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Kitchen Hood and Sprinkler System Interfaces

NFPA 13 gives credit to kitchen hood protection systems in several ways. Section 7.10 (2010 edition) deals with commercial-type cooking equipment and its associated ventilation, and Section 7.10.2.2 has, since the 1987 edition, allowed omission of sprinklers and spray nozzles from ducts, duct collars, and plenum chambers (the spaces within the kitchen hoods above the grease filters but below the exhaust ducts) where all cooking equipment is served by listed grease extractors. NFPA 96 – *Ventilation Control and Fire Prevention of Commercial Cooking Operations* is widely adopted within fire codes and requires listed grease removal devices for all commercial cooking equipment, so omission of sprinklers from these areas is common.

NFPA 13 presents a means of providing sprinkler protection of commercial cooking equipment, with the arrangement of such protection shown in Figure A.7.10.2. Standard sprinklers or automatic spray nozzles are permitted to protect all cooking areas and equipment except deep fat fryers, for which a special listing is required per Section 7.10.8.2.1. Sprinkler protection of the equipment includes sprinklers within the exhaust ducts.

Sprinklers in Exhaust Ducts

Section 7.10.3.4.1 in the 2010 edition of NFPA 13 allows sprinklers to be omitted from ducts not exceeding 75 ft in length when the entire exhaust duct is protected in accordance with NFPA 96. The 2007 edition had allowed sprinkler protection of the duct to be omitted when the duct was protected in accordance with UL 300–*Standard for Safety Fire Testing of Fire Extinguishing Systems for Protection of Commercial Cooking Equipment*. The change was made by the Technical Committee on Sprinkler System Installation Criteria on the basis that NFPA 96 was the appropriate reference standard. However, NFPA 96 (Section 10.1.1) states that “fire-extinguishing equipment for the protection of grease removal devices, hood exhaust plenums, and exhaust duct systems” is to be provided. One of the acceptable installation standards for automatic fire-extinguishing systems referenced (Section 10.2.6) is NFPA 13. It makes little sense for NFPA 13 to be making an exception to itself when it is the referenced standard.

The Section made more sense back in the 2002 and prior editions:

7.9.3.4 Sprinklers or automatic spray nozzles shall not be required where the entire exhaust duct is connected to a listed exhaust hood incorporating a specific duct collar and sprinkler (or automatic spray nozzle) assembly that has been investigated and been shown to protect an unlimited length of duct in accordance with UL 300, Standard for Safety Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas.

The 75 ft limitation was added in the 2007 edition of NFPA 13 based on a proposal from the Western Regional Fire Code Development Committee. The proposal noted that while passing UL 300 allows unlimited length exhaust ducts without nozzles, the systems are actually tested with a maximum 75 ft duct length. When this limitation was added, however, the allowance to omit sprinklers in ducts on the basis of listed grease extractors in Section 7.10.2.2 was retained, so there was zero net effect – we are not aware of any sprinklers installed in commercial cooking ducts longer than 75 ft that are protected with UL 300 listed wet chemical systems.

Wet Chemical Systems

From a practical standpoint, most commercial cooking equipment installations are now being protected with wet chemical systems listed in accordance with UL 300. An upgraded version of that standard went into effect in November of 1994 and essentially made all dry chemical kitchen hood systems obsolete. The new UL 300 standard was developed in response to changes in the food preparation industry, most notably the substitution of vegetable oils for animal fats in order to help reduce the fat and cholesterol content of food. Because vegetable oils burn at a higher temperature than animal fats and produce fires that are more difficult to extinguish, new test protocols for kitchen hood suppression systems were required, and significant changes needed to be made in the design of the fire systems. It was found that a greater cooling effect was needed. No dry chemical systems were able to meet the new test requirements for extinguishment of fires in deep fat fryers, and most wet chemical systems had to be modified, since a greater amount of wet chemical agent was needed.

Hoods as Obstructions

A key aspect of sprinkler system and hood interface is found in Section 7.10.2.4:

7.10.2.4 Hoods containing automatic fire-extinguishing systems are protected areas; therefore, these hoods are not considered obstructions to overhead sprinkler systems and shall not require floor coverage underneath.

Note that there is no restriction on size of the hoods. In other words, it is not because the hoods are generally less than 4 ft in width that sprinklers are not required beneath them, but because they are protected with alternative automatic fire-extinguishing systems.

A recent question to NFSA's "Expert of the Day" program dealt with the situation where the automatic extinguishing system only partially protected the area under a hood:

Question: If there is a protected hood that has cooking equipment only under part of the hood and nothing under the remaining portion of the hood, is the floor area under the hood where there is no equipment required to be protected (under the hood, only the cooking equipment is protected) or does Section 7.10.2.4 allow protection to be excluded?

Answer: It is extremely unusual to have a large hood with nothing under it. Typically, such a hood would be in place for future expansion and would include the extra nozzles assuming the placement of future kitchen appliances.

Since you don't seem to have the extra nozzles in this case, the floor area needs to be protected in some way, similar to all of the other rules in NFPA 13. We would start by asking whether the hood is more than 4 ft

wide. If the hood is 4 ft wide or less, then no additional protection is required for the floor area under the hood as long as the sprinklers are spaced above the hood to cover all the way to the wall. This is similar to treating the hood like any other obstruction (duct or walkway beneath the sprinklers).

If the hood is more than 4 ft wide, sprinklers should be positioned at the ceiling in conformance with one of the rules in Section 8.6.5.1.2 (usually referred to as the “beam rule”) to spray under the hood, or sprinklers need to be installed under the hood. This is consistent with any other obstruction more than 4 ft wide between ceiling sprinklers and the floor.

Water System Hoods

Another recent question to the EOD program indicated the contractor was being asked to provide a water supply connection to a water-based hood extinguishing system, and whether this was appropriate:

Question: We have a project where ventless kitchen hoods are being installed. We are being asked to provide outlets on our fire sprinkler system for providing water to these systems, but are not sure if these systems are acceptable per UL and FM standards. I am unclear where this is covered by NFPA standards, and certainly don’t know of a code reference in NFPA 13 that allows this type of connection. Does NFPA 13 allow the connection of a kitchen hood system to a sprinkler system? The hood system in question is made by a company named CaptiveAire and is called their “CORE Fire Suppression System.”

Answer: No, NFPA 13 does not. According to the manufacturer’s website, their system is intended as a water-based system for protection of commercial cooking appliances, hood plenums and ducts. A surfactant is introduced into the water spray, which is applied at pressures of 30-70 psi. With regard to approvals the company’s website indicates the following: *“The CORE Protection Fire System is ETL Listed under Report number 3132231SAT-004 to UL Standard 300 and ULC/ORD-C1254.6-1995; meets requirements of NFPA 96 (Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment); NFPA 17A (Standard on Wet Chemical Extinguishing Systems).*

“Water-wash” systems to help clean the hood have been around for years, and rules for these systems are contained within NFPA 96. During the development of the 2011 edition of NFPA 96, the statement was made that Section 10.2.8 of that standard contained an allowance for water-wash systems to provide fire control when specifically listed for the application, but that no water-wash systems were listed at that time for fire extinguishment.

The traditional water-wash systems took their supply from a plumbing line. This new system requires a water supply that the manufacturer reportedly suggests be taken either from a plumbing line or the fire protection supply.

During the development of the 2011 edition of NFPA 96 the following section was added:

10.2.8.8 Grease removal devices, hood exhaust plenums, and exhaust ducts on fixed baffle hoods with water wash shall be permitted to be protected by a sprinkler system with an individual control valve if the design of the hood prevents the water from reaching the cooking appliances.

This new section is somewhat confusing. The original proposal was to allow a water-wash system to be supplied from the building’s sprinkler system. The proposal was accepted in principle, but the Committee Action seems to confuse the hood water-wash systems with actual sprinkler systems within the hood. As

explained in the Committee Statement, one of their intents was to ensure that water from the “sprinkler system” would not reach the cooking surfaces.

With regard to the new water-based hood extinguishing system, confusion remains as to where the connection to the fire protection supply can be made. NFPA 13 would not consider this system an extension of the fire sprinkler system. Therefore, if allowed by the AHJ, it would be considered an alternative fire protection system served by the same water supply, and would require separate valving from the sprinkler system. In that manner, any special backflow protection measures needed due to the surfactant could be placed on the supply line to the hood system.

Section 10.2.8.7 of NFPA 96 has for some time prevented or delayed operation of a water-wash system when the hood and duct were protected by a separate fixed fire extinguishing system. In the 2011 edition, the wording was clarified to require inoperability of the water-wash system for at least 60 seconds after the activation of an NFPA 17A (presumably wet chemical) fire extinguishing system. That was aimed at effectiveness of the wet chemical system.

Unlike the water wash systems used only for periodic cleaning, the possibility of simultaneous activation of a water-based hood suppression system and the sprinkler system during a fire event should be considered. While there are no criteria within NFPA 13 relative to simultaneous water demands of the systems, the wording of Section 11.3.3.3 applicable to water curtains could be used for guidance:

11.3.3.3 If a single fire can be expected to operate sprinklers within the water curtain and within the design area of a hydraulically calculated system, the water supply to the water curtain shall be added to the water demand of the hydraulically calculations and shall be balanced to the calculated area demand.

Upcoming NFSA “Technical Tuesday” Seminar – November 29th

Topic: Rubber Tire Storage

Instructor: Karl Wiegand, E.I.T., NFSA Manager of Installation Standards

Date: Tuesday, November 29, 2011- 10:30 am EST

Protection of rubber tire storage is a difficult task. On top of being made out of plastic, rubber tires inherently present a difficult fire hazard because of their shape. Even in the most tightly laced arrangement rubber tires have large air pockets to feed a fire. Their shape also creates shielding issues, preventing water spray from reaching the fire. This seminar will discuss the special protection arrangements employed by NFPA 13 to protect rubber tire storage.

To register or for more information, click [HERE](#) or contact Michael Repko at (845) 878-4207 or e-mail to seminars@nfsa.org.

Register Now for 2012 “Tech Tuesday” Series on Standpipes

NFSA Engineering has announced a new series of 12 “Technical Tuesday” online seminars for the first half of 2012, focusing on all aspects of standpipe system design, installation, testing and inspection. The series starts on January 10th, so register now and take advantage of the multi-seminar discounts of up to 25 percent: