

explosive dust

Paint

# Fire and explosion -

# How safe is your workplace?

solvent

A short guide to the Dangerous Substances  
and Explosive Atmospheres Regulations

Liquefied petroleum gas

varnish

LPG



Petrol

For small and medium sized businesses

**This leaflet provides practical advice to employers (particularly those with small and medium-sized businesses), and the self-employed, about the basic requirements of the Dangerous Substances and Explosive Atmospheres Regulations 2002 – usually known as DSEAR. It is not intended to be a comprehensive guide to DSEAR and, because it is a snapshot view, it cannot include all matters covered by DSEAR.**

**When you have read the leaflet, if you need to know more about DSEAR, you can access HSE's website at [www.hse.gov.uk/spd/dsear.htm](http://www.hse.gov.uk/spd/dsear.htm), or refer to the Regulations\* or their more detailed Approved Codes of Practice (ACOP) and guidance. You will find details of how to obtain this information, and a list of useful reading material, at the back of this leaflet.**

**\*SI 2002/2776**

### What is DSEAR?

**D**SEAR is a set of regulations concerned with protection against risks from fire, explosion and similar events arising from dangerous substances used or present in the workplace. The Regulations apply to employers and the self-employed.

### What is a dangerous substance?

**T**he Regulations give a detailed definition of 'dangerous substance', which you should refer to for more information, but it includes any substance or preparation, which because of its properties or the way it is used could cause harm to people from fires and explosions. Dangerous substances include: petrol; liquefied petroleum gas (LPG); paints; varnishes; solvents; and dusts which when mixed with air could cause an explosive atmosphere, for example, dusts from milling and sanding operations. Dangerous substances can be found, in varying quantities, in most workplaces.

### What is an explosive atmosphere?

**A**n explosive atmosphere is an accumulation of gas, mist, dust or vapour, mixed with air, which has the potential to catch fire or explode. An explosive atmosphere does not always result in an explosion, but if it caught fire the flames would quickly travel through it and if this happened in a confined space (eg in plant or equipment) the rapid spread of the flames or rise in pressure could also cause an explosion.



### Where does DSEAR apply?

**D**SEAR applies at most workplaces where a dangerous substance is present or could be present.

### What are the main requirements of DSEAR for employers and the self-employed?

You must:

- \* carry out a risk assessment of any work activities involving dangerous substances;
- \* provide measures to eliminate or reduce risks as far as is reasonably practicable;
- \* provide equipment and procedures to deal with accidents and emergencies;
- \* provide information and training to employees;
- \* classify places where explosive atmospheres may occur into zones and mark the zones where necessary. (This duty is being phased in – see the table on page 9 for dates.)

Overall, DSEAR clarifies the existing requirements to manage fire and explosion risks which are set out in the Management of Health and Safety at Work Regulations 1999 (Management Regulations), and expands those requirements in a few areas (described below).

### What does the risk assessment involve?

**T**he risk assessment is an identification and careful examination of the dangerous substances present or liable to be present in the workplace; the work activities involving them; and how they might fail and cause fire, explosion and similar events that could harm employees and the public. Its purpose is to enable you to decide what you need to do to eliminate or reduce the safety risks

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from dangerous substances as far as is reasonably practicable. It should take account of such matters as:

- \* the hazardous properties of the substances;
- \* the way they are used or stored;
- \* the possibility of hazardous explosive atmospheres occurring;
- \* all potential ignition sources.

You must carry out a risk assessment regardless of the quantity of dangerous substance present, as it will enable you to decide whether existing measures are sufficient or whether any additional controls or precautions are necessary. As well as assessing the normal activities within the workplace, you will also need to assess non-routine activities, such as maintenance work, where there is often a higher potential for fire and explosion incidents to occur.

### When should I do the risk assessment?

**T**he risk assessment must be carried out now, unless you have already carried out a detailed assessment under the Management Regulations, of the risks from fire, explosion and other events arising from dangerous substances, including addressing requirements specified by DSEAR. You must review the assessment regularly and further assessments should be carried out before starting any new work or before making modifications to existing plant or processes including using a different substance or formulation.

The measures identified as necessary by the risk assessment have to be put into place before the work starts.

### Does the risk assessment have to be recorded?

If you have **five or more employees** you must record the significant findings of the assessment as soon as is practicable after that assessment is made, including:

- \* measures taken to eliminate or reduce risk;
- \* sufficient information to show that the workplace and work equipment will be safe from risk of fire and explosion during operation and maintenance;
- \* and from 1 July 2003:
  - details of any areas zoned as hazardous due to the likely presence of explosive atmospheres;
  - where employers share a workplace, any special measures to ensure coordination of safety requirements to protect workers from explosive atmospheres.

### What safety measures does DSEAR require?

You are required to ensure that the safety risks from dangerous substances are eliminated or, where this is not reasonably practicable, to take measures to control risks **and** to reduce the harmful effects of any fire, explosion or similar event, so far as is reasonably practicable (mitigation).

#### **Substitution**

This is the best solution and involves replacing a dangerous substance with a substance or process that totally eliminates the risk. In practice this is difficult to achieve and it is more likely that it will be more practicable to replace the dangerous substance with one that is less hazardous (eg by replacing a low-flashpoint solvent with a high-flashpoint one). An alternative is to design the process so that it is less dangerous.

This might include, for example, changing from a batch production to a continuous production process; or changing the manner or sequence in which the dangerous substance is added. However, you must take care when carrying out these steps to ensure that no other new safety or health risks are created or increased, which then outweigh the improvements implemented as a result of DSEAR.

In reality, where the dangerous substance is handled or stored for use as a fuel, there is often no scope for elimination and very little chance to reduce the quantities handled.

Where risk cannot be entirely eliminated you should apply control and mitigation measures to reduce risk as follows:

### **Control measures**

You should apply control measures in the following order of priority, where this is appropriate to the nature of the activity or operation and supports the findings of the risk assessment:

- \* reduce the quantity of dangerous substances to a minimum;
- \* avoid or minimise releases;
- \* control releases at source;
- \* prevent the formation of an explosive atmosphere;
- \* collect, contain and remove any releases to a safe place (eg by ventilation);
- \* avoid ignition sources;
- \* avoid adverse conditions (eg exceeding the limits of temperature or other control settings) that could lead to danger;
- \* keep incompatible substances apart.

### Mitigation measures

You should apply mitigation measures, which are consistent with the risk assessment and appropriate to the nature of the activity or operation. These can include:

- \* preventing fires and explosions from spreading to other plant and equipment or to other parts of the workplace;
- \* reducing the numbers of employees exposed to a minimum;
- \* in the case of process plant, providing plant and equipment that can safely contain or suppress an explosion, or vent it to a safe place.

Measures taken to achieve the elimination or the reduction of risk should take into account the design, construction and maintenance of the workplace and work processes, including all relevant plant, equipment, control and protection systems.

### What additional requirements apply in places where explosive atmospheres can occur?

In workplaces where explosive atmospheres may occur you should ensure that:

- \* areas where hazardous explosive atmospheres may occur are classified into zones based on their likelihood and persistence;
- \* areas classified into zones are protected from sources of ignition by selecting equipment and protective systems meeting the requirements of the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996 although, **equipment already in use before July 2003 can continue to be used indefinitely provided the risk assessment shows it is safe to do so;**

- \* where necessary, areas classified into zones are marked with a specified "EX" sign at their points of entry;
- \* where employees work in zoned areas they are provided with appropriate clothing that does not create a risk of an electrostatic discharge igniting the explosive atmosphere;
- \* before coming into operation for the first time, areas where hazardous explosive atmospheres may be present are confirmed as being safe (verified) by a person (or organisation) competent in the field of explosion protection. The person carrying out the verification must be competent to consider the particular risks at the workplace and the adequacy of control and other measures put in place.

These additional requirements come into effect at different times depending on when the workplace is first used:

<b>Workplace</b>	<b>When requirements must be met</b>
Workplace already in use before July 2003	Workplace must meet requirements by July 2006
Workplace already in use before July 2003 but modified before July 2006	Workplace must meet requirements from the time the modification takes place
Workplace coming into use for the first time after 30 June 2003	Workplace must meet requirements from the time it comes into use

### What arrangements are required for dealing with accidents, incidents and emergencies?

The requirements of DSEAR build on existing requirements under the Management Regulations. You will need to supplement those existing arrangements if you assess that an accident, incident or emergency could arise, for example a fire, or a significant spillage, because of the quantity of dangerous substances at your workplace.

In these circumstances you are required to arrange:

- \* suitable warning (including visual and audible alarms) and communication systems;
- \* escape facilities, if required by the risk assessment;
- \* emergency procedures to be followed in the event of an emergency;
- \* equipment and clothing for essential personnel dealing with the incident; and,
- \* practice drills.

The scale and nature of the emergency arrangements should be proportionate to the level of risk.

You should make information on emergency procedures available to employees and contact the emergency services to advise them that the information is available (and provide the emergency services with any information they consider necessary).

### What information, instruction and training is required for employees (and others at the workplace)?

You are required to provide your employees (and their representatives), and other people at the workplace who may be at risk, with suitable information, instruction and training on precautions and actions they need to take to safeguard themselves and others, including:

- \* name of the substances in use and risks they present;
- \* access to any relevant safety data sheet;
- \* details of legislation that applies to the hazardous properties of those substances; and
- \* the significant findings of the risk assessment.

Much of this is already required by existing health and safety legislation.

You need only provide information, instruction and training to non-employees where it is required to ensure their safety. Where it is provided, it should be in proportion to the level and type of risk.

## Who enforces DSEAR?

DSEAR is enforced by:

- \* HSE or local authorities depending on the allocation of premises under the Health and Safety (Enforcing Authority) Regulations 1998. In the main, HSE will enforce at industrial premises and local authorities (environmental health officers) elsewhere eg in retail premises;
- \* fire authorities at most premises subject to DSEAR in relation to general fire precautions such as means of escape.



## Further reading

*Dangerous Substances and Explosive Atmospheres Regulations 2002* S1 2002/2776 HMSO

*Seven steps to successful substitution of hazardous substances* HSG110 HSE Books 1994 ISBN 0 7176 0695 3

*Five steps to risk assessment* Leaflet INDG163(rev1) HSE Books 1998 (single copy free or priced packs of 10 ISBN 0 7176 1565 0)

*The idiot's guide to CHIP 3: Chemicals (Hazard Information and Packaging for Supply) Regulations 2002* Leaflet INDG350 HSE Books 2002 (single copy free or priced packs of 5 ISBN 0 7176 2333 5)

*Energetic and spontaneously combustible substances: Identification and safe handling* HSG131 HSE Books 1995 ISBN 0 7176 0893 X

*Safe handling of combustible dusts: Precautions against explosions* HSG103 HSE Books 1994 ISBN 0 7176 0725 9

*Safe use and handling of flammable liquids* HSG140 HSE Books 1996 ISBN 0 7176 0967 7

*The storage of flammable liquids in containers* HSG51 (Second edition) HSE Books 1998 ISBN 0 7176 1471 9

*Use of LPG in small bulk tanks* Chemical Information Sheet CHIS4 HSE Books 1999

*Small-scale use of LPG in cylinders* Chemical Information Sheet CHIS5 HSE Books 1999

*Fire safety: An employer's guide* (Home office, Scottish Executive, Department of the Environment (Northern Ireland) for HSE) HMSO 1999 ISBN 0 11 341229 0

*Unloading petrol from road tankers. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L133 HSE Books 2003 ISBN 0 7176 2197 9*

*Design of plant, equipment and workplaces. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L134 HSE Books 2003 ISBN 0 7176 2199 5*

*Storage of dangerous substances. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L135 HSE Books 2003 ISBN 0 7176 2200 2*

*Control and mitigation measures. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L136 HSE Books 2003 ISBN 0 7176 2201 0*

*Safe maintenance, repair and cleaning procedures. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L137 HSE Books 2003 ISBN 0 7176 2202 9*

*Dangerous Substances and Explosive Atmospheres. Dangerous Substances and Explosive Atmospheres Regulations 2002. Approved Code of Practice and guidance L138 HSE Books 2003 ISBN 0 7176 2203 7*

Department of Trade and Industry guidance on *Equipment and protective systems intended for use in potentially explosive atmospheres*. Details can be obtained from DTI website: [www.dti.gov.uk/strd/atex.html](http://www.dti.gov.uk/strd/atex.html)

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For information about health and safety ring HSE's Infoline Tel: 08701 545500 Fax: 02920 859260 e-mail: [hseinformationsservices@natbrit.com](mailto:hseinformationsservices@natbrit.com) or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

HSE's Safety Policy Directorate website for information on DSEAR, modernising petrol legislation, flammable substances, and explosive atmospheres: [www.hse.gov.uk/spd/spdflamm.htm](http://www.hse.gov.uk/spd/spdflamm.htm)

This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

This leaflet is available in priced packs of 5 from HSE Books, ISBN 0 7176 2589 3. Single free copies are also available from HSE Books.

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