

## **GUIDANCE NOTE No. 58**

### **HOT WORK**

#### **1. Introduction**

The Solvents Industry Association has made the decision to issue this Guidance Note due to the specific risks involved in carrying out 'hot work' in an area that may use, store or contain solvents. This Guidance Note is limited to scenarios associated with the storage and use of solvents. There is no legal definition for hot work; however HSE guidance states it 'is usually taken to apply to an operation that could include the application of heat or ignition sources to tanks, vessels, pipelines etc. which may contain or have contained flammable vapour, or in areas where flammable atmospheres may be present'. It is generally understood as any non-routine (i.e. maintenance) work that has the potential to cause ignition (e.g. by generating a spark such as cutting or grinding); or if work involves the use of a naked flame such as welding or cutting; or for the use of any electrical equipment which is not intrinsically safe or of a suitably protected type within a DSEAR zoned area. .

There are no specific regulations controlling hot work, however a list of associated regulations and guidance is given in the references. This Guidance Note does not replace these legal documents, however it is designed to highlight the specific risks associated with solvents.

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## 2. Use of Solvents

Many solvents are classified as flammable in accordance with the CLP Regulations (Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures) as follows:

| <b>Category</b> | <b>Criteria</b>                                   | <b>Hazard Statement</b>                     |
|-----------------|---|---|
| 1               | Flash Point <23°C and initial boiling point ≤35°C | H224: Extremely flammable liquid and vapour |
| 2               | Flash Point <23°C and initial boiling point >35°C | H225: Highly flammable liquid and vapour    |
| 3               | Flash Point ≥23°C and ≤60°C                       | H226: Flammable liquid and vapour           |

Fire or explosion could occur when solvent liquid or vapour is released and comes into contact with a suitable ignition source, or alternatively, when a heat or fire source comes into contact with the container. Hot work would act as the ignition source.

The extent of a fire or explosion hazard depends on the amount of flammable vapour given off from a solvent which is determined by:

- The temperature of the liquid
- The volatility of the liquid
- How much of the surface area is exposed
- How long the liquid is exposed for
- The air movement over the surface

Other physical properties of the liquid give additional information on how vapour/air mixtures may develop and also on the potential hazards. These physical properties include:

- Flashpoint
- Auto-ignition temperature
- Viscosity
- Lower explosion limit
- Upper explosion limit

Flashpoint is defined as the lowest temperature at which a liquid gives off vapour in sufficient quantity to form a combustible mixture with air near the surface of the liquid under specified

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test conditions. Generally, a liquid with a flashpoint below the ambient temperature of the surroundings will give off sufficient vapour to mix with the air and be ignited.

Liquids with a flashpoint greater than ambient temperature are less likely to give off a flammable concentration of vapour unless they are heated, mixed with low flashpoint materials or released under pressure as a mist or spray. The lower the flashpoint of a liquid, the greater the risk. Many solvents have a low flash point.

The viscosity of the liquid is also significant as it determines how far any spilled material will spread and therefore the size of any exposed surface.

Solvents are frequently stored, contained and used in areas that hot work could be carried out, e.g. on a pipe or a tank. In addition, solvent vapours may be present in the area where hot work is being carried out. A risk of fire or explosion could arise from the presence of liquid solvents. In addition, there is also a risk of explosion from the solvent vapours.

### 3. Risk Assessment

Where hot work is being carried out, a risk assessment must be carried out by a competent person to determine what measures need to be taken to ensure a safe system of work is in place. This risk assessment is generally recorded on a 'permit to work' or 'hot work permit' for each separate hot work carried out to ensure a safe system of work. It should be noted that **the issue of a risk assessment within a hot work permit does not, by itself, make a job safe** - that can only be achieved by those preparing for the hot work, those supervising the hot work and those carrying out the hot work. Additional risk assessments (and permits to work) may also be required such as breaking containment and confined space entry.

The Risk Assessment should be carried out using the 5 steps outlined in the HSE Guidance:

[Identify the hazards](#)

[Decide who might be harmed and how](#)

[Evaluate the risks and decide on precaution](#)

[Record your findings and implement them](#)

[Review your assessment and update if necessary](#)

The assessment must take into account all of the information known about the hot work, for example the presence (or likely presence) of either liquid solvents or solvent vapours; or will

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take place in the course of the work to be undertaken and which could affect the condition of the work area, e.g. solvents in paint or adhesives or fugitive emissions from solvents stored in a nearby tank. In addition, the type of hot work must also be established – for example high energy sources of ignition such as naked flames, welding and spark-producing grinding wheels, which are almost certain to ignite flammable atmospheres; or low energy sources such as hand tools and non-sparking portable electrical equipment, which are likely to cause ignition only if there is a fault.

The assessment should also take into account the control measures that may be required, such as fire fighting equipment required (e.g. type of fire extinguisher, fire blankets, running water or spray); use of a fire watcher and for how long they should remain in position following completion of the hot work; emergency response.

#### **4. Safe Working with Hot Work**

The precautions required in a safe system of work will depend on the nature of the hot work being carried out and the risk assessment. The main elements are listed in the HSE guidance, however listed below are those precautions specific to working with solvents:

- Adequate training and experience is essential. Training / competency standards must be established so that work can be carried out safely. Knowledge of the risks involved with working with solvents is required.
- The atmosphere where hot work is to be carried out will need testing by a competent person for flammable or explosive atmospheres with an appropriately calibrated gas monitor prior to works being carried out, and possibly for the duration of the hot work. The majority of gas monitors are calibrated with methane, however depending on the solvents commonly used, pentane may be used. This is because methane calibrated gas monitors are set at a much higher Lower Explosive Limit (LEL) than if they were calibrated with pentane. The manufacturer will be able to offer further advice.
- Any gas monitor must be bump tested on a regular basis.
- Where the risk assessment has identified presence or possible presence of flammable vapour (for example within a pipe where cutting is required), there may be a need to purge the vapour from the area using an inert gas. Purging cannot take place using air, as this may combine with the solvent vapour to produce a flammable mixture within

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the area. Where purging has been carried out, the atmosphere will need to be tested to check that purging has been effective.

- There may be a risk of solvents from nearby processes or services entering the area where hot work is to be carried out. Isolations must take place in accordance with HSG253.
- Static must be considered as a potential ignition source – the SIA have a separate DVD publication ‘Solvents and Static Electricity’ and Guidance Note, which is available on the website [www.solvents.org.uk](http://www.solvents.org.uk)
- Respiratory protective equipment (RPE) may be required for hot work, for example if toxic vapours may be emitted as a result of the hot work. The RPE must be suitable for the purpose, i.e. correctly selected, appropriate for the task and the wearer must be face fit tested if required. If a canister or cartridge type respirator is selected, care must be taken to select the correct filter type depending on protection required.
- Those undertaking hot work need to be aware of the potential for hot residue falling from the hot work activity and igniting overalls, particularly if the overalls are contaminated with solvents or oils themselves. Those undertaking hot work should change from normal working overalls to clean overalls with specific fire retardant / fireproof qualities.

## 5. References

Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures  
Management of Health and Safety at Work Regulations 1999  
Dangerous Substances and Explosive Atmospheres Regulations 2002  
Control of Substances Hazardous to Health Regulations 2002  
Personal Protective Equipment at Work Regulations 1992 (as amended)  
The Selection of Use of Flammable Gas Detectors – HSE  
Provision and Use of Work Equipment Regulations 1998  
HSG 53 Respiratory protective equipment at work: A practical guide, HSE  
HSG 250 Guidance on Permit to Work Systems: A guide for the petroleum, chemical and allied industries, HSE  
HSG 253 The Safe Isolation of Plant and Equipment, HSE  
Guidance Note 57 Confined Space, SIA  
Guidance Note 47 Flammable Solvents and the Hazard of Static Electricity, SIA

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