Fire Alarm Topics: Dec. 14, 2006, AFAA Meeting, Tysons' Westpark Hotel

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Agenda:

A. Devices in Underground Parking Garages (weatherproof?)
B. Fire Alarm Retrofit Installations
C. Elevator Fire Alarm Devices.

Fire Alarm Devices in Underground Garages (weatherproof?)

Definitions from NEC 2002, Article 100 (page 38)

1. Rainproof: Constructed, protected, or treated so as to prevent rain from interfering with the successful operation of the apparatus under specified test conditions.

2. Raintight: Constructed or protected so that exposure to a beating rain will not result in the entrance of water under specified test conditions.

3. Watertight: Constructed so that moisture will not enter the enclosure under specified test conditions.

4. Weatherproof: Constructed or protected so that exposure to the weather will not interfere with successful operation.

FPN: Rainproof, raintight, or watertight equipment can fulfill the requirements for weatherproof where varying weather conditions other than wetness, such as snow, ice, dust, or temperature extremes, are not a factor.

NFPA 72 requirements from 72-99, 4-2.2:

Physical construction. Appliances intended for use in special environments, such as, outdoors versus indoors, high or low temperatures, high humidity, dusty conditions, and hazardous locations, or where subject to tampering shall be listed for the intended application.

UL Standards: 1971, 1638, 464, 1480.

Tests called for by UL that are relevant to environmental conditions:

1971: 31: Component Temperature Test
32: Environmental Tests
46: Indoor Corrosion Test

1638: does not cover public mode signaling per NFPA 72.

464: 18: Temperature Test
21: Humidity Test
22 Corrosion Tests (Indoor Use).
Outdoor Use Appliances:

32 Rain Test
33 Variable Ambient Temperature Test
34 Humidity Test
35 Corrosion Tests

1480: 7: Protection Against corrosion
27: Component Temperature Test
38: Variable Ambient Tests: temperature and humidity tests
40 Corrosion Tests
41 Immersion Test
42 Water Spray Test

Real issues are:

What constitutes "indoor" use?
Are unconditioned spaces indoors or outdoors?
Is a space which is beneath a building and not conditioned still indoor?

Device sample characteristics:
Wheelock Inc:

Series NS strobe products are listed under UL Standard 1971 for indoor use with a temperature range of 32 degrees F to 120 degrees F and maximum humidity of 93% (+ or – 2%).
Series NH horns are listed under UL Standard 464 for audible signal appliances (indoor use only).

Question then becomes what is the environment in the underground garage?
If you are under roof, then one point of view says that you are not outdoors. However, the only way to make a good case for being indoors is if you have walls and a roof. If you have partial walls and a roof, then you can question whether or not you are indoors. For a totally enclosed underground garage, underneath a building, you are indoors. You are, however, exposed to auto exhaust, humidity, and potentially extreme temperatures. In many underground garages, the temperatures are not that extreme since temperature variation is in fact less than above ground.

If you have direct wind or rain exposure, then you are outdoors.

The main problems with devices in underground garages come from corrosive fume-ridden auto exhaust, though condensation might sometimes be a factor. Condensation can also be a factor in conditioned spaces as well. Unless you have temperature or humidity extremes going beyond 93 percent RH or lower than freezing, then a device placed in an underground garage, not exposed to wind and rain, would be used within its listing. Someone would have to check the corrosion issue.

The exposure conditions of the device are the critical issue.
At entrances to garages, you can have wind and rain enter the garage through openings even though the garage as a whole is under roof. Hence your perimeter devices would

have to be set up to deal with this. Locating devices away from the perimeter would be the best option. Then you don't run in to the exposure conditions.

If you have a building with a series of open parking levels above ground, but underneath an office use, which occurs in some cases, it is probable that you will have wind and rain exposure around the entire perimeter of the structure. In that case, you will have to determine the extent of that exposure and if you have exposure treat the area as outdoors.

In breezeways, walkways, etc, if they are not enclosed, you usually have exposure to wind and rain and hence would be considered outdoors.

Remember that the Physical Conditions section of NFPA 72-99 points directly to the actual conditions in which the device is placed. Whether or not you have an HVAC system in the area is not at issue. Just because you have a space with no HVAC system, such as an underground garage, does not mean that it is "outdoors." We have many non-HVAC conditioned or minimally HVAC conditioned spaces in buildings e.g. airlocks, penthouses, mechanical rooms etc.

Our experience is that "underground" is not outdoors.

Fire Alarm Retrofit Installations:

What is the scope of work?

The Uniform Statewide Building Code of Virginia states:

103.5 Reconstruction, alteration or repair. The following criteria is applicable to reconstruction, alteration or repair of buildings or structures provided the reconstruction, alteration, or repair does not adversely affect the performance of the building or structure, cause the building or structure to become unsafe or lower existing levels of health and safety.

1. Parts of the building or structure not being reconstructed, altered or repaired shall not be required to comply with the requirements of this code applicable to newly constructed buildings or structures.

2. The installation of material or equipment, or both, that is neither required nor prohibited shall only be required to comply with the provisions of this code relating to the safe installation of such material or equipment.

3. Material or equipment, or both, may be replaced in the same location with material or equipment of a similar kind or capacity.

Likewise, **Section 103.8** of the USBC states:

Non-required equipment: The following criteria for non-required equipment is in accordance with Section 36-103 of the Code of Virginia. Building owners may elect to install partial or full fire alarms or other safety equipment that was not required by the edition of the USBC in effect at the time a building was constructed without meeting current requirements of the code, provided the installation does not create a hazardous condition. Permits for installation shall be obtained in accordance with this code. In

addition, as a requirement of this code, when such non-required equipment is to be installed, the building official shall notify the appropriate fire official or fire chief.

The USBC is available at
http://www.dhcd.virginia.gov/BCAR/Virginia%20Uniform%20Statewide%20Building%20Code.htm

AFAA local posed three items of concern with regard to retrofit work:

1. Interface between new and existing system for tandem operation.
2. Testing, inspection, and fire watch requirements.
3. Panel and device replacement only, without strobe upgrade.

A. Interface:
   1. All building occupants must receive the same level of protection.
   2. All devices must be used in accordance with their listing.
   3. Any system out of service must be called in. (see IFC 901.7).
   4. Reciprocal interaction of the old and new must be checked. You must not produce an infinite loop. However, you must also have a single point reset, or side by side reset capability, with proper instructions.
   5. If there is a conflict between notification device types, e.g. between different floors or core to tenant, then the occupants must be informed as to the situation, and as to the duration of the conflict.
   6. Wiring conflicts (e.g. FPL versus 120VAC circuits, as in old bell loops; re-use of same conduit, etc) must be dealt with properly under NEC 760.
   7. Any disturbance of rated assemblies must be properly dealt with under IBC Chapter 7 and IFC Chapter 7, and cleared with Critical Structures, DPWES.

B. Testing, Inspection and Fire Watch
   1. Any system out of service must be called in to 703-246-4821 and to the PSCC at 703-691-2131.
   2. IFC 901.7 must be followed.
   3. Provide a schedule letter, with scope and timing of outages, to Testing Branch, FPD. (FAX 703-246-9173). This will insure that proper notification of outages is given in advance to our Testing Branch.
   4. Insure that building occupants are notified of outages.
   5. Testing on per floor or per area basis is done with prior arrangement.
   6. Plans approval and low voltage permit required per USBC 108.2.
   7. Plans must clearly show that which is being altered, and that which is not being altered. Under Virginia law, what's new is new and what's old is old. All devices that remain attached to your combined (old plus new) system must work as per their listing.
   8. Scope of work definition will determine the scope of testing. Scope of work must be accurately reflected in the plans.

C. Existing panel and device replacement without change of notification appliances.
    1. See USBC 103.5 (as above). If you choose to replace initiating devices and a panel and leave the prior notification appliances in place, that is your decision.
    2. You must define your scope of work as replacement, or replacement and additions. Do not use the word upgrade. The word upgrade backs you in to current code.
    3. As long as you can demonstrate that your replacement (with or without additions) does not constitute a hazard, and that your equipment is used according to its listing, you will be ok under the Code of Virginia.
    4. ADA is a federal law, and our enforcement is confined to the USBC and the Fairfax County Fire Codes.
    5. You cannot produce, as a permanent condition, non-uniformity of notification in a building that would impair the response of the occupants to an emergency, since you have then produced a hazard and are in violation of the USBC.
    6. You are at all times subject to the owner's condition regarding compliance with the ADA. Again, that is a federal law; enforcement is done by the Department of Justice. The current (2004/5) version of ADA as posted on their website references NFPA 72-99 and 72-2002. The Commonwealth of Virginia has currently adopted NFPA 72-99, so there is no conflict between ADA and current code in Virginia.
    7. Scope of work definition and precision are an absolute must. Vague references to "upgrade" are worthless.

Elevators and fire alarm devices:

A. Recall. Per ASME A17.1-2000. See NFPA 72-99, 3-9.3. This is complete and correct.
B. Shunt trip. Only found in sprinklered buildings. Do not use in a non-sprinklered building. See NFPA 72-99, 3-9.4., **NEC 620-51:"(B) Operation**. No provision shall be made to open or close this disconnecting means from any other part of the premises. If sprinklers are installed in hoistways, machine room, control rooms, machinery spaces, or control spaces, the disconnecting means shall be permitted to automatically open the power supply to the affected elevator(s) prior to the application of water. No provision shall be made to automatically close this disconnecting means. Power shall only be restored by manual means."
   See also NFPA 13-99, 5-13.6. Fairfax County Code Reference Package details the sprinklers in hoistways issue. See www.fairfaxcounty.gov/ps/fr/prevention.
C. Fire alarm speakers in elevators. Stay on until alarm is silenced. See NFPA 72-99, 1-5.4.8.
D. Devices in top of shaft and in pit. Depends on elevator type and cab characteristics. See FXCO Code Reference Package. If motor is on top of cab, then shaft is same as machine room and you must place devices at top of shaft.

If pit is non-combustible and has no combustible hydraulic fluids, then there are no sprinklers in the pit nor any fire alarm devices in the pit.

E. Fire alarm devices in elevator shafts are only a function of having sprinklers present. IBC 3004, venting, only requires that vents be activated from the elevator lobby smoke detectors, not from a smoke detector in the shaft. If you have no sprinkler at top of shaft because there is a code compliant elevator cab and the shaft is non-combustible, then you have no devices at the top of shaft. If the motor is on top of the cab, in the shaft, then you have the devices and the sprinklers.