DataStream

Engineer's Edition

A System Sensor Publication

In this issue. . .

Summer Issue – 2002 **Vol. 2, #2**

Sensor or Detector?

What do you call those things that detect smoke? Are they smoke sensors or smoke detectors? The distinction can be important, depending upon with whom you're discussing fire protection.

In an intelligent smoke detecting device, its sensing chamber and microprocessor develop a value that equates to the level of smoke in the air. This value is then compared to a threshold value that corresponds to an alarm point. The threshold value can either reside in the device itself or in the fire alarm control panel. If the threshold value is in the device, then it is considered a smoke detector. If the threshold value is in the control panel, then it is considered a smoke sensor. There are advantages and disadvantages to both approaches.

The distinction of where the alarm decision is made tends to be less important today than it has been in the last several years since there is a consensus that both approaches have merit.

Equivalent Facilitation

The National Fire Alarm Code (NFPA 72) and the Americans with Disabilities Act Accessibility Guidelines (ADAAG) both contain requirements for the placement of visual signaling appliances for public mode use. Unfortunately, the two documents differ with respect to the candela rating required in some circumstances.

In non-sleeping areas, NFPA 72 requires only one 15 candela strobe in a 20 x 20 foot room. ADA would require a 75 candela strobe in that same area. The 15 candela strobe is clearly preferable from a current draw viewpoint. Fortunately, there is a method of reconciling the differences between ADAAG and NFPA 72. It is called "equivalent facilitation." Currently, equivalent facilitation is stated as follows: "Departures from particular technical and scoping requirements of this guideline by the use of other designs and technologies are permitted where the alternative designs and technologies used will provide substantially equivalent or greater access to and usability of the facility." It is important to note that this statement actually applies to all of aspects of ADAAG, not just visual appliances.

What is required in the situation where conflicting candela ratings are called for, is to demonstrate that a 15 candela strobe will provide the minimum visual intensity (measured in lumens per square foot) required by ADAAG. Formulas are available that relate visual appliance candela ratings to lumens per square foot. Using these formulas will show whether you are providing "substantially equivalent or greater access and usability" in a facility.

Of course, any departure from specific requirements in ADAAG will likely require approval by the authority having jurisdiction. The likelihood of these departures being approved varies greatly depending upon the municipality. If approved, though, the use of equivalent facilitation may be a great benefit in the overall fire system design.

Heat Detection

There are certain fire protection applications where a smoke detector simply is not the appropriate selection. The most common reason that a smoke detector is not appropriate is that the environment has too much airborne particulate. Smoke detectors applied in those situations would be cost prohibitive from a maintenance standpoint. So, in those non-life safety applications, heat detectors are often used.

There are a number of different types of heat detectors and each has advantages and disadvantages. Heat detectors can be electronic or mechanical, fixed temperature set point or rate of rise, and spot type or linear.

Fundamentally, heat detectors can either be electronic or mechanical. System Sensor primarily manufactures the electronic variety. Electronic heat detectors use a thermistor as the primary heat sensing device. A thermistor is a component whose resistance changes with temperature. Electronic heat detectors usually have some additional features, such as LED indicators that blink to indicate proper standby operation. Mechanical heat detectors can either be bi-metallic or pneumatic. Bi-metallic heat detectors use a strip that consists of two dissimilar metals. When it is heated, the metal distorts and closes a contact. Bi-metallic heat detectors tend to be very inexpensive. Pneumatic heat detectors use an air chamber that is sealed with a moveable diaphragm. When the air inside the sealed chamber gets warm, it expands and distorts the diaphragm, presses on a set of contacts thereby making an electrical connection. Pneumatic detectors are often used in harsh environments because they can be sealed against corrosive elements.

Heat detectors can also be classified as either fixed temperature or rate-of-rise. Fixed temperature set point heat detectors are designed to alarm at a particular temperature. Because of thermal lag, however, if the rate of temperature rise is fast, the detector may actually alarm when the room temperature is higher than the set point. Fixed temperature detectors tend to be less costly to design and produce than other varieties. Sometimes a rate-of-rise component is added to a fixed temperature design. This way, when either the fixed temperature is exceeded or a pre-set temperature increase rate is exceeded, the detector will alarm. Heat detectors with a rate-of-rise feature tend to produce a higher level of protection in many applications, but should be used with caution. One should verify that the intended environment does not naturally have rapid temperature rises that exceed the detectors trip point. This may be the case in an attic, for example.

Finally, detectors can either be spot type or linear. Spot type detectors essentially have their "detection mechanism" at one location. That is, the sensing element is in one physical location. Contrast that with linear heat detection, where the sensing element is spread out over a large physical area. In linear heat detection, a special multicore wire or cable is utilized. The cable has two conductors that are fitted with an insulating jacket with a specific melting point. That melting point corresponds to the detection scheme's fixed temperature set point. When the temperature gets high enough, the insulating jacket separating the conductors melts and they come into contact with one another, shorting out. This short can be detected. These linear heat detection cables can be hundreds of feet in length, making them ideal for conveyor or cable tray applications.

Heat detection, while not providing as rapid detection of fire as smoke detection, has many appropriate applications. It is essential, however, that the specifier has an understanding of the types of technologies available and their limitations.

SYSTEM SENSOR®
Commercial Products Group
3825 Ohio Avenue
St. Charles, IL 60174
www.systemsensor.com

Data Stream–Engineer's Edition *is a quarterly publication of System Sensor's Commercial Products Group. The intention of this newsletter is to provide valuable information on trends and new products in the fire protection industry to the architect and engineering community. The information contained herein is current as of the date of publication, but dates and specifications may change without notice. To request additional copies of* Data Stream, *please contact Scott Lang or Paul Sistare at System Sensor: 630/377-6580.*