



HEALTH AND SAFETY Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) Procedure

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1. PURPOSE

- 1.1 This document sets out how Ulster University will protect employees, students and all other persons by controlling exposure to risks from dangerous substances and explosive atmospheres as a result of activities in the university.

2. SCOPE AND COMMENCEMENT

- 2.1 This procedure applies to all areas of operation within the University where dangerous substances are used or present which could, if not properly controlled, cause harm to people because of a fire and/or explosion.
- 2.2 It applies to both University personnel (including students under supervision) and Contractors with effect from 25 May 2021.

3. BACKGROUND

- 3.1 The effects of accidental fires or explosions can be catastrophic and widespread in terms of lives lost, injuries, damage to property and the environment.
- 3.2 Activities which involve using or potential for creating, chemicals, vapours, liquids, gases, solids or dusts that can readily burn or explode are therefore considered hazardous.
- 3.3 Dangerous substances are any substances used or present at work that could, if not properly controlled, cause harm to people because of a fire and/or explosion. Examples include such things as solvents, paints, varnishes, flammable gases such as liquid petroleum gas (LPG), dusts from machining and sanding operations, pressurised gases and substances corrosive to metal. Explosive atmospheres can be caused by flammable gases, mists or vapours or by combustible dusts.
- 3.4 Safety measures to prevent catastrophic incidents are normally put in place at design, construction and installation stage of buildings, plant and equipment. This needs to be effectively managed, maintained and reassessed particularly, if there is new (or changes to existing) plant, equipment, substances and/or procedures.
- 3.5 Those responsible for such activities must know the dangerous substances stored, used and potentially created in their work areas which can cause fire/explosion and have effective control measures in place to either remove those risks or, where this is not possible, control them.
- 3.6 DSEAR addresses risk to persons **safety** from dangerous substances, as opposed to risks to **health** addressed by the Control of Substances Hazardous to Health Regulations (COSHH).

4. DEFINITIONS

DSEAR	Dangerous Substances and Explosive Atmospheres Regulations
Dangerous substance	(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; (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. (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 (a) or (b) above;
Explosive atmosphere	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.
Hazardous Area	Any place in which an explosive atmosphere may occur in quantities such as to require special precautions to protect the safety of persons.

5. KEY LEGAL REQUIREMENT

- 5.1 The [Dangerous Substances and Explosive Atmospheres Regulations \(Northern Ireland\) 2003](#) apply to all activities which involve use of, or potential to create, dangerous substances and potentially explosive atmospheres.
- 5.2 DSEAR sets minimum requirements for the protection of staff, students and others from fire and explosion risks arising from dangerous substances and potentially explosive atmospheres.
- 5.3 DSEAR compliments the general requirement to manage risks under the Management of Health and Safety at Work Regulations 2000 and addresses risk to persons **safety** from dangerous substances, as opposed to risks to **health** addressed by the Control of Substances Hazardous to Health Regulations (COSHH).
- 5.4 L138 [DSEAR Approved Code of Practice and Guidance](#) sets out what is required to comply with DSEAR.

6. RESPONSIBILITIES

Vice- Chancellor

- 6.1 On behalf of the Council the Vice-Chancellor has executive responsibility to ensure, that the requirements of the health and safety legislation and the University health, safety and wellbeing policy are complied with. The Vice-Chancellor will ensure that responsibility for health and safety is properly assigned and accepted at all levels within the University.

Deputy Vice Chancellor (DVC), Pro Vice Chancellors (PVC), Chief People Officer (CPO), Chief Finance and Strategy Officer (CFSO) Deans, Directors, Heads of Schools and Departments and Research Institute Directors.

- 6.2 Are responsible for ensuring that the requirements of DSEAR are complied with in accordance with this procedure.

Managers (including those in charge of buildings and management of UU estates)

- 6.3 Managers must: -
- Identify when DSEAR applies within the scope of their responsibility – This could be premises, plant, equipment, substances or processes.
 - Arrange for a risk assessment, proportionate to the risk, of any work activities involving dangerous substances/explosive atmospheres.
 - Make sure those completing risk assessments have necessary, training understanding of the equipment or processes and risks from dangerous substances.
 - Maintain an inventory of dangerous substances and associated safety data sheets.
 - Ensure measures are implemented to eliminate, or where this is not possible,
 - reduce risks, as far as is reasonably practicable.
 - Ensure procedures in place to deal with accidents and emergencies.
 - Provide appropriate information and training to employees or others as appropriate.
 - Provide the appropriate equipment and clothing to work safely with or near dangerous substances and explosive atmospheres.
 - Ensure regular workplace inspection/supervision is carried out and recorded to ensure that the control measures as identified by the DSEAR risk assessment are being fully implemented.
 - Undertake appropriate planned preventative maintenance and inspections of plant and equipment containing or using dangerous substances or, where explosive atmospheres are possible.
 - Coordinate the work of contractors including ensuring they are competent, authorised in accordance with permit to work procedures, have provided a suitable risk assessment and method statement and are appropriately supervised when on site.

Staff

6.4 All staff must: -

- Follow all instruction, training and other information provided to them for their safety.
- Store, use and dispose of any dangerous substances safely.
- Adhere to hazardous area specifications.
- Avoid introducing any source of ignition into a hazardous area, other than as authorised e.g., by a hot work permit.
- Use only equipment authorised for the hazardous area.
- Wear and use only personal protective equipment supplied as per instructions.
- Comply with the no smoking (including e-cigarettes) and mobile phone rules where dangerous substances/explosive atmospheres may be present.
- Report immediately any unsafe conditions. e.g., to line manager, Estates Services or person authorising the work.

7. WHEN DOES DSEAR APPLY?

7.1 DSEAR applies when work or activity in the University presents the following conditions: -

- A dangerous substance is present or could be generated;
- Potentially explosive atmosphere may occur;
- The dangerous substance and/or potentially explosive atmosphere could be a risk to the safety of people (rather than their health)

7.2 Some examples of when DSEAR applies includes: -

- Storage of fuel for work equipment and vehicles;
- Use of flammable gases, such as acetylene, for welding;
- Storage and use of oxidisers such as Oxygen;
- Vapour released when a volatile solvent is poured from one container to another;
- Welding or other 'hot work' on tanks and drums that have contained flammable material;
- Use of flammable solvents in laboratories;
- Transporting flammable substances in containers around a workplace;
- Deliveries from road tankers, such as LPG;
- Chemical manufacturing and processing;
- Handling, storage and use of gases under pressure;
- Handling, storage and use of substances corrosive to metal.
- Materials that can cause the rapid escalation of a fire if handled in a certain way. (e.g. cellular plastic foams).

- Use or creation of substances including those with potential energy releasing events like fire and explosion such as exothermic reactions.

8. MAIN REQUIREMENTS OF DSEAR

8.1 The main requirements can be summarised as: -

- Carry out a comprehensive risk assessment of any work activities involving dangerous substances or potentially explosive atmospheres.
- Provide technical and organisational measures to eliminate or reduce as far as reasonably practicable the identified risks.
- Provide appropriate equipment and procedures to deal with accidents and emergencies.
- Provide relevant information and training for employees.
- Identify and classify places where explosive atmospheres may occur into zones and mark accordingly.

9. RISK ASSESSMENT

- 9.1 Where a dangerous substance is, or is liable to be, present a suitable and sufficient assessment of the risks must be undertaken by the person responsible for the activity before the activity takes place.
- 9.2 The assessment in relation to DSEAR should be proportionate to the risk. It can be as part of the overall workplace risk assessment or stand alone for more complex/technical/high risk activities or areas.
- 9.3 For risks which are more significant, for example on complex sites or installations, the risk assessment may summarise measures described more fully in other referenced documents such as technical notes for operation of gas detection systems or permit to work systems. The risk assessment should adequately outline the content of the other referenced documents and these reference documents should be readily available. The UU DSEAR Risk Assessment template is available at [insert link](#).
- 9.4 Plan for a regular review of the risk assessment e.g. yearly depending on risk and complexity of the activity. Review is also necessary if there is a change in substances, equipment, processes or following a dangerous occurrence or accident. No new activity such as process scale up involving dangerous substances or processes and/or equipment related to their use should take place without a thorough review of the risk assessment first.
- 9.5 The risk assessment must be completed by a competent person, that is, someone with necessary ability, knowledge, training and relevant experience.
- 9.6 It is important the risk assessment demonstrates that a structured and thorough approach has been followed as set out **Appendix 1-3**.
- 9.7 Contractors working on or near plant and equipment e.g. on maintenance or essential repair, where dangerous substances or explosive

atmospheres may be present, is recognised as a time when additional control measures may be required. This includes the need to ensure competency of contractors, sharing information on the risks and agreeing method statements and ensuring compliance with safety protocols on, for example, permits for hot works.

10. CONTROLLING THE RISK

- 10.1 DSEAR sets out a hierarchy of control based on principles of ELIMINATE, CONTROL and MITIGATE which must be followed in order of priority with elimination the best solution which must be considered first.
- 10.2 Where elimination/substitution of dangerous substance/s or circumstances cannot be achieved, control measures to prevent a fire, explosion or similar energetic incident from occurring must next be considered.
- 10.3 The next priority is the identification and implementation of mitigation measures to reduce the detrimental effects of a fire, explosion or similar incident.
- 10.4 **Appendix 2 & 3** sets out the measures to take in priority order.

11. ADDITIONAL REQUIREMENTS WHERE EXPLOSIVE ATMOSPHERES CAN OCCUR

- 11.1 Gases, vapours, mists and dusts can give rise to explosive atmospheres when dispersed in certain concentrations in the air. If, following all of the steps taken to implement controls, an explosive atmosphere may still occur, the precise areas involved needs to be clearly identified based on likelihood and potential duration of the explosive atmosphere.
- 11.2 This process is known as Hazardous Area Classification. The classification given to a particular zone, and its size and location, will depend on the likelihood of an explosive atmosphere occurring and its persistence if it does.
- 11.3 The results of the classification/zoning plan must then be used to control the equipment that may be used, or the work activities that may be carried out in these areas so as to prevent ignition. **(See Appendix 4)**
- 11.4 All zones need to be clearly identified and recorded on a plan, the entry points to areas classified into zones must be marked with a specified 'EX' sign and access controlled. **(See Appendix 5 Fig. 1)**
- 11.5 Staff working in zoned areas must be provided with appropriate clothing and equipment that does not create a risk of an electrostatic discharge igniting the explosive atmosphere.
- 11.6 Before coming into operation for the first time, areas where explosive atmospheres may be present, equipment and protection systems must be confirmed as being safe (verified) by a competent person either within or contracted by UU.

- 11.7 In order to prevent an explosion within a zoned area, particular care must be taken in respect of ignition sources.
- 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, electronic devices such as mobile phones, e-cigarettes, 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 Appendix 5 Fig. 2).**
 - Staff or contractors who provide, maintain or verify electrical installations in, or associated with hazardous areas should be competent to undertake this work.

12. INFORMATION, INSTRUCTION AND TRAINING

- 12.1 Staff, students and contractors/visitors must, as far as is relevant, be provided with information, instruction and training proportionate to the level and type of risk. This includes:
- Details of the dangerous substances and the risks they present
 - The findings of the risk assessment and associated control and mitigation measures should be explained so that staff understand the risk and know what they and others need to do to stay safe.
 - 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.
 - The special rules to be followed in areas where dangerous substances or explosive atmospheres may occur – This includes signage on entering such areas.

13. PLANS FOR ACCIDENTS, INCIDENTS & EMERGENCIES

- 13.1 An assessment of arrangements for incidents and emergencies must be completed taking account of the likelihood, scale and consequences of any incident involving dangerous substances/explosive atmospheres, to ensure appropriate emergency procedures are put in place.
- 13.2 Arrangements already in place to meet other health and safety requirements such as first aid provision, emergency warning systems and fire drills can be put into effect when such an incident occurs. The assessment should identify enhancements/additional measures where appropriate.
- 13.3 If procedures devised to comply with other legislation are sufficient in themselves to cover the risks posed by dangerous substances/explosive atmospheres, no additional arrangements need be developed.

- 13.4 If an accident, incident or emergency occurs, those tasked with carrying out repairs or other necessary work must be provided with the appropriate equipment, including PPE and information, instruction and training to enable them to carry out this work safely.
- 13.5 Emergency procedures must be made available to the emergency services so they can prepare their own response procedures and precautionary measures.

Resources

L138 [DSEAR Approved Code of Practice and Guidance](#)

Guidance on the Chemicals (Hazard Information and Packaging for Supply) Regulations

[classification and labelling guide for classification](#)

HSE DSEAR <https://www.hse.gov.uk/fireandexplosion/dsear-regulations.htm>

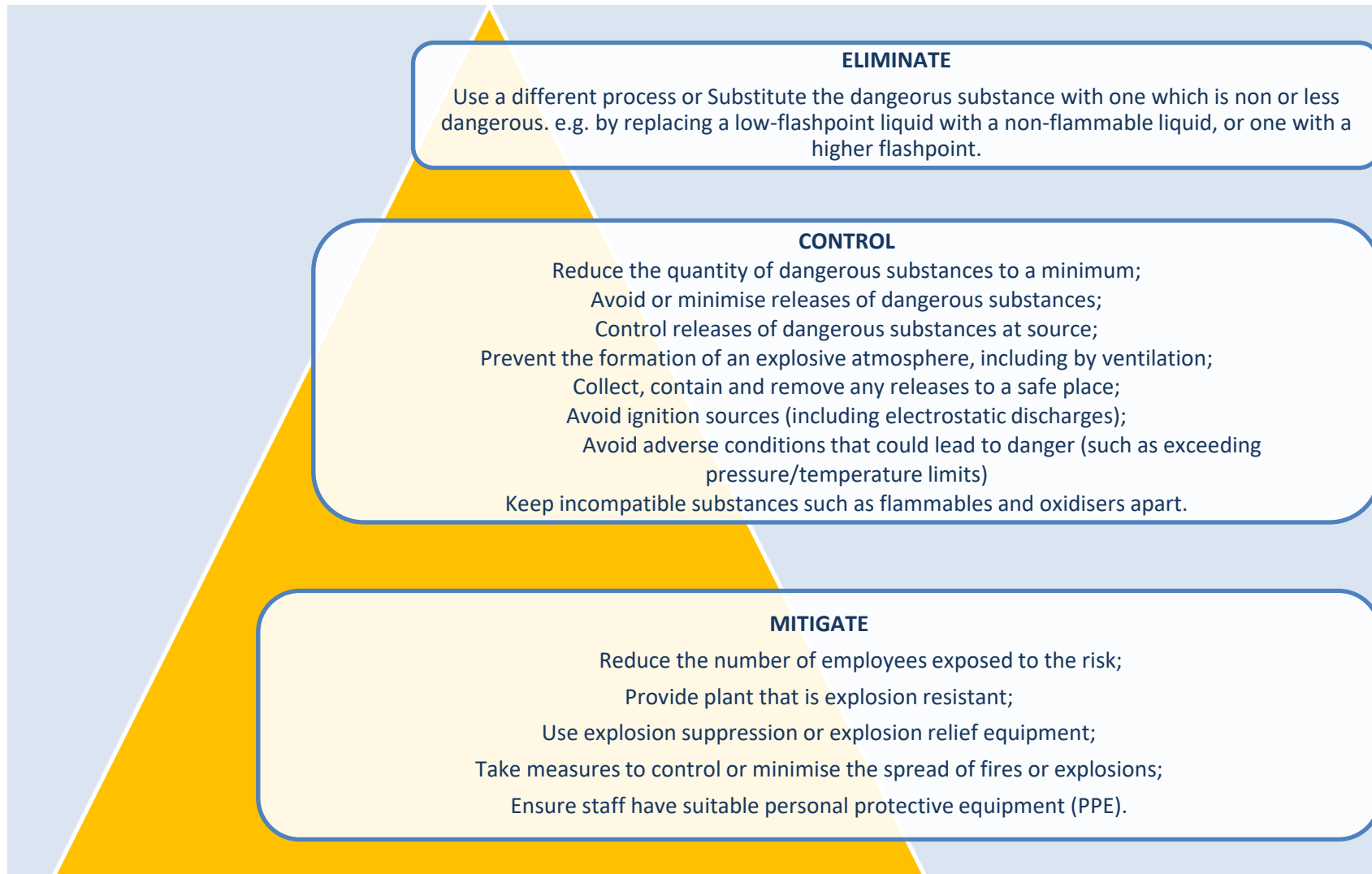
A brief guide to the Dangerous Substances and Explosive Atmospheres Regulations <https://www.hse.gov.uk/pubns/indg370.pdf>

Safe Use of Acetylene <https://www.hse.gov.uk/fireandexplosion/acetylene.htm>

Hazard symbols labelling/packaging <https://www.hse.gov.uk/chemical-classification/labelling-packaging/hazard-symbols-hazard-pictograms.htm>

To be suitable and sufficient the risk assessment must consider: -

- The hazardous properties of the substance. Classification, Labelling and Packaging of substances and mixtures and the safety data sheet will help to determine if a substance is either, explosive, oxidising, extremely flammable, highly flammable or flammable
- The people at risk from fire, explosion or similar energetic events.
- Information on safety provided by the supplier such as a relevant safety data sheet.
- The circumstances – The work processes, substances used and their possible interactions;
- Non-routine activities such as maintenance/repair of plant/equipment.
- The amount of the substance/s being used.
- If more than one dangerous substance involved, the risk presented by substances combining;
- The arrangements for the safe handling, storage and transport of dangerous substances and of waste containing dangerous substances;
- Activities, such as maintenance, where there is the potential for a high level of risk;
- The likelihood that an explosive atmosphere will occur and its persistence.
- The likelihood that ignition sources, including electrostatic discharges, will be present and become active and effective.
- The scale of the anticipated effects of a fire or an explosion;
- Any places which are or can be connected via openings to places in which explosive atmospheres may occur.



5 Steps of DSEAR Risk Assessment

Appendix 3

Step 1 Identify the fire and explosion hazards and hazards from similar energetic events	Step 2 Decide who might be harmed and how	Step 3 Evaluate the risks and decide on precautions	Step 4 Record your findings and implement control measures	Step 5 Review your risk assessment and update if necessary
<p>Consider the dangerous substances present, including those that may be formed in the workplace; the potential ignition sources of the dangerous substances;</p> <p>the work activities involving the dangerous substances;</p> <p>the possible formation and extent of explosive atmospheres;</p> <p>the scale of the anticipated effects from the fire, explosion or similar energetic event.</p> <p>See package Hazard labelling and safety data sheets supplied.</p>	<p>Identify the people at risk from the fire, explosion hazards or similar energetic event involving the dangerous substance.</p> <p>Based on your consideration of the anticipated effects of the incident, determine who might be potentially harmed by it.</p> <p>Include non- routine activities such as maintenance of plant</p> <p>This includes members of the staff, contractors, students and members of the public who might be put at risk by the work activity.</p>	<p>Consider adequate measures to eliminate or reduce the risks from dangerous substances, so far as is reasonably practicable.</p> <p>This should take account of such things as: The possible substitution of the dangerous substance by one that is non-hazardous, or one that is less hazardous;</p> <p>The control measures to prevent a fire, explosion or similar energetic incident from occurring;</p> <p>The mitigation measures to limit the scale and magnitude of the incident should it occur.</p>	<p>This should include the location and extent of explosive atmospheres and their classification in terms of zones. The risk assessment should also help you decide on:</p> <p>the information, instruction and training you give to your employees. This should be sufficient for them to safeguard themselves and others from the risks presented by the dangerous substances;</p> <p>The arrangements to deal with accidents, incidents and emergencies, including involvement of the emergency services</p>	<p>Plan in regular reviews of the risk assessment.</p> <p>Depending on the activity, risk and complexity this could be anything from 1-3 years but certainly no longer.</p> <p>If you introduce significant changes to your workplace, such as changing the dangerous substances present or their quantities, or changing the work equipment or processes, you should review your risk assessment.</p> <p>Similarly, you should do this in the event of an incident, including a near miss – for example, a release of a dangerous substance without ignition – to determine if the measures you have in place are sufficient.</p>

Hazardous Area Classification Table

Appendix 4

Zone	Definition	Example	Equipment to be used
	A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapour or mist, (Or in the form of a cloud of combustible dust in air)		Equipment built to the requirements will carry the explosion protection symbol "Ex", 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.
Zone 0 (Zone 20 for dusts)	is present continuously or for long periods or frequently	The area above a flammable liquid within a tank would be classed as Zone 0	Category 1 equipment
Zone 1 (Zone 21 for dusts)	is likely to occur in normal operation occasionally	The environment immediately around the location where bulk decanting of flammable liquids takes place.	Category 1 or 2 equipment
Zone 2 (Zone 22 for dusts)	is not likely to occur in normal operation but, if it does occur, will persist for a short period only.	Room or compartment in which bulk decanting takes place. 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. 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.	Category 1, 2 or 3 equipment

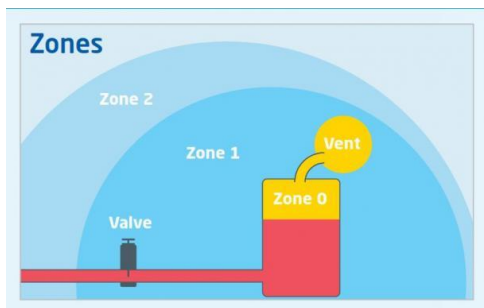




Figure 1
Hazardous Zone Signage



Figure 2
Marking and symbol for suitable equipment

