody>
</table>

Classification triggering components: Contains petroleum distillates.

### 2.2 Labels Elements

**Labelling according to Regulation (EC) No 1272/2008**

Symbol(s):

- Flammable liquid
- Flammable vapour
- Health hazard
- Environmental hazard

**Signal Words**

Danger

**CLP Hazard Statements**

PHYSICAL HAZARDS:

H226: Flammable liquid and vapour.
Labelling according to Directive 1999/45/EC, 67/548/EEC

EC Symbol(s)

:  Xn Harmful
   N Dangerous for the environment.

EC Classification


EC Risk Phrases

:  R20 Harmful by inhalation.
   R38 Irritating to skin.
   R40 Limited evidence of carcinogenic effect.
   R51/53 Toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.
   R65 Harmful: may cause lung damage if swallowed.

7.1 Precautions for Safe Handling

:  Avoid inhaling vapour and/or mists. Avoid prolonged or repeated contact with skin. When using do not eat or drink. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Earth all equipment. Electrostatic charges may be generated during pumping. Electrostatic discharge may cause fire. The vapour is heavier than air, spreads along the ground and distant ignition is possible.
## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour</td>
<td>May contain a reodorant.</td>
</tr>
<tr>
<td>Initial Boiling Point and Boiling Range</td>
<td>170 - 390 °C / 338 - 734 °F</td>
</tr>
<tr>
<td>Pour point</td>
<td>&lt;= 6 °C / 43 °F</td>
</tr>
<tr>
<td>Flash point</td>
<td>&gt; 55 °C / 131 °F (Abel)</td>
</tr>
<tr>
<td>Upper / lower Flammability or Explosion limits</td>
<td>1.0 - 6.0 % (V)</td>
</tr>
<tr>
<td>Auto-ignition temperature</td>
<td>&gt; 220 °C / 428 °F</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>&lt; 0.1 hPa at 20 °C / 68 °F</td>
</tr>
<tr>
<td>Density</td>
<td>0.82 - 0.845 g/cm³ at 15 °C / 59 °F</td>
</tr>
<tr>
<td>Water solubility</td>
<td>Negligible.</td>
</tr>
<tr>
<td>Solubility in other solvents</td>
<td>Data not available</td>
</tr>
<tr>
<td>n-octanol/water partition coefficient (log Pow)</td>
<td>3 - 6</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>2 - 4.5 mm²/s at 40 °C / 104 °F</td>
</tr>
</tbody>
</table>
Section 9: Physical and Chemical Properties.

9.1 Information on basic physical and chemical properties.
Appearance:
Physical state: Liquid.
Colour: Not available.
Odour: Not available.
Flashpoint: 17°C
Flammability: Flammable.
UEL: Not available.
LEL: Not available.
Auto-Ignition temp: Not available.
Explosive Properties: Not available.

9.2: Other information.
No additional information available.
“Additional information may be necessary in some cases in view of the wide range of properties of the substances and preparations.

If in other cases it emerges that information on certain properties is of no significance or that it is technically impossible to provide, the reasons for this shall be clearly stated under each heading.

Information shall be provided for each hazardous property.

If it is stated that a particular hazard does not apply, clearly differentiate between cases where no information is available to the classifier, and cases where negative test results are available.”

REACH Regulations, Annex II.
Other Sources of Information

Another source of information is HSE's Approved Supply List.

This is a list prepared by HSE, which lists many commonly used substances and their classification, i.e. If a substance or preparation is classified as explosive, oxidising, extremely flammable, highly flammable or flammable then it is a dangerous substance.

In the case of proprietary substances purchased from a supplier, and classified under CLP, the packaging in whatever form (cylinder, drum, bottle, tin, or box) should contain warning pictograms and other safety / handling / storage information.

If you require this information, you may need to contact the supplier and request that they give this to you.

Or

You can have tests undertaken on behalf of the company as well.
Many workplaces will handle, store or process dangerous substances, from food manufacturing to distribution, and many other sectors in between.

Many workplaces are handling dangerous substances, gases, vapours or dusts and in all of these cases, the employer has a duty to control and reduce the associated risks Under the Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR).

1. Unfortunately, too many organisations are unaware of the risks until it is too late.

The Health & Safety Executive (HSE) has issued a number of fines in recent years for breaches of DSEAR. Worse still, organisations could be putting their workers at risk by:

2. Not maintaining safety and compliance.

A DSEAR assessment, which is recommended every three to five years, will help to identify the level of risk within an organisation so that an appropriate strategy can be built to control and reduce that risk. Even sites handling diesel now require an assessment too. However, some company’s are not addressing these risks at or adequately.

Are you meeting your obligations?
Most industrial activities involving chemicals should already have had a DSEAR risk assessment completed and a COSHH assessment amongst other requirements but some do not.

Unfortunately, even if a DSEAR Risk Assessment has been completed, adhering to the control measures that have been recommended seems to be the problem in some areas and these can include:

a) not used,

a) zones ignored,

a) signage missing etc.
1. Scale of operation.

The work activity may have been seen as a small scale operation and does not require such control measures – DSEAR gone overboard!

• The scale will be one of the key factors in deciding zoning for DSEAR.

• Where work is on a small scale (for fluids, typically up to around 50ml) the risk will be insignificant and zoning would be inappropriate.

• For medium scale operations (involving around 2.5 litres of fluids), risks will be more significant but if there are adequate controls such as means to isolate electrical equipment, supervision by trained staff and good handling procedures, the area may still not need to be zoned.

• Large operations will probably fall within the zoning requirements of DSEAR due to the quantities and possibility of release.
2. **Cost.**

Some companies will need to introduce earthing and bonding and / or even ventilation systems as a recommendation and neither of these systems are cheap. Therefore it may be this reason as to why the systems are not in place.

3. **Lack of understanding.**

Some DSEAR Risk Assessments can be very complicated. Once complete they need to be given to the appropriate people and explained fully to ensure that everyone understands the control measures and the reasons why they are required.

4. **Lack of training.**

It is also important to train everyone working in these areas to ensure that everyone is aware of the risks and the control measures that they are required to adhere to. This in turn will help to reduce number 3 above – Lack of understanding.
5. Changes made but Risk Assessments are not reviewed.

This is something that happens a lot.

- Refurbishment to the building is undertaken and the areas are changed or relocated but then the new locations are not reviewed and some control measures can be missed or forgotten completely.

  OR

- Substances are changed but they are not assessed as they are ‘similar’ to the other one.

It is recommended that a DSEAR Risk Assessment review is undertaken every 3 to 5 years

Unless Something Changes.

Then a review should be undertaken straight away followed by:

- appropriate communication to the relevant people backed up with
- appropriate training to the relevant people.
Vapour, Gas, Mist considerations.

Maximise Dissipation

Giving static the best chance of dissipating by:

Fully conductive process plant and equipment (including PPE)
The first and largest explosion occurred at 06:01am near tank 912, which led to further explosions which eventually overwhelmed 20 large storage tanks. The cause of the explosion was a fuel-air explosion in a vapour cloud of evaporated leaking fuel.

The **Buncefield fire** was a major explosion on 11 December 2005 at the Hertfordshire Oil Storage Terminal located near the M1 Motorway.
Dust considerations.

**Organic**
Sugar, Flour, Paper, Soap, Dried Blood

**Wood**
All varieties including sawdust

**Metal**
Aluminum, Magnesium

**Plastic Dust** (additives)

**Carbon Dust** : Coal
If a high concentration of wood dust becomes airborne and contacts an ignition source in a contained area, an explosion could occur.
How bad could it be?

Secondary Explosions Are Catastrophic.

An initial (primary) explosion in processing equipment or in areas where fugitive dust has accumulated, may dislodge additional dust or damage a collection system (such as a duct, vessel or collector).

This dust, if ignited, causes additional explosions, which can result in damage that is more severe than the original explosion due to increased concentrations and quantities of dispersed combustible dust.
So why are DSEAR Control Measures not adhered to? We have not even covered:
THANK YOU FOR LISTENING.

What was that about Static?!