

 UNIVERSITY OF CAMBRIDGE	Department:	Location:
	Date:	Assessment Reference:

Dangerous Substances and Explosive Atmospheres Risk Assessment Form

This form is intended for use where the possibility of developing a flammable / explosive atmosphere has been identified; that is significant in the area where the work is being carried out.

Any additional Chemical Hazards requiring assessment should be carried out on Form HSD030C, or in an alternative/additional risk assessment as required i.e. for 'gases under pressure' and referenced here.....

Experiment / Procedure / Process / Activity (include a brief description):

Dangerous Substances to be used (List ALL flammable substances used and any expected flammable products):

Dangerous Substance	Quantity in Use	Physical Form liquid, gas, dust	Hazards Flammable nature, etc.	Flash Point (°C)	Vapour Pressure (solvents)	Lower Explosive Limit (LEL)	Upper Explosive Limit (UEL)	Auto-Ignition Temperature (°C)

Frequency of operation (hourly, daily, weekly, monthly or 'one-off'):

Can any of the substances be substituted with a less dangerous substance or form of the substance? **YES / NO**

NB: Flammability issues may need to be balanced against other hazardous properties such as toxicity

If **yes**, you must do so, **or** justify not using it.

Has the quantity of the dangerous substance(s) been reduced to a minimum? **YES / NO**

How might an explosive atmosphere arise? **Normal Operation / Accidental Release** (delete as appropriate)

Would an explosive atmosphere persist for a significant period **YES / No** (delete as appropriate)

If 'YES' state or estimate for how long it would persist? _____ Hours, _____ Minutes

ASSESS the RISK: Describe in more detail how an explosive atmosphere would or could arise.....

RISK ASSESSMENT and Identification of CONTROL MEASURES:

Identify potential control measures required to prevent an explosive atmosphere arising, including:

Closed systems excluding air or other oxidants, including the use of inert gases to prevent fire/explosions ☐

Local Exhaust Ventilation (LEV) to contain, dilute and remove an explosive atmosphere to a safe place outside, ☐

Pressure and/or temperature controls to suppress the formation of an explosive atmosphere (which/how...) ☐

Give further details of any control measures identified, including consideration of failure modes and their effects.....

Identify potential control measures required to prevent an explosion occurring:

- Removal of incompatible/excess chemicals to safe storage before commencing work ☐
- Removal of ALL ignition sources from any potential explosive atmosphere zone, including naked flames, electrical sparks, static arising from any source (equipment, tools, moving materials, clothing, shoes etc.) and any items above the auto-ignition temperature etc. (detail as required.....) ☐
- Monitoring for gas or solvent vapour releases linked directly to automatic shut-down mechanisms (specify.....) ☐
- Using ATEX rated electrical equipment (free of ignition sources) in any potential explosive atmosphere zone ☐
- Using 'PPE', to prevent or reduce the chance of ignition by static build up and discharge i.e. cotton clothing / cotton lab coats (non-synthetics), antistatic shoes and where appropriate earthing straps (specify.....) ☐

Identify potential control measures required to mitigate the effects of an explosion / fire:

- Equipment designed to be explosion resistant (specify.....) ☐
- Local fire suppression/extinguisher system(s) to suppress/prevent the spread of a fire (specify) ☐
- Minimising other flammable and combustible material in any potential explosive atmosphere zone ☐
- Monitoring for gas or solvent vapour releases linked directly to automatic alarm systems (specify.....) ☐

Have all necessary steps been taken to prevent the spread of fire? YES / NO

If NO, why not? (detail and justify.....)

Residual Risks Associated with the Procedure and the Requirement for Zoning.

If, despite control measures being in place, or because a reasonably foreseeable failure mode could result in a significant flammable / explosive atmosphere occurring in the place of work (i.e. the concentration of gas or solvent vapour rising above the lower flammable / explosive limit), then consideration should be given to 'zoning' the area where the flammable / explosive atmosphere could arise.

Note: DSEAR defines 'places where explosive atmospheres may occur' as:

"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 these Regulations"

But goes on to say:

"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 these Regulations".

Where applicable, for flammable gases and vapours, "Hazardous places are classified in terms of zones on the basis of the frequency and duration of the occurrence of an explosive atmosphere" as:

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".

NB: Should there be a realistic risk of a significant cloud of combustible dust then the appropriate alternative zoning will be required.

Assessment of the Requirement for Zoning:

After due consideration of the control measures in place and the consequences of potential realistically foreseeable failures of those control measures:

Does the place/area require zoning? YES / NO

If 'NO' then simply record this assessment, sign it off and use the identified control measures; reviewing the assessment regularly and as appropriate. For example the spillage of a small bottle of solvent in most areas would not normally require zoning but would still require consideration in a risk assessment.

However, if 'YES' –

Has the place/area been assessed as ZONE 0 YES/NO If 'YES' consult the Safety Office !

Or has the place/area been assessed as ZONE 1 YES/NO

Or has the place/area been assessed as ZONE 2 YES/NO

If the answer to any of the above zoning questions is YES, then define the area of the zone:

In words and in a graphical 3D plan, drawn in plan & elevation, show the extent of the zone, (for example 'Room XX' or 'Area around equipment ABC in room YY to a radius of N metres; see plan below/attached').....

Remember: if you have identified a Zone 0 the University's Safety Office must be consulted.

Selection of Equipment for Use in an Identified Zone:

DSEAR states that *"All equipment and protective devices in the identified zone(s) must comply with the Equipment and Protective Systems for Use in Potentially Explosive Atmosphere Regulations 1996", (be ATEX rated and be labelled as such: , "unless this risk assessment finds otherwise" (see below).*

"In particular, the following categories of equipment must be used in the zones indicated, provided they are suitable for gases, vapours, mists, dusts or mists and dusts, as appropriate:

- in zone 0 (or zone 20 for dusts), category 1 equipment,
- in zone 1 (or zone 21 for dusts), category 1 or 2 equipment,
- in zone 2 (or zone 22 for dusts), category 1, 2 or 3 equipment."

Is the appropriate equipment available and in USE..... YES/NO

If NO, why not? (detail and justify.....)

Warning Signs for Places / Zones Where Explosive Atmospheres May Occur:

These signs should be placed at entrances to the zone and if necessary in the zone, to alert people to the locations where an explosive atmosphere may occur and the need to take special precautions.


☐
Before work commences in an area classified as a zone; in compliance with DSEAR (Regulation 7)

“the employer shall ensure that its overall explosion safety is verified by a person who is competent in the field of explosion protection as a result of <their> experience or any professional training or both.”

☐
Information Instruction and Training:

Ensure that **all** those who will work in or enter the zone receive suitable and sufficient Information, Instruction and Training for their role(s), including workers, maintenance, cleaners and visitors.

☐

Note: Clearly this is an ongoing commitment as circumstances and personnel change.

Will the work be carried out **ONLY** during agreed Departmental Core/Normal Hours: **YES/NO**

IF NO, then JUSTIFY and clearly state what authority is there to do this work outside core/normal hours, who has given this permission (signature) and what provisions have been made to make this work acceptable and safe?

Waste Disposal Routes: Refer to University and Departmental policy.

Consider segregation, containment and appropriate labelling of waste in order to avoid problems of mixing incompatible wastes, in particular flammable wastes such as **non-chlorinated solvents** and oxidizers should be rigorously segregated.

Chlorinated solvent	☐	Aqueous (hazardous)	☐	Oxidisers	☐
Non-chlorinated solvent	☐	Aqueous (non-hazardous)	☐	Other (specify):	

Identify incompatible wastes:

NB: The mixing of incompatible wastes can introduce significant additional hazards, consult literature and SDSs

DO NOT accumulate flammable waste in any zoned working area, transfer it immediately to an appropriate storage facility (preferably outside the building) which itself may require zoning.

Emergency Procedures (emphasise any special hazards):

Fire Extinguisher(s):	CO ₂	☐	Dry Powder	☐	Fire Suppression	☐
Spillage/Uncontrolled Release:	Spill Kit	☐	Ventilate Area	☐	Evacuate Area	☐

Other (specify):

What could happen if there was catastrophic failure of the apparatus?

What could happen if there was catastrophic failure of the control measures?

It is agreed that application of the control measures specified will provide adequate management of the identified risks.

Name of assessor:

Signature:

Date:

Name of co-signatory: (e.g. Supervisor / authorised deputy / competent person)

Signature:

Date:

Note: This risk assessment is valid for a maximum of one year after which time it **MUST** be reviewed.