

Dangerous Substances and Explosive Atmospheres (DSEAR) Procedure

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The University uses dangerous substances in some of its operations.

- A dangerous substance is any substance used or present at work that could, if not properly controlled, cause harm to people as a result of a fire or explosion.
- They can be found in nearly all workplaces and include solvents, paints, varnishes, flammable gases, dusts, pressurised gases and substances corrosive to metal that may generate a flammable or explosive atmosphere

This Procedure is intended to ensure that all staff and students at the University who use dangerous substances or generate explosive atmospheres do this in a manner that assists the university to discharge its duty of care in this area and to comply with the Health and Safety at Work, etc. Act 1974 and the Dangerous Substances and Explosive Atmospheres Regulations 2002.

It should be noted that the requirements of this Procedure clarify what needs to be done in relation to the safe management of such substances in existing legislation

- The Management of Health and Safety at Work Regulations 1999,
- The Control of Substances Hazardous to Health Regulations 2002 and
- the Fire (Scotland) Act 2005 and therefore should not place any additional duties on those complying with existing legislation.

These substances will normally be identified on the completion of the COSHH risk assessment.

This procedure is intended to implement that policy and applies to all Schools and Departments of the University across all campuses.

This Procedure covers dangerous substances and explosive atmospheres anywhere within the University. It applies to the control of dangerous substances and explosive atmospheres in areas outside of the University (e.g. as the result of visits to other workplaces with University Staff, field trips). The requirements of the Procedure may be met in respect of other workplaces by ensuring that the risk assessments and risk control measures produced by the controllers of those workplaces are suitable and sufficient prior to the commencement of the activities that may give rise to exposure.

There is a specific requirement, under DSEAR to carry out a risk assessment in respect of all dangerous substances and explosive atmospheres and to put in place appropriate risk control measures to remove or reduce the risk to staff, students and other persons who may be exposed to such dangerous substances and explosive atmospheres as a result of the University's operations. The responsibility to ensure compliance with the DSEAR Regulations and this Procedure rests with the University, the School / Support Department and all individuals involved.

**Dangerous Substances and Explosive Atmosphere Regulations 2002 (DSEAR)
Background:**

- The primary legislation applying to the control of substances that can cause fire and explosions in the workplace is the Dangerous Substances and Explosive Atmosphere Regulations 2002 (DSEAR) (SI 2002 No.2776). The text of the Regulations can be found at the HMO website.
- DSEAR requires employees to assess the risks of fires and explosions that may be caused by dangerous substances in the workplace. These risks must then be eliminated or reduced as far as is reasonably practicable. The aim is to protect employees and other people who may be put at risk, such as visitors to the workplace and members of the public. The Regulations complement the requirement to manage risks under the Management of Health and Safety at Work Regulations 1999 (SI 1999 No. 3242).
- DSEAR put into effect requirements from two European Directives: The Chemical Agents Directive (98/24/EC) and the Explosive Atmospheres Directive (99/92/EC). It also replaced a number of older regulations dealing with flammable substances safety.

Main Duties Within DSEAR**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 (where applicable)
- Provide information and training to employees
- Classify places where explosive atmospheres may occur into zones and mark the zones where necessary

The requirement to carry out a suitable risk assessment under DSEAR is an absolute duty in order to properly manage the use, storage, handling and disposal of dangerous substances and explosive atmospheres.

When carrying out a DSEAR risk assessment reference should be made to other University Procedures, e.g. "Procedure for Disposal of Hazardous Wastes", "Carrying out of Risk Assessment: Procedure and Guidance", "Procedure for Control of Substances Hazardous to Health", etc.

Further information regarding dangerous substances and explosive atmospheres is available through the Health and Safety team, and the Health and Safety Executive's Website and links from the University intranet or internet sites.

Obligations of the employer

- The employer shall take technical and /or organisational measures appropriate to the nature of the operation, in order of priority and in accordance with the following basic principles:
- The avoidance of ignition of explosive atmospheres
- The prevention of the formation of explosive atmospheres, or where the nature of the activity does not allow that,
- Mitigation of the detrimental effects of an explosion so as to ensure the health and safety of workers

Risk Assessment

The risk assessment shall be completed prior to the commencement of work and revised when the workplace, work equipment or organisation of the work undergoes significant changes, extensions or conversions, or after an incident has occurred.

You should apply control measures, the safe system of work, in the following order,

1. Elimination of the substance, however if this is not possible,
2. Reduce the quantity of dangerous substances to a minimum or substitute with a less dangerous substance
3. Control release of source
4. Prevent the formation of an explosive atmosphere
5. Collect, contain and remove any releases to a safe place e.g. by ventilation
6. Avoid ignition sources
7. Avoid adverse conditions that could lead to danger e.g. exceeding the limits of temperature or other control settings.
8. Keep incompatible substances apart. **Oxidisers and Reducers**

The risk assessment is in two stages (see Appendix 1)

- Stage one confirms that the substances used in your process are not flammable or explosive or will not cause such conditions to be made. This information come from COSHH assessment and material safety data sheets, MSDS, provided by the manufacturer of the substance. This is signed off by the person carrying out the assessment and the academic supervisor or line manager.

- Stage two involves the identification of substances that produce flammable or explosive vapours. This requires the completion of each section of the assessment including the Safe System of Work.

ZONED AREAS (see Appendix 2)

Zoned areas can only be assessed by someone with extensive chemical knowledge of the substance properties and expansion rates of gases.

Currently the university has only one zoned area, the external flammable solvent store at the rear of the Denholm building North.

Zones are classified as 0,1,2 for vapours created from flammable liquids with the lowest number being the most dangerous as it is in continuous operation. Zones 20,21,22 refer to dusts that are explosive.

The solvent storages building is classified as **Zone 2**.

N.B. Normally a sign would be attached to the building to indicate this, but the anti-terrorism act does not allow this.

RESPONSIBILITIES

Deans of Schools / Directors / Heads of Department

Responsible for all health and safety within their School or Department and therefore must:

- Allocate sufficient staff training resources to manage DSEAR where applicable
- Ensure risk assessments are completed, including for DSEAR
- Allocate sufficient resources for all control measures required by the risk assessment
- Cooperate with the Estates department for any statutory examination and testing and ensure appropriate maintenance records are kept.

Supervisors, Technical Line Managers

Responsible for ensuring the day-to-day supervision of health and safety matters in their areas of responsibility and therefore must:

- Identify safer alternatives to working with dangerous and explosive atmospheres where reasonably practicable
- Carry out, and monitor/review all applicable risk assessments for DSEAR or
- Communicate the risk assessment to all affected parties
- Bring this procedure to the attention of direct reports undertaking the work

- Check that the relevant paperwork, such as Risk Assessment, statutory checks and maintenance is completed by those undertaking work and sign off on assessments.

Health and Safety Champion

Act as the focal point for health and safety within their school or department and as such must:

- Bring any concerns reported to them, and related to this procedure, to the attention of the school or department Health and Safety Committee as appropriate. Any urgent concerns should be raised with the Dean of School / Head of Department immediately.

Individual Users (Staff and Students) have a responsibility for their own health and safety and that of others, and therefore must:

- Take care of themselves and others who could be affected by their actions and omissions
- Adhere to the control measures identified in the DSEAR Risk Assessment
- Report any significant safety issues to their academic supervisor promptly
- Will already be covered by other risk assessments and fire safety risk assessments of work activities.

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, contractors, visitors to the premises, members of the public etc.

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 (e.g. replacing a low flashpoint solvent with a high flashpoint one that also has carcinogenic properties).

Control Measures

If elimination is not possible then 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)

Currently there are no operations or chemical processes that require explosion relief.

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. 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.

Information Instruction and Training

Staff, students and other persons who might be at risk must be provided 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 sheets
- Copies of this Procedure
- The significant findings of the risk assessment

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, DSEAR requires the recording of the significant findings of the risk assessment. The details 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, e.g. arrangements for contractors such as service engineers, alarm activation out of normal hours etc.
- Measures taken to inform, instruct and train employees.

Appendix 1- DSEAR 2002 Risk Assessment Form (preliminary assessment)



DSEAR

(Dangerous Substances & Explosive Atmosphere
Regulations 2002)

Risk Assessment

STAGE 1

**Assessment Reference
number :**

**Name the substance; and
any mixtures, involved in
the process**

COSHH ref no : COSHH

**Where is the substance
stored**

**Where does the process
take place**

Who is at Risk

Academic /
Technical
Staff

☐

Students

☐

Cleaners

☐

FMO's

☐

Contractors

☐

Visitors

☐

**Describe the
activity or work
process.
(quantity of
substance,
frequency and
duration)**

Is substitution possible?

☐
☐

Yes

No

CLP Classification:

(Classification Labelling and Packaging)

Explosive


☐

Oxidising


☐

Flammable


☐

Hazard Type for Proprietary product/substance:

Flammable

☐

Highly Flammable

☐

Extremely

☐

Capable of producing an

Oxidising
atmosphere

☐

Explosive

☐

explosive

☐

Hazard Type for substance generated in-house:

Flammable

☐

Highly Flammable

☐

Extremely

☐

Capable of producing an

Oxidising
atmosphere

☐

Explosive

☐

explosive

☐

If you have not ticked any of the preceding boxes, you should terminate the risk assessment at this point, otherwise continue to STAGE 2

STAGE 2

Control Measures:

Yes No N/A

Has the quantity of the dangerous substance held/used been reduced to a minimum?

Have steps been taken to avoid, or minimise releases (intentional or unintentional)?

Have steps been taken to control releases at source?

Have steps been taken to prevent the formation of an explosive atmosphere?

Have steps been taken to collect, contain and remove any releases to a safe place (e.g. by ventilation)?

Are incompatible substances kept apart in storage and, so far as is practicable, in use (e.g. oxidisers and combustibles)?

Have the number of employees exposed to the dangerous substances or explosive atmosphere been reduced to the minimum?

Has plant been supplied that is explosion resistant?

Is explosion suppression or relief provided on equipment?

Have adequate measures been taken to control or minimise the spread of fire, or explosion?

Has suitable personal Protective Equipment (PPE) been provided, and have operatives been trained how to wear it correctly?

Workplace Management Systems: *where appropriate to activity or operation*

Yes No N/A

Is the workplace designed, constructed and maintained so as to provide adequate fire-resistance and/or explosion relief?

Is any assembly, construction, installation, rig, plant, equipment, protection system, etc., designed in such a manner as to minimise risk of fire and/or explosion?

Is any such assembly, construction, installation, rig, plant, equipment, protection systems, etc., used in such a manner as to minimise risk of fire and/or explosion?

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?

Is a permit to work scheme required for working with the substance(s), or in the work area, and are these strictly enforced? N/A

In the case of explosive atmospheres; (if not applicable mark here and proceed to storage)

NA ☐

Yes No N/A

Have all such areas been classified in to zones in accordance with Schedule 2 of the Regulations?

Where necessary have such classified zones been marked at their entry points with the specified 'EX' hazard warning sign?

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?

Are employees working in zoned areas provided with clothing that does not create a risk of electrostatic discharge?

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?

Storage

Yes No N/A

Are all flammable substances kept in suitable fire resistant storage and are all quantities in excess of 50ltrs kept in dedicated and appropriately protected flammable stores?

Are all petroleum spirits, or derivatives thereof, in excess of 50ltrs kept in dedicated and appropriately protected petroleum spirit stores?

Are incompatible substances stored apart (e.g. flammables, oxidisers, combustibles, flammable gases, LPG)?

Where appropriate have storage areas been designed to provide explosion relief/resistance?

Emergency Procedures:

Yes No N
A

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)?

Have suitable emergency procedures been developed and communicated to the workforce to deal with fire and evacuation?

Have suitable emergency procedures been developed and communicated to the workforce to deal with the spillage of dangerous substances?

Waste Disposal:

Have suitable procedures been developed, communicated to the workforce and implemented to deal with the safe transport and disposal of dangerous substances?

What will you do with your waste? The waste is collected in a labelled bottle specifically for this waste only. It will be removed by the hazardous waste advisor when full.

Information, Instruction and Training:

Have you been given; appropriate Information, instruction and training, commensurate with the hazard potential of the dangerous substances, or process, as regards; product detail, hazard, risk reduction methods to be employed, management systems to be followed, emergency systems, etc.?

☐

Yes

☐

No

Are only trained and competent persons involved in work with these dangerous substances?

☐

Yes

☐

No

Where any question relevant to a dangerous substance being used, produced, handled or stored has returned a No response, the subject area should be revisited to ensure that all required and reasonably practicable risk reducing measures have been implemented.

SAFE SYSTEM OF WORK for risk assessed substances

Include your control measures for safe handling, storage, emergency measures and application of any explosive atmosphere zones to be observed.

This safe system must be adhered to at all times.

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 reasonably practicable, are you satisfied that this is the case?

Assessor name:

Date:

Signature:

RISK ASSESSMENT SIGN OFF

(to be completed by Supervisor or Project Manager)

Assessment ref no.:

The process/activity is unsafe, and the process/activity must cease immediately

☐
☐

The process/activity meets the requirements of DSEAR and may continue.

Supervisor / Manager name:

Signature:

Date:

Appendix 2- Zoned area classification



	Hazardous Area Zone	Presence of Explosive Atmospheres
Gas Group	Zone 0	Continuous, frequent or for long periods
	Zone 1	Intermittent in normal operation (likely)
	Zone 2	Occasional or for short periods (Never in normal operation)
Dust Group	Zone 20	Continuous, frequent or for long periods (air/cloud of combustible dust)
	Zone 21	Intermittent in normal operation
	Zone 22	Occasional or for short periods



"EX" sign













Gas, mist, fume, vapour



Combustible Dust

Examples of supplementary zone classification signs

Appendix 3- Warning pictograms on dangerous substance containers

Physical Hazards				
				
Explosive	Flammable	Oxidising	Compressed Gas	Corrosive to metals
Health Hazards				Env. Hazards
				
Acutely Toxic	Corrosive	Less Serious Hazard	Long Term Health Effects	Damaging to the Aquatic Environment