



Coffee Break Training - Fire Protection Series

Fire Alarms & Detection: Smoke Detection in Duct Systems: Part 2

No. FP-2012-31 July 31, 2012

Learning Objective: The student shall be able to explain the importance of proper duct detector placement in various duct configurations.

Last week's "Coffee Break Training" summarized the placement of smoke detectors in heating, ventilating, and air conditioning (HVAC) distribution systems.

Another important consideration of duct detector installation is the device's location in relation to duct bends or return-air inlets. As air changes direction in a duct, or as it first enters the duct from a room, it tends to have excessive turbulence.

In order to ensure a good laminar flow and mix with products of combustion across the detector sensing element, light beam, or sampling tube, the detector should be installed between 6 and 10 "duct diameters" downstream of the duct bend or return-air inlet. Thus, if the detector is installed in an 8-inch (203 mm) diameter duct, it should be located not less than 48 inches (1,220 mm), nor more than 80 inches (2,032 mm), from the duct bend or return-air outlet.

For extremely large ducts (greater than 36 inches (914 mm) wide or tall), additional detectors may be required. Students should refer to National Fire Protection Association (NFPA) 72, *National Fire Alarm and Signaling Code* for guidance on detector placement.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems* includes a unique requirement regarding fire alarm reporting of duct smoke detectors. In those buildings with fire alarm systems that do **not** have a constantly attended location where security personnel or employees are monitoring alarms, the operation of a duct detector must sound a fire alarm. This may include automatically notifying the fire department if the fire alarm is reported off premises.

If the building or facility has a constantly attended location, the duct detector must send a "supervisory" signal when it operates. This enables staff to investigate the source of the alarm without notifying the fire suppression forces. This option exists because of the high number of false fire alarms caused by dust and other particulate matter that accumulates in air handling systems.

If the building has no fire alarm system, but HVAC shutdown is required, NFPA 90A specifies the duct detector must sound both a visual and audible alarm in an occupied location. Constant attendance is not required, so detectors may include remote-mounted light-emitting diodes (LEDs) to identify which detector has gone into alarm mode. Remember, this is a requirement of NFPA 90A, Chapter 6, and it is not found in NFPA 72.



The exterior-mounted duct smoke detector is mounted on a large duct, so additional duct detectors may be required.



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