TECH TALK
Volume 3

ALLIANZ GLOBAL CORPORATE & SPECIALTY®

HIGH VOLUME LOW SPEED FANS IN SPRINKLERED BUILDINGS

ALLIANZ RISK CONSULTING

This Tech Talk discusses the negative effects that HVLS fans can have on sprinkler performance and Allianz Risk Consulting (ARC) recommendations.

INTRODUCTION

High Volume Low Speed (HVLS) fans are increasingly being used in industrial buildings protected by automatic sprinkler systems. Their large physical size has created several concerns among the fire protection community regarding their impact on sprinkler performance. These concerns are focused on the obstructions created by the fan blades themselves and the velocity of the air created by these fans while operating.

Source: Big Ass Fan Company

Field surveys indicate that 80% of HVLS fan installations are located over areas normally occupied by people, such as loading docks or sorting/picking areas. This data is consistent with the concept that HVLS fans are primarily used for worker comfort within these facilities.

In this document, HVLS fans are defined as any fan mounted at the ceiling level between the top of storage and ceiling sprinklers with a diameter between 6 ft. and 24 ft. (1.8 m and 7.3 m). The HVLS fans can have as few as two blades and as many as 12 blades with an approximate rotational speed of 30-70 revolutions per minute (rpm).

FIRE TESTING

Since 2007, a series of 20 full-scale fire tests have been conducted to determine how HVLS fans affect the performance of automatic sprinkler systems. One of the most comprehensive projects was sponsored by the Property Insurance Research Group, whereby Allianz Risk Consulting (ARC) was a participant, and coordinated by the National Fire Protection Association's (NFPA) Fire Protection Research Foundation.

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The fire tests were conducted using both early suppression fast-response (ESFR) and control mode density area (CMDA) sprinklers over rack and palletized storage arrays. A cartoned unexpanded Group A Plastic commodity was used for all of the tests except for two, which used a Class II commodity. Test results were successful when the operating HVLS fan was shut down 90 seconds after activation of the first sprinkler. Other methods of fan shut down were successfully tested using air sampling and ionization type smoke detectors, which resulted in earlier shut down of the fan and less commodity damage.

Source: Underwriters Laboratories, Inc.

ARC RECOMMENDATIONS

Based on the fire test results to date, ARC recommends the following for all sprinklered buildings (storage or non-storage) with HVLS fan installations:

1. Arrange HVLS fan(s) to shut down (de-energize) power upon activation of one of the following:
   a. Sprinkler waterflow, shutting down immediately upon receiving the signal from the alarm system.
   b. Smoke detection (ionization or air sampling); photoelectric type smoke detectors do not perform well in high air flow areas and should not be used.
   c. Heat detection (e.g. spot, linear, etc.); operating temperature must be rated below the temperature rating of the sprinklers in the building.

Note: When smoke or heat detection devices are used to shut down HVLS fans, they should be spaced uniformly above the fan blade area and installed in accordance with the latest edition of NFPA 72, *National Fire Alarm and Signaling Code*, and the manufacturer's recommendations.

2. Position the HVLS fan(s) as follows to prevent obstructing the sprinkler discharge pattern:
   a. Provide a minimum 3 ft. (0.9 m) vertical clearance between the fan blades and sprinkler deflector.
   b. Center approximately between four adjacent sprinklers.
   c. Limit fan(s) to a maximum diameter of 24 ft. (7.3 m).
3. Test the power shutdown interlock for the fan(s) at least annually to verify proper operation.

REFERENCES

The Fire Protection Research Foundation, *High Volume/ Low Speed Fan and Sprinkler Operation Phase II Re-search Program Report,* revised January 27, 2011

NFPA 13, *Standard for the Installation of Sprinkler Systems*

NFPA 72, *National Fire Alarm and Signaling Code*

QUESTIONS OR COMMENTS?

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