


Fundamentals of Fire Alarm Systems

Sponsored by 

SFPE Austin/San Antonio Chapter
San Marcos, Texas
7 January 2015



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Agenda

- Introduction and Administration
- Historical Context of Today's NFPA 72®
- Fire Alarm System Fundamentals
 - Power Supplies, Signals, and Circuits
- Initiating Devices
 - Automatic Detection, Waterflow Switches, and Manual Fire Alarm Boxes
- Notification Appliances
 - Audible and Visible

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Agenda (continued)

- Types of Fire Alarm Systems
 - Household, Protected Premises, and Supervising Station
- Inspection, Testing and Maintenance of Fire Alarm Systems
- Relationship of NFPA 72® with IBC/IFC
- UL's Role in Fire Alarm System listing and certification

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Important Stuff

- Fire Exits
- Restrooms
- Breaks and Lunch
- Cell Phones
- Seminar Duration



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About the Presenter

- Art Black
 - Carmel Fire Protection Associates
 - Carmel-by-the-Sea, California
- Fire Service since 1975
- Fire Marshal since 1987
- Principal Member of NFPA 72® since 1990



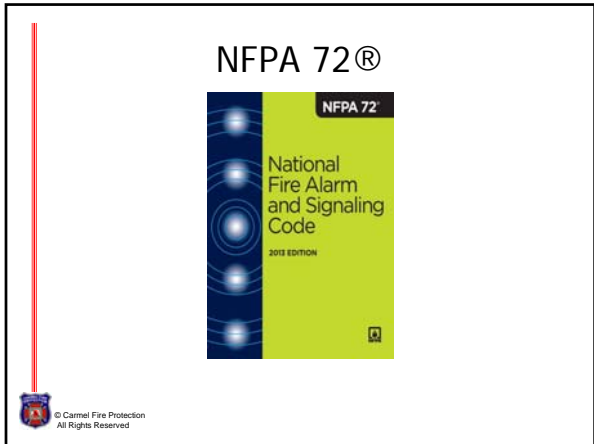
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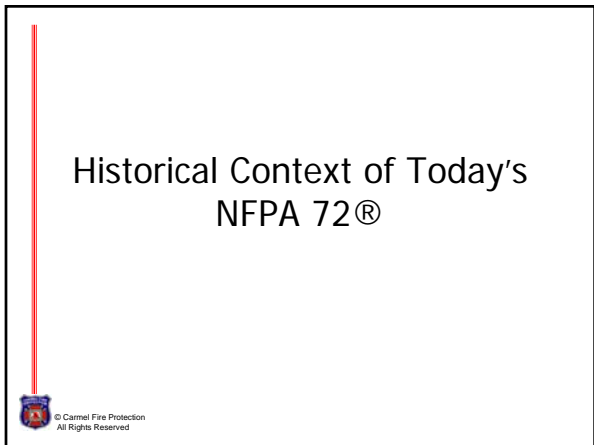
About the Presenter

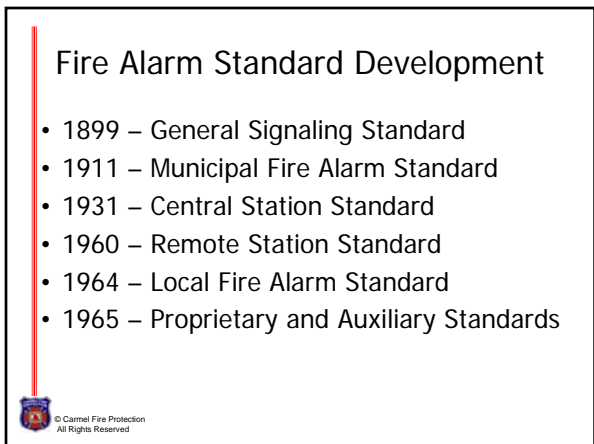
- Tom Presnak
 - Underwriters Laboratories LLC
 - Northbrook, Illinois
- UL Fire Alarm Auditor since 1988
- Fire Service Liaison since 2004
- Principal Member of NFPA 72® since 2012



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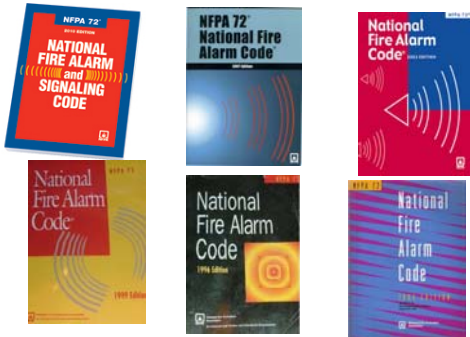


Fire Alarm Standard Development

- 1967 – Household Standard
- 1983 – Voice Evacuation Standard
- 1985 – Guide to Testing and Inspection
- 1985 – Guide to “Indicating” Appliances
- 1988 – Reconsolidation Efforts Begin
- 1993 – First Edition of “National Fire Alarm Code”



NFPA 72®



Fire Alarm System Fundamentals



Reasons for Installation

- Life Safety
- Property Protection
- Mission Continuity
- Cultural Preservation
- Environmental Protection



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Reasons for Installation

- Life Safety
- Property Protection
- Mission Continuity
- Cultural Preservation
- Environmental Protection
- *BUT THE REAL REASON IS....*
- *"Because the Fire Marshal made me!"*




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Basic Requirements

- NFPA 72 applies to all systems
 - Installed pursuant to code requirements
 - Installed pursuant to insurance requirements
 - Installed voluntarily
- All equipment used on a fire alarm system must be listed for the application.



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Qualifications

- Fire alarm systems must be designed by qualified individuals.
- Fire alarm system installation must be supervised by qualified individuals.
- What is "qualified"?



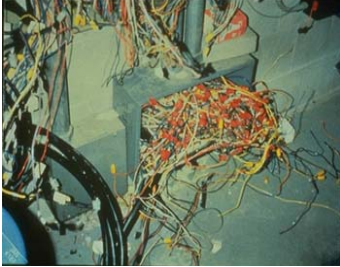
Qualified Installer?



Quality Installation?

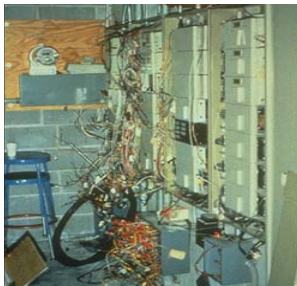


Qualified Installer?



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Qualified Installer?



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Be Careful What You Ask For...



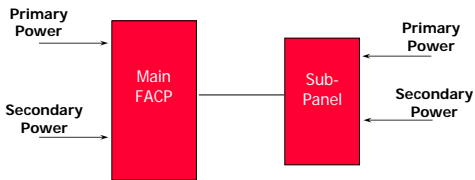
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Power Supplies

- Fire Alarm Systems require two sources of power
 - Primary Power
 - Secondary Power



Power Supplies



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Primary Power

- Source can be either Light and Power Service or an Engine Driven Generator.
- Primary Power must be provided by a dedicated branch circuit.
- Circuit breaker location must be identified at the fire alarm control panel.



Circuit Breaker

- Must have a red marking.
- Must have a circuit breaker lock.
- Must be marked appropriately
 - FIRE ALARM
 - MNS
 - FIRE/MNS



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Secondary Power

- Secondary Power source must be either batteries or automatic-start engine-driven generator.
 - Model Fire Codes may not permit storage of enough fuel on site for engine-driven generators to be used. Be careful.

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Secondary Power

- Secondary Power must have the capacity to run the fire alarm system for at least 24 hours plus 5 minutes of full alarm afterwards.
 - Prior editions: 24 hours for some systems, 60 hours for other systems.
- Emergency voice alarm communications systems need the capacity to run the system for at least 25 hours plus 15 minutes of calculated full load.

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System Functions

- Alarm Signals
- Supervisory Signals
- Trouble Signals



Alarm Signals

- Indicate "EMERGENCY"
 - Automatic Detector, Manual Fire Alarm Box, Waterflow Switch, or Suppression System
- Distinctive annunciation is required
- Signals can be silenced or reset only by authorized personnel
- Zones to be descriptively annunciated



Annunciation



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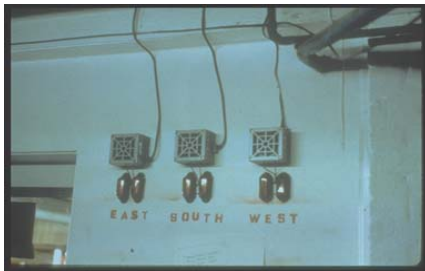
Annunciation



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Annunciation



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Supervisory Signals

- Indicates an off normal condition on a system monitored by the fire alarm system
- Distinctive annunciation
 - Different sound
 - Different light
- Silencing and resetting limited to authorized personnel

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Trouble Signals

- Indicates problem with the fire alarm system
- Distinctive annunciation
 - Different sound
 - Different light
- Silencing and resetting limited to authorized personnel
- System will resound every 24 hours



System Documentation

- NFPA 72®-2013 Chapter 7
 - Basic Requirements
 - Minimum Documentation
 - Specific Documentation Requirements
 - ITM Documentation
 - Document Retention



Document Security and Retention

- With every new system, a documentation cabinet shall be installed at the system control unit or at another approved location at the protected premises
- All record documentation shall be stored in the documentation cabinet
- Where this documentation cabinet is not in the same location as the system control unit, its location shall be identified at the system control unit



Documentation Cabinet

- The documentation cabinet shall be prominently labeled SYSTEM RECORD DOCUMENTS.
- The contents of the cabinet shall be accessible by authorized personnel only.



Documentation Cabinet



Initiating Devices



Alarm Initiating Devices

- Automatic Detectors
 - Heat Detectors
 - Smoke Detectors
 - Flame Detectors
- Manual Fire Alarm Boxes
- Waterflow Switches



Supervisory Initiating Devices

- Supervisory Initiating Devices report “off-normal” conditions on other systems monitored by the fire alarm system.
 - Valve supervisory switches → sprinkler systems
 - Duct detectors → HVAC systems
 - Fire pump supervisory → fire pumps
 - Water level switches → water supply systems

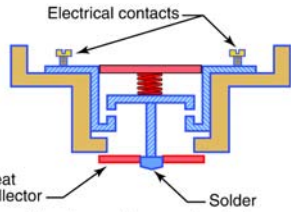


Heat Detectors

- Spot Detectors
 - Fixed Temperature
 - Rate of Rise
 - Rate Compensation
- Line Detectors
 - Melting/Shorting
 - Electrical conductivity



Fixed Temperature Heat Detector

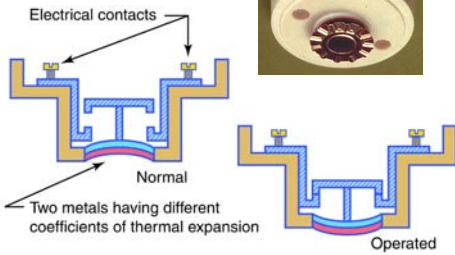


When solder melts, plunger drops and contacts are shorted.

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Fixed Temperature Heat Detector



Two metals having different coefficients of thermal expansion

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Line-type Heat Detector



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Line-type Heat Detector



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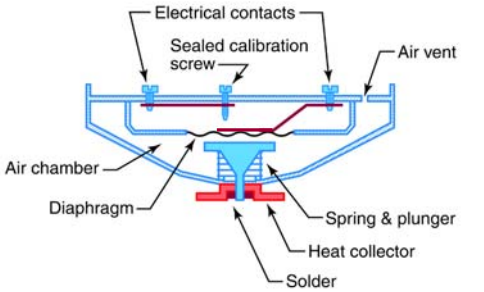
Rate-of-Rise/Fixed Temperature Heat Detector



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Rate-of-Rise/Fixed Temperature Heat Detector



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Rate Compensation Heat Detector

The diagram illustrates the internal structure of a Rate Compensation Heat Detector. It features an outer case that houses an inner assembly. This assembly includes two yellow inner struts that support a central sensing element. Electrical contacts are positioned on either side of the sensing element, and circuit wires are connected to these contacts. A small inset image shows the physical detector with its wires.

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Electronic Heat Detector

The diagram shows the internal components of an Electronic Heat Detector. A trapezoidal detector housing contains a PC board with a processor and a thermister. The housing also features screw terminals for electrical connections. A small inset image shows the external appearance of the detector.

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Heat Detector Listing

The diagram illustrates the listing of heat detectors around a central fire source, represented by a red square. Detectors are marked with 'H' (Heat Detector) and 'AS' (Aspirating Smoke Detector). Distances are indicated by arrows:

- 40 ft. between two 'H' detectors at the top.
- 30 ft. between two 'H' detectors below the 40 ft. distance.
- 20 ft. between two 'H' detectors below the 30 ft. distance.
- 10 ft. between two 'AS' detectors at the bottom.

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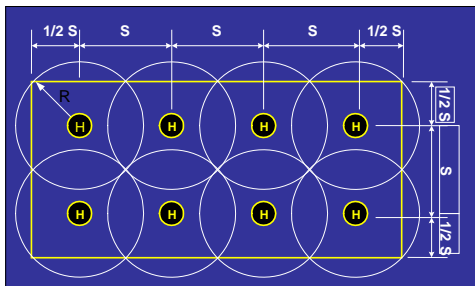
Dead Air Space

- Do not install detectors within 4" of wall if ceiling mounted
- Do not install detectors within 4" of ceiling if wall mounted
- Applies only to **HEAT** detectors; smoke detectors have no restrictions



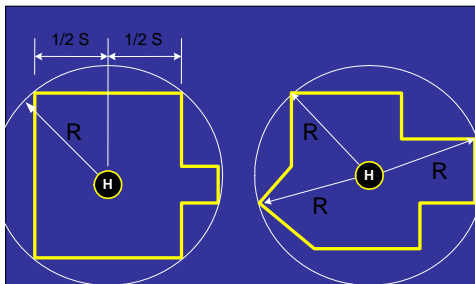
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Detector Coverage



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Location of Heat Detectors




Radius of coverage = $R = 0.7 \times S$

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Smoke Detectors


- Spot Detectors
 - Ionization Chamber
 - Photoelectric - light scattering
- Line Detectors
 - Photoelectric - light obscuration



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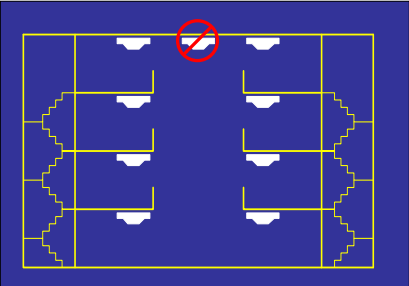
Listed Spacing

- Generally no "listed" spacing
- Use 30' unless otherwise noted by manufacturer.



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Stratification



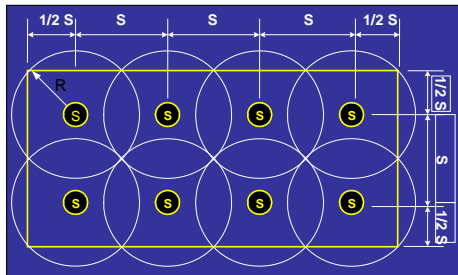
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Stratification



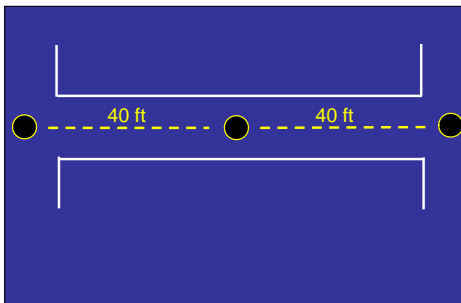
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Detector Coverage



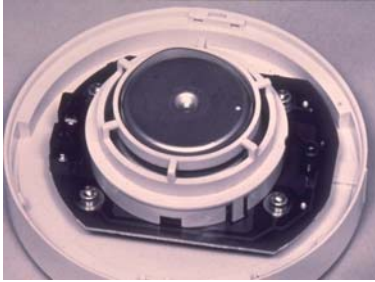
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Detector Coverage



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Ionization Chamber Detector



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Photoelectric Light-Scattering Smoke Detector



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Beam Smoke Detector



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Manual Fire Alarm Boxes

- Accessible
- At least one per system
- Where manual system is required, spacing requirements apply



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Installation of System

- Workmanlike Installation
- Monitoring for Integrity
- T-Taps
- Protection of Smoke Detectors during Construction

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Workmanlike Installation



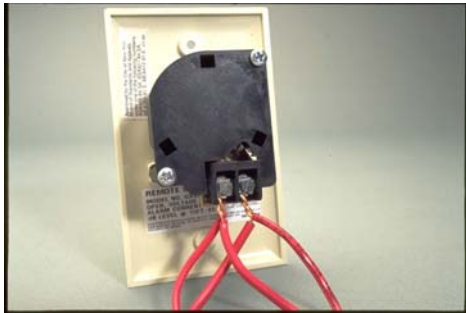
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Workmanlike Installation



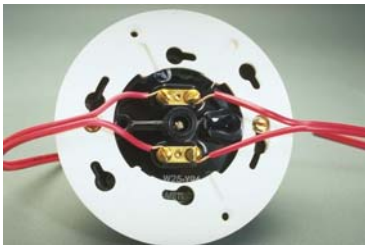
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Workmanlike Installation



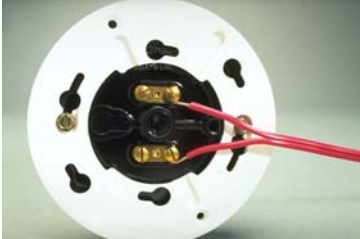
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Monitoring for Integrity



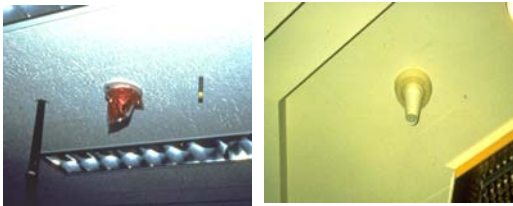
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T-Taps



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Protection of Detectors During Construction



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Smoke Detectors: Installation During Construction

- 17.7.1.11 Protection During Construction
- .1 Where detectors are installed for signal initiation during construction, they shall be recalibrated or replaced prior to final acceptance test
- .2 Where detectors are installed but not operational, they shall be protected.
- .3 Where detection is not required during construction, detectors shall not be installed.

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Notification Appliances



Notification Appliances

- Notification appliances provide occupant notification of a fire alarm actuation or other emergency situation.
- Uses multiple senses
 - Vision (strobes, flashing lights, etc)
 - Hearing (horns, chimes, sirens, etc)
 - Touch (tactile notification appliances)



Notification Appliances



Notification Appliances

- Audible
 - Temporal III Pattern
 - Synchronization required
- Visible
 - UL 1971 Appliances
 - Synchronization required with more than two strobes or strobe patterns



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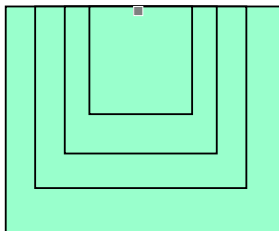
Audible Appliances

- Public Mode Requirements
- Private Mode Requirements
- Sleeping Room Requirements

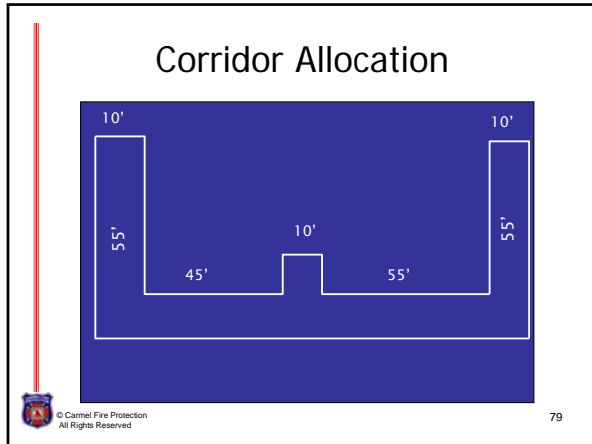


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Visible Appliance Allocation




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Chapter 24 ECS

- 24.3.8 Mass Notification Layers
- 24.3.11 Risk Analysis for MNS



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Chapter 24



- 24.3.8 Mass Notification Layers
 - Layer 1 – means of notification of occupants by systems installed inside a building
 - Layer 2 – means of notification of occupants on the exterior of a building
 - Layer 3 – means of notification of personnel through distributed recipient MNS
 - Layer 4 – means of notification of personnel by public measures (public broadcast radio, TV, etc)

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Chapter 24



- 24.3.11 Risk Analysis for MNS
 - Specifies risk analysis design requirements for mass notification systems.



Types of Fire Alarm Systems



Types of Fire Alarm Systems

- Household Fire Warning Systems
- Protected Premises Systems
- Public Fire Reporting Systems
 - Auxiliary Fire Alarm Systems
- Supervising Station Systems
 - Remote Station
 - Proprietary Station
 - Central Station Service



Household System

- Provides monitoring of smoke and heat detectors and (sometimes) waterflow. Also can provide burglar/intrusion alarm services.



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Local System - Protected Premises

- Provides Local Evacuation Only-no off premise monitoring



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Auxiliary Systems- Public Emergency Alarm Reporting Systems (NFPA 72 2010 Chapter 27)

- Street box systems- for the most part of the country no longer used. Does not monitor supervisory or trouble signals



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Supervising Station Systems

NFPA 72 2010

23.14.1 Systems requiring transmission of signals to continuously attended locations providing supervising station service shall also comply with the applicable requirements of Chapter 26.

26.1.1 Where a protected premise fire alarm system has its signals sent to a supervising station, the entire system shall become a supervising station alarm system.

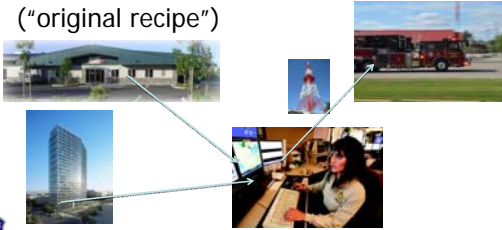


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Remote Station Fire Alarms NFPA 72 26.5

- Alarm operates, signal transmits directly to 911 center, who then dispatches FD ("original recipe")

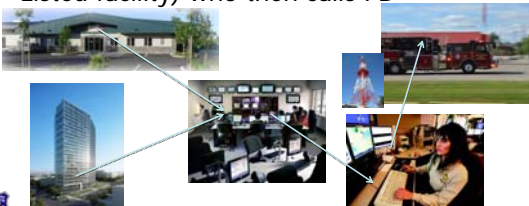


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Remote Station Fire Alarms NFPA 72 26.5

- Alarm operates, signal transmits to a location approved by AHJ (typically UL Listed facility) who then calls FD



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Remote Station Requirements- NFPA 72 2010

- 26.5.3.1.1 Alarm, supervisory, and trouble signals shall be permitted to be received at a communications center which complies with NFPA 1221.
- 26.5.3.1.2 Alarm, supervisory, and trouble signals shall be permitted to be received at the fire station or governmental agency.....
- 26.5.3.1.3 Where permitted by the AHJ alarm, supervisory, and trouble signals shall be permitted to be received at an alternate location approved by the AHJ



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Remote Station Requirements- NFPA 72 2010

- 26.5.4.5.1 The remote supervising station shall have not less than two qualified operators on duty at all times to ensure disposition of signals with the requirements of 26.5.5
- 26.5.4.4 retransmission of alarm signals (Covers 4 types)
(dedicated circuit, one way phone from RSS, private radio, other as approved by AHJ)
- 26.5.5.1 If the remote supervising station is at a location other than the communications center, alarm signals shall be immediately retransmitted to the communications center.



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26.5.5.2 Upon receipt of an alarm, supervisory or trouble

Remote Station Requirements- NFPA 72 2010

- 26.5.5.1 If the remote supervising station is at a location other than the communications center, alarm signals shall be immediately retransmitted to the communications center.
- 26.5.5.2 Upon receipt of an alarm, supervisory or trouble signal by the remote supervising station other than the communications center, the operator on duty shall be responsible for notifying the owner, or the owner's designated representative immediately.
- 26.5.5.3 All operator controls at the remote supervising station shall be operated at the beginning of each shift or change in personnel, and the status of all alarm, supervisory, and trouble signals shall be noted and recorded.



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NFPA 72 –2010 New Requirement

- **26.5.2 Indication of Remote Station Service.** Owners utilizing remote station fire alarm systems shall provide annual documentation to the Authority Having Jurisdiction identifying the party responsible for the inspection, testing, and maintenance requirements of Chapter 10.



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Indication of Remote Station Service

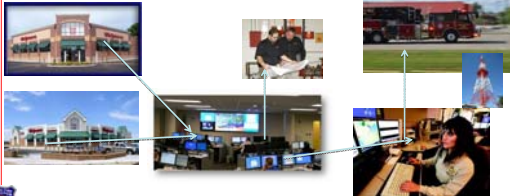
- This documentation shall take one of the following forms:
- (1)* An affidavit attesting to the responsibilities and qualifications of the parties performing the inspection, testing, and maintenance and accepting responsibility of compliance with Chapter 10. This document shall be signed by a representative of the service provider.
- (2) Documentation indicating code compliance of the remote station fire alarm system issued by the organization that listed the service provider.
- (3) Other documentation acceptable to the Authority Having Jurisdiction.
- *A.26.5.2 (1) Chapter 14 permits the building owner or his designated representative to perform these services if they are qualified. In this situation, the documentation could be a declaration of qualification signed by the building owner. Multiple service providers are permitted.*



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Proprietary Fire Alarms NFPA 72 2010 26.4

- Fire alarm operates, signal transmits to monitoring location operated by the company who owns the property, who then dispatches FD; and also representative of property



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Signal processing- Proprietary Supervising Stations

- Alarm Signals- 90sec to dispatch FD, runner dispatch and arrival within 2 hrs where system cannot be reset by someone on site.
- Supervisory Signals- 4 minutes to call the premise, runner arrival within 2 hrs when system cannot be reset by someone on site.
- Trouble Signals- 4 minutes to call premise, initiate service within 4 hrs.
- Notify AHJ where system or any part of system will be out of service greater than 8 hours.
- *Note: The runner or service person in this case may be a qualified representative of the property owner.*

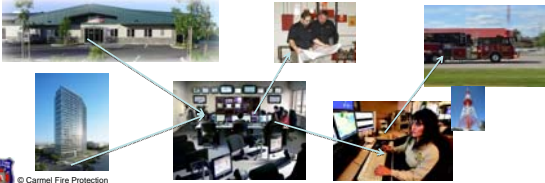


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Central Station Service Fire Alarms NFPA 72 2010 26.3

- Alarm operates, signals transmit to commercial monitoring company, who then dispatches FD, commercial monitoring company may be required to send a runner to investigate/repair system.
- *Indication of Compliance Required by Code posted at property*



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Elements of Central Station Service

- **NFPA 72 2010 26.3.2 Service scope**
- Installation of transmitters
- Alarm, guard, supervisory, trouble signal monitoring
- Retransmission
- Record Keeping and reporting
- Testing & Maintenance
- Runner Service.



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NFPA Central Station Service Requirements

• NFPA 72 2010 26.3.3 Contract Requirements

1. Listed Central Station providing all elements of Central Station Service
2. Listed Central Station providing as minimum, monitoring, record keeping and retransmission with own facilities and personnel , shall be permitted to subcontract installation, testing, maintenance, and runner service.
3. A listed local service company provides installation, testing, maintenance, and runner service with own facilities and personnel and contracts monitoring, record keeping and retransmission to listed central station.
4. A listed central that provides installation, testing, maintenance and runner service with own personnel may contract monitoring, record keeping and reporting to another listed central station.



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Central Station Service Signal Disposition

•NFPA 72 2010 26.3.7

- Alarm Signals- 90sec to dispatch FD, runner dispatch and arrival within 2 hrs where system cannot be reset by someone on site.
- Supervisory Signals- 4 minutes to call the premise, runner arrival within 2 hrs when system cannot be reset by someone on site.
- Trouble Signals- 4 minutes to call premise, initiate service within 4 hrs.
- Notify AHJ where system or any part of system will be out of service greater than 8 hours.



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AHJ Notification of Impairments

•Central Station Service

- NFPA 72 2010 26.3.7.3 Supervisory Signals. (3) Notify the AHJ when sprinkler systems or other fire suppression systems or equipment have been wholly or partially out of service for 8 hours.
- NFPA 72 2010 26.3.7.4 Trouble Signals. (3) When the interruption is more than 8 hours, provide notice to the AHJ as to the nature of the interruption, time of occurrence, and its restoration to normal.
- ***NFPA 72, 2013 - 10.21.4 *The service provider shall report to the AHJ any Fire Alarm system that is out of service for more than 8 hours. (This change is for all systems)*



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NFPA72-2010 Central Station Service Requirements

- 26.3.4 **Indication of Central Station Service.**
- 26.3.4.3 Document must be posted within 1 meter (3ft) of the FACP. With copies provided to the AHJ
- 26.3.4.4 A Central Repository of the issued documents accessible to the AHJ shall be maintained by the listing organization
- 26.3.4.5 Alarm system service that does not comply with all of the requirements of Section 26.3 shall not be designated as central station service
- 26.3.4.7 The AHJ must be notified of expiration and cancellation of the document



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Communications Methods

- Ways to get signals from protected premises to the monitoring entity (2007)
 - Multiplex
 - Digital Alarm Communications
 - Radio (3 methods)
 - Directly connected non-coded
 - McCulloh
 - Other transmission technologies



Communications Methods

- Ways to get signals from protected premises to the monitoring entity (2010-2013)
 -
 - Digital Alarm Communications
 - Radio (2 methods)
 -
 - Performance Based Technology



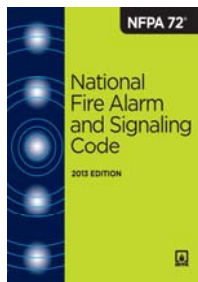
Digital Alarm Communications

- Uses regular "POTS" telephone lines
- Telephone lines need to be connected to fire alarm panel ahead of any customer owned equipment
- Dedicated telephone lines are NOT required
- DACT has 90 seconds to complete transmission



The Future of DACTs?

- The second line on a DACT must be a different technology (i.e., radio, IP)
- If there are two telephone lines on a DACT, timer tests must be every six hours.



Inspection, Testing and Maintenance of Fire Alarm Systems



Inspection, Testing and Maintenance

- Required for all systems
 - Existing
 - Installed under current code



Inspection, Testing and Maintenance

- Responsibility of owner to assure that code compliant inspection, testing and maintenance is performed.
 - Own personnel
 - Outside contract
- Either method must be documented in writing
- Technicians must be qualified



Inspection, Testing and Maintenance

- Personnel qualifications
 - Factory Trained and Certified
 - NICET Certified
 - IMSA Certified
 - Locally Licensed
 - Employed and Certified by Listed Company
 - Other?



Inspection, Testing and Maintenance

- Requirement to notify everyone prior to any testing
 - Occupants
 - Responders
- Requirement to notify same people after testing
- Recommended contingency plan



Inspection, Testing and Maintenance

- Simulate release of suppression agents!




Inspection, Testing and Maintenance

- Acceptance Testing
 - 100%
- Re-Acceptance Testing
 - Required after any system modification
 - All modified components tested 100%
 - All non-modified components spot-check 10% up to 50 devices
 - Record of Completion to be updated



Inspection, Testing and Maintenance



- Inspection
 - Visual Inspection
- Testing
 - Functional Testing



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Inspection, Testing and Maintenance


- Testing Smoke Detectors



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Inspection, Testing and Maintenance

- Testing Heat Detectors



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Inspection, Testing and Maintenance

- Testing Beam Detectors?



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Inspection, Testing and Maintenance

- Testing Manual Fire Alarm Boxes



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Inspection, Testing and Maintenance

- Testing Waterflow Switches



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Testing, Inspection and Maintenance

- Maintenance
 - As required by the manufacturer
 - More frequent maintenance if required by ambient conditions



Inspection, Testing and Maintenance

- Maintenance Instructions



Inspection, Testing and Maintenance

- Documentation
 - Records must be permanent
 - Records need to be kept until next test and one year thereafter
 - Any impairments need to be reported in writing to the owner



Relationship of NFPA 72® to Model Codes (IBC/IFC)



Chapter Overview

- 901 General
- 902 Definitions
- 903 Automatic Fire Sprinklers
- 904 Alternative Automatic Fire Extinguishing Systems



Chapter Overview



- 905 Standpipes
- 906 Portable Fire Extinguishers
- 907 Fire Alarm & Detection Systems
- 908 Emergency Alarm Systems
- 909 Smoke Control Systems



Chapter Overview

- 910 Smoke and Heat Vents
- 911 Explosion Control
- 912 Fire Department Connections
- 913 Fire Pumps
- 914 Fire Protection Based on Special Detailed Requirements of Use and Occupancy



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907 – Fire Alarm and Detection Systems

- 907.1 General
 - 907.1.1 Construction Documents
 - 907.1.2 Fire Alarm Shop Drawings
 - 907.1.3 Equipment
- 907.2 Where required – new buildings and structures
- 907.3 Where required in existing buildings and structures

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907.2 Where required

- 907.2.1 Group A
- 907.2.2 Group B
- 907.2.3 Group E
- 907.2.4 Group F
- 907.2.5 Group H
- 907.2.6 Group I
- 907.2.7 Group M
- 907.2.8 Group R-1
- 907.2.9 Group R-2
- 907.2.10 Group R-4

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907.2 Where required

- 907.2.11 Single- and Multiple-Station Smoke Alarms
- 907.2.12 Special Amusement Buildings
- 907.2.13 High-rise buildings
- 907.2.14 Atriums
- 907.2.15 High-piled combustible storage
- 907.2.16 Aerosol storage
- 907.2.17 Lumber, wood structural panel and veneer mills



907.2 Where required

- 907.2.18 Underground buildings with smoke control systems
- 907.2.19 Deep underground buildings
- 907.2.20 Covered mall buildings
- 907.2.21 Residential aircraft hangars
- 907.2.22 Airport traffic control towers
- 907.2.23 Battery rooms



907 – Fire Alarm and Detection Systems

- 907.4 Fire Safety Functions
 - 907.4.1 Duct smoke detectors
 - 907.4.2 Delayed egress locks
 - 907.4.3 Elevator emergency operation
 - 907.4.4 Wiring



907 – Fire Alarm and Detection Systems

- 907.5 Initiating Devices
 - 907.5.1 Protection of fire alarm control unit
 - Exceptions
 - » Ambient Conditions
 - » Where a fire sprinkler system is installed



907 – Fire Alarm and Detection Systems

- 907.5 Initiating Devices (continued)
 - 907.5.2 Manual fire alarm boxes
 - 907.5.2.1 Location
 - 907.5.2.2 Height
 - 907.5.2.3 Color
 - 907.5.2.4 Signs
 - 907.5.2.5 Protective covers



Manual Fire Alarm Box Locations

- Every required exit
- Every floor level
- Travel distance not to exceed 200 feet
- Manual Fire Alarm Box to be within 5 feet of door



Locations

Travel Distance
200 feet or less

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Height

- Manual fire alarm boxes are to be installed so the operable part is 48" above finished floor.

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Manual Fire Alarm Boxes

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Colors

- Manual fire alarm boxes shall be RED
- Mount on a contrasting color
- Other boxes must be a different color and labeled



Signs



Protective Covers



907 – Fire Alarm and Detection Systems

- 907.5 Initiating Devices (continued)
 - 907.5.3 Automatic smoke detection
 - 907.5.3.1 Automatic sprinkler system permitted in lieu of automatic heat detectors unless otherwise noted.



907 – Fire Alarm and Detection Systems

- 907.6 Occupant notification systems
 - 907.6.1 Presignal features
 - 907.6.2 Alarm notification appliances
 - 907.6.2.1 Audible alarms
 - 907.6.2.2 Emergency voice/alarm communications systems
 - 907.6.2.3 Visible alarms



Occupant Notification



907.6.2.3
Visible Alarms



907.6.2.1
Audible Alarms



907.6.2.2 Emergency Voice/Alarm
Communications Systems



907 – Fire Alarm and Detection Systems

- 907.7 Installation
 - 907.7.1 Wiring
 - 907.7.2 Power supply
 - 907.7.3 Zones
 - 907.7.4 Access
 - 907.7.5 Monitoring
 - 907.7.5.1 Automatic telephone dialing devices



907 – Fire Alarm and Detection Systems

- 907.8 Acceptance tests and completion.
 - 907.8.1 Single and multiple station alarm devices
 - 907.8.2 Record of completion
 - 907.8.3 Instructions



907 – Fire Alarm and Detection Systems

- 907.9 Inspection, testing and maintenance
 - 907.9.1 Maintenance required
 - 907.9.2 Testing
 - 907.9.3 Smoke detector sensitivity
 - 907.9.4 Method
 - 907.9.5 Maintenance, inspection and testing



UL's Role in Fire Alarm System Listing and Certification



Underwriters Laboratories- UL LLC

- **98,000 product evaluations**
- **600,000 inspection visits**
- **120 UL Inspection Centers**
- **Worldwide offices**
- **100 + countries with UL customers**
- **10,000 + employees**



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What is UL's Alarm Certificate Services?

- An assessment and auditing program designed to provide confidence that alarm systems meet nationally recognized codes and standards.
 - Installation
 - Maintenance
 - Inspection/testing
 - Monitoring
 - Runner Service – where required



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How UL Certification of Alarm Systems works

- Initial Assessment
 - Property-specific
 - Compliance
 - Signal monitoring
 - Retransmission
 - Runner service
 - Record keeping
 - Summary of findings and Corrective Action Plan
- Follow-up Audits
 - Selected sampling
 - Conducted annually
 - Processes and procedures
 - Summary of findings and Corrective Action Plan
- In order to be eligible to issue a Certificate, an alarm contractor must utilize only UL listed alarm equipment that is installed and maintained per applicable codes and standards



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How UL Certification of Alarm Systems works

- In order to be eligible to issue a Certificate, an alarm contractor must utilize only UL listed alarm equipment that is installed and maintained per applicable codes and standards



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What does NFPA 72 say about certification ?

- NFPA 72 2010 Sect 26.3.4.2 The document shall include at minimum:
- 1. Name of Prime contractor
- 2. Full description of Fire Alarm System as installed
- 3. Issue and expiration dates of the documentation
- 4. Name, address and contact information for organization issuing the documentation
- 5. Identification of AHJ



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Certificate or Certificate of Compliance ?



Why a UL Certificate ?

- Confirmation of Ongoing Code Compliance
- Provide Accountability
- Required by code for Central Station Service
- Code Optional for Remote Station systems
- Code based repair criteria
- Risk reduction
- Ease of recognition of Listed products
- UL Staff Technical knowledge/support

UL Fire Alarm Contractor Listing Categories

- UUJS- Local, Auxiliary, Remote Station and Proprietary systems.
 - UUFX- Central Station Service-
 - Full Service
 - Monitoring Only (cannot issue certificates)
 - Local Service Company
 - UUKA- Proprietary Fire Monitoring
- UL Lists alarm service companies, properly listed companies issue certificates declaring compliance with NFPA 72*

UL Audit Focus

•The annual audit confirms that an Alarm Service Company (ASC) has processes & controls in place that assure Code compliance for properties covered by an active UL Certificate.

•UL's preferred method of operation – Allow ASC to demonstrate compliance

UL staff visit each Listed company every year to audit their ability to provide ongoing compliance.

•Using the applicable edition of NFPA 72 (declared on the certificate) UL staff will audit the ASC in three areas:

- System Documentation
- Signal Processing
- Field review of selected systems



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Field Audit of System

• Installed systems audited to:

- Declarations on the certificate
- Applicable NFPA 72 requirements
- Any local AHJ requirements

• System placed on test with the supervising station:

• UL will ask ASC rep to selectively test devices such as:

- Control panel function
- Communicator operation
- Secondary power capacity and operation
- Operation of waterflow switch
- Automatic detection devices
- Pull stations
- Supervisory devices
- Notification appliances

- The system record drawings will be reviewed for accuracy as the audit is conducted.



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Signal Processing – Central Station Service

- Alarm Signals- 90sec to dispatch FD, runner dispatch and arrival within 2 hrs where system cannot be reset by someone on site.
- Supervisory Signals- 4 minutes to call the premise, runner arrival within 2 hrs when system cannot be reset by someone on site.
- Trouble Signals- 4 minutes to call premise, initiate service within 4 hrs.
- Notify AHJ where system or any part of system will be out of service greater than 8 hours.

• ***Note: Local AHJ's may find need to modify these requirements*

- *UL Staff may verify compliance with these requirements by frequently running fire service tests.*



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System Documentation

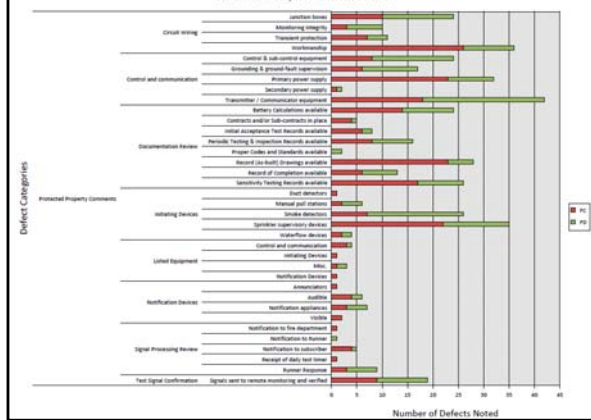
- Record Drawings
- Battery Calculations
- Initial Acceptance Tests
- Reacceptance Tests
- Record of Completion
- Periodic Test Records
- Sensitivity Testing
- Contracts
- Service Records
- Owners Manuals
- Codes and standards



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YTD 2013 Minneapolis Area Audit Defects



ULCVS Access


- Access to UL Fire Certificate database
- Various search features
- Look up Listed Alarm Service Providers
- Notification of issued and expired certificates




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Questions?



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