CONTROLLING CHEMICAL HAZARDS

Guidance Sheet

IMPORTANT HSE TOPICS **FLASHPOINTS**

In order to evaluate the risk of fire or explosion, often the most useful property that a planner can use is the substance's flashpoint.

What is a Flashpoint?

The flashpoint of a liquid is the lowest temperature at which the liquid gives off enough vapour to be ignited (start burning) at the surface of the liquid. Sometimes more than one flashpoint is reported for a chemical. Since testing methods and purity of the liquid tested may vary, flashpoints are intended to be used as guides only, not as fine lines between safe and unsafe.

Flammable and combustible liquids are liquids that can burn. They are classified, or grouped, as either flammable or combustible by their flashpoints. Generally speaking, flammable liquids will ignite (catch on fire) and burn easily at normal working temperatures. Combustible liquids have the ability to burn at temperatures that are usually above working temperatures.

There are several specific technical criteria and test methods for identifying flammable and combustible liquids. The table below shows the flammability hazard groupings that are currently being adopted internationally:

Table 1: Hazard Classes of Flammable Liquids

Class	Description	Criteria
1	Extremely Flammable Liquid or Vapour	Flash point < 23° C and initial boiling point ≤ 35 ° C
2	Highly Flammable Liquid or Vapour	Flash point < 23° C and initial boiling point < 35 ° C
3	Flammable Liquid or Vapour	Flash point ≥ 23° C and ≤ 60.5 ° C
4	Combustible Liquid	Flash point > 60.5° C and ≤ 93 ° C

How do you use Flashpoints?

Flammable and combustible liquids themselves do not burn. It is the mixture of their vapours and air that burns. Gasoline, with a flashpoint of -43°C, is an extremely flammable liquid. Even at temperatures as low as -43°C, it gives off enough vapour to form a burnable mixture in air. No. 6 fuel oil is a combustible liquid; it has a flashpoint of > 62°C, so it must be heated above that temperature before it can be ignited in air.

At normal room temperatures, flammable liquids can give off enough vapour to form burnable mixtures with air. As a result, they can be a serious fire hazard. Flammable liquid fires burn very fast. They also give off a lot of heat and often clouds of thick, black, toxic smoke.

Combustible liquids at temperatures above their flashpoint also release enough vapour to form burnable mixtures with air. Hot combustible liquids can be as serious a fire hazard as flammable liquids.

Spray mists of flammable and combustible liquids in air may burn at any temperature if an ignition source is present. The vapours of flammable and combustible liquids are usually invisible. They can be hard to detect unless special instruments are used.

When selecting chemicals for use at well sites select ones with as high a flash point as possible and it should be above 61° C.

In the case of production fluids the flash point and degree of danger will vary greatly depending on which well or field they come from. The flash point of crude oils can range from -20° C to over 120° C. The flash point of natural gas condensates can range from -130° C to 10° C. If you have any flammable liquids you need to implement controls to protect the work place against fire or explosion (GS Flammables Materials).

Where do you find Flashpoints?

The Safety Data Sheet (SDS) should have the flash point listed for any flammable or combustible liquids you purchase – if not call the supplier and ask them to provide it before you decide to use their product. Sometimes more than one flash point will be listed. The flash point can vary depending on the test method. A closed cup test (often abbreviated "cc") is preferred over an open cup test (often abbreviated "oc") because the closed cup method gives more reliable results.

In the case of production fluids you will often have to send samples of the fluid off to a laboratory for testing. Be sure to specify that you would like a closed cup flash point test as opposed to an open cup flash point test.

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How do Flashpoints differ from Auto Ignition Temperatures and Flammable or Explosive Limits?

A material's auto ignition or ignition temperature is the temperature at which a material self-ignites without any obvious sources of ignition, such as a spark or flame. Most common flammable and combustible liquids have auto ignition temperatures in the range of 300°C to 550°C. Some materials have low auto ignition temperatures. For example, gasoline has an auto ignition temperature of 280°C and its vapours can be ignited by hot process equipment.

A material's flammable or explosive limits also relate to its fire and explosion hazards. These limits give the range between the lowest and highest concentrations of vapour in air that will burn or explode.

The lower flammable limit or lower explosive limit (LFL or LEL) of gasoline is 1.4 percent; the upper flammable limit or upper explosive limit (UFL or UEL) is 7.6 percent. This means that gasoline can be ignited when it is in the air at levels between 1.4 and 7.6 percent. A concentration of gasoline vapour in air below 1.4 percent is too "lean" to burn. Gasoline vapour levels above 7.6 percent are too "rich" to burn.

Auto ignition temperatures and flammable limits, like flashpoints however, are intended as guides not as fine lines between safe and unsafe.

DEVELOP A CONTROL PLAN BY:

- ❒ Selecting the appropriate Control Approach using the Controlling Chemical Hazards guideline or web project.
- ❒ Identifying and applying the appropriate Guidance Sheets.
- ❒ Eliminating / substituting when possible.
- ❒ Applying engineering controls.
- ❒ Applying administrative controls.
- ❒ Specifying Personal Protective Equipment.