

## Guidance to DSEAR:

### Summary

The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) came into force on 9th December 2002. The statutory Instrument can be found at: <http://www.legislation.hmso.gov.uk/si/si2002/20022776.htm>.

DSEAR applies to all dangerous substances at nearly every business, including HE, in the UK. It sets minimum requirements for the protection of workers from fire and explosion risks arising from dangerous substances and potentially explosive atmospheres. DSEAR complements the general requirement to manage risks under the Management of Health and Safety at Work Regulations 1999 and addresses risk to persons safety from dangerous substances, as opposed to risks to health addressed by COSHH.

In order to ensure compliance Colleges and Schools (or equivalents) will require to:

- Carry out a risk assessment of any work activities involving dangerous substances;
- Provide technical and organisational measures to eliminate or reduce as far as is reasonably practicable the identified risks;
- Provide equipment and procedures to deal with accident 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 table for dates.)

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

For the diligent Academic School or Support Department the impact of DSEAR should 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 Regulations, and in respect of proper and sufficient escape routes, provision of fire fighting equipment, etc., that undertaken by the Health and Safety Department's Fire Safety Unit.

### Scope of DSEAR

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

- a) There is work being carried out by an employer;
- b) A dangerous substance is present, or is liable to be present;
- c) The dangerous substance presents a risk to persons safety (as opposed to health)

'Workplace' means any premises, or part thereof, used for work, this includes all industrial, commercial and educational premises, vehicles, vessels, roads, houses and other domestic dwellings, and common parts of buildings.

DSEAR is intended to protect not only employees at the workplace, but also any other person whether at work or not who may be put at risk by dangerous substances. This includes employees working for other employers, students, visitors to the site, members of the public, etc.

However, when considering arrangements to deal with accidents, incidents and emergencies and the provision of information, instruction and training, employers only have duties to persons who are at their workplace.

## **Responsibility for Implementation**

In the case of the University the management responsibility for ensuring compliance with the Regulations in general, and in particular that; risk assessment is undertaken and any required risk reducing measures, emergency arrangements, etc, are implemented and that sufficient information and training is provided, ultimately lies with the Head of School or equivalent, whilst this responsibility cannot be absolved the task may be delegated to a supervisor, technical manager, or other designated responsible person.

## **Activities/Substances to which DSEAR apply**

The following activities and substances may be commonly found in the work situation within a university. 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
- 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 gases, including 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.

## **Determining the presence of dangerous substances**

You should undertake the following:

- Check whether the substances have been classified under the Chemicals (Hazard Information and Packaging for Supply) Regulations 2002(CHIP) as: explosive, oxidising, extremely flammable, highly flammable or flammable.

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 CHIP Regulations as flammable, oxidising, etc. 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. If a substance or preparation is classified as explosive, oxidising, extremely flammable, highly flammable or flammable then it is a dangerous substance. The Safety and Hygiene Adviser holds a copy of the Approved list and queries regarding this should be made by email to [Health.Safety@ed.ac.uk](mailto:Health.Safety@ed.ac.uk)

In the case of proprietary substances purchased from a supplier, and classified under CHIP, the packaging in whatever form (cylinder, drum, bottle, tin, or box) should contain warning pictograms (black on orange) denoting the safety hazard, this is often the most easily noted warning that a substance is dangerous. The packaging may also include EU risk phrases e.g. "R9 - explosive when mixed with combustible material".

- 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.

The key point here is that 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 (or the self-employed) 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. Therefore imbedded within DSEAR is the well-understood safety-hierarchy synonymous with other Regulations of: Avoidance/Elimination, or Control/Mitigation

## **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, this is known as process intensification. 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 of risk 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.

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>

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

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

### **Arrangements to deal with accidents, incidents and emergencies**

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

- 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
- 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.

However it should be noted that these requirements clarify what already needs to be done in relation to the safety management of dangerous/hazardous substances in existing legislation e.g. the Management of Health and Safety at Work Regulations 1999, the Control Of Substances Hazardous to Health Regulations 2002, the Fire Precautions (Workplace) Regulations 1997/99, the Fire precautions Act 1971 and associated Codes of Practice, and therefore should not require any additional duties to those already present in complying with this existing legislation.

In this University all aspects of fire safety regarding designated petroleum spirit stores, including annual risk assessment and inspection, is undertaken by the Health and Safety Department's Fire Safety Unit, any queries regarding this should be addressed to the University Fire Safety Adviser ([Fire@ed.ac.uk](mailto:Fire@ed.ac.uk))

### **Information instruction and training**

Employers are required to provide employees 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 Schools or other management units.

### **Recording the significant findings of the risk assessment**

As with other health and safety legislation that you will be familiar with DSEAR requires the recording of the significant findings of the risk assessment. The detail should include:

- 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 to inform, instruct and train employees.

### **Suggestion for undertaking 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 usual 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, this is available at:

<http://www.docs.csg.ed.ac.uk/Safety/ra/DSEAR.doc>

### **Petroleum spirit stores and legislation**

Petroleum legislation is being modernised as part of the DSEAR package. Schools which have dedicated petroleum spirit stores will be aware that the keeping of petrol was controlled by inspection by the local authority and the issuing of licences under the Petroleum (Consolidation) Act. However, the DSEAR Regulations apply to petrol and therefore duplicate these controls, accordingly the licensing requirements for petrol have been removed, save that for petrol that is being kept for dispensing into vehicles.

In this University all aspects of safety regarding designated petroleum spirit stores, including risk assessment and inspection, is being undertaken by the Health and Safety Department's Fire Safety Unit any queries regarding this should be addressed to [fire@ed.ac.uk](mailto:fire@ed.ac.uk)



Example of warning sign required for places where explosive atmospheres may occur



- must be triangular in shape;
- must have black letters on yellow background with black edging - yellow portion must take up at least 50% of the area of the sign

### Further reading/References

- 7 Steps to successful substitution of hazardous substances, HSG 110, HSE Books 1994 ISBN 0 7176 0695 3.
- Process Intensification, DTI Guide, DTI Publications Unit
- Equipment and Protective Systems for Use in Potentially Explosive Atmospheres Regulations 1996 (as amended), Statutory Instrument 192, 1996 text available at:  
[http://www.hmso.gov.uk/si/si1996/Uksi\\_19960192\\_en\\_1.htm](http://www.hmso.gov.uk/si/si1996/Uksi_19960192_en_1.htm)
- 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 <http://www.hse.gov.uk/pubns/chis5.pdf>
- Keeping of LPG in cylinders and similar containers CS 4, HSE Books ISBN 0 7176 0631 7
- 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
- Fire and explosion - How safe is your workplace? A short guide to the Dangerous Substances and Explosive Atmospheres Regulations INDG370 HSE Books 2002 <http://www.hse.gov.uk/pubns/indg370.pdf>
- Safe Working with Flammable Substances, INDG227, HSE Books 2002 <http://www.hse.gov.uk/pubns/indg227.pdf>