

FIREHOUSE[®]

Weekly Drill

DRILL #115: SMOKE CONTROL IN HIGH-RISE BUILDINGS

Introduction

Modern technology and energy codes have created many hazards for the firefighters in high-rise buildings. One such hazard is that of air movement and smoke control during firefighting operations. Having a thorough knowledge of these buildings' systems is important. Improper or careless ventilation techniques may be disastrous to both occupants and firefighters.

Many fire departments have procedures that call out how many floors will be climbed before firefighters should occupy elevators to gain access to the fire floor. Other departments use a rule of thumb that elevators will not be used for access to floors on or below the sixth floor. Any use of elevators by anyone, including firefighters, during a fire involves a risk of entrapment. Firefighters using the stairs to gain access to the fire floor face less of a danger than the hazards posed by using an elevator for fires on the sixth floor and below.

Dangers of Smoke

One thing for sure, however, is that smoke is a major killer in high-rise buildings. Smoke will spread throughout the building and reach many areas well before any heat being produced by the fire. The movement of smoke is a result of pressure differences, which can be created by wind, fans and blowers, and by the ventilation system within the building.

The mechanical ventilation systems within a high-rise building will distribute smoke throughout the building until it can be secured or shut down. Any doors leading into a stairwell, once opened on the fire floor, will allow smoke to begin accumulating in the stairwell. Fire personnel must quickly identify which stairwells will be used for fire attack and which will be used for removing building occupants. However, once smoke is allowed to build up in the stairwell, fire personnel will find a way to remove it.

Ventilation

This can be done using the mechanical ventilation system; however, not many firefighters know how to perform this task and if someone from the building maintenance is not there to perform this task the fire department will have to inject air into the stairwell. This will pressurize it in such a way that the smoke gets pushed out



upper level openings such as roof scuttles or bulkhead doors being opened to the roof.

In the immediate fire area, heat from the fire can be used to assist in directing the smoke to exterior opening. However, all high-rise buildings will pose a problem for firefighters known as “stack effect” (air buoyancy) caused by uncontrolled air flow. As mentioned, wind can have an effect on air movement and the stack effect within the building. During cold weather, the air infiltrating at the lower levels of the building will have a tendency to rise and, during hot weather, the air infiltrating on the upper levels will have a tendency to sink.

Preplans or site visits to familiarize firefighters with the building operating equipment are important. Arrange tours with the building maintenance personnel or engineer to obtain specific information on the air-handling system is a plus for fire personnel. During this familiarization tour, identify the location of the mechanical equipment room and the control panel that the fire department may have to utilize.

—Prepared by Russell Merrick