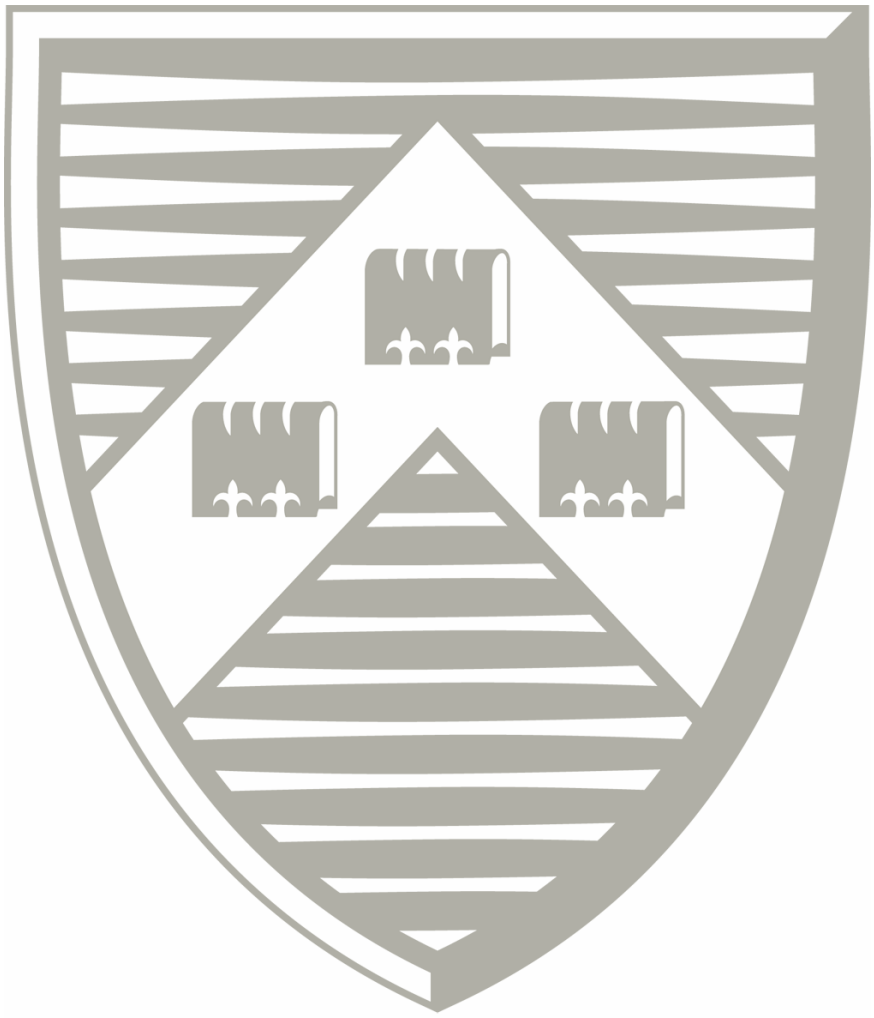
The Workplace Health and Safety Office



UNIVERSITY POLICY AND MANAGEMENT PROCEDURE

Dangerous Substances and Explosive Atmospheres (DSEAR)

Statement

This Management Procedure was approved and authorised by the Health, Safety and Welfare Committee (now Workplace Health and Safety Committee) on ***27 May 2014*** *on behalf of the University of York Council and forms part of the Health and Safety Policy of the University of York.*

This document is a Management Procedure for good health and safety management practice. This Management Procedure provides Deans of Faculty, Heads of Departments, Heads of College and all managers, staff and students with the necessary information to incorporate healthy and safe practices and relevant procedures into their activities. Divergence from this Management Procedure may result in Deans of Faculty, Heads of Departments, Heads of College and the University of York being exposed to possible legal proceedings.

The use of this Management Procedure and the incorporation of its requirements into working practices and activities will ensure that the University of York and its community achieves compliance with its legal duties with regards to health and safety.

The most recent version of this Management Procedure is available at
https://www.york.ac.uk/admin/hsas/safetynet/atoz.htm

Date of Review	*December 2023*	*By*	*The Director of Health and Safety*
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Date of Next Review	*December 2025*	*By*	

UNIVERSITY POLICY

1. INTRODUCTION

The University of York (University) has a duty of care for its staff and students under the management of Health and Safety at Work Regulations. This includes Academic, Research and Teaching (ART) activities that may create, involve or generate any dangerous substances or explosive atmospheres, hence the **Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)** requires the University to control the risks to safety from fire and explosions.

Dangerous substances are any substances used or present at the University that could, if not properly controlled, cause harm to people as a result of a fire or explosion and similar energy-releasing events and corrosion to metals. They can be found in nearly all areas within Departments and workplaces on Campus and include such things as flammable solvents, paints, varnishes, flammable gases, such as liquid petroleum gas (LPG), hazardous substances and chemicals etc. used in connection with academic, research, teaching and support activities.

DSEAR requires University Departments 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 staff, students and others who may be put at risk, such as visitors and authorised contractors to the workplace including members of the public.

Fires and explosions create harmful physical effects - thermal radiation, overpressure effects and oxygen depletion. These effects can also be caused by other energetic events such as runaway exothermic reactions involving chemicals or decomposition of unstable substances, such as peroxides. These events are also covered by DSEAR, additional information and reference is available at:

http://www.hse.gov.uk/fireandexplosion/dsear-background.htm

The following examples illustrate the type of activities covered by DSEAR:

- storage of petrol as a fuel for cars, boats or horticultural machinery
- use of flammable gases, such as acetylene
- handling and storage of flammable wastes (Faculty of Sciences etc)
- use of flammable solvents in laboratories
- storage of flammable substances
- filling, storing and handling aerosols with flammable propellants such as LPG
- transporting flammable substances in containers around a workplace
- chemical manufacturing, processing and research activities.

ARRANGEMENTS

2. RISK ASSESSMENT AND CONTROL

DSEAR places duties on University Departments to assess and eliminate or reduce risks from dangerous substances. Before any work, teaching or research activity is carried out, Departments must assess the fire and explosion risks that may be caused by dangerous substances. This should be an identification and careful examination of:

- the dangerous substances in the workplace
- the work activities involving those substances
- the ways in which those substances and activities could harm people.

If there is no risk to safety from fires and explosions, or the risk is trivial, no further action is needed. If there are risks then Departments must consider what else needs to be done to comply fully with the requirements of DSEAR.

2.1 Preventing or Controlling Risk

Departments must put control measures in place to eliminate risks from dangerous substances, or reduce them as far as is reasonably practicable. Where it is not possible to eliminate the risk completely, employers must take measures to control risks and reduce the severity (mitigate) the effects of any fire or explosion.

The best solution is to eliminate the risk completely by replacing the dangerous substance with another substance (substitution).

In practice this may be difficult to achieve – but it may be possible to reduce the risk by using a less dangerous substance, for example; replacing a low flashpoint substance with a high flashpoint one. In other situations it may not be possible to replace the dangerous substance at all. For example, it would not be practical to replace dangerous substances within ART activities.

2.2 Control Measures

Where the risk cannot be eliminated, DSEAR requires control measures to be applied in the following priority order:

- reduce the quantity of dangerous substances to a minimum
- avoid or minimise releases of dangerous substances
- control releases of dangerous substances at source
- prevent the formation of a dangerous atmosphere
- collect, contain and remove any releases to a safe place (for example, through ventilation)
- avoid ignition sources
- avoid adverse conditions (for example, exceeding the limits of temperature or control settings) that could lead to danger

- keep incompatible substances apart.

These control measures should be consistent with the risk assessment and appropriate to the nature of the activity or operation.

2.3 Mitigation

In addition to control measures DSEAR requires Departments to put mitigation measures in place. These measures should be consistent with the risk assessment and appropriate to the nature of the activity or operation and include:

- reducing the number of people exposed to the risk
- providing plant that is explosion resistant
- providing explosion suppression or explosion relief equipment
- taking measures to control or minimise the spread of fires or explosions
- the provision of suitable Personal Protective Equipment (PPE).

2.4 Emergency Plans and Procedures

Arrangements must be made to deal with emergencies. These plans and procedures should cover safety drills and suitable communication and warning systems and should be in proportion to the risks. If an emergency occurs, staff and authorised contractors tasked with carrying out repairs or other necessary work must be provided with the appropriate equipment, to allow them to carry out this work safely.

The information in the emergency plans and procedures must be made available to the Workplace Health and Safety Office who will work with the emergency services to allow them to develop their own plans, if necessary and as appropriate.

2.5 Information, Instruction and Training

Departments must provide their staff, students and visitors etc, with relevant information, instructions and training. This shall include:

- the dangerous substances present in the workplace and the risks they present, including access to any relevant safety data sheets and information on any other legislation that applies to the dangerous substance
- the findings of the risk assessment and the control measures put in place as a result (including their purpose and how to follow and use them)
- the emergency procedures.

Information, instruction and training need only be provided to other students and non-employees (visitors and authorised contractors) where it is required to ensure their safety. It should be in proportion to the level and type of risk.

The contents of pipes, containers, etc must be identifiable to alert staff, students and others to the presence of dangerous substances. If the contents have already been identified in order to meet the requirements of other legislation, this does not need to be

done again under DSEAR.

3. ATEX and EXPLOSIVE ATMOSPHERES

Explosive atmospheres within the workplace can be caused by flammable gases, mists or vapours or by combustible dusts. Explosions can cause loss of life and serious injuries as well as significant damage. If there is enough of the substance, mixed with air, then all it needs is a source of ignition to cause an explosion.

Preventing releases of dangerous substances, which can create explosive atmospheres, and preventing sources of ignition are two widely used ways of reducing the risk. Using the correct equipment can help greatly in this.

DSEAR places legal duties on University Departments to eliminate or control the risks, from explosive atmospheres within the workplace.

3.1 Explosive Atmosphere

Under DSEAR, an explosive atmosphere is defined as a mixture of dangerous substances with air, under atmospheric conditions, in the form of gases, vapours, mist or dust in which, after ignition has occurred, combustion spreads to the entire unburned mixture. Atmospheric conditions are commonly referred to as ambient temperatures and pressures. That is to say temperatures of -20°C to 40°C and pressures of 0.8 to 1.1 bar.

Many University areas may contain, or have activities that produce, explosive or potentially explosive atmospheres. Examples include places where work activities create or release flammable gases or vapours, such as Science Departments and laboratories.

3.2 Classification of Explosive Atmospheres

Departments must classify areas where hazardous explosive atmospheres may occur into zones. The classification given to a particular zone, and its size and location, depends on the likelihood of an explosive atmosphere occurring and its persistence if it does. Schedule 2 of DSEAR contains descriptions of the various classifications of zones for gases and vapours and for dusts (Appendix 1 - Classification of Hazardous Areas).

3.3 Selection of Equipment and Protective Systems

Areas classified into zones must be protected from sources of ignition. Equipment and protective systems intended to be used in zoned areas should be selected to meet the requirements of the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996. Equipment already in use before July 2003 can continue to be used indefinitely provided a risk assessment shows it is safe to do so.

3.4 Identifying Areas Where Explosive Atmosphere May Occur

Where necessary, the entry points to areas classified into zones must be marked with a specified 'EX' sign.

3.5 Providing Anti-static Clothing

Departments must provide staff and students who work in zoned areas with appropriate clothing that does not create the risk of an electrostatic discharge igniting the explosive atmosphere, including anti-static footwear. The clothing provided depends on the level of risk identified in the risk assessment.

3.6 Confirming (Verifying) Overall Explosion Safety

Before a workplace containing zoned areas comes into operation for the first time, the Department must ensure that the overall explosion safety measures are confirmed (verified) as being safe. This must be done by a person or organisation competent to consider the particular risks in the workplace, and the adequacy of the explosion control and other measures put in place.

3.7 What is ATEX?

ATEX is the name commonly given to the two European Directives for controlling explosive atmospheres:

1) Directive 99/92/EC (also known as 'ATEX 137' or the 'ATEX Workplace Directive') on minimum requirements for improving the health and safety protection of workers potentially at risk from explosive atmospheres. The text of the Directive and the supporting EU produced guidelines are available on the EU-website. For more information on how the requirements of the Directive have been put into effect in Great Britain see the information in the section Explosive atmospheres in the workplace below.

2) Directive 2014/34/EU (also known as 'ATEX 114' or 'the ATEX Equipment Directive') on the approximation of the laws of Members States concerning equipment and protective systems intended for use in potentially explosive atmospheres. The text of the Directive and EU produced supporting guidelines are available on the EU website. For more information on how the requirements of the Directive have been put into effect in Great Britain see the section on Equipment and protective systems intended for use in explosive atmospheres.

Further information:

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0034

3.8 Equipment and Protective Systems

In Great Britain, the requirements of the Directive (94/9/EC) were put into effect through BIS Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 1996 (SI 1996/192).

The Regulations apply to all equipment intended for use in explosive atmospheres, whether electrical or mechanical, and also to protective systems.

Manufacturers/suppliers (or importers, if the manufacturers are outside the EU) must

ensure that their products meet essential health and safety requirements and undergo appropriate conformity procedures. This usually involves testing and certification by a 'third-party' certification body (known as a Notified Body) but manufacturers/suppliers can 'self-certify' equipment intended to be used in less hazardous explosive atmospheres. Once certified, the equipment is marked by the 'EX' symbol to identify it as such.

Certification ensures that the equipment or protective system is fit for its intended purpose and that adequate information is supplied with it to ensure that it can be used safely.

Additional information and reference is available at:

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

Appendix 1
Management Procedure
Dangerous Substances and Explosive Atmospheres
Classification of Hazardous Areas

Overview

Certain gases, vapours, mists and dusts can all form explosive atmospheres with air. Hazardous area classification is used to identify places where, because of the potential for an explosive atmosphere, **special precautions** over sources of ignition are needed to prevent fires and explosions.

Hazardous area classification should be carried out as an integral part of a DSEAR risk assessment to identify places (or areas) where controls over ignition sources are needed (hazardous places) and also those places where they are not (non-hazardous places). Hazardous places are further classified in Zones which distinguish between places that have a high chance of an explosive atmosphere occurring and those places where an explosive atmosphere may only occur occasionally or in abnormal circumstances. The definitions of the Zones (which are included in DSEAR) also recognise that the chance of a fire or explosion depends on the likelihood of an explosive atmosphere, occurring at the same time as an ignition source, becomes active.

DSEAR defines a place where an explosive atmosphere may occur in quantities that require special precautions to protect the health and safety of workers as **hazardous**. A place where an explosive atmosphere is not expected to occur in quantities that require such special precautions is deemed to be **non-hazardous**. For these purposes **"special precautions**" means precautions to control potential ignition sources within a hazardous area, particularly in relation to the construction, installation and use of equipment.

The term "not expected to occur in such quantities" means that Departments should consider the likelihood of releases of dangerous substances potentially leading to explosive atmospheres as well as the potential quantity of such releases when considering area classification. So if a release is extremely unlikely to occur and/or if the quantities released are small, it may not be necessary to classify the area as hazardous.

For example, if a dangerous substance is being carried through a seamless pipe, and that pipe has been properly installed and maintained, it is extremely unlikely that the substance will be released. An explosive atmosphere would not be expected to occur from this source and the area surrounding the pipe would be non-hazardous.

A spillage from a small bottle of solvent would release so little flammable material that no special precautions are needed, other than the general control of ignition sources (for example, no smoking) and cleaning and disposing of the spillage. It would not be classified as a hazardous area. When considering whether hazardous area classification is necessary for "small" quantities

of dangerous substances, the actual circumstances of use and any local arrangements/rules or specific industry guidance should also be taken into account.
Dangerous substances in small pre-packaged containers for sale, display, etc. in retail premises would not normally ("normal" is intended to ensure that atypical situations such as a poorly ventilated basement in a Shop etc. where aerosols or other flammables are present remains subject to a hazardous area classification study) require the area to be classified as hazardous. However we would expect a hazardous area classification to be carried out for pre-packaged containers held in large quantities e.g. in stores. Procedures to clean up and dispose of any spillage/release and to control ignition sources in the event of such a release would be needed.

Assessing the Risk

Identifying hazardous or non-hazardous areas should be carried out in a systematic way. Risk assessment should be used to determine if hazardous areas exist and to then assign zones to those areas. The assessment should consider such matters as:

- the hazardous properties of the dangerous substances involved
- the amount of dangerous substances involved
- the work processes, and their interactions, including any cleaning, repair or maintenance activities that will be carried out
- the temperatures and pressures at which the dangerous substances will be handled
- the containment system and controls provided to prevent liquids, gases, vapours or dusts escaping into the general atmosphere of the workplace
- any explosive atmosphere formed within an enclosed plant or storage vessel
- any measures provided to ensure that any explosive atmosphere does not persist for an extended time, e.g. ventilation.

Taken together these factors are the starting point for hazardous area classification, and should allow for the identification of any zoned areas. The following paragraphs give further information on what to consider during an assessment.

The Hazardous Properties of Dangerous Substances

The properties of a dangerous substance that need to be known include the boiling point and flash point of any flammable liquid, and whether any flammable gas or vapour that may be evolved is lighter or heavier than air. For dust, information on particle size and density will be needed, once it has been shown that a particular dust can form an explosive atmosphere. Often, relevant information is contained on a safety data sheet provided with the product.

The Size of Potential Releases

Some potential sources of release may be so small that there is no need to specify a hazardous area. This will be the case if the consequence of an ignition, following a release, is unlikely to cause danger to people in the vicinity. However, in the wrong circumstances ignition of quite small quantities of flammable gas/vapour mixed with air can cause danger to anyone in the immediate vicinity. Where this is the case, as in a relatively confined location, from which rapid

escape would be difficult, area classification may be needed even where quite small quantities of dangerous substances are present.
The size of any potential explosive atmosphere is, in part, related to the amount of dangerous substances present. Industry specific codes have been published by a variety of organisations, to provide guidance on the quantities of various dangerous substances that should be stored. For example, the "Code of Practice on Storage of Full and Empty LPG Cylinders and Cartridges" produced by the LP Gas Association. Other examples are available via the HSE website:

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

Temperatures and Pressures

Additional information relating to the process that involves the dangerous substances should also be taken into account, including the temperatures and pressures used in the process, as this will influence the nature and extent of any release, and the extent of any subsequent hazardous areas. Some substances do not form explosive atmospheres unless they are heated, and some liquids if released under pressure will form a fine mist that can explode even if there is insufficient vapour.

Ventilation

Ventilation, either natural, or mechanically (e.g. produced by fans), can both dilute sources of release, and remove dangerous substances from an enclosed area (Fume Cupboards). There is a close link between the ventilation at any given location and the classification and extent of a zone around a potential source of release. Well-designed ventilation may prevent the need for any zoned area or reduce it so it has a negligible extent.

Extent of Hazardous Areas

The assessment needs to identify areas within a workplace that are connected to places where an explosive atmosphere may occur. This will provide information on any areas away from the source of the hazard to which an explosive atmosphere may spread, for example through ducts. Such areas should be included in the classification system for places where explosive atmospheres may occur. An approach to assessing this risk is described in BS EN 60079/10. A technique for preventing this risk is described in BS EN 50016, on pressurisation of enclosures or rooms containing electrical equipment.

Other Considerations

When considering the potential for explosive atmospheres, it is important to consider all dangerous substances that may be present at the workplace, including waste products, residues, materials used for cleaning or maintenance, and any used only as a fuel. Also some combinations of dangerous substances may react together, forming an ignition source, or in combination may form an explosive atmosphere, where singly this does not occur.

Some repeated activities such as refuelling cars or loading and unloading tankers intended for use on the public roads, involve the introduction of potential sources of ignition into an area

where a spill is possible, and which would meet the description of a hazardous area. In these circumstances, safety can be achieved by isolating power sources (e.g. turning off engines, etc) while a transfer is taking place, and making suitable checks before and after a transfer, before moving a vehicle into or out of a hazardous area.

Activities, such as maintenance, may incur risks not covered by the normal area classification of the area where the activity is taking place, for instance the introduction of sources of ignition into a hazardous area. Sometimes the dangerous substance can be removed before the maintenance work activity starts. Sometimes, special control measures can be taken to prevent the release of any dangerous substance during the work. In such cases the additional risks associated with the activity should be assessed before work starts.

Relationship between Fires and Explosions

In many cases where an explosive atmosphere can form, any ignition will cause a fire rather than an explosion. Both fire and explosion cause dangers to workers, and in many cases the precautions required to prevent an ignition are the same. The overall package of precautions required will depend on the possible consequences of a fire or explosion.

Many factors influence the risks from a fire involving dangerous substances. In particular, employers should consider whether a fire could lead to an explosion, how fast a fire might grow, what other materials might be rapidly involved, any dangers from smoke and toxic gases given off, and whether those in the vicinity would be able to escape.

Classifying Hazardous Areas into Zones

Once an area has been identified as hazardous it should be classified into zones based on the frequency and persistence of the potentially explosive atmosphere. This then determines the controls needed on potential sources of ignition that may be present or occur in that area. These controls apply particularly to the selection of fixed equipment that can create an ignition risk; but the same principles may be extended to control the use of mobile equipment and other sources of ignition that may be introduced into the area (for example, matches and lighters) and the risks from electrostatic discharges.

An international standard, BS EN 60079/10, explains the basic principles of area classification for gases and vapours, and its equivalent for dusts was published in 2002 as BS EN 61241/3. These standards form a suitable basis for assessing the extent and type of zone, and can be used as a guide to complying with the requirements in DSEAR. However, they cannot give the extent and type of zone in any particular case, as site-specific factors should always be taken into account.

Industry specific codes have also been published by various organisations and, provided they are applied appropriately, they are valuable in encouraging a consistent interpretation of the requirements. Information is available via the HSE website:

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

Area classification studies usually take the form of drawings identifying the hazardous areas and zones. Additional text gives information about the dangerous substances that will be present, the work activities that have been considered, and other assumptions made by the study. Whenever such drawings and documents have been produced, they should be included in the risk assessment record required by DSEAR. These documents should be considered whenever new equipment is to be introduced into a zoned area.

Maintenance

During a period when maintenance is being carried out, the normal area classification drawings may not be applicable. If dangerous substances have been removed, it may be possible to treat areas normally classified as hazardous as non-hazardous. Alternatively, if the maintenance creates the larger than normal risk of a release of a dangerous substance, larger areas may need to be treated as hazardous. It is not normally necessary to create new area classification drawings for the duration of the maintenance work.

Equipment in Hazardous Areas

Special precautions need to be taken in hazardous areas to prevent equipment from being a source of ignition. In situations where an explosive atmosphere has a high likelihood of occurring, reliance is placed on using equipment with a low probability of creating a source of ignition. Where the likelihood of an explosive atmosphere occurring is reduced, equipment constructed to a less rigorous standard may be used. Equipment is categorised (1, 2 or 3) depending on the level of the zone where it is intended to be used.

A number of ways of constructing equipment to prevent ignition risks have been published as harmonised European Standards, and in some cases, additional requirements are set out in the Standards relating to installation and use.

Marking of Equipment

A standardised marking scheme is applied to identify equipment suitable for a specific location. Equipment built to the requirements of EPS will carry the explosion protection symbol “Ex” in a hexagon, the equipment category number (1, 2, or 3), the letter G and/or D depending on whether it is intended for use in gas or dust atmospheres, and other essential safety information. In many cases this will include a temperature rating expressed as a “T” marking, and sometimes a gas group. These indicate limitations to safe use. Estates Services and Departments arranging the installation of equipment should consider the marking and documentation provided with “Ex” equipment when it is being installed.

DSEAR requires that new equipment and protective systems used in a hazardous area, must be selected on the basis of the requirements set out in the DTI’s Equipment and Protective Systems for Use in Potentially Explosive Atmospheres Regulations 1996 (as amended) (EPS), unless the risk assessment finds otherwise.

For much electrical equipment, Departments will notice comparatively little change from the situation now, except in the details of the marking on equipment. The EPS regulations, however, also apply to mechanical equipment that is a potential ignition source. This is a new requirement, and until recently there has been no mechanical equipment that has been certified for use in a hazardous area. A harmonised European standard for category 3 mechanical equipment is now available as BS EN 13463 part 1.

DSEAR recognises that there might be circumstances where the risk assessment finds that the selection criterion for equipment is inappropriate, or unnecessarily restrictive. A degree of flexibility has been introduced into Schedule 3 of the Regulations, by allowing Departments to use equipment that does not conform to the requirements in the DTI's Regulations, where the Department's risk assessment finds otherwise.

It is important to understand, however, that it would normally be expected that equipment used in zoned areas would comply with the requirements in the DTI Regulations and that equipment of a higher or lower category, than that usually required, would only be present in special circumstances. For example:

- during maintenance operations where alternative effective precautions are provided to control the risk
- where workers can be excluded from the hazardous area and will not be at risk from any ignition of an explosive atmosphere
- where equipment of the required category is simply not available, but a lower category can be used in combination with other protective measures to achieve the purposes of these regulations.

Where Departments intend to use the flexibility provided in DSEAR, their decision must be fully justified in their assessment of risk. It should also be considered in the context of other requirements placed on Departments by these Regulations.

The flexibility in DSEAR does not affect in any way the duties placed on manufacturers, suppliers, importers and other "responsible persons" under the EPS Regulations 1996. Equipment they place on the market, must comply with the requirements of EPS. In many cases however, manufacturers will have a choice to make, whether they build to category 2 or 3 standards. Their decision will depend on the needs of the customers. In particular, DSEAR should not be used:

- to allow equipment imported from outside the EU, built to other standards, to be used without complying with the EPS Regulations
- to justify explosion protected equipment, built to lower standards than that specified by EPS.

Departments who manufacture equipment for their own use, or who import directly from outside the European Economic Area (EEA) are considered to be a "responsible person" under

EPS and take on the full responsibility for complying with those Regulations when putting that equipment into the EEA.

Hazardous Area Zones and Equipment Categories

Hazardous places are classified in terms of zones on the basis of the frequency and duration of the occurrence of an explosive atmosphere.

Gases, Vapours and Mists

For gases, vapours and mists the zone classifications are:

- **Zone 0 -** A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist, is present continuously or for long periods or frequently.
- **Zone 1 -** A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist, is likely to occur in normal operation occasionally.
- **Zone 2 -** A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist, is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Dusts

For dusts the zone classifications are:

- **Zone 20 -** A place in which an explosive atmosphere, in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently.
- **Zone 21 -** A place in which an explosive atmosphere, in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.
- **Zone 22 -** A place in which an explosive atmosphere, in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Notes:

Layers, deposits and heaps of combustible dust must be considered as any other source which can form an explosive atmosphere. "Normal operation" means the situation when installations are used within their design parameters.

Equipment Categories and Zones

The hazardous area zone classification and corresponding equipment categories are:

- Zone 0 or zone 20 -category 1 equipment
- Zone 1 or zone 21 -category 2 equipment
- Zone 2 or zone 22 -category 3 equipment.

Category 1 equipment can also be used in zones 1 and 21 and category 1 and 2 equipment can be used in zones 2 and 22.

Appendix 2
Management Procedure
Dangerous Substances and Explosive Atmospheres
Storage of Dangerous Substances

The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) require risks from the indoor storage of Dangerous Substances to be controlled by elimination or by reducing the quantities of such substances in the workplace including laboratories to a minimum and providing mitigation to protect against foreseeable incidents.

It is recognised that for practical purposes where flammable liquids are used, there is likely to be a need for a limited quantity to be stored in the workplace including laboratories. It is the responsibility of the Head of Department (HoD)/Duty holder when carrying out a risk assessment required under DSEAR Regulation 5, to justify the need to store any particular quantity of flammable liquid within a workplace including laboratories. However, the guiding principle is that only the minimum quantity needed for frequently occurring activities or that required for use during ½ day or one shift should be present in the workplace including laboratories. Clearly actual quantities will depend on the work activity and also the departmental arrangements for controlling the fire risks in the workplace including laboratories.

When not in use, containers of flammable liquids needed for current work activities should be kept closed and stored in suitable cabinets or bins of fire-resisting construction and which are designed to retain spills (110% volume of the largest vessel normally stored in it). These should be located in designated areas that are where possible away from the immediate processing area and do not jeopardise the means of escape from the workplace including laboratories. The flammable liquids should be stored separately from other dangerous substances that may enhance the risk of fire or compromise the integrity of the container or cabinet/bin, for example energetic substances, oxidizers and corrosive materials. It is recognised that these other dangerous substances may be flammable liquids in their own right or held in a flammable liquid. However, it is still inappropriate to store these in the same cabinets or bins with other flammable liquids. *[Further guidance on Energetic and spontaneously combustible substances is contained in HS(G)131 published by HSE]*.

It is recommended that the maximum quantities that may be stored in cabinets and bins are no more than 50 litres for extremely, highly flammable and those flammable liquids with a flashpoint below the maximum ambient temperature of the workplace including laboratories; and no more than 250 litres for other flammable liquids with a higher flashpoint of up to 55°C.

These quantities are intended to be viewed as recommended maxima representing good industry safe practice, rather than be taken as absolute limits. There is intended to be some flexibility with these limits, where it is recognised that the design of modern day buildings and the pattern of work can sometimes make adherence to these quantities difficult to achieve; for example, in

large or open-plan workplaces including laboratories. However, where the HoD does identify a need to store quantities in excess of the recommended maxima, a robust demonstration of this requirement would need to be made and in particular the DSEAR risk assessment should take into account:

- The properties of the materials to be stored or handled in the workplace including laboratories. For mixed storage the worst case situation should be applied, i.e. all materials in the storage cupboard or bin should be considered as being the same material as the one that has the lowest flashpoint;
- The size of the workplace including laboratories and the number of people working in it;
- The amount of flammable liquids being handled in the workplace including laboratories and the quantities of liquid that may be accidentally released or spilled;
- Ignition sources in the workplace including laboratories and potential fire spread in the event of an ignition:
- Exhaust ventilation provision to the workplace including laboratories and/or the storage cupboard or bin;
- The fire performance of the storage cupboard or bin;
- The arrangements for closing the cupboard or bin doors/lid in the event of a fire;
- Means of escape from the workplace including laboratories.

The particular objective, in the event of an incident, is to ensure that people can safely escape from the workplace including laboratories. In this context, the purpose of storing Dangerous Substances in cupboards and bins of appropriate construction and design is to provide a physical barrier to delay the involvement of these materials in a fire and limit the passage of flame and hot gases should the Dangerous Substances subsequently become involved, for sufficient time for staff and students safe evacuation and the HoD immediate emergency procedures supporting this to be implemented.

Regulation 6 guidance texts together with appendices 4 and 5 of the 2013 edition of L138 provide general guidance and details of the performance requirements for fire resisting cupboards and bins. It is important to recognise that these do not specify an absolute test or standard for the cupboard or bin, rather they relate to nominal construction principles, namely:

- that the materials used to form the sides, top, bottom, door(s) and lid are capable of providing the required fire resistance (i.e. 30 minutes integrity) and reaction to fire (i.e. minimal risk);
- that the joints between the sides, top and bottom of cupboards and bins should be free from openings or gaps;
- that the lid/doors should be close fitting against the frame of the bin/cupboard, such that there is a nominal overlap between the frame and lid/doors in their closed position;
- that the supports and fastenings should be of a material with a melting point greater than 750°C.

These criteria represent the minimum performance requirements for compliance with the current legislation. However, it is to be noted that there are a number of more demanding standards and design specifications, which refer to the fire performance of the complete cabinet structure, including: BS EN 14470-1:2004 'Fire safety storage cabinets – Part 1: Safety storage cabinets for flammable liquids'; Factory Mutual, Underwriters Laboratories and ANSI/NFPA 30 standards. Where standards go beyond the minimum requirements of UK health and safety legislation, it is to be emphasised that their implementation in the UK is not a legal requirement. However, for quantities in excess of the recommended maxima the HoD may find cabinets with enhanced fire performance help in making their DSEAR risk assessment demonstration.

It is of course the responsibility of the HoD to ensure that cabinets to any particular standard or design specification do meet the minimum legal requirements. Equally, the use of cabinets with enhanced fire performance should not be seen as a substitute for the provision of dedicated store rooms and outdoor storage areas for the safekeeping of containers which are nominally empty or are not needed for current work.