Flammable liquids

What is the hazard?

There are different definitions for different classes of ignitable liquids in both legislation and standards. This hazard sheet deals with flammable liquids, herein defined as liquids that have the potential to ignite from a spark or a pilot flame at an ambient temperature. The nominal flashpoint is the standard reference measure for ascertaining at what temperature a liquid becomes flammable, and it should be considered together in conjunction with the normal ambient temperature and standard pressure within the context or system in which the liquid is handled. The focus of this hazard sheet is on handling of smaller amounts of flammable liquids.

The major hazard related to flammable liquids is ignition due to contact between an ignitable atmosphere of vaporised liquid and an ignition source. The vapours from a flammable liquid are always heavier than air and may accumulate at a low level. Typical flammable liquids that can be found in an industrial premises, are for example solvents used for cleaning or painting operations, and petrol or other kinds of fuel.

There are also other hazards inherent to all ignitable liquids that may require attention. A pressurised release may result in the formation of an ignitable aerosol (tiny droplets suspended in air).

Information related to the hazard

The flash point and the auto-ignition temperature of a liquid are two important physical properties. The flash point is the lowest temperature at standard conditions which a liquid produces a vapour at a flammable concentration, which could possibly ignite with the introduction of an external ignition source. The flash point temperature can be below 0°C. For example, the flashpoint for ethanol it is +12°C, and for petrol it is -43°C.

The auto-ignition temperature (AIT) is the temperature at which, a vapour ignites without the presence of any ignition source. The energy present within the vapour itself is enough to cause autoignition. The AIT of hydrocarbons is normally in the region of 250 – 450 °C.

The lower and upper explosion limits (LEL and UEL, respectively) are also important properties when dealing with flammable liquids. Further, the flammable liquid's solubility with water and its density are important factors to define how to best fight the fire in the flammable liquid.

How to reduce the risk

A Material Safety Data Sheet (MSDS) should be made available for all of the chemicals used at the site. The MSDS contains information on e.g. the flashpoint,the auto-ignition temperature, and what substances can be stored together.

When dealing with flammable liquids, it is important to recognize various standards and regulations that needs to be applied, such as the ATEX regulative within Europe, IEC standards worldwide or other applicable national legislation and regulations. For example, local regulations may limit the volume that may be stored at any one place and a license might be required.

The person responsible for the storage and handling areas of flammable liquids must be clearly defined, and this person must have sufficient training, knowledge and authority. Employees as well as contractors working in the area in which the flammable liquids are stored or handled must also have the appropriate knowledge and training. The training should include e.g. general knowledge about the risk, what to do in emergencies, how to avoid ignition, how to fight fires and how to handle spills safely. The training must be repeated periodically, preferably annually.

The storage areas should be located in separate buildings away from important production and storage facilities or they should be equipped with a fire separation, which segregates them from other operations. Combustible liquids with a high flashpoint, and flammable liquids with a low flashpoint, should not be stored together.

IBC's, drums and other small containers should be provided with a spill containment, which is made from a non-combustible material. This is to ensure that the spill area is limited and that any leakages are prevented from reaching other critical installations. Any spillage containment or drainage canal should not allow leakages to spread from one fire section to another. A pre-plan should be drafted and it should include details of the methods and equipment necessary for controlling and cleaning up a spill.

For dedicated storage rooms, ventilation systems should be installed with an exhaust, which is located within 150 – 300 mm from the floor and from the ceiling. This is because the vapours from all ignitable liquids are denser than air. The monitoring of the operation of the ventilation system may be needed for safety reasons. The alarm should be transferred to an occupied control station. The interlocking of the operation of the ventilation system with the electrical power supply to the room should also be used to indicate a failure in the ventilation system.

For small volumes of storage and handling in production areas (one container of each liquid, or one workday's consumption - whichever is the most), use storage cabinets especially designed for flammable liquids. The doors of the cabinets should be kept closed and they should be provided with spill trays and have sufficient low-level exhaust ventilation.

All of the containers used in the workplace should be specifically designed for the safe containment of flammable liquids (i.e. LPC, FM, UL approved or similar, of non-combustible construction and selfclosing). It is recommended to store flammable liquids in fixed assemblies, such as storage tanks or metal containers, rather than plastic IBC's.

Whenever or wherever there flammable liquids are stored or handled, it is important to ensure that all of the metal objects are bonded to the same electrical potential. The electrical connection between the bonded objects must be tested annually to ensure that it is functioning as intended.

Fire-fighting

The most effective type of portable fire extinguisher is the foam water mix and CO_2-extinguishers. Although B-classified powder (dry chemical) type can also be used. Fixed protection systems should be provided if there is the potential for larger spills. If there is sprinkler protection, verify that there is enough spill retention capacity to accommodate not only the sprinkler water but also a liquid spill. For solvent not soluble with water, using foam additives can be necessary to control/extinguish a fire.

12/2020