

## Dangerous Substances Explosive Atmospheres

### Reviews and Revisions

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## INTRODUCTION

The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) came into force on 9 December 2002. The Statutory Instrument can be found at:

<http://www.legislation.gov.uk/uksi/2002/2776/contents/made>

DSEAR applies to all dangerous substances at nearly every business, including Higher Education, in the UK. It sets minimum requirements for the protection of staff from fire and explosion risks arising from dangerous substances and potentially explosive atmospheres. DSEAR compliments the general requirement to manage risks under the Management of Health and Safety at Work Regulations 1999 and addresses risk to person's safety from dangerous substances, as opposed to risks to health addressed by the Control of Substances Hazardous to Health Regulations (COSHH)

In most cases the impact of DSEAR will be small, as the risks to safety from fire and explosion will have been addressed by way of their own general risk assessment of work activities in compliance with the Management of Health and Safety at Work Regulations, and in respect of proper and sufficient escape routes, provision of firefighting equipment.

## GENERAL PRINCIPLES

### Scope of DSEAR

DSEAR applies whenever the following conditions are met in a workplace:

- a) There is work being carried out
- b) A dangerous substance is present, or is liable to be present
- c) The dangerous substance presents a risk to person's safety (as opposed to health)

DSEAR is intended to protect not only staff in the workplace, but also any other person who may be put at risk by dangerous substances. This includes students, contractors on site, visitors, members of the public, etc.

### Activities/Substances to which DSEAR apply

The following activities and substances may be commonly found in the work situation with the University. The list is not exhaustive, but offered as example:

- Storage of petrol as a fuel for cars, motor boats, horticultural machinery, etc.
- Use of flammable gases, such as acetylene
- 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
- Work activities that could release naturally occurring methane
- Use of flammable solvents in laboratories
- Storage of flammable goods, such as paints, solvents, reagents
- Storage, use and handling of flammable liquids in containers around LPG
- Transport of flammable liquids in containers around the workplace

- Chemical/gas manufacture, resulting from process or research experiment

DSEAR is concerned with the harmful physical effects from thermal radiation (burns), over-pressure-effects (blast injuries) and oxygen depletion effects (asphyxiation) arising from fire or explosion.

## DEFINITIONS

DSEAR – Dangerous Substances Explosive Atmosphere Regulations

An **explosive atmosphere** is 'a mixture, under atmospheric conditions, of air and one or more dangerous substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture'.

DSEAR requires that workplaces where explosive atmospheres may occur are classified into **zones**. Zoning is based on the likelihood of an explosive atmosphere being present and the risk of an explosion.

Hazardous Area Classification (HAC)

Gas and Vapour	Definition	Dust	Definition
Zone 0	Present continuously or for long periods or frequently	Zone 20	Present continuously or for long periods or frequently
Zone 1	Likely to occur in normal operations occasionally	Zone 21	Likely to occur in normal operations occasionally
Zone 2	Not likely to occur in normal operations, but, if it does, will persist for a short period only	Zone 22	Not likely to occur in normal operations, but, if it does, will persist for a short period only

## RESPONSIBILITIES

In order to ensure compliance Faculties and Departments are required to:

- Carry out a risk assessment of any work activities involving dangerous substances
- Provide technical and organisational controls to eliminate or reduce as far as it reasonably practicable the identified risks
- Provide equipment and procedures to deal with accident and emergencies

- Provide information and training to staff
- Classify places where explosive atmospheres may occur into zones, and mark the zones where necessary

Arrangements should make explicit good practices for reducing the risk from fires, explosions and similar energetic (energy releasing) events that are in turn caused by dangerous substances such as flammable solvents.

### Determining the presence of dangerous substances

Each Faculty or Service Department that carry out the activities detailed above should undertake the following:

- Check whether the substances have been classified under the Classification, Labeling and Packaging Regulation (CLP) as: explosive, oxidising, extremely flammable, highly flammable or flammable.

NOTE: The Classification, Labeling and Packaging Regulation (CLP) align the European Union system of classification, labeling and packaging chemical substances and mixtures to a Globally Harmonized System (GHS) and came into force on 1 June 2015

Those ordering and using hazardous chemicals will notice only the new hazard warning 'pictograms' on labels, as well as changes to information given in the Material Safety Data Sheets (MSDS). The old black and orange hazard symbols will no longer be relevant.

- New: red / black diamonds called 'pictograms'



When dangerous/hazardous substances are supplied for use at work, suppliers must provide you with safety data sheets. The safety data sheet should identify whether the chemical is classified under the CLP Regulations as flammable, oxidising, etc. Another source of information is HSE's Approved Supply List. This is a list prepared by HSE, which details many commonly used substances and their classification. If a substance or preparation is classified as explosive, oxidising, extremely flammable, highly flammable or flammable then it is a dangerous substance.

<http://www.hse.gov.uk/fireandexplosion/dsear.htm>

## Assess the physical and chemical properties of the substance or preparation

and the circumstances of the work involving those substances to see if that can create a safety risk to persons from an energetic event, if so a dangerous substance is present. This is particularly important in order to identify dangerous substances that may only arise as a result of a work process. These may be vapours or gases produced during a laboratory technique, substances that decompose, or react exothermically, when mixed with other substances e.g. peroxides. Wood and many other dusts may be dangerous substances, 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.

It is the combination of the properties of the substance and the circumstances of the work process that needs to be assessed. If the assessment shows that there is a safety risk to persons arising from a fire, explosion or other energy-releasing event then the substance is a dangerous substance for DSEAR purposes.

## Risk Assessment

If dangerous substances are identified as being present in the workplace DSEAR requires employers to carry out a risk assessment before commencing any new work activity involving dangerous substances. The purpose of the risk assessment is to enable employers to decide what they need to do in order to eliminate or reduce, so far as is reasonably practicable, the safety risks from dangerous substances and ensure that these safety control measures are implemented.

## Elimination

Elimination is the best solution and must be considered first. This involves replacing a dangerous substance with a substance or process that totally eliminates the risk by avoiding exposure to the hazard. In practice this may be somewhat difficult to achieve and it is more likely that it will be possible to replace the dangerous substance with one that is less hazardous (e.g. by replacing a low flashpoint solvent with a high flashpoint one) or to design the process so that it is less dangerous – for example, by reducing quantities of substances in the process. However, care must be taken whilst carrying out these steps so as to ensure that no other new safety or health risks are created or increased.

## Control measures

DSEAR requires that control measures be applied in the following order of priority consistent with the risk assessment and appropriate to the nature of the activity or operation:

- 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 (e.g. by ventilation)
- Avoid ignition sources
- Avoid adverse conditions (e.g. exceeding the limits of temperature or control settings) that could lead to danger
- Keep incompatible substances apart

Measures that mitigate the risk must be applied and these should likewise be consistent with the risk assessment and appropriate to the nature of the activity or operation, these should include:

- Reducing the numbers of employees exposed
- Providing plant which is explosion resistant
- Providing explosion suppression or explosion relief equipment
- Taking measures to control or minimise the spread of fires or explosions
- Providing suitable Personal Protective Equipment (PPE)

DSEAR also specifies that the measures taken to achieve the elimination or the reduction or risks should include:

- Design, construction and maintenance of the workplace (e.g. fire-resistance, explosion relief)
- Design, assembly, construction, installation, provision, use and maintenance of suitable work processes, including all relevant plant, equipment, control and protection systems
- The application of appropriate systems of work including: written instructions, permits to work and other procedural systems of organising work

DSEAR also requires the identification of hazardous contents of containers and pipes.

Many will already be marked or labelled under existing EC legislation. For those that are not, 'identification' could include training, information or verbal instruction, but some may require labelling, marking or warning signs.

### Additional requirements for explosive atmospheres

In places where your risk assessment indicates that 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, and in accordance with Schedule 2 to the Regulations
- 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 1 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 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
- If the initial assessment identifies a zone 0 or a zone 20 classification independent advice must be sought on the appropriate control measures

## Arrangements to deal with accidents, incidents and emergencies

DSEAR requires that the University makes arrangements to protect employees (and others who are in the workplace) in the event of accidents etc. The provisions build on existing requirements in Regulation 8 of the Management of Health & Safety at Work Regulations and require employers to make arrangements including:

- Suitable warning (including visual and 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
- Practice drills
- Making information on the emergency procedures available to employees
- Contacting the emergency services to advise them that information on emergency procedures is available (and providing them with any information they consider necessary)

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

At Northumbria University all aspects of fire safety regarding designated petroleum spirit stores, including annual risk assessment and inspection, is undertaken by the University's Central H&S team

## Recording the significant findings of the risk assessment

- The measures (technical and organisational) taken to eliminate and/or reduce risk
- Sufficient information to show that the workplace and work equipment will be safe during operation and maintenance including;
  - Details of any hazardous zones
  - Any special measures taken to ensure co-ordination of safety measures and procedures, when employers share a workplace
- Measures taken inform, instruct and train employees

## Suggestion for undertaking a risk assessment

As most, but not all, dangerous substances present a health risk as well as a safety risk most of the above aspects of risk assessment will be dealt with in your COSHH risk assessment of hazardous substances, it may therefore be prudent and less time consuming to address the hazards of fire and explosion at the same time as undertaking the COSHH risk assessment, thus obviating the need to undertake separate risk assessment at separate times. As an aid to the risk assessment procedure the Health and Safety Department has developed a DSEAR assessment template and this may be used, as appropriate, in full or in part as an appendix to the COSHH Risk Assessment Form.

# TRAINING

## Information instruction and training



The University is required to provide staff and other people at the workplace who might be at risk with suitable information, instruction and training on precautions and actions they need to take to safeguard themselves and others, including:

- Names 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
- The significant findings of the risk assessment

Employers should also make information available to employee representatives.

Information, instruction and training need only be provided 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. Again, much of this is already required by existing health and safety legislation and should not place any additional burden upon Faculties or Departments.

## FORMS

Link to form

## RELATED DOCUMENTS

COSHH

L138 Dangerous Substances Explosive Atmospheres Regulations

Guidance on the classification and zoning of areas where potentially explosive atmospheres may occur, and the selection of equipment for use in those areas can be found at:

<http://www.hse.gov.uk/fireandexplosion/atex.htm>

## APPENDICES