

**University of Greenwich general policy and procedures for  
dealing with substances that are subject to the Dangerous  
Substances and Explosive Atmosphere Regulations 2002  
(DSEAR)**

**V1.2020**

# Contents

1. Introduction .....	3
2. Responsibilities .....	3
3. Relevant substances.....	4
4. Risk reduction hierarchy .....	5
5. Additional requirements where explosive atmospheres may arise .....	6
6. Safety measures required within hazardous areas (zones 0, 1, 2/20, 21, 22).....	6
7. Information, instruction and training .....	8
8. Emergency procedures .....	8

## **1. Introduction**

The Dangerous Substances and Explosive Atmosphere Regulations 2002 (DSEAR) were enacted to ensure that employers make their workplaces safe in respect of potential fires, explosions and similar events that may arise as a result of the use, storage, etc., of dangerous substances.

The risk posed by dangerous substances must be assessed under both health and safety and fire safety legislation. For the avoidance of confusion, risk assessments carried out as required by H&S legislation should focus on the specific risks posed by dangerous substances and how those risks should be necessarily reduced. Within the fire risk assessment, the emphasis should be more on the general fire safety measures that are required to protect building occupants from fire. Key considerations in respect of the latter assessment are:

- The level of fire resistance required for areas containing hazardous substances
- The level and type of detection required
- Fire exit provision
- Emergency escape lighting
- Firefighting equipment and suppression systems

If following a general H&S risk assessment, the risk of explosion is deemed insignificant or is satisfactorily reduced by existing control measures, it may be reasonable to take no or limited further action. For example, with relatively small quantities of solvents, existing safety and emergency procedures may be deemed sufficient. In a well-managed workplace with unexceptional hazards this should generally be the case. However, in cases where the risk is greater, such as within bulk chemical/cylinder stores and plant rooms that contain gas installations, a specific DSEAR risk assessment needs to be conducted by a competent person.<sup>1</sup>

## **2. Responsibilities**

Faculty Operating Officers/Directors/Heads of Unit who are responsible for the individuals who use, store or maintain dangerous substances should ensure that:

- The risk from dangerous substances is properly assessed and controlled
- Suitable emergency procedures are developed
- Relevant information is recorded/made available appropriately
- Necessary training and instruction is delivered to staff and others

The Director of Estates should ensure that a suitable and sufficient fire risk assessments and general fire emergency procedures are devised.

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<sup>1</sup> The level of competence necessary to carry out a dedicated DSEAR risk assessment will vary but any individual required to carry out the task should have sufficient training to enable them to be defined as a 'competent person' as referred to in the 'Dangerous Substances and Explosive Atmospheres Regulations 2002 - Approved Code of Practice and guidance, L138 (Second edition) Published 2013'

### **3. Relevant substances**

Substances that can be defined as dangerous for the purposes of the legislation generally have the capacity to create or cause an explosion and include the following:

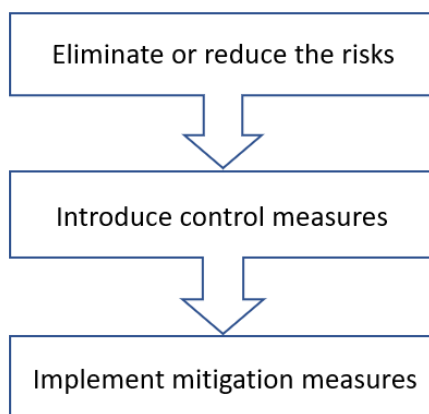
- Flammable gases (including natural gas) in cylinders or pipework.
- Oxygen
- Petrol
- Diesel
- Volatile solvents and other liquids
- Flammable paints
- Cylinders containing non-flammable gases (included from 2015)
- Flammable dusts

In order to comply with DSEAR, the risk posed by any dangerous substances should be established as part of the general risk assessment for the relevant area or process. Particular matters to focus on are:

- What dangerous substances are present or may be formed?
- The properties of the hazardous substances
- Information on safety provided by the supplier
- What potential ignition sources are/may be present?
- What work activities involve the use of dangerous substances?
- The amount of the substance
- The potential for dangerous interactions between substances
- The arrangements for the safe handling, storage and transport of dangerous substances (including waste material)
- Activities, such as maintenance, where there is the potential for a high level of risk
- The possible formation, extent and duration of explosive atmospheres
- Places which are/can be connected to places where explosive atmospheres may be formed
- The anticipated scale of any explosion or similar event
- Whether dangerous substances can be omitted from the workplace or substituted for non-hazardous substances
- Control measures that may prevent an explosion or similar event
- Mitigation measures that may limit the impact of any incident

#### 4. Risk reduction hierarchy

A hierarchical approach to risk reduction should be taken to minimize the risks posed by dangerous substances. This hierarchy is as follows:



##### Eliminate or reduce the risks

The first consideration in respect of risk reduction is to establish whether the risk can be eliminated or reduced. Eliminating the risk posed by, for example, flammable paints could be achieved by replacing those paints with water-based alternatives. Similarly, reducing the risks posed by solvents within a laboratory would be to reduce volumes to a minimum and keeping bulk amounts in a dedicated store.

##### Introduce control measures

Once dangerous substances have been eliminated or reduced as far as practicable, control measures should then be considered. Such measures might include the following:

- Avoiding/minimising releases of dangerous substances
- Controlling release of dangerous substances at source
- Preventing the formation of explosive atmospheres (for example through ventilation)
- Collecting, containing and removing any releases to a safe place
- Avoiding ignition sources
- Avoiding adverse conditions (such as exceeding pressure/temperature limits)
- Keeping incompatible substances apart

##### Mitigation measures

The final element of the risk reduction hierarchy involves introducing measures to that will mitigate the effect of any incident. Such measures include:

- Reducing the number of employees that are 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
- Providing suitable PPE

## **5. Additional requirements where explosive atmospheres may arise**

If, following all of the steps taken above, an explosive atmosphere may still occur, the precise areas involved need to be clearly identified along with the potential duration of the explosive atmosphere. These areas will naturally vary in size and may be limited to fairly small zones around a point of release of a dangerous substance within a room. This process is known as Hazardous Area Classification and will result in the following identifiable zones:

### Zone 0 (Zone 20 for dusts)

This is an area where an explosive atmosphere is continuously present, or present for long periods. The area above a flammable liquid within a tank would be classed as Zone 0.

### Zone 1 (Zone 21 for dusts)

This is an area where an explosive atmosphere is likely to occur occasionally during normal operation. Such areas might include the environment immediately around the location where bulk decanting of flammable liquids takes place.

### Zone 2 (Zone 22 for dusts)

This is an area where an explosive atmosphere is not likely to occur in normal operation and, if it does, will persist for a short period only. This might be the room or compartment in which bulk decanting takes place.

It should be noted in respect of the above that the size of zones will vary according to such things as the presence or absence of effective ventilation. For example, in a poorly ventilated chemical store where decanting takes place, the size of zone 1 may increase (and zone 2 will decrease correspondingly). Naturally, every effort should be made to eliminate hazardous zones, reduce their area or degree of risk (for example, attempts should be made to eliminate zone 2 areas altogether and to reduce zone 1 areas to zone 2 classification)

It should also be noted that areas should not be classified where the risk is insignificant. For example, the accidental spillage of a small quantity of solvent in an average sized laboratory should not entail that the potential location of the spillage be designated as zone 2.

## **6. Safety measures required within hazardous areas (zones 0, 1, 2/20, 21, 22)**

All zoned areas should be clearly identified on a plan that indicates the size of the zone in all dimensions. Where necessary, to avoid persons entering a hazardous zone unknowingly, warning signs should be displayed (see figure 1 below)



Figure 1 – signage required to indicate hazardous zones

In order to prevent an explosion within a zoned area, particular care must be taken in respect of ignition sources. Further to this, the following practices are to be observed:

- All potential ignition sources should be excluded (this includes naked flames, items that might generate sparks or heat, clothing capable of creating an electrostatic discharge, etc)
- Only suitable equipment should be brought into or located in the zone. Such equipment will be CE marked and carry the Ex symbol (see figure 2). For further guidance, see *The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016* (EPS).
- Before the initial use of equipment or protective systems that come under the EPS regulations, it should be assessed as suitable by a person competent to make that decision.
- Persons who provide, maintain or verify electrical installations in, or associated with hazardous areas should be competent to undertake this work (for e.g. be CompEx trained).



## **7. Information, instruction and training**

Employees, students and visitors should, as far as is relevant, be provided with information, instruction and training. This includes:

- Details of the dangerous substances and the risks they present
- The findings of the risk assessment and associated control/mitigation measures should be explained so that staff understand the risk and know what they and others should do to in respect of it.
- Details of the emergency procedure
- Contents and hazards of dangerous substances in pipes, containers, etc. should be clearly identified, if not already done so under other legislation.

## **8. Emergency procedures**

The likelihood, scale and consequences of any accident involving dangerous substances should be assessed and appropriate emergency procedures put in place. These procedures should cover the protection of those who may be exposed, mitigation of the effects of any incident and the restoration of normal operations. These procedures will include plans and procedures for safety drills, warning and other communication systems, and first aid arrangements.

The purpose of this requirement is to ensure that steps necessary beyond those in place taken as a result of the need to comply with other legislation are taken. Further to this, if procedures devised to comply with other legislation are sufficient in themselves to cover the risks posed by dangerous substances, no additional arrangements need be developed.

Those involved in implementing repairs, etc following an emergency should be provided with suitable information, instruction and PPE.

Emergency procedures should be made available to the emergency services so that they can implement their own plans safely and effectively.