

Insight: Ignitable Liquids

Recognizing the Risk

Fires involving flammable or ignitable liquids (ILs) usually create larger amounts of heat (heat of combustion) when compared to fires involving solids. Burning liquids can pool to create pool fires and these pool fires burn so hot that they can exceed the capability of the sprinkler system.

The four main dangers associated with flammable liquids are:

- An explosion resulting from a flammable vapor/air mixture within its explosive limit that comes into contact with an ignition source *inside an enclosed space*
- A fire involving the flow of burning liquid over a large area
- A fire occurring from a pinhole leak on a pressurized system creating an atomized discharge that comes in contact with an ignition source
- The rupture or explosion of unvented or inadequately vented containers exposed to fire

The main causes of fires that involve ignitable liquids result from:

- Inadequate maintenance
- Misuse of equipment or disregard of safety procedures/regulations
- Carelessness
- Improper or inadequate design
- Static electricity
- Poor housekeeping

Reducing the Risk

An assessment is a good start towards reducing risk. This assessment should include the following:

- Identify all ignitable liquids that are present including where they are used and their quantities
- Determine Control measures in place
- Review of the plans and procedures relevant to accidents, incidents and emergencies

The possibility of reducing the risk, by substitution with a non-combustible alternative or reducing the risk by substituting for a liquid having a FP above 414°F (212°C) should always be thoroughly investigated.

Ventilation

Either natural or mechanical means should be sufficient to prevent the concentration of the liquid below its lower explosive limit (LEL). Ventilation openings should be at high and low level direct to the outside. Mechanical ventilation should provide a minimum of six air changes per hour. Extract should be at low level and inlet at high level so as to provide cross-flow. Fan motors should be suitable for the hazard zone.

Ignition

Sources of ignition should have been removed and electrical equipment in the area should be appropriate for the risk category or zone. Potential sources of ignition should be identified and either removed or operated at temperatures well below the auto-ignition temperature of the liquid. Common sources that should be evaluated include the following:

- Electrical power distribution
 - Wiring (Cables, seals, fittings and boxes)
 - Switches, Circuit Breakers, Motor Controller, Fuses
 - Receptacles
- Electric Motors
- Lighting Fixtures
- Heating Equipment
- Areas where the potential for the static electricity exist
- Fork-lift trucks

Containment

The liquids should be in suitable containers. Spillages should be contained and prevented from spreading. Containment via bunds and drip trays should be provided where required. Empty containers should be properly managed. Containment should be designed to hold:

- 100% of the largest spill
- an allowance for 30 minute sprinkler water discharge
- an additional 5cm freeboard
- The containment of liquids will reduce the surface area of a pool fire resulting in less heat generated during the fire as well as reducing the area exposed by a fire.

Automatic shut-offs with over-fill alarms should be fitted to all enclosed vessels and to all vessels supplied by piped services as a precaution against overfilling. Where tanks are stored inside a building consideration should be given to providing an emergency dump facility.

Separation

The liquids should be separated from other stored materials. Flammable liquids should be stored separately from oxidizing agents or flammable gases. Processing or handling of flammable liquids should preferably be in a detached building. Where this is not possible it should be done in a compartment providing a minimum of 2 hours fire resistance.

Storage

All tanks, vessels, and containers should be clearly marked to ensure that personnel are aware of the contents and the potential hazards. The quantities of flammable liquids kept in working areas should be kept to a minimum; the quantity should not exceed the requirements for the day or shift being worked.

Fire Protection

Consideration should be given to the provision of a fixed fire fighting system e.g. sprinklers with foam additives and an automatic fire detection system. In hazardous areas, the systems should be intrinsically safe and appropriate for the appropriate class/division or zone.

For more information, contact your local AIG Risk Engineer.

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