BASIC FIRE ALARM TRAINING

What is a fire alarm system?

- Per the definition in NFPA 72 –
  - A system or portion of a combination system that consists of components and circuits arranged to monitor and annunciate the status of fire alarm or supervisory signal-initiating devices and to initiate the appropriate response to those signals

Basic Components of a Fire Alarm System

Control Panel

Communications

Initiating Devices

Notification Appliances

Control Panel/Communicator

A component of the fire alarm system that receives signals from initiating devices and processes these signals to determine the fire alarm output functions

Communications

DACS – Digital Alarm Communications Systems

POTS – (Plain Old Telephone System) Loop Start with line seizure from the point of demarcation prior to sending it to the home or business.

Cable Company Service – assuming you have no CODEC, Voice Compression or back up power issues.

One Way/Two Way Radio – Mesh Radio and GSM

IP Communicators with UL listings

Sole Path Communicators with UL Listings

2010 Edition National Fire Alarm and Signaling Code

<u>NFPA 72-2010 Housecleaning Efforts</u>

Recently removed transmission methods

Active Multiplex
McCulloh
Directly Connected Non-Coded Systems
Private Microwave Radio Systems

ANNUNCIATOR

Initiating Devices

A system component that originates transmission of a change-of-state condition

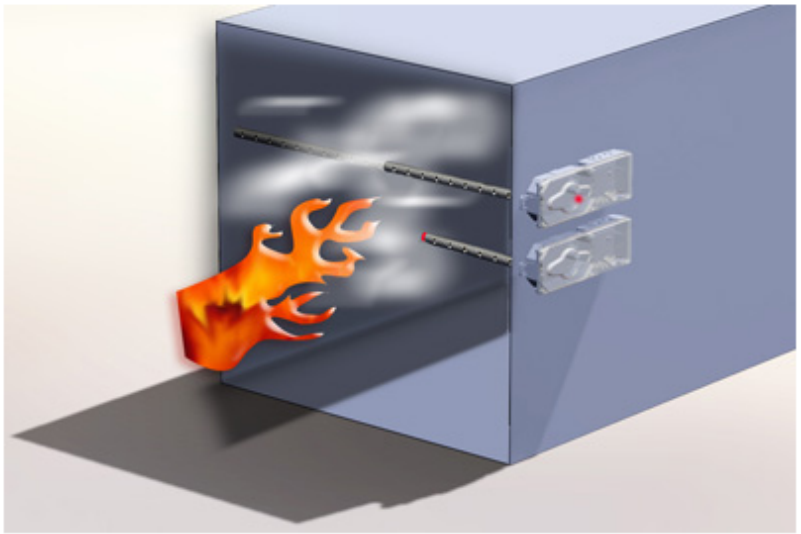
Examples of Initiation Devices

Automatic Initiating Devices

- Smoke Detector

- Heat Detector

Duct Detectors



Manual Initiating Devices

- Pull Station

Types Of Sprinkler Systems

Wet Pipe: Since water is always present in the pipes supplying the sprinkler heads, these types of sprinkler system are quick to react upon the operation of a sprinkler head in a fire scenario. These are the most common systems and are used in buildings where there is no risk of freezing. Wet systems are required for multi-storey or high-rise buildings and for life safety systems for UK standards.

Dry pipe: The pipes are filled with air under pressure at all times and the water is held back by the control valve outside of the protected area. Should a sprinkler head open in a fire scenario, the drop in air pressure opens the valve and water flows into the pipe work and onto the fire. Dry pipe systems are used where wet or alternate systems cannot be used.

Alternate: Alternate systems have the pipes full of water for the summer period, then subsequently drained down and filled with air for the winter. This is typically for buildings that are not heated, e.g. underground car parks.

Sprinkler System Devices

- Water Flow

- Valve Tamper

Sprinkler Heads

CONVENTIONAL

UPRIGHT

PENDENT

HORIZONTAL SIDEWALL

VERTICAL SIDEWALL

RECESSED PENDENT

RECESSED PENDENT

CONCEALED HORIZONTAL SIDEWALL

CONCEALED PENDENT

Temperature Rating		Color of Fluid Within Bulb	
Celcius	Fahrenheit		
57	135	Orange	
68	155	Red	
79	174	Yellow	
93	200	Green	
141	286	Blue	
182	360	Mauve	
227 / 260	440 / 500	Black	

Notification Appliances

- A fire alarm system component such as a bell, horn, speaker, light, or text display that provides audible, tactile, or visible outputs, or any combination thereof

Examples of Notification Appliances

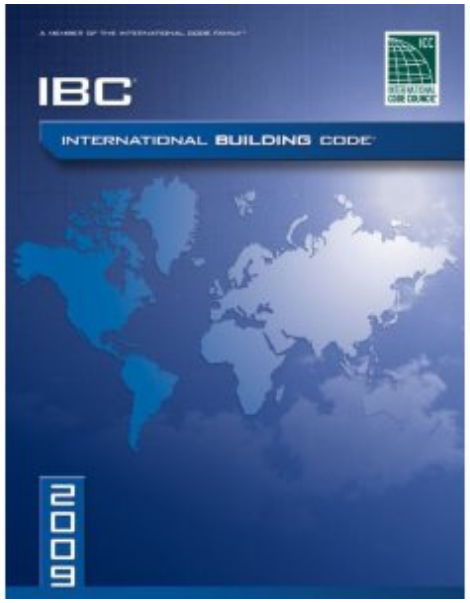
- Horn/Strobe

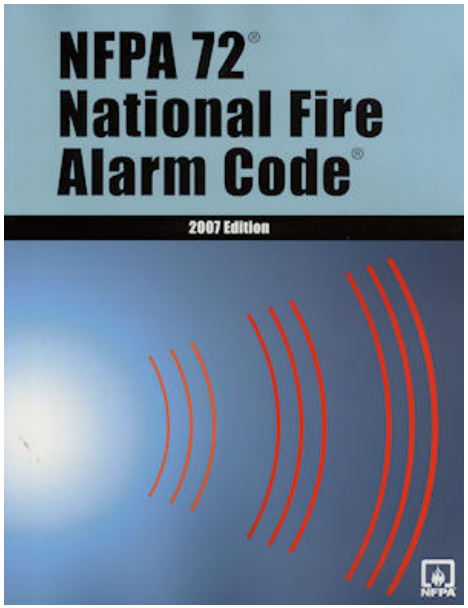
- Strobe-Ceiling Mount

- Speaker

- Bell

Fire Alarm Requirements





International Building Code

- In Pennsylvania, Ohio, and many other states, the International Building Code (IBC) is the model building code for the state.
- Each building, based on it's use, is assigned a Use and Occupancy Code
- The Use and Occupancy Code then determines if a fire alarm system is required.
- Fire alarm systems may also be required by other authorities, such as insurance companies

NFPA 72
The National Fire Alarm Code

- Once it is determined that a fire alarm system will be installed, NFPA 72 then tells us how to install the system

NFPA 70
The National Electric Code

- Once it is determined that a fire alarm is required by the IBC, and has been designed per NFPA 72, the National Electric Code (NEC) tells us how to wire the system

Underwriter's Laboratories (UL)

What is UL?

- UL is a global independent safety science company with more than a century of expertise innovating safety solutions from the public adoption of electricity to new breakthroughs in sustainability, renewable energy and nanotechnology. Dedicated to promoting safe living and working environments, UL helps safeguard people, products and places in important ways, facilitating trade and providing peace of mind.

Huh?

- Basically, UL is a company that has developed standards on how products should operate safely. Manufacturers send their products to UL to be tested by UL to UL standards. If the product passes the tests, the manufacturer can place the UL mark on the product.

What about fire alarms and UL?

- Fire alarm service companies and monitoring centers apply to UL to become listed companies
- UL investigates the company and ensures the company understands and can comply with applicable standards
- UL audits listed companies once per year to ensure the company is maintaining compliance

- Authorities Having Jurisdiction (AHJ) will require a UL certificate on a system
- The UL Certificate is the UL mark for fire alarm systems
- The UL certificate on a fire alarm system ensures the AHJ that the system was designed, installed, tested and maintained properly
- One of the main reasons an AHJ will require a UL certificate is to reduce false alarms

Factory Mutual (FM)

- FM basically provides the same service as UL. At one time, when a property was insured by Factory Mutual insurance, they required the fire alarm system to be FM approved.

Commercial Fire Alarm Monitoring and Dispatching Requirements

- Fire Alarm system alarm transmissions require immediate dispatch of the fire department (unless otherwise required)

UL Runner Response

- Runner response is required on all UL Listed/FM Placard fire alarm systems.
- Central Station is responsible for the dispatch of Runners in accordance with procedures based on NFPA 72 after normal business hours. During normal business hours, Customer Care/Service is responsible.
- Runner Service is defined as a service performed at the protected premises, including resetting and silencing of all equipment transmitting fire alarm or supervisory signals to an off-premises location.
- A UL Runner is a person (other than the required number of operators on duty at central, supervising, or runner stations) available for prompt dispatching, when necessary, to the protected premises.
- A Runner shall not be required if there will not be a fire department or customer representative on-site.

Fire Alarm Response

- Dispatch runner or technician to the protected premises within **1 hour** of receipt of a signal if the equipment needs to be manually reset by the prime contractor.
- A runner/technician response may be waived by the fire department or other Authority Having Jurisdiction (AHJ). The customer may not call off a runner response.
- A runner/technician is not required if the signal results from a prearranged test. If a runner/technician is required, they must arrive within 1 hour of the signal being received.

Supervisory Signal Response

- Dispatch a runner or maintenance person to arrive within **1 hour** of the signal being received to investigate.
- Central station must dispatch a runner/maintenance person to the protected premises if a supervisory signal is received, even if the signal has reset.
- A runner/technician is not required if the signal results from a prearranged test.
- In addition, a runner would not be required if a prearranged procedure is in place with the subscriber on the handling of supervisory signal and the subscriber is able to reset the supervisory signal.
- If the subscriber is unable to reset the supervisory signal, a runner/technician must still arrive within 1 hour of receipt of the signal.
- Supervisory alarms are defined as alarms received from sprinkler system supervisory appliances. These include, but are not limited to, valve tampers switches, low air pressure/temperature switches, fire pump supervision, tank level/temperature switches. Additionally, when duct detectors are configured not to provide fire alarm response, they shall be considered a supervisory signal

Trouble Signal Response

- Dispatch personnel to arrive within **4 hours** to initiate maintenance, if necessary.
- This is interpreted to mean the central station must dispatch a technician to the protected premises if a trouble signal is received.
- If a reset signal to the trouble signal is received before the technician arrives, the technician would not have to respond.
- The customer should be notified of the reset signal and asked if they still require runner response.
- Trouble signals also include such signals as AC power loss, battery trouble, phone line trouble, failure to test, and other related control panel problem signals.
- If the trouble is due to a known cause that would not be able to be repaired by the technician, runner response is not required (i.e. AC power to the building is off due to storm damage).

Additional Runner Requirements

- The UL Runner should complete a Select Security Service Ticket and clearly mark the ticket as a UL Runner so that the customer is charged accordingly. This ticket is for the reset only.

- If additional work or services are required at the site, the UL Runner should contact the primary on-call Technician.

Additional Fire Alarm Requirements

- No Select Security personnel shall place a fire alarm system or any part of a fire alarm system on test without first investigating the cause of the problem on-site. Select Security personnel may place a fire alarm system or a part of a fire alarm system on test at the request of the customer.
- If it is determined that a fire alarm system or any part of a fire alarm system will be placed on test, the reason for the system being on test and the person placing the system on test shall be documented in the account history on the central station software.
- If it is determined that a fire alarm system or any part of a fire alarm system will be placed on test for a period of more than 8 hours, the Authority Having Jurisdiction shall be notified. The person who was notified and the person that made the notification shall be documented in the account history on the central station software.
- No Select Security personnel shall disconnect a device on a fire alarm system for a period of more than 8 hours. If a device must be disconnected for a period of more than 8 hours, the Authority Having Jurisdiction shall be notified. The person who was notified and the person that made the notification shall be documented in the account history on the central station software. Additionally, an out of service tag shall be placed on any device that is disconnected and at the fire alarm annunciator.

Fire Alarm Inspections

- Fire alarm inspections shall be conducted per the requirements of the current version of NFPA 72 and contract documents. The fire alarm inspections will consist of the following:

Quarterly Inspections:

- 1. The technician shall operationally test the fire alarm control panel. The fire alarm control panel shall be tested to verify correct receipt of alarm, supervisory and trouble signals, operation of notification appliance and auxiliary function outputs, circuit supervision and AC power loss.

- 2. Fire alarm panel batteries shall be inspected for corrosion or leakage and tested under full load with the primary power disconnected. The battery charging circuit shall be tested to ensure correct voltage output to the batteries.

- 3. The digital alarm communicator shall be operationally tested to ensure receipt of the correct signal to the central station within 90 seconds of going off-hook. The digital alarm communicator shall be tested to ensure line seizure, line failure detection, and the ability to transmit line failure within 4 minutes of detecting the line fault.

- 4. The sprinkler alarm and supervisory initiating devices shall be functionally tested per NFPA 72 standards and manufacturer's instructions. Sprinkler alarm and supervisory initiating devices include but are not limited to waterflow switches, high/low pressure switches, valve tamper switches and room temperature switches.

- 5. Waterflow switches shall be tested by flowing water through the inspectors test valve. Initiation of the waterflow alarm signal shall occur within 90 seconds of opening the inspectors test valve.

- 6. High/low pressure switches shall be operated and verified that receipt of the signal occurs when the required pressure is increased or decreased a maximum of 10 psi.

- 7. Valve tamper switches shall be operated and verified that receipt of signal occurs within the first two revolutions of the hand wheel.

- 8. Room temperature switches shall be operated and verified that receipt if signal occurs when the room temperature decreases to 40°F.

Annual Functional Inspections:

- 1. The technician shall operationally test the fire alarm control panel. The fire alarm control panel shall be tested to verify correct receipt of alarm, supervisory and trouble signals, operation of notification appliance and auxiliary function outputs, circuit supervision and AC power loss.

- 2. Fire alarm panel batteries shall be inspected for corrosion or leakage and tested under full load with the primary power disconnected. The battery charging circuit shall be tested to ensure correct voltage output to the batteries.
- 3. The digital alarm communicator shall be operationally tested to ensure receipt of the correct signal to the central station within 90 seconds of going off-hook. The digital alarm communicator shall be tested to ensure line seizure, line failure detection, and the ability to transmit line failure within 4 minutes of detecting the line fault.

- 4. Alternate communication methods and devices shall be tested per the current revision of NFPA72 and the manufacturer's instructions

- 5. The alarm and supervisory initiating devices shall be functionally tested per NFPA 72 standards and manufacturer's instructions. Alarm and supervisory initiating devices include but are not limited to system spot type smoke detectors, heat detectors, duct detectors, projected beam smoke detectors, manual pull stations, waterflow switches, high/low pressure switches, valve tamper switches and room temperature switches.

- 6. System spot type smoke detectors shall be tested in place to ensure smoke entry into the sensing chamber and an alarm response.

- 7. Restorable heat detectors shall be tested with a heat source. Non-restorable heat detectors shall be tested electrically and mechanically.

- 8. Duct detectors shall be tested to ensure that the device will sample the airstream.

- 9. Projected beam smoke detectors shall be tested per the manufacturer's recommendations.

- 10. Manual pull stations shall be operated.

- 11. Waterflow switches shall be tested by flowing water through the inspectors test valve. Initiation of the waterflow alarm signal shall occur within 90 seconds of opening the inspectors test valve.

- 12. High/low pressure switches shall be operated and verified that receipt of the signal occurs when the required pressure is increased or decreased a maximum of 10 psi.

- 13. Valve tamper switches shall be operated and verified that receipt of signal occurs within the first two revolutions of the hand wheel.

- 14. Room temperature switches shall be operated and verified that receipt if signal occurs when the room temperature decreases to 40°F.

- 15. The alarm notification appliances shall be functionally tested. Alarm notification appliances shall include but are not limited to bells, horns, horn/strobes, and strobes.

- 16. Audible notification appliances shall be tested to ensure proper sound pressure and verified that the sound is distinguishable from other audible devices.

- 17. Visual notification appliances shall be tested to ensure that the light flashes and has the proper intensity.

Semi-Annual Visual Inspections:

- 1. The fire alarm control panel and annunciators shall be visually inspected to ensure they are secure and accessible.

- 2. Fire alarm initiating devices and notification appliances shall be visually inspected to ensure there are no changes that affect equipment performance

What's required to be red?

- Per NFPA 72, the fire alarm disconnecting means (circuit breaker) must be red. Per the IBC, manual pull stations must be red