

Dangerous Substances and Explosive Atmospheres Code of Practice

Reviews and Revisions

Action	Date	Reason	Reviewer
Amend link to Statutory Instrument	24/08/15	Incorrect link in place	Lesley Salkeld

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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 persons safety from dangerous substances, as opposed to risks to health addressed by the Control of Substances Hazardous to Health Regulations (COSHH)

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.

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 fire fighting equipment, etc., by the University Fire Safety Adviser.

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 persons 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.

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 Harmonised 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, this is known as process intensification. However care must be taken whilst carry 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

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>

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)
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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 Fire Safety Advisor, and queries regarding this should be addressed to the University Fire Safety Advisor.

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
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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.

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 this is available in appendix 1 of this document.

APPENDIX 1

Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) Risk Assessment

Chemicals risk assessment

If the substance(s) that you are working with, handling or storing is flammable, extremely flammable, highly flammable, oxidising, explosive, or capable of producing an explosive atmosphere, this further section of the risk assessment process must be addressed.

Dangerous Substances and Explosive Atmospheres Regulations 2002

If a proprietary product, does the hazard information contained within the Material Safety Data Sheet, or on the labelling on the product packaging denote that it is (check box):

Explosive Oxidising Extremely flammable Highly flammable Flammable

or, has a flash point lower than 32°C

or, that; release of vapour/gas may produce an explosive atmosphere

If a substance is produced as a result of an in-house process, or as a bi-product of such a process, is that substance (check box):

Explosive Oxidising Extremely flammable Highly flammable Flammable

or, have a flash point lower than 32°C

or, could release of vapour/gas/dust produce an explosive atmosphere Yes No

If **No** has been answered to all of the above questions you may terminate the risk assessment at this point, otherwise continue:

Note here names of product, or substance being handled, stored, or produced:

Note here how a work system, or activity could fail and give rise to fire or explosion, also note any sources of ignition:

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Control measures (check box as appropriate)

Process/activity

Where appropriate to the nature of the activity or operation:

Has the quantity of the dangerous substance held/used been reduced to a minimum?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Have steps been taken to avoid, or minimise releases (intentional or unintentional)?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Have steps been taken to control releases at source?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Have steps been taken to prevent the formation of an explosive atmosphere?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Have steps been taken to collect, contain and remove any releases to a safe place (e.g. by ventilation)?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Have steps been taken to avoid adverse conditions (e.g. exceeding the limits of temperature or other control settings)?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>

Are incompatible substances kept apart in storage and, so far as is practicable, in use (e.g. oxidisers and combustibles)?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Have the number of employees exposed to the dangerous substances or explosive atmosphere been reduced to the minimum?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Has plant been supplied that is explosion resistant?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Is explosion suppression or relief provided on equipment?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Have adequate measures been taken to control or minimise the spread of fire, or explosion?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Has suitable Personal Protective Equipment (PPE) been provided, and have operatives been trained how to wear it correctly?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>

Workplace/process and management systems (check box as appropriate)

Where appropriate to the nature of the activity or operation:

Is the workplace designed, constructed and maintained so as to provide adequate fire-resistance and/or explosion relief?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is any assembly, construction, installation, rig, plant, equipment, protections system, etc., designed in such a manner as to minimise risk or fire and/or explosion?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is any such assembly, construction, installation, rig, plant, equipment, protection system, etc., used in such a manner as to minimise risk of fire and/or explosion?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Have appropriate safe systems of work, or other required procedural systems of organising work, been developed and communicated to the workforce, either by way of this form or another document?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is a permit to work scheme required for working with the substance(s), or in the work area, and are these strictly enforced?	Yes <input type="checkbox"/> No <input type="checkbox"/>
In the case of explosive atmospheres; <i>(if not applicable check box and proceed to storage)</i>	<input type="checkbox"/>
Have all such areas been classified into zones in accordance with Schedule 2 to the Regulations?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Where necessary have such classified zones been marked at their entry points with the specified 'EX' hazard warning sign?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Are all areas classified into such zones appropriately protected from sources of ignition, through the selection of equipment and protective systems compliant with the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are employees working in zoned areas provided with clothing that does not create a risk of electrostatic discharge?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Have areas where explosive atmospheres may be present, before their first operation, been verified as being safe by a person, or organisation competent in the field of explosion protection?	Yes <input type="checkbox"/> No <input type="checkbox"/>

Storage

Are all flammable substances kept in suitable fire resistant storage and are all quantities in excess of 50 litres kept in dedicated and appropriately protected flammable stores?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are all petroleum spirits, or derivatives thereof, in excess of 50 litres kept in dedicated and appropriately protected petroleum spirit stores?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are incompatible substances stored apart (e.g. flammables, oxidisers, combustibles, flammable gases, LPG)?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Where appropriate have storage areas been designed to provide explosion relief/resistance?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>

Emergency Procedures

Have suitable emergency procedures been developed and communicated to the workforce to deal with adverse process conditions (e.g. exceeding limits of temperature, or other control settings)?	Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Have suitable emergency procedures been developed and communicated to the workforce to deal with fire and evacuation?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Have suitable emergency procedures been developed and communicated to the workforce to deal with the spillage of dangerous substances?	Yes <input type="checkbox"/> No <input type="checkbox"/>

Waste disposal

Have suitable procedures been developed, communicated to the workforce and implemented to deal with the safe transport and disposal of dangerous substances?	Yes <input type="checkbox"/> No <input type="checkbox"/>
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Information, Instruction and Training

Has appropriate information, instruction and training, commensurate with the hazard potential of the dangerous substances, or process, been provided to the workforce as regards; product detail, hazard, risk reduction methods to be employed, management systems to be followed, emergency systems, etc.?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are only trained and competent persons involved in work with dangerous substances?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Where any question relevant to a dangerous substance being used, produced, handled or store has returned a No response, the subject area should be revisited to ensure that all required and reasonable practicable risk reducing measures haven been implemented.	Yes <input type="checkbox"/> No <input type="checkbox"/>

Conclusion

The risk(s) from the hazard potential of the dangerous substances and/or explosive atmospheres identified in this risk assessment must be reduced to the lowest level reasonable practicable, are you satisfied that this is the case?	Yes <input type="checkbox"/> No <input type="checkbox"/>
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Name of Assessor:	Signature:
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Date assessment undertaken:	Date review required:
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N.B. There is a following page

Safe System of Work (to be communicated to the relevant workforce)

As a result of risk assessment of the work process involving the following dangerous substance(s)

_____ this including their handling, storage and ability, in the form that they present in the work situation, to result in an explosive atmosphere, the following safe system of work (rules of work) must be observed and adhered to all times.

(Continue on another sheet if required)

In the event of an emergency situation actions laid out in the safe system of work that are designed to minimise damage to equipment or property should only be undertaken if this does not put yourself or others at significant risk, personal safety and that of others must take priority.

I have read and understood the above safe system of work.

Signature	Date