

Avoiding a Food Court Fight

by Dean K. Wilson, P.E.

Our engineering design firm has received a contract to provide all design services for a large mercantile food court. This multi-restaurant installation will occupy a 15,500 sq. ft. space constructed to join three former “strip malls” into an enclosed, interconnected series of mercantile establishments. The food court will have nine fast food restaurants and three sit-down restaurants. A large courtyard will provide seating for patrons of the fast food restaurants. The space will have a wet pipe automatic sprinkler system. Between them, the 12 restaurants have 17 range hood and cooking surface protection systems.

We want to avoid any “fight” with the Authorities Having Jurisdiction (AHJs) involved in this project. Therefore, in designing the input side of the fire alarm system for this space, what requirements must we meet in order to satisfy the appropriate codes and standards with respect to monitoring the range hood and cooking surface protection systems?

I'm glad you have sought help on this particular design. I recently had a conference call with five Authorities Having Jurisdiction (AHJs) representing separate entities who complained that, in reviewing fire protection drawings, they have frequently discovered instances where designers have overlooked the need to monitor the range hood and cooking protection systems by means of the fire alarm system.

Before we delve into the fire alarm system requirements, let me caution you to always begin by asking the AHJs for this project what requirements they may have. The possibility always exists

that a particular jurisdiction will have implemented unique requirements because of a loss history or some other motivating factor. So, always check if any special local requirements apply.

Next, you should take a look at the system requirements for both dry chemical range hood and cooking surface extinguishing systems and wet chemical range hood and cooking surface extinguishing systems.

The equipment components used to provide protection for range hoods and other cooking surfaces must comply with the listing requirements of ANSI/UL 300, *Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*. The most recent issue date of this document occurred in May 20 2005 with minor revisions in 2010. This document provides the testing requirements for the equipment used to comply with NFPA 17-2013, *Standard for Dry Chemical Extinguishing Systems*, and NFPA 17A-2013, *Standard for Wet Chemical Extinguishing Systems*. Depending on what extinguishing agent you choose to use to protect the various range hoods and cooking surfaces, you should reference the appropriate standard. I do think it makes much more sense to choose a single extinguishing agent and make each range hood and cooking surface protection system as similar as possible.

You will need to familiarize yourself with the appropriate Standard for whichever extinguishing agent you intend to use. You should also take note that both NFPA 17-2013 and NFPA 17A-2013, respectively, require all electrical installation to meet the following requirements:

NFPA 17-2013: 4.8 Electrical Wiring and Equipment. Electrical wiring and equipment shall be installed in accordance with *NFPA 70, National Electrical Code*.

NFPA 17A-2013: 4.7 Electrical Wiring and Equipment. Electrical wiring and equipment shall be installed in accordance with *NFPA 70, National Electrical Code*, or the requirements of the authority having jurisdiction.

As to the matter of monitoring the availability of the range hood and cooking surface protection system to operate when needed in a fire, both Standards offer the following requirements:

NFPA 17-2013: 5.7* Operation and Control of Systems.

A.5.7 See *NFPA 72, National Fire Alarm and Signaling Code*, for detection, alarm, and control functions for dry chemical extinguishing systems.

5.7.2 Supervision.

5.7.2.1 Supervision of electrically or pneumatically operated automatic systems shall be provided unless specifically waived by the authority having jurisdiction.

5.7.2.2 Pneumatic actuation piping, hose, and tubing that is not normally pressurized shall not require supervision.

NFPA 17A-2013: 5.3 Supervision.

5.3.1 Where electrical power is required to operate the fixed automatic fire-extinguishing system, the system shall be monitored by a supervisory alarm with a reserve power supply provided.

5.3.1.1 Where supervision of any or all of the following is provided, it shall be designed and installed to give an indication of trouble in the following:

- (1) Automatic detection system
- (2) Electrical actuation circuit
- (3) Electrical power supply

5.3.1.2 Signals indicating the failure of supervised devices or equipment shall give prompt and positive indication of any failure and shall be distinct from signals indicating operation or hazardous conditions.

5.3.2 Where fixed automatic fire-extinguishing systems include automatic mechanical detection and actuation as a backup detection system, electrical power required for automatic operation shall not require monitoring or a reserve power supply.

5.3.3 Where fixed automatic fire-extinguishing systems are interconnected or interlocked with the cooking equipment power sources so that if the fire-extinguishing system becomes inoperable due to power failure, all sources of fuel and heat to all cooking appliances serviced by that hood shall automatically shut off, and electrical power monitoring shall not be required.

Each of these Standards also states requirements for initiating an alarm signal and providing notification to the occupants that the range hood and cooking surface protection systems have operated, as follows:

NFPA 17-2013: 5.7.3* Notification. An audible or visual indicator shall be provided to show that the system has operated, that personnel response might be needed, and that the system is in need of recharge.

A.5.7.3 If only local alarms are provided, consideration should be given to transmitting these alarms to a constantly attended location.

5.7.4 Connection to the Alarm System. The extinguishing system shall be connected to the fire alarm system, if provided, in accordance with the requirements of *NFPA 72, National Fire Alarm and Signaling Code*, so that the actuation of the dry chemical system will sound the fire alarm as well as provide the function of the extinguishing system.

NFPA 17A-2013: 5.2.1.8 An audible or visual indicator shall be provided to show that the system has operated, that personnel response is needed, and that the system is in need of recharge.

5.2.1.9 The extinguishing system shall be connected to the fire alarm system, if provided, in accordance with the requirements of *NFPA 72, National Fire Alarm and Signaling Code*, so that the actuation of the extinguishing system will sound the fire alarm.

Some additional requirements exist for pre-engineered dry chemical range hood and cooking surface extinguishing systems, as follows:

NFPA 17-2013: 9.6 System Supervision.

9.6.1 Where electrical power is required to operate the fixed automatic fire-extinguishing system, the system shall be monitored by a supervisory alarm and provided with a reserve power supply.

9.6.2 Where fixed automatic fire-extinguishing systems include automatic mechanical detection and actuation as a backup detection system, electrical power required for automatic operation shall not require monitoring or a reserve power supply.

9.6.3 Where fixed automatic fire-extinguishing systems are interconnected or interlocked with the cooking equipment power sources so that if the fire-extinguishing system becomes inoperable due to power failure, all sources of fuel and heat to all cooking equipment serviced by that hood shall automatically shut off, and electrical power monitoring shall not be required.

Let's turn to the fire alarm system requirements from NFPA 72-2013, *National Fire Alarm and Signaling Code*[®].

Most range hood and cooking surface extinguishing systems will *not* employ the fire alarm system control unit to directly actuate the fire extinguishing system. However, in those rare cases where such use occurs, that system control unit must have received a listing from a nationally recognized testing laboratory as “also suitable for use in a releasing device service.” In addition, NFPA 72-2013 has several other significant requirements, as follows:

23.11 Suppression System Actuation.

23.11.1 Releasing service fire alarm control units used for automatic or manual activation of a fire suppression system shall be listed for releasing service.

23.11.2 Releasing devices for suppression systems shall be listed for use with releasing service control units.

23.11.3 Each releasing device (e.g., solenoid, relay) shall be monitored for integrity (supervised) in accordance with applicable NFPA standards.

23.11.4 The installation wiring shall be monitored for integrity in accordance with the requirements of Section 12.6.

23.11.5 Releasing service fire alarm systems used for fire suppression—releasing service shall be provided with a disconnect switch to allow the system to be tested without actuating the fire suppression systems.

23.11.5.1 Operation of a disconnect switch or a disable function shall cause a supervisory signal at the releasing service fire alarm control unit.

23.11.5.2 The disconnect shall be a physical switch and not be accomplished by using software.

23.11.5.3 Software disconnects, even if activated by dedicated buttons or key switches, shall not be permitted as a method to secure a suppression system from inadvertent discharge.

23.11.6 Sequence of operation shall be consistent with the applicable suppression system standards.

23.11.7* Each space protected by an automatic fire suppression system actuated by the fire alarm system shall contain one or more automatic fire detectors installed in accordance with Chapter 17.

A.23.11.7 Automatic fire suppression systems referred to in 23.11.7 include, but are not limited to, preaction and deluge sprinkler systems, carbon dioxide systems, Halon systems, and dry chemical systems.

23.11.8 Suppression systems or groups of systems shall be controlled by a single releasing service fire alarm control unit that monitors the associated initiating device(s), actuates the associated releasing device(s), and controls the associated agent release notification appliances.

23.11.9 If the configuration of multiple control units is listed for releasing device service, and if a trouble condition or manual disconnect on either control unit causes a trouble or supervisory signal, the initiating device on one control unit shall be permitted to actuate releasing devices on another control unit in lieu of 23.11.8.

23.11.10 If the releasing service fire alarm control unit is located in a protected premises having a separate fire alarm system, it shall be monitored for alarm, supervisory, and trouble signals, but shall not be dependent on or affected by the operation or failure of the protected premises fire alarm system.

23.11.11 Releasing fire alarm systems performing suppression system releasing functions shall be installed in such a manner that they are effectively protected from damage caused by activation of the suppression system(s) they control.

While this seldom applies to range hood and cooking surface extinguishing systems, you should become familiar with the implementation of these requirements in case they arise in some unusual and particular design. In fact, with so many systems concentrated in one general area, you may find some cost savings in using just such a design.

With regard to alarm signal and occupant notifications, NFPA 72-2013 states the following requirements:

17.13* Detection of Operation of Other Automatic Extinguishing Systems. The operation of fire extinguishing systems or suppression systems shall initiate an alarm signal by alarm initiating devices installed in accordance with their individual listings.

A.17.13 Alarm initiation can be accomplished by devices that detect the following:

- (1) Flow of water in foam systems
- (2) Pump activation
- (3) Differential pressure
- (4) Pressure (e.g., clean agent systems, carbon dioxide systems, and wet/dry chemical systems)
- (5) Mechanical operation of a release mechanism

As you can see, this subject has aspects that might prove far more complicated than it seems at first examination. You did well to seek some assistance. When you prepare your initial design, I

suggest you consult with a licensed profession fire protection engineer. Once you receive the engineer's comments and design suggestions and you implement those suggestions, you can then confidently submit your design for approval to the AHJs for this particular project.

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