



## EXPLOSIVE LIMIT- LEL& UEL

In today's highly complex industrial environment, process safety is a key consideration in the maintenance and sustenance of very expensive and complex process facilities. Furthermore, the classification of a plant environment into various classes - Class I, II, III - according to the degree or probability of occurrence of hazards has greatly simplified the management of process safety. However, despite these classifications and the abundance of a lot of knowledge on hazardous gases, accidents still occur in process plants in the most bizarre manner. These are largely due to a lack of basic knowledge about the nature of the hazardous gases themselves and what constitute an explosive atmosphere.

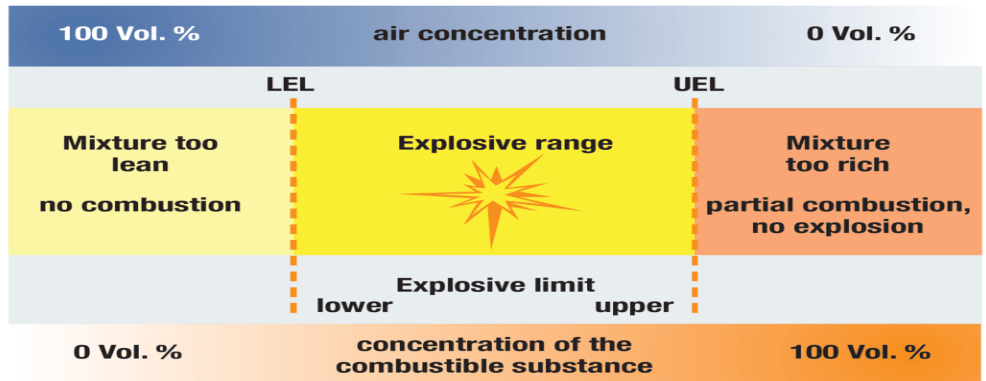
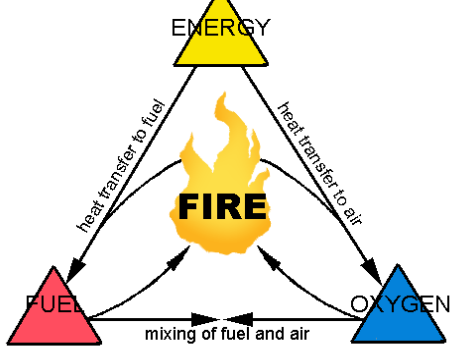
### Lower Explosive Limit (LEL)

The LEL of a gas is the lowest concentration (percentage) of a gas or vapor in air capable of producing combustion in the presence of an ignition source (flame, heat etc). It can also be referred to as the Lower Flammable Limit (LFL).

### Upper Explosive Limit (UEL)

The UEL of a gas is the maximum concentration(percentage) of gas or vapor that will burn in air in the presence of an ignition source. Above the UEL, the mixture is too "rich" to burn. The range between the LEL and the UEL as shown in the graph above is known as the flammable range of the gas. The larger the flammability range, the greater the potential for an explosive mixture of the gas with air.

### Fire Triangle



### Did You Know?

- ❖ Sparks from flame-cutting, welding and grinding can bounce a long way. That is why most permits call for removing combustible materials and testing for flammable gases within 35ft (10.7m).
- ❖ Gravity can pull sparks and hot particles down to the ground – and even down into pits and sumps. Monitor LFL under where elevated hot work is performed.
- ❖ Most flammable vapors are heavier than air, so they tend to accumulate in low spaces, including sewers and sumps.
- ❖ Even lighter flammable vapors can linger in places with poor ventilation – like inside pipes, vessels, or containment walls. Contractors and Maintenance Workers do not know your process. They do not know all the places to look for flammable vapors. Conditions can change while hot work is being performed. Process operations, upsets, or even weather conditions can introduce flammable materials near where hot work is being performed.
- ✓ Check every opening and sump within the 35ft (10.7m) zone.
- ✓ Use your knowledge of the process area to think of places where flammable vapors or combustible liquids and solids could exist
- ✓ Use the "wands" or sample tubes that come with your gas detectors to check inside spaces.
- ✓ Use Welding blankets and other protections to stop sparks and particles getting to places where they should not.

**BUT DON'T COUNT ON THESE ALONE!**

# Test in ALL the places where flammable vapors could be ignited!