

FIREHOUSE®

Weekly Drill

DRILL #105: FIRE STAGES AND PHASES

Introduction

Knowing the stages or phases of a fire is very important when it comes to firefighter safety. Under the Occupational Safety and Health Administration (OSHA) two-in/two-out law, firefighters are allowed to make entry without the establishment of a Rapid Intervention Company (RIC) if the fire is in the incipient stage or if there are people trapped inside the structure.

So what are the stages and phases of a fire? The incipient phase of a fire starts when a substance begins to heat up. The heat source usually is a match or some other instrument that produces heat. Heating can also occur through any one of the forms of heat transfer: conduction, convection, radiation or auto exposure.

At some point in time all the elements come together and ignition occurs. Ignition is when an outside source of heat is no longer needed for a material to sustain combustion. The heat required will come from the material burning. When we look at it in a practical way, we can see that all the elements found in the tetrahedron are at work; fuel, heat, oxygen and a chemical reaction.

Step by Step

Following the incipient phase we can find either the growth stage or the free-burning phase to be next (depending on which manual we use). The growth phase begins at the point of ignition. As the fire begins to grow, other combustibles in the room begin taking on heat and start to decompose as they do so.

Several factors come into play during this growth phase. First is the amount of oxygen within the space or available to sustain the fire and its development. Next is the amount a fuel readily available for burning. Another element is the size or the space the fire is building up in. The larger the space, the more heat is allowed to dissipate, slowing down heat buildup and spread of the fire.

Another factor is how well the area is insulated. A well insulated area will hold the heat in and allow it to quickly build up, spreading the fire more quickly; however, it can also withhold oxygen from the fire.

The free-burning phase (or fully developed stage) takes place when the heat being produced quickly increases



and the fire has spread to other fuels in the area. This phase of the fire is regulated in one of two ways. First, the amount of air or oxygen that is available to sustain the fire and secondly, the amount of fuel provided within the space. It is during this phase that a flashover will occur if there is going to be one.

The last stage to talk about is the smoldering or decay stage. During this phase of the fire, most of the flames have died out and there is more of a glowing of the embers burning taking place. Basically, all the fuel that can burn has burned and the fire is starting to diminish. If allowed to, the fire would eventually burn itself out, due to the lack of fuel and oxygen available.

These factors will have a direct effect on the tactics that are put in place at an incident. Having a good understanding of the different stages and phases of a fire will greatly assist the incident commanders and company officers with their decision making process. It will also keep the firefighters well within their safety zone by understanding the many aspects of a fire.

—Prepared by Russell Merrick