

No. 10: What Does The Smoke Tell Us? Part 2

Introduction

In Part 1 we covered two of the four characteristics of smoke: volume and density. This drill will focus on the other two characteristics: velocity and color.

Velocity

Velocity is caused by pressure building up within the involved structure. Another way to look at velocity is to think of it as the rate at which the smoke is moving. During a fire, pressure begins to build from the heat being produced and the volume of smoke filling the area. In addition the lack of, or limited ventilation effects the smoke's production due to the incomplete combustion which is occurring.

This build up of pressure has a direct bearing on the smoke and begins to push it out of the structure via openings in the exterior walls, including windows, doors or other openings in the structure. So which is it, the heat or the smoke causing the velocity issue?

Smoke has a great deal of velocity behind it when it leaves the structure. Combined with the smoke rapidly rising, it would indicate that velocity is being produced by the heat being given off by the fire. On the other hand, smoke leaving the structure that seems to hang in the air and doesn't really rise would be an indication that this velocity is a direct result of the volume of smoke within the structure.

Should the smoke's velocity have the appearance that it is boiling out the openings, keep a close watch on it. This is a tell-tale sign that flashover is imminent. Begin ventilation before moving in with a charged hoseline and move slowly and cautiously.

Velocity can also provide an indication of the fire's location. Smoke exiting from the structure, having a strong velocity appearance is an indication that the heat source is nearby.

Color

Color is a very important component and can give us a good indication of the stage that the fire is at. White smoke indicates the fire is in the incipient stage and conditions are generally tenable. It can also indicate when interior crews are successfully applying water to the fire. As the fire



Photo by Glen E. Ellman/FortWorthFire.com

progresses to the next stage, wooden materials begin to break down because of burning and produce a tan or light brown smoke.

As the smoke becomes browner in color, we need to be thinking that it has reached the structural components (studs, rafters, joists, etc.) of the building. With today's lightweight construction features this may imply imminent collapse.

Plastic materials will produce a gray color smoke in the early stages, but most of the time it is black smoke. The blacker the smoke, the more indication there is of it containing carbon, hydrocarbons, and flammable byproducts. Keeping in mind the principles learned with velocity and density, one could conclude that the higher the velocity and the lower the density, smoke conditions are being pushed by a relatively free burning fire.

Weather

Weather conditions, especially those being extreme, are going to have a direct effect on the conditions of smoke.

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