SimplexGrinnell SUMMER 2006

# LifeAlarm® Lines

NEWS AND UPDATES IN LIFE SAFETY

## Elevator and Fire Alarm System Interaction – Part II

**Bruce Fraser**

There is an interesting evolution occurring with requirements for interfacing fire alarm and elevator systems. It is worth examining the historical development and looking at some background from the ASME (American Society of Mechanical Engineers) A17.1 perspective.

### Elevator Recall

ASME A17.1b [1973] Supplement to the 1971 Elevator Code (Eighth Edition) introduced a new rule (Rule 211.3) that contained, among other things, a requirement for "Firefighters' Recall." The new rule applied to all automatic non-designated attendant elevators that traveled 25' above or below the designated level. Elevators having to comply with ASME A17.1 were now required to be "recalled" to a specific floor upon actuation of either a key switch (Manual Recall), or by smoke detectors located in elevator lobbies (Automatic Recall). Firefighters were to be the only individuals to have access to the keys for the key switch. They would use this feature to capture (recall) and gain control of the elevator(s) for their use in firefighting and assisting those not capable of evacuating on their own.

It was in ASME A17.1 [1981] (10th Edition) where recall of elevators to an "alternate" level was introduced. An actuated smoke detector in the main elevator lobby would cause elevators to be recalled to an alternate level (other than to the "designated" floor). Also, an actuated smoke detector in the elevator machine room was now required to recall the elevators to the "designated" floor.

In 1990 ASME A17.1 (13th Edition) added a section requiring all elevator cars to be provided with an illuminated visual and audible signal system (firefighter helmet symbol). The light was meant to illuminate during recall to alert passengers that the car is returning non-stop to the designated level. This visual symbol and its change in function will be discussed later in this series.

Consideration was given in the ASME A17.1b [1995] edition to address the condition (as with many hydraulic elevators) where the elevator machine room is located on the designated level. Smoke detectors in the elevator machine room, when actuated, would then be required to recall the elevator to the alternate level. The reason, of course, was to recall the elevator to the recall level furthest from the fire condition.

### Substantial Changes Made in 1997

Prominent terminology changes were made in the 1997 supplement of ASME A17.1. The title of section "211.3b Smoke Detectors" was changed to read "211.3b Phase 1 Fire Alarm Activation." Also, the term "fire alarm initiating devices" replaced the previously used term, "smoke detectors." It was recognized that smoke detectors are not necessarily the most appropriate choice of detection when environmental conditions exceed the listing limitations of smoke detectors, and also that NFPA 72 should define what detection should be used.

The 1998 Supplement of ASME A17.1 required that the actuation of a fire alarm initiating device in the elevator machine room or in the hoistway cause the visual signal (firefighter helmet) in the associated elevator cars to flash. The reason for this requirement is to provide a signal to firefighters that indicates the elevator is unsafe to use because of fire threat in the hoistway or machine room. This addition also provided the change needed for correlation with the "third circuit" requirement that appeared in the 1996 edition of NFPA 72.

### Harmonization with Canadian Elevator Standards

The 2000 edition (16th) of ASME A17.1 was harmonized with the Canadian CAN/CSA B44 Elevator Safety Standard. In addition, the entire code was reformatted and renumbered using a decimal numbering system.

Some heading changes were made; for instance, "Firefighters' Service – Automatic Elevators" is now "Firefighters' Emergency Operation – Automatic Elevators," and "Phase I Fire Alarm Activation" is now "Phase I Emergency Recall Operation by Fire Alarm Initiating Devices." But apart from those and other minor changes, the content didn't change much. Some rewording and paragraph modifications were made to accommodate minor differences that still exist between the United States and Canada.

### Mainline Power Disconnect

First required by ASME A17.1 – 1984, main line power disconnect, commonly referred to as "shunt trip," was meant to prevent use of elevators that might act unpredictably and unsafely. Heat detectors with dual contacts were commonly used to achieve the desired operation. One set of contacts reported in to the fire alarm system and the other initiated power disconnect. Note that the circuit to initiate the power removal was not required to be monitored in any way. As a matter of fact, some thought the fire alarm circuits could not be used in the power removal process. This was because of wording in the National Electrical Code (NFPA 70) which indicated that power could not be removed by the fire alarm control panel. What was meant, and later clarified by changes to NFPA 70, was that a general fire alarm signal is not to kill power to the elevators. The wording did cause some confusion, but the intent was always to allow fire alarm circuitry and components to be used to achieve power disconnect.

As an aside, it is important to note that "mainline" power disconnect refers to the

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power to drive the elevator and not to the circuits for lighting and communication to the elevator cars. Initially, power removal had to occur prior to release of water from sprinklers. This was accomplished by utilizing heat detectors that would operate before the sprinklers. But, in ASME A17.1a – 1994 the wording was changed to "…upon or prior to the application of water from sprinklers…"

In addition to having heat detectors initiate power removal, this change permitted sprinkler waterflow or pressure switches to initiate mainline power shutdown. The change also created irritating "nuisance" power disconnects because the built-in retard mechanisms associated with flow switches had to be disabled. The retard, or "delay," mechanisms were initially designed to eliminate sprinkler flow signals caused by fluctuations in street pressure, air in the sprinkler system, or similar conditions. Now those mechanisms have to be disabled in order to meet the requirement of "…upon or prior to the application of water from sprinklers," since, with a built-in delay, it would be possible to have waterflow from a sprinkler prior to the signal to disconnect power. Proper installation of check valves helped to minimize the problem, but did not totally eliminate it. Further, in the 1996 edition of NFPA 72, a paragraph was added prohibiting the use of pressure or waterflow switches with time delays for this application.

Look for subsequent issues where we'll cover today's requirements for both new and existing elevators ... ASME A17.1, NFPA 72, NFPA 13, and NFPA 70 requirements, as well as a look into the future to see where our industry may be expanding requirements regarding interfacing fire alarm and elevator systems.

## Carbon Monoxide Detection

### Gary Girouard

A number of states across the US and provinces in Canada have passed laws requiring Carbon Monoxide (CO) Alarms be installed in residential occupancies. The increased awareness to detect deadly CO has been spawned by several tragedies in recent years. These requirements are focused on residential occupancies ranging from single to multiple dwelling units, up to and including hotels and motels. Where 14 states have already passed legislation requiring CO Alarms in residential occupancies, at least 20 or more have drafted laws requiring the installation of this important life-saving appliance. In addition, the National Fire Protection Association introduced NFPA 720 in 2003, a new standard for the Installation of Household Carbon Monoxide (CO) Warning Equipment. There are other non-residential applications for CO detection such as those dictated by the International Building Code (IBC), which requires approved CO detection systems in parking garages to automatically activate ventilation systems. However, the focus of this article is on the residential application of CO Alarms.

CO detection technology has been available for some time and CO Alarms and detectors are designed using any one of three sensing technologies, bio-mimetic, electro-chemical, or solid-state. Where each has its particular methods for sensing the buildup of CO, Underwriters Laboratories (UL) sets the benchmark for specific performance criteria that CO sensing devices are required to meet. These requirements establish parameters for sensors to detect CO at concentration levels below the danger point where a human occupant may be impaired and lose the ability to take survival actions. There are two standards, UL 2034 and UL 2075. UL 2034 is the standard for single-station residential devices (CO Alarms) and they may be battery-powered, line powered or both, and may be wired for tandem operation. UL 2075 is the standard for system connected Gas & Vapor Detectors and Sensors used where toxic and/or combustible gasses are the threat. Both standards set the alarm levels based upon the concentration of CO gas as measured in parts-per-million (PPM) and the duration of exposure. UL 2034/UL 2075 require detection of CO at concentration levels at 400 PPM within 4-15 minutes, 150 PPM within 10-50 minutes, and 70 PPM within 60-240 minutes of exposure. Each of these limits is based upon data collected in clinical studies on the effects of CO on humans.

Matching these devices to each application requires knowing which adopted codes must be followed and the functional requirements. While standalone devices satisfy singular applications, there are times when tandem wired devices may be needed, or system connected detectors if off-site monitoring is required.

CO sensing devices sound a distinct warning that is different from the notification sounder of a smoke alarm. Where combination devices might be seen as a cost-effective solution to provide CO and smoke detection within a single unit, the rules of placement may be affected by the smoke detection technology used. For example, in a residential application a CO detector may be required within 10 feet of each bedroom. If there is a bathroom in the same vicinity, some regulations prohibit an ionization detector within 20 feet of a bathroom, making a combination CO/Ion Smoke devices inappropriate in this situation. A CO/Photo smoke detector could be used but with combination devices, it must have, the ability to distinguish CO from smoke to alert occupants of the type of danger detected.

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## Product Spotlight: *Info*Alarm™ Command Center

The new Simplex® 4100U *Info*Alarm Command Center provides a large screen display with extended information content, dual language support, and an intuitive menu driven interface that conveniently prompts the operator for the next action required. By using a larger area format instead of an individual text line display, the *Info*Alarm Command Center's display provides text information for Alarm, Supervisory, or Trouble. The format is flexible and able to be customized per application, allowing additional information to be presented to suit the specific user's needs. In addition, system reports are easily viewed and logs can be read with minimal scrolling.

The larger more flexible *Info*Alarm display provides customized operating convenience because alarm activity in the fire alarm system can be presented as the First and Most Recent alarm, First 5 and Most Recent or the First eight alarms listed sequentially. In addition, a basic site plan can also be displayed with activity status icons, General Alarm, or Direct to List; selectable individually by event type. The "System Normal" display screen also supports a gray scale bitmap (watermark) for location name, company logo, or site plan.

As new state regulations are implemented, AHJ's are moving quickly to educate citizens and offer guidance on how to meet the new laws while also considering the cost impact of devices, including installation. Standalone battery-powered devices provide the quickest and most cost-effective means to install CO Alarms. But like their smoke alarm counterparts, the batteries are often removed, or not replaced when depleted, leaving no protection. Permanently wired devices provide more reliable protection, but the cost of installation is higher and varies between new construction versus an existing occupancy.

CO Alarms are typically located outside of sleeping rooms, but some states will accept alternate locations if, for example, devices are located in the vicinity of centralized fuel burning equipment, closer to the source of potential CO. This may provide an alternative option to the higher cost of installing devices at multiple sleeping areas, or having to run wire into existing finished living spaces. This can be beneficial on larger-scale occupancies, multi-family units, or hotel/motels that are served by centralized fuel-burning heating systems.

What about testing CO devices? All CO detectors are provided with a test switch, which exercises the functions of the internal circuitry. Unlike NFPA 72, which requires smoke sensing devices to be tested by introducing smoke into the sensing chamber, there is no current testing standard to introduce test gas into CO sensors. Some manufacturers do offer a CO tester, but there is debate over whether it exposes the device to higher than normal concentrations of CO, or amounts not equal to the conditions the device was tested for under UL's standard? Along those same lines, does a highly concentrated amount of CO properly test the device? There are many questions that need to be answered, but as this technology evolves, CO detection should not be treated the same as smoke detection. CO is a threat that differs from smoke and how it affects occupants.

CO detection will continue to grow in demand as new laws are enacted at the federal, state and local levels to protect citizens. Staying current with the laws, codes, and requirements is key, but equally important is how to apply the products for the best protection. The Consumer Products Safety Commission has developed a questions and answers document on carbon monoxide. Go to **www.cpsc.gov/cpscpub/pubs/466.html**

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## Saving Lives, Protecting Property: Today's Advanced Fire Sprinkler Systems

**Frank Monikowski and Terry Victor**

On February 17th, 2003, the use of indoor pyrotechnics ignited a fire in a Minneapolis music venue. The club's automatic sprinkler system quickly activated and extinguished the blaze without a single life lost. Three days later, The Station nightclub in Providence, Rhode Island, burned to the ground after a similar pyrotechnics display engulfed the ceiling in flames. More than 100 people were killed in one of this country's deadliest fires ever. The Station was not equipped with fire sprinklers.

America's fire departments responded to an estimated 1.7 million fires in 2003 alone, with nearly 4,000 civilian deaths, more than 18,000 civilian injuries, the death of 111 firefighters, and a stunning $12.3 billion in property damages. Once a fire starts, the most effective measures to combat it are early detection, alarm and especially fire sprinkler systems. According to the National Fire Protection Association (NFPA), there is no documented case of more than two fatalities in a building fire when sprinkler systems are properly installed and fully operational. Such a staggering statistic is difficult to ignore. Moreover, the people least capable of self-evacuation – small children, elderly, and handicapped individuals – are most directly protected by such in-house measures.

According to congressional findings included in fire sprinkler legislation introduced in the U.S. House of Representatives, the use of sprinklers is responsible for a 70% reduction in total property damage from fires in public assembly, educational, residential, commercial, industrial and manufacturing buildings. Contrary to popular myth – perpetuated in no small measure by what is seen in dramatic movies – when one fire sprinkler goes off to fight a fire, the entire system does not activate. Individual sprinklers react as needed to temperatures in the fire area. Also, from an investment standpoint, typical costs for a sprinkler system installation in new or existing commercial buildings are very affordable. Those costs range from under a dollar to up to $2.50 per square foot, price points that are comparable to the installation of new carpeting. In addition, some companies in the industry offer lease-financing options that make the cost of fire sprinkler and alarm system upgrades and retrofits more affordable for building owners.

With aggressive new legislation in a number of states forcing businesses and communities to meet increasingly tough fire codes, fire sprinkler systems are becoming more common in new construction and existing structures. In some cases, older buildings, which previously had been "grandfathered" and thus exempted from current regulations, are being held to today's safety standards.

### A Carrot and a Stick

The NFPA recently issued a report containing new evidence supporting the considerable value of automatic fire sprinkler systems, finding them even more reliable than previously thought in reducing deaths from fire and in protecting property. The report, "U.S. Experience with Sprinklers and Other Fire Extinguishing Equipment," states that the chances of dying in a fire are reduced by up to 75% when sprinklers are used. The report also documented for the first time that virtually no sprinkler system failures have been product related. Instead, failures have in large part been caused by human errors of judgment. Sixty-five percent of the time, the system was shut down – for one reason or another – at some time prior to the fire breaking out.

More importantly, the report concluded that fire sprinkler systems are still very much underused in the United States. For example, at recent code hearings, representatives of the healthcare industry testified that as many as 4,200 nursing homes may need to be retrofitted with fire sprinklers. Thousands of assisted living facilities housing older Americans and people with disabilities lack sprinkler protection. The results of a USA Today investigation published in October also uncovered some disturbing findings. According to that report, four of every five nursing homes that suffered fatal fires since 1999 had obtained waivers from regulators that allowed them to stay in business despite fire-safety deficiencies.

Building owners do not argue with fire authorities over the rationale and need for protecting their buildings with fire sprinklers.

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Rather, as mentioned earlier, the issue has often been cost. In that regard, hope is on the horizon. The passage of federal legislation, Senate bill (S.512) and House bill (HR 1131), that proposes tax and depreciation incentives would help ease the financial burden many building owners face in proceeding with a fire-safety upgrade. In fact, coupled with the cost savings associated with insurance discounts, fire sprinkler systems could be paid off in a few short years, thus enhancing life safety for those most in need of protection. Those of us associated with any aspect of building development, maintenance, and life and property protection are strongly encouraged to visit www.nfsa.org or www.sprinklernet.org to obtain more information and register support.

### Technology Continues to Move Forward

On a daily basis, sprinkler manufacturers work with contractors, industry association members and code-compliance Authorities Having Jurisdiction (AHJs) to identify the needs – both common and unique – of facility owners across a multitude of building designs, operations and applications. Continuing advances – in materials, installation techniques, heat and pressure sensitivity, flow efficiencies, maintenance, testing and overall reliability – are all focused on the goal of designing and producing residential and commercial fire sprinkler systems that dramatically enhance life and property protection and help reduce building construction and operating costs. In fact, not only have modern fire sprinkler systems helped make buildings safer than ever, but in relative dollars the cost of installing and operating a sprinkler system today is no more expensive than 15 to 20 years ago.

### Testing and Inspection

Once installed and operating, regular inspection and testing of fire sprinkler systems provide the peace of mind that comes from knowing a system is ready and remains in top working order. Although some users may want to carry out inspections and testing on their own, a good and sometimes safer alternative is to have trained professional sprinkler system service personnel handle this responsibility. Sprinkler system inspections and tests help ensure that important National Fire Protection Association (NFPA) standards are being met. This type of program confirms a system's readiness, inspects components, and provides a detailed report recommending any necessary corrective action.

### Conclusion

Today's fire sprinklers incorporate the latest in design and engineering technologies to provide an extremely high level of life-safety and property protection. The features and benefits now available are making fire sprinkler systems more efficient, reliable and cost effective. For the best in safety and protection, fire sprinkler systems should be installed and maintained as a key element of a comprehensive strategy that also includes electronic fire alarm, central monitoring and other critical systems.

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