Fire Facts You Need to Know

Fire is perhaps the most useful phenomenon ever discovered by mankind. Early man learned to make productive use of fires engendered naturally by lightning, material ejected by volcanoes and other natural occurrences. Today, fire is vital to civilization. Food, energy, transportation, industrial processing, health care, agriculture and our space program, all are dependent on the combustion process.

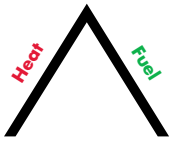
Practically every human alive recognizes fire's extraordinary usefulness and at the same time is all too aware of the extraordinary dangers it presents. Industrial and residential fires alike, present huge problems. Over 1-1/2 million fires were reported in 2006 in the U.S.; and nearly 20,000 deaths and injuries were reported. That's one fire nearly every 3 minutes. To understand how to prevent these catastrophes, following are some basic fire principles.

What is fire?

Fire has been defined as the visible heat energy being released from rapid oxidation of a fuel. Something is "on fire" when the exothermic release of heat from the oxidation reaction reaches the visible light level.

The classic fire triangle illustrates the three components, that when combined, will result in a fire. The three legs of the fire triangle represent fuel, oxygen, and heat. Air provides oxygen for combustion. The amount of heat required for ignition varies with the characteristics of the fuel and may be introduced by a variety of sources including electric or friction sparks, open flame or heating elements. Fuel is any substance that will sustain combustion after the initial application of heat to start it. It may be paper, wood or other Class A combustible, natural or bottled gas, or the vapors from gasoline, kerosene, diesel fuel, etc. The practical emphasis is on preventing a fire from starting by prohibiting the formation of the triangle.

The Fire Triangle



All three legs of the triangle must be present for a fire to start.

Examples:

Heat
Mechanical sparks, static electric discharge, open flame, smoking, frictional heat, lightning

Fuel
A. Solids: paper, wood, plastic, fabric
B. Liquids: flammable liquids, vapor such as gasoline, cooking oil, nail polish remover
C. Gases: natural gas, propane, butane

Oxygen Air

Removing any one leg of the fire triangle stops a fire from starting.

This book deals with flammable liquids. What is it that makes them dangerous? What are the characteristics to be controlled? We must recognize, first, that it is not the liquid itself that causes the difficulty. It is vapor that forms, mixes with air and burns when the liquid is heated to its' flashpoint or above and ignited. Flammable liquid vapors form the fuel leg of the triangle. Flammable liquid vapor ignitions occur so rapidly that they are frequently described as explosions. They generate extraordinary and frightening heat and light in an instant.

How Flammable Liquids Safety Equipment Separates the Fire Triangle

Safety equipment in use for storing, transporting or dispensing flammable liquids is designed to control one or more legs of the fire triangle.

Containment of the liquid fuel to prevent it from spreading in the event of fire is a primary function of all flammables safety equipment, including safety cans, safety cabinets, plunger and bench cans, rinse and wash tanks, waste containers and others.

Dissipation of heat to prevent flammable liquid vapor from reaching its ignition temperature is built in to certain types of safety equipment. The flame arrester is common to safety cans, faucets, bench cans, plunger cans and other equipment described earlier in this handbook. In the form of a wire mesh screen or perforated baffle plate, it permits escaping vapor to burn but dissipates heat so that vapor inside the container will not ignite or explode.

Closing out oxygen is another function of safety containers. When the lids of self-closing rinse tanks shut, they snuff out fire by closing off the oxygen supply. Self-closing lids on funnels and safety cans do the same. Oily waste cans are also designed with self-closing covers.

Characteristics of Flammable Liquids

In order to best understand the hazards of flammable liquids, control procedures, and to interpret the tables on pages 32 to 37, a familiarity with the following terms will prove useful.