Health and Safety Code of Practice

SCP42 Dangerous Substances and Explosive Atmospheres

Responsibility for Policy:	Finance Director, Deputy Chief Executive and University Secretary
Relevant to:	LJMU Staff
Approved by:	Health and Safety Committee
Responsibility for Document Review:	Manager, Safety and Health Services
Date introduced:	October 2007
Date(s) modified:	October 2012, February 2014, October 2015, November 2016
Next Review Date:	September 2020

RELEVANT DOCUMENTS

- Health and Safety at Work etc. Act 1974
- Management of Health and Safety at Work Regulations 1999
- Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)
- DSEAR Approved Code of Practice and Guidance
- INDG 370 Controlling Fire and Explosion Risks in the Workplace (Health and Safety Executive)
- Equipment and Protective Systems intended for the Use in Potentially Explosive Atmospheres Regulations 1996
- Classification, Labelling and Packaging Regulations 2009
- Personal Protective Equipment at Work Regulations 1992
- Guidance Note GN13 Guidance for the storage of gas cylinders in the workplace (revision 5: 2012) (British Compressed Gas Association)
- Fire Service Operational Guidance: Incidents involving hazardous materials

RELATED POLICIES & DOCUMENTS

- Liverpool John Moores University Health and Safety Policy Statement
- MCP1 Organisation for the Implementation of the Health and Safety Policy
- MCP2 Arrangements for the Implementation of the Health and Safety Policy
- SCP18 Risk Assessment
- SCP9 Personal Protective Equipment

THIS CODE OF PRACTICE FORMS PART OF THE UNIVERSITY'S HEALTH AND SAFETY POLICY AND REPLACES ALL PREVIOUS ISSUES

INDEX

1. Introduction and objective
1.1 What do the Regulations require?

2. Definitions
2.1 Dangerous substance
2.2 Explosive atmosphere

3. Types of flammable substances
3.1 Flammable liquids
3.2 Flammable dusts
3.3 Flammable solids
3.4 Flammable gases
3.5 Oxygen
3.6 Reactive chemicals

4. The Fire Triangle

5. Risk assessment

6. Storage

7. Emergencies and procedures for serious and imminent danger

Appendix 1 DSEAR risk assessment form
Appendix 2 Guidance and information to assist with completion of the risk assessment

1. INTRODUCTION AND OBJECTIVE

Dangerous substances can cause fire and explosions. The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR) put duties on employers and the self-employed to protect people from risks to their safety from fires, explosions and similar events in the workplace. This includes members of the public who may be put at risk by work activity. The Regulations complement the requirement to manage risks under the Management of Health and Safety at Work Regulations 1999.

This Code of Practice provides information to staff on complying with DSEAR.

1.1 What do the Regulations require?

Under these Regulations the person supervising the activity must:

(a) Carry out a risk assessment of any work activities involving dangerous substances.

(b) Provide measures to eliminate and reduce fire and explosion risks, so far as is reasonably practicable.

(c) Put controls in place to reduce the effects of any incidents involving dangerous substances.

(c) Provide equipment and procedures to deal with accidents and emergencies.

(d) Provide information and training to employees.

(e) Identify and classify places where explosive atmospheres may occur into zones, avoid ignition sources, and mark the zones where necessary.

2. DEFINITIONS

2.1 Dangerous substance

Dangerous substances are any substances or preparations used or present at work that could, if not properly controlled, cause harm to people as a result of a fire or explosion. Dangerous substances include petrol, liquefied petroleum gas (LPG), paints, varnishes, solvents and dusts which, when mixed with air, could cause an explosive atmosphere. They also include substances that are corrosive to metals and gases under pressure.

2.2 Explosive atmosphere

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: i.e. temperatures of -20^{O} C to 40^{O} C and pressures of 0.8 to 1.1 bar.

An explosive atmosphere does not always result in an explosion, but if it caught fire the flames would quickly travel through it and if this happened in a confined space (e.g. in plant or equipment) the rapid spread of the flames or rise in pressure could also cause an explosion.

3. TYPES OF FLAMMABLE SUBSTANCES

There are an enormous variety of flammable substances to be found in the workplace, for example solvents, gases, fuels, packaging materials and dusts etc.

3.1 Flammable liquids

Flammable liquids can give off large volumes of flammable vapours at room temperature. These vapours, when mixed with air, can ignite - often violently. Spilled flammable liquids can, if not contained, flow a long way to an ignition source and then flash back to the source of the leak. Spills on clothing can represent a serious risk of injury if ignited. Flammable liquids are classed as:

(a) Extremely flammable: liquids which have a flash point lower than O^{o}C and boiling point (or, in the case of a boiling range, the initial boiling point) lower than or equal to 35^{o}C.

(b) Highly flammable: liquids which have a flash point below 21^{o}C but which are not extremely flammable.

(c) Flammable.

3.2 Flammable dusts

Finely divided flammable dusts dispersed in the workplace atmosphere can, if ignited, explode violently and cause extensive damage.

3.3 Flammable solids

Some types of plastic foam, packaging materials, polyester wadding and textiles will ignite easily and burn fiercely, giving off a lot of dense black smoke.

3.4 Flammable gases

Gases in cylinders are often stored at very high pressures, and so their uncontrolled release can be physically dangerous. A small amount of released gas can fill a large area with a potentially explosive mixture. This is particularly true of liquefied gases such as LPG.

3.5 Oxygen

Although oxygen is an essential ingredient in controlled burning, such as in gas fire or oxy-fuel gas welding and cutting, its misuse can lead to serious consequences. Materials that, ordinarily, burn slowly will burn vigorously in an oxygen-enriched atmosphere. Others such as greases and oils may burst into flames in this kind of atmosphere.

3.6 Reactive chemicals

Some products contain chemicals, such as organic peroxides, which can explode if they are not stored and handled correctly. Other substances can react vigorously with incompatible materials or contaminants. For example, oxidising chemicals can cause flammable materials to ignite and some substances, such as sodium, react violently with water and can ignite.

Note: Archived cellulose nitrate film is extremely dangerous. It catches fire very easily and once alight is difficult to extinguish. Fires involving cellulose nitrate burn extremely quickly with a hot, intense flame and the smoke is particularly toxic, containing large quantities of poisonous gases. Any cellulose nitrate film that is encountered will be extremely old as production in the UK was stopped in 1951. This is a problem because the high fire risk from cellulose nitrate film increases as it ages (check guidance for advice).

4. THE FIRE TRIANGLE

Three requisites are needed for a fire: a fuel at the right concentration, a good supply of air, and a source of ignition.

Supervisors must:

(a) Be aware of the hazards of various types of flammable substance.

(b) Be aware of the basic standards which apply to safe handling and storage of flammable substances.

(c) Introduce procedures to prevent accidents and protect people from the hazards of flammable substances.

5. RISK ASSESSMENT

The risk assessment is an identification and careful examination of the dangerous substances present, or liable to be present, in the workplace; the work activities involving them; and how they might fail and cause fire, explosion and similar events that could harm employees, students and the public. Its purpose is to enable the supervisor to decide what is required to eliminate or reduce the safety risks from dangerous substances as far as is reasonably practicable. The Risk Assessment proforma (Appendix 1) can be found as a Word document accompanying this Code of Practice on the Health and Safety Unit's website. Guidance and information to assist with the completion of the risk assessment may be found in Appendix 2 of this Code of Practice.

The risk assessment should take account of such matters as:

(a) The hazardous properties of the substances
(b) The way they are used or stored
(c) The possibility of hazardous explosive atmospheres occurring
(d) All potential ignition sources

In areas where hazardous explosive atmospheres may occur the risk assessment must ensure that:

(a) They are classified into zones based on their likelihood and persistence (please see Appendix 2, section 3.2)
(b) 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 the Use in Potentially Explosive Atmospheres Regulations 1996 (equipment already in use before July 2003 can continue to be used indefinitely provided the risk assessment shows it is safe to do so).

The task of risk assessment may be delegated. The responsibility may not. Risk assessments must be in the place where the substance is being used.

6. STORAGE

Flammable substances must be kept in suitable containers. If there is a spill it should be contained and prevented from spreading to other parts of the working area. Lidded containers and spillage catchment trays, for example, should be used to help prevent spillages spreading.

Flammable substances should be stored and used away from other processes and general storage areas. They should be separated by physical barriers such as flame retardant storage cupboards that meet British Standards, in separate rooms or buildings.

Flammable solids must not be stored close to heaters or electrical equipment that could run hot and act as a local ignition source.

Stored cylinders need to be suitably restrained and their valves protected from impact damage.

Storage and temperatures for reactive chemicals should be carefully controlled to prevent dangerous decomposition or reaction.

7. EMERGENCIES AND PROCEDURES FOR SERIOUS AND IMMINENT DANGER

When working with flammable substances, there is the potential for something to go wrong. As part of the risk assessment possible problems should be considered and everyone including staff employed in the area, students and support staff such as domestic staff should be instructed as to what to do in an emergency. Instructing staff in emergency procedures is an important part of their job training, and should be ongoing.

Having procedures for serious and imminent danger is a statutory requirement under the Management of Health and Safety at Work Regulations 1999.

APPENDIX 1

LIVERPOOL JOHN MOORES UNIVERSITY

DSEAR Risk Assessment Form

The **Dangerous Substances Explosive Atmospheres Regulations 2002** require:
Regulation 5 – Risk Assessment
Regulation 6 - Elimination or reduction of risks from substances
Regulation 7 – Part 1 - Classify areas where an explosive atmosphere may occur.
This form may be used in conjunction with a COSHH risk assessment, or as a stand-alone risk assessment under DSEAR 2002 and the Management of Health and Safety at Work Regulations 1999.

Name of School	
Name of risk assessor	
Name of supervisor	
Location of work (Building name and room number)	
Date of assessment	
Title of activity/project/experiment	

Provide a brief description of the activity/project/experiment:

Who might be at risk? (Tick all that apply):

Staff ☐ Students ☐ Visitors ☐ Public ☐ Contractors ☐ Other ☐

1. If using a proprietary product, does the Material Safety Data Sheet or labelling on the product packaging indicate that it is: (tick boxes)	**Yes**	**No**	**N/A**
Explosive			
Oxidising			
Flammable			
Or has a flash point lower than 32°C			
Or, that release of vapour or gas may produce an explosive atmosphere			
Is the manufacturer's material safety data sheet (MSDS) available?			
2. If the substance is produced as a result of an *in-house* process, or as a bi-product of such a process, is that substance: (tick boxes)	**Yes**	**No**	**N/A**
Explosive?			
Oxidising?			
Flammable?			
Has a flash point lower than 32°C?			
Or, that release of vapour or gas may produce an explosive atmosphere?			

If **No** has been answered to all the questions above, you may finish at this point. Otherwise continue.

3. Names of the products stored, produced or handled (Identify if they are solid, liquid, gas, other)

4. Does the substance/process match any of the following? (Tick boxes):	**Yes**	**No**	**N/A**
Explosive			
Oxidising			

Flammable			–

5. What quantity/concentration is being stored, produced or handled? (Tick box):

Negligible ☐ Low ☐ Medium ☐ High ☐

Details:

6. Note any sources of ignition: (tick all that apply)

Non-intrinsically safe equipment		Direct/focussed sunlight	
Naked flame		Other high energy light source	
Static electricity		Hot surfaces	
Spontaneous/auto-ignition		Friction sparks	
Exothermic reaction		Microwave energy	
Ionising radiation		Other (specify)	
Kinetic velocity flow (O_2/H_2)			

7. Explain here how a system of work or activity could fail and give rise to fire or explosion.

8. Control measures: (tick boxes)	**Yes**	**No**	**N/A**
Has the quantity of the dangerous substance held or 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. ventilation)?			_
Have steps been taken to avoid adverse conditions (e.g. exceeding temperature limits or other control settings)?			
Are incompatible substances kept apart in storage, and so far as practicable, in use (e.g. oxidisers and combustibles)?			_
Has the number of people exposed to the dangerous substances or the explosive atmosphere been reduced to a minimum?			_
Is plant that is in use 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 been provided and have staff been trained how to wear it properly?			
Details:			

9. Workplace or process and management systems, where appropriate to the nature of the activity or operation: (tick boxes)	**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 the 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 all persons who might need to know, 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?			
Details:			

10. Zoning and control of explosive atmospheres: (tick boxes) (*if not applicable, tick here _____ and proceed to next section*)	**Yes**	**No**	**N/A**
Have all such areas been classified into zones in accordance with Schedule 2 of the Regulations?			_
Where necessary, have such classified zones been marked at their entry points with the specified hazard warning sign? 			
Are all classified 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 people working in zoned areas provided with clothing that does not create a risk of electrostatic discharge?			
Before their first operation, has equipment where explosive areas may be present been verified as being safe, by a competent person?			_
Details:			

11. Monitoring: (tick box)	**Yes**	**No**	**N/A**
Is there a gas monitor with detection and an alarm?			
Details:			

12. Storage: (tick boxes)	**Yes**	**No**	**N/A**
Are all flammable substances kept in suitable fire resistant storage?			_
Are all quantities of flammable substances in excess of 50L kept in dedicated and appropriately protected flammable 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 or resistance?			
Details:			

13. Transport: (tick box)	**Yes**	**No**	**N/A**
Will dangerous substances be transported around the site/building?			
Details:			

14. Emergency procedures: (tick boxes)	**Yes**	**No**	**N/A**
Have suitable emergency procedures been developed and communicated to personnel 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 personnel to deal with fire and evacuation?			_
Have suitable emergency procedures been developed and communicated to personnel to deal with a spillage of dangerous substances?			_
Details:			

Minor spillage or release		
Specify procedure		
Other actions: (tick boxes)	Evacuate and secure laboratory/area	Yes___ _
	Inform competent person (e.g. supervisor, School Safety Officer etc.)	Yes___ _
Major spillage or release		
Specify procedure		

Other actions: (tick boxes)	Evacuate and secure laboratory / area	Yes___
	Evacuate building by fire alarm	Yes___
	Evacuate building by phased walk through (no fire alarm)	Yes___
	Call Security on ext. 2222	Yes___
	Call Health and Safety Unit on ext. 5540	Yes___
	Inform competent person (e.g. responsible person/School Safety Officer etc.)	Yes___

15. Waste Disposal: (tick box)	**Yes**	**No**	**N/A**
Have suitable procedures been developed, communicated to personnel and implemented to deal with the safe transport and disposal of dangerous substances?			_

Identify waste type (tick all that apply):
Liquid ☐ Solid ☐ Gas ☐ Inorganic ☐ Organic ☐ Aqueous ☐ Mixed ☐ Other ☐

Describe waste disposal method:

16. Information. instruction, training: (tick box)	**Yes**	**No**	**N/A**
Has appropriate information, instruction and training, commensurate with the hazard potential of the dangerous substances, or process been provided to personnel as regards; product detail, hazard, risk reduction methods to be employed, management systems to be followed, emergency systems etc.?			_

Details:

17. Personal protective equipment (PPE). (Tick all that apply)

Lab coat ☐ Overalls ☐ Chemical suit ☐ Disposable clothing ☐ Apron ☐ Spectacles ☐ Goggles ☐ Face shield ☐ Gloves ☐ Special headwear ☐ Special footwear ☐ Other ☐

Specify the type:

18. Respiratory protective equipment (RPE). (Tick all that apply)

Disposable mask ☐ Filter mask ☐ Half face respirator ☐ Full face respirator ☐
Powered respirator ☐ Breathing apparatus ☐ Other ☐

Specify the type:

19. 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 possible level reasonably practicable. Is this the case? (Tick box)	**Yes**	**No**	**N/A**
			_

20. As a result of the risk assessment the following Safe System of Work must be adhered to:

Details:

21. Approval

Assessor's name	**Signature**	**Date**
Supervisor's name	**Signature**	**Date**

APPENDIX 2

GUIDANCE AND INFORMATION TO ASSIST WITH COMPLETION OF THE RISK ASSESSMENT

1. DEFINITIONS

1.1 Dangerous substance

A dangerous substance is:

a) A substance or preparation which meets the criteria in the approved classification and labelling guide for classification as a substance or preparation which is explosive, oxidising, extremely flammable, highly flammable or flammable. Please note that the CHIP Regulations were revoked from June 2015. Chemicals suppliers must now meet the requirements of the classification, labelling and packaging Regulations 2009.

b) a substance or preparation which, because of its physico-chemical or chemical properties and the way it is used or is present at the workplace creates a risk, not being a substance or preparation falling within subparagraph (a) above; or

c) any dust, whether in the form of solid particles or fibrous materials or otherwise, which can form an explosive mixture with air or an explosive atmosphere, not being a substance or preparation falling within subparagraphs (a) or (b) above.

1.2 Explosive atmosphere

An explosive atmosphere means a mixture, under atmospheric conditions, of air and one or more dangerous substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

1.3 Flash point

The flash point is the lowest temperature at which a liquid has a sufficient vapour pressure to form an ignitable mixture with air near the surface of the liquid. Many common organic liquids have flash points below room temperature e.g. acetone (-18^0C) or diethyl ether (-45^0C)

1.4 Ignition temperature

The ignition (sometimes called auto-ignition) temperature of a substance is the minimum temperature required to initiate or to cause self-sustained combustion independent of the heat source. A spark or flam is not necessary for ignition temperature. For diethyl ether this is 160^0C and the material can be ignited by a hot plate.

1.5 Lower and Upper Explosive Limits

The limits define the range of concentrations in mixtures with air (or oxygen depending on definition) that will propagate a flam and cause an explosion. The lower values of these limits are normally well above levels legally allowed as ambient in laboratories and workplaces but can easily be exceeded flowing a spill.

1.6 Sources of ignition

The most common sources of ignition in the laboratory are flames and heating elements but there are a number of less obvious electrical sources such as refrigerators, heat-guns, stirrers etc. It also must be remembered that vapour from a flammable liquid may be denser than air and may spread over bench and floor surfaces to sources of ignition which are apparently remote.

1.7 Spontaneous combustion

Some materials are prone to inflame spontaneously with no source of ignition. Normally this is the result of exothermic auto oxidation within a large mass where heat cannot escape.

1.8 Pyrophoric materials

Pyrophoric materials are those that ignite spontaneously in air below about 45^0C. Consequently the main hazards arising from the use of such materials involve fire, either from direct contact with the pyrophoric material or as a result of secondary fire following ignition. The most commonly used materials are alkyl lithiums, trialkylaluminium reagents and alkylboranes.

2. RISK PHRASES

2.1 List of Risk Phrases

Risk phrases have been replaced by hazard statements and precautionary explanations to reflect changes implemented by the Classification, Labelling and Packaging Regulations 2009, but they may still be used until 2017.

R1	Explosive when dry
R2	Risk of explosion by shock, friction, fire or other source of ignition
R3	Extreme risk of explosion by shock, friction, fire and other sources of ignition
R4	Forms very sensitive explosive metallic compounds
R5	Heating may cause an explosion
R6	Explosive with or without contact with air
R7	May cause fire
R8	Contact with combustible material may cause fire
R9	Explosive when mixed with combustible material
R10	Flammable
R11	Highly flammable
R12	Extremely flammable
R13	Extremely flammable liquefied gas
R14	Reacts violently with water
R14/15	Contact with water liberates extremely flammable gases
R16	Explosive when mixed with oxidizing substances
R17	Spontaneously flammable in air
R18	In use, may form inflammable/explosive vapour-air mixture
R19	May form explosive peroxides
R44	Risk of explosion if heated under confinement

2.2 Risk Phrase explanations

Flammable R10

Liquid substances and preparations having a low flash (of less than 55^0C).

Highly flammable R11, R17, R15

The following substances and preparations, namely –

a) Substances and preparations which may become hot and finally catch fire in contact with air at ambient temperature without any application of energy
b) Solid substances and preparations which may readily catch fire after brief contact with a source of ignition and which continue to burn or to be consumed after removal of the source of ignition
c) Liquid substances and preparations having a very low flash point (of less than 21^0C) or
d) Substances and preparations which, in contact with water or damp air, evolve extremely flammable gases in dangerous quantities

Extremely flammable R12

Liquid substances and preparations having an extremely low flash point and low boiling point (flash point less than 0^0C and a boiling point of 35^0C or less); and gaseous substances and preparations which are flammable in contact with air at ambient temperature and pressure.

Explosive R2, R3

Solid, liquid, pasty or gelatinous substances and preparations which may react exothermically without atmospheric oxygen, thereby quickly evolving gases, and which under defined test conditions detonate, quickly deflagrate or upon heating explode when partially confined.

Oxidising R7, R8, R9

Substances and preparations which give rise to a highly exothermic reaction in contact with other substances, particularly flammable substances.

2.3 Existing symbols

2.4 New global labelling and information

2.4.1 Gas under pressure symbol: Gas cylinder

Symbols that will phased out:
There is no existing symbol for this hazard pictogram.

What does it mean?
- Contains gas under pressure; may explode if heated
- Contains refrigerated gas; may cause cryogenic burns or injury

Examples of precautionary statements
- Protect from sunlight
- Wear cold insulating gloves/face shield/eye protection
- Get immediate medical advice/attention

2.4.2 Explosive symbol: Exploding bomb


Symbol that will be phased out

What does it mean?
- Unstable explosive
- Explosive; mass explosion hazard
- Explosive; severe projection hazard
- Explosive; fire, blast or projection hazard
- May mass explode in fire

Examples of precautionary statements
- Obtain special instruction before use
- Do not handle until all safety precautions have been read and understood
- Keep away from heat/sparks/open flames/hot surfaces – No smoking
- Wear protective gloves/protective clothing/eye protection/face protection
- Use personal protective equipment as required
- Explosion risk in case of fire

2.4.3 Oxidising symbol: Flame over circle

Symbol that will be phased out

What does it mean?
- May cause or intensify fire; oxidiser
- May cause fire or explosion; strong oxidiser

Examples of precautionary statements
- Keep away from heat/sparks/open flames/hot surfaces – No smoking
- Wear protective gloves/protective clothing/eye protection/face protection
- Rinse immediately contaminated clothing and skin with plenty of water before removing clothes.

2.4.4 Flammable symbol: Flame

ymbol that will be phased out

What does it mean?
- Extremely flammable gas
- Flammable gas
- Extremely flammable aerosol
- Flammable aerosol
- Highly flammable liquid and vapour
- Flammable liquid and vapour
- Flammable solid

Examples of precautionary statements
- Do not spray on an open flame or other ignition source.
- Keep away from heat/sparks/open flames/hot surfaces – No smoking
- Keep container tightly closed
- Keep cool
- Protect from sunlight

2.5 New symbols (used globally)

Explosive

Oxidizing

Flammable

Gas under Pressure

2.6 Signage

3. CLASSIFICATION OF PLACES WHERE EXPLOSIVE ATMOSPHERES MAY OCCUR

3.1 Places where explosive atmospheres may occur

A place in which an explosive atmosphere may occur in such quantities as to require special precautions to protect the health and safety of the workers concerned is deemed to be hazardous within the meaning of the DSEAR Regulations.

A place in which an explosive atmosphere is not expected to occur in such quantities as to require special precautions is deemed to be non-hazardous within the meaning of the DSEAR Regulations.

3.2 Classification of hazardous places

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

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.
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.

Note:

1. Layers, deposits and heaps of combustible dust must be considered as another source which can form an explosive atmosphere.

2. “Normal operation” means the situation when installations are used within their design parameters