

WSAFM Fire Prevention Institute

Significant Changes to NFPA 72 – Impacting the Code Official, Designer and Contractor



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Who am I?

- Inspector/Plans Examiner
- Deputy State Fire Marshal (MN)
- NFPA 72 Technical Committee
- Instructor for International Code Council (ICC) and National Fire Academy
- Appointed by MN Gov. Mark Dayton to Board of Architecture & Engineering (2013)



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Fire & Life Safety Interests...

- Fire Alarm Systems



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Fire & Life Safety Interests...

- Fire Alarm Systems



- School Fire Safety

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Fire & Life Safety Interests...

- Fire Alarm Systems



- School Fire Safety



- Autism/Fire & Life Safety

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Introductions

- Please introduce yourself:
 - Department/City (if applicable)?
 - Years of experience in your industry?
 - Years of experience designing/inspecting/reviewing fire alarm systems?



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Miscellaneous Information

- Restrooms
- Breaks
- Roster
- Informal
- Participate
- Please ask questions



"You're not allowed to use the sprinkler system to keep your audience awake."

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ICC Preferred Provider

- This course has been approved by the International Code Council's Preferred Provider Program for 3.5 hours of continuing education.
- Please sign roster (if certified with ICC)



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Learning Objectives/Goals

- Gain a better understanding of fire alarm systems
- Scope and layout of NFPA 72, 2010 Edition
- What's coming in future editions
- That you learn something new



Why am I taking this course?

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Agenda

- Review the changes from the 2007 to the 2010 editions
- Cover new chapters
- Also, address the 2013, 2016 and 2019 editions



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Terminology

- The term "alarm" refers to a single station device:
 - Not part of a system,
 - Intended to alert the occupant,
 - Examples: smoke alarms, CO alarms,
- The term "detector" refers to a device connected to a fire alarm system.
 - A detector does not alert the occupant (horn/strobes do that)



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Editorial Remarks

- Asterisk (*) indicates annex material
- Vertical line indicates new/changed material
- Bullet indicates material removed
- [XXX-XXX] indicates committee responsible for definitions
- Brackets [] indicate material extracted from another NFPA document

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What Changed ???



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New Format: 2007 – 2016



2002/2007 editions had 11 chapters

2010/2013/2016 editions have 29 chapters

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NFPA 72 (2010/2013) – Format

- Chapters 1-2-3
 - Administration
 - Referenced Publications
 - Definitions
- Chapters 4-6
 - Reserved
- Chapter 7
 - Documentation
- Chapters 8-9
 - Reserved
- Chapter 10
 - Fundamentals



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NFPA 72 – Format

- Chapter 11
 - Reserved
- Chapter 12
 - Circuits and Pathways
- Chapter 13
 - Reserved
- Chapter 14
 - Inspection, Testing & Maintenance



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NFPA 72 – Format

- Chapters 15-16
 - Reserved
- Chapter 17
 - Initiating Devices
- Chapter 18
 - Notification Appliances
- Chapters 19-20
 - Reserved



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NFPA 72 – Format

- Chapter 21
 - Emergency Control Functions and Interfaces
- Chapter 22
 - Reserved
- Chapter 23
 - Protected Premises Fire Alarm Systems
- Chapter 24
 - Emergency Communication Systems - New



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NFPA 72 – Format

- Chapter 25
 - Reserved
- Chapter 26
 - Supervising Stations Fire Alarm Systems
- Chapter 27
 - Public Emergency Alarm Reporting Systems
- Chapter 28
 - Reserved



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NFPA 72 – Format

- Chapter 29
 - Single – Multiple Station Alarms and Household Fire Alarm Systems
- Annexes (Not enforceable language)
 - A – Explanatory Material
 - B – Engineering Guide for Automatic Fire Detector Spacing
 - C – System Performance and Design Guide
 - D – Speech Intelligibility

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NFPA 72 – Format

- Annexes (cont.)
 - E – NEMA SB30 – Fire Service Annunciator and Interface
 - F – Sample Ordinance
 - G – Guide for Testing of Circuits
 - H – Informational References



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Terminology Changes

- “FIRE” removed or changed to “EMERGENCY” in most cases
 - Example: “manual fire alarm box” is now “manual alarm box”.
- Where “FIRE” is integral to the meaning of the text, it was not changed
 - Example: “fire department”

FIRE

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Chapters 1-2-3

- Chapter 1
 - Administration
- Chapter 2
 - Referenced Publications
- Chapter 3
 - Definitions



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Chapters 1-2-3

- Chapter 1 (continued)
 - **1.6.5** *The values presented for measurements in this Code are expressed with a degree of precision appropriate for practical application and enforcement. It is not intended that the application or enforcement of these values be more precise than the precision expressed.*

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Chapters 1-2-3

• John's Interpretation

- Use some common sense when measuring.
- There is no exact science regarding many of the dimensions listed in the standard (examples to come).



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Important New Definitions

- Acoustically Distinguishable Spaces
 - Applicable to emergency communication systems
- Several new definitions for emergency communication systems and the different types (one-way, in-building, wide area, etc.)
- Dedicated Function Fire Alarm Control Unit

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New Definitions

- Managed Facilities-Based Voice Network
 - Added to allow the continued use of DACTs with certain conditions
- Risk Analysis



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Chapter 10 - Fundamentals

- Protection of Fire Alarm Systems
- Qualifications-Designer/Installer/Supervising station operators
- Primary/Secondary Power Supplies
- Annunciation and Annunciation Zoning
- Monitoring Integrity
- Documentation
- Impairments



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Chapter 10 - Qualifications

- 10.5 Personnel Qualifications
 - Revised and added requirements for personnel qualifications for:
 - System designers
 - System installers
 - Inspection/Testing/Maintenance Personnel
 - Supervising Station operators (added in 2010)
 - Inspectors/Plans Examiners – 2016 Edition

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Chapter 10 – Fundamentals

- Supervising Station Operators-Added in 2010
 - Operators in supervising station shall demonstrate competence in all tasks as required by chapter 26. Including...
 - Certified by the manufacturer of the receiving system or equipment or the alarm monitoring automation system.



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Chapter 10 – Fundamentals

- Supervising Station Operators (Cont.)
 - Operators in supervising station shall demonstrate competency in all tasks as required by chapter 26. Including...
 - Certified by an organization acceptable to the AHJ
 - Ex. Central Station Alarm Association
 - Licensed or certified by the state or local AHJ
 - Other training or certification approved by the AHJ

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Chapter 10 -Fundamentals

- Language for 2016 Edition of NFPA 72
- Establish a minimum standard for inspectors and plans examiners that inspect and review fire alarm/ECS systems



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AHJ/Plans Examiner Qualifications

- 2016 Edition
- Section 10.5.4.3-Code officials who perform plan review services shall meet one or more of the following:
 - (1) Personnel who are registered, licensed, or certified by a state or local authority
 - (2) Personnel who meet the requirements of NFPA 1031, *Standard for Professional Qualifications for Fire Inspector and Plan Examiner*
 - (3) Personnel who are assigned to perform plan reviews and inspections by the authority having jurisdiction

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Chapter 10 - Changes

- 10.6 Signal Priority – Changed in 2010 Ed.
 - Signals need to be prioritized as follows:
 1. Emergency Communication System
 2. Fire
 3. Supervisory
 4. Trouble
 - Note that ECS is not prioritized all the time, but based on a risk analysis
 - See definition of Risk Analysis in Chapter 3



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Chapter 10-Change

- 10.6 Signal Priority – 2013 Edition
 - Signals need to be prioritized as follows:
 1. Emergency Communication System
 2. Fire
 3. Pre-Alarm/Carbon Monoxide Alarm
 4. Supervisory
 5. Trouble

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Chapter 10 (13) – Fundamentals

- Pre-Alarm signal
 - Pre-Alarm Condition-“An abnormal condition that poses an immediate threat to life, property or mission”.
 - Ex: Heat detector sending a signal to the panel when ceiling temperature reaches 130°F
 - Intent is to give building owner/staff additional time to investigate possible issue before initiating devices reach alarm condition.

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Chapter 10 (13) – Fundamentals

- Pre-Alarm signal
 - Newer panels have pre-alarm capability
 - This is in addition to alarm, supervisory and trouble
 - This is different from alarm verification
 - Panel will notify owner by text/email of condition *about* to happen

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Chapter 10 – Fundamentals

- 10.14.3 Initiating Devices (manual and automatic) shall be selected and installed so as to minimize the possibility of nuisance alarms.
 - Pay close attention to where initiating devices are being placed on plans.



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Chapter 10 - Changes

- Protection of Control Equipment
 - In areas that are not continuously occupied, automatic smoke detection is required at all fire alarm control panels, NAC power panels and supervising station transmission equipment.
 - Exception for fully sprinklered buildings (2007 edition) has gone away

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Initiating Devices

- FAQ: Can a heat detector be used when ambient conditions prohibit a smoke detector?



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Initiating Devices

- FAQ: Can a heat detector be used when ambient conditions prohibit a smoke detector?
 - ANSWER: Yes; however, if ambient conditions are not suitable for a smoke detector, it often is not suitable for control equipment either.

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Chapter 12 – Circuits and Pathways

- Application
- General
- Pathway Class Designation
- Pathway Survivability
- Terminology

TERMINOLOGY

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Section 12.2 - General

- Chapter 12 is a NEW chapter in 2010
- Chapter 12 has no requirements
- Chapter 12 describes pathway classifications and pathway survivability levels
- Other chapters refer to Chapter 12 for reference.

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Chapter 17 – Initiating Devices



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Chapter 17 – Initiating Devices

- Covers the installation criteria for all sensors or devices that are used to provide recognition of a fire
- Chapter covers any device that provides an incoming signal to the fire alarm control panel
- Installation criteria for single & multiple station smoke alarms are found in chapter 29.

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Detector Coverage

- **Total Coverage**-When required by laws, codes, or standards, ...includes all rooms, hallways, storage areas, basements, attics, spaces above suspended ceilings
 - Rare to require total coverage
- **Partial/Selective**-Where laws, codes, or standards require selected areas be covered
- **Nonrequired**-Devices installed to achieve a specific fire safety objective but not mandated by laws, codes or standards

NFPA 72 (10) Section 17.5.3



Initiating Device Locations – 02/07 Edition

- **5.4.6** Initiating devices shall be installed in all areas, compartments, or locations where required by other NFPA codes and standards or as required by the authority having jurisdiction.



Initiating Device Locations – 10/13 Edition

- **17.4.6** Initiating devices shall be installed in all areas, compartments, or locations where required by other NFPA codes and standards or as required by other governing laws, codes, or standards.



Heat Detectors & High Ceilings

TABLE 17.6.3.5.1 Heat Detector Spacing Reduction Based on Ceiling Height

Ceiling Height Greater than (>)		Up to and Including		Multiply Listed Spacing by
ft	m	ft	m	
0	0	10	3.0	1.00
10	3.0	12	3.7	0.91
12	3.7	14	4.3	0.84
14	4.3	16	4.9	0.77
16	4.9	18	5.5	0.71
18	5.5	20	6.1	0.64
20	6.1	22	6.7	0.58
22	6.7	24	7.3	0.52
24	7.3	26	7.9	0.46
26	7.9	28	8.5	0.40
28	8.5	30	9.1	0.34

Exception: Table 17.6.3.5.1 shall not apply to the following detectors, which rely on the integration effect:
 (1) Line-type electrical conductivity detectors (see 3.3.66.11)
 (2) Pneumatic rate-of-rise tubing heat detectors (see 3.3.66.15)
 In these cases, the manufacturer's published instructions shall be followed for appropriate alarm point and spacing.



Chapter 17 – Initiating Devices

- Section 17.7.1.8-Unless specifically approved and listed for specific environmental conditions, smoke detectors shall not be installed in the following locations:
 - Where temperature is below 32°F
 - Where temperature is above 100°F
 - Where relative humidity is above 93%
 - Air velocity > 300 ft./min.




Environmental Factors on Smoke Detectors

- Factors to consider that may affect smoke detector response:
 - Moisture
 - Combustion Products and Fumes
 - Atmospheric Contaminants
 - Engine Exhaust
 - Heating Elements and Abnormal Conditions



Environmental Factors on Smoke Detectors


- Factors to consider that may affect smoke detector response:
 - Moisture
 - Live steam
 - Steam tables
 - Showers
 - Humidifiers
 - Slop sink
 - Humid outside air
 - Water spray



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Environmental Factors on Smoke Detectors


- Factors to consider that may affect smoke detector response:
 - Combustion Products and Fumes
 - Chemical fumes
 - Cleaning fluids
 - Cooking equipment
 - Cutting/welding
 - Fireplaces
 - Ovens



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Environmental Factors on Smoke Detectors


- Factors to consider that may affect smoke detector response:
 - Engine Exhaust
 - Diesel engines
 - Gas engines
 - Gasoline forklifts



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Environmental Factors on Smoke Detectors


- Factors to consider that may affect smoke detector response:
 - Heating Elements with Abnormal Conditions
 - Dust accumulation
 - Improper exhaust
 - Incomplete Combustion



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Environmental Factors on Smoke Detectors


- Factors to consider that may affect smoke detector response:
 - Electrical Noise and Mechanical Influences
 - Vibration
 - Radiation
 - Intense light
 - Electrostatic discharge



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Environmental Factors on Smoke Detectors

- Factors to consider that may affect smoke detector response:
 - Airflow
 - Gusts
 - Excessive velocity



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Chapter 17 – Changes

17.7.1.11 Protection During Construction

- When smoke detectors are installed during construction, they need to be tested and calibrated or replaced.
- When detectors are not required during construction, they shall not be installed until after all the other construction trades have completed cleanup.



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Chapter 17 – Initiating Devices

17.7.3.1.3 If the intent is to initiate action when smoke/fire threatens a specific object or space, the detector shall be permitted to be installed in close proximity to that object or space.

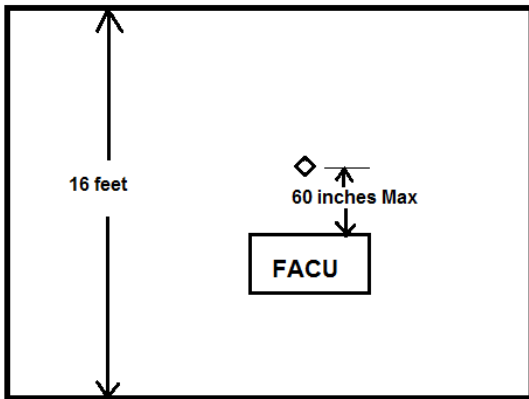
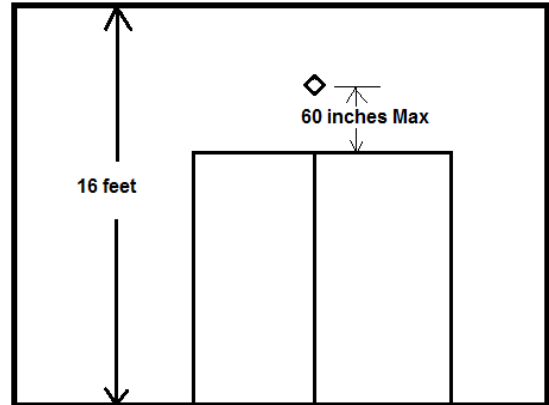


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Chapter 17 – Initiating Devices

- There are some applications that do not require full area protection where there are ceilings in excess of 15 feet:
 - Elevator landings
 - Protection of fire alarm control units
- Detection should be placed on the wall above and within 60 in. from the top of the elevator door(s) or FACU

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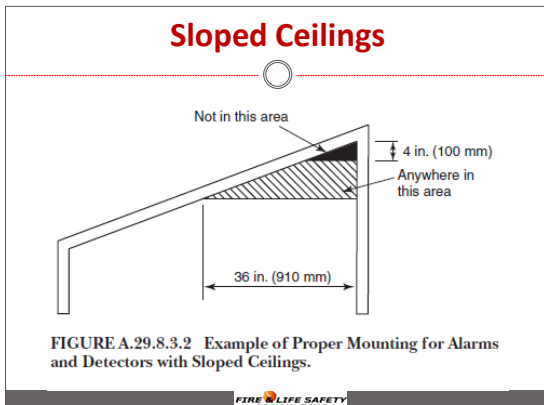
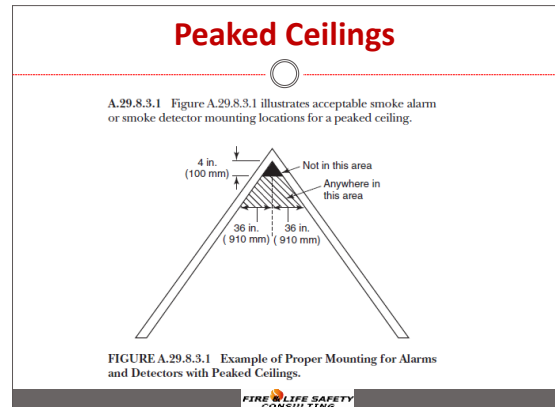
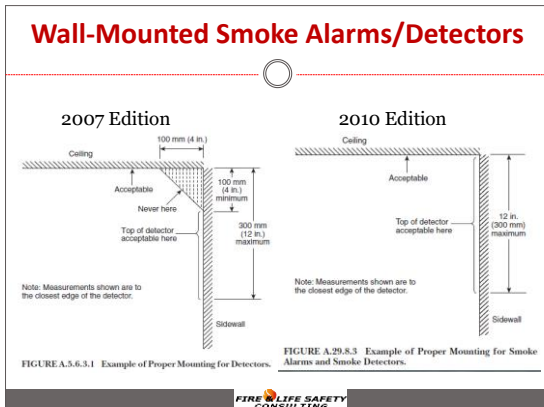


Chapter 17 – Changes

- 17.7.3.2 Smoke detector (or alarm) installation
 - Wall mounting permitted within 12" of ceiling
 - 4" dead space no longer in the code for smoke detectors
 - Exc. for sloped or peaked ceilings



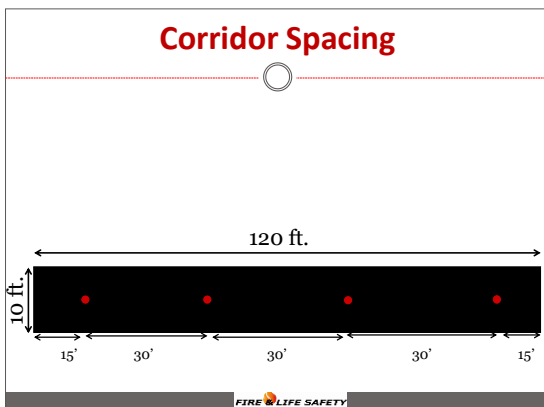
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Chapter 17 – Changes

- 17.7.3.2.3.1 Smoke Detector Spacing
 - Code language modified to clarify nominal spacing of smoke detectors
 - NFPA 72 (13) – “In the absence of specific performance-based design criteria, smooth ceiling smoke detector spacing shall be a nominal 30 feet.” OR
 - Use the “0.7 Rule”

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Detector Spacing - “The 0.7 Rule”

- The distance to the corner is more than 15 ft.
- $a^2 + b^2 = c^2$
- $15^2 = 225$
- $225 + 225 = 450$
- $\sqrt{450} = 21.2$ ft.
- 30 ft. $\times 0.7 = 21$ ft.

30 ft.

30 ft.

15 ft.

21.2 ft.

15 ft.

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Smoke Detectors for Door Release

- NFPA 72 outlines two methods for controlling doors:
 - Door and shutter release mechanisms that are integral to the door hold-open release mechanism (see section 21.8)
 - Area smoke detectors



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Smoke Detectors for Door Release Service

- Section 17.7.5.6
 - If corridor is protected with smoke detection, no need for detection within 5 feet of door
 - Specific installation requirements depend on the depth of wall section (see section 17.7.5.6.5)



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Smoke Detectors for Door Release Service

Section 17.7.5.6 (cont.)

- If depth of wall section ≤ 24 in. on one side only, one ceiling mounted smoke detection is required on the higher side
- If the depth of wall section is > 24 in. on both sides, two ceiling mounted smoke detectors are required



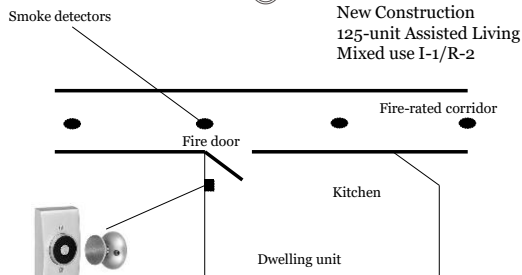
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Smoke Detectors for Door Release

- Section 17.7.5.6.1-Smoke detectors that are part of an open area protection system covering the room, corridor, or enclosed space on each side of the smoke door and that are located and spaced as required by 17.7.3 shall be permitted to accomplish smoke door release service.

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Smoke Detectors for Door Release-Scenario



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Smoke Detectors for Door Release Service

- If separation between (multiple doorways) is > 24 in., each doorway shall be treated separately



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Chapter 18 – Notification Appliances

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Chapter 18 – Notification Appliances

- Application
- General
- Audible Characteristics
- Visible Characteristics – public mode
- Visible Characteristics –private mode
- Graphic Visible Signaling Method

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Sound Levels – Public Mode

- 15 dBA above average ambient sound; or,
- 5 dBA above average ambient sound level lasting 60 seconds
- If ambient sound level is greater than 105 dBA, visual notification appliance is required,

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Sound Levels – Public Mode

- 110 dBA is maximum allowed

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Sound Levels – Sleeping Areas

- 15 dBA above ambient average sound level,
- 5 dBA above maximum sound level (lasting 60 seconds), or
- 75 dBA minimum measured at pillow level
- Whichever is greater.
- This will usually require an appliance in the dwelling unit.

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New Requirement for Frequency of Alert Tone for Awakening

- 520 Hz Square Wave
 - Systems (Chapter 18) – effective January 1, 2014
 - Household (Chapter 29) – effective on adoption

520 Hz Sq. Wave 3000 Hz

Why the change?

- **Background:**
 - Study done by Victoria (Australia) University
 - Study tried to determine why people were not waking to the fire alarm signal
 - Nearly 50% of the participants with mild to severe hearing loss slept through the 3000 Hz smoke alarm signal
 - The higher 3000 Hz signal also was not as effective at waking children

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Why the change?

- People with hearing loss have trouble hearing high frequencies than low.
- The 520 Hz square wave signal awoke nearly 100% of the participants in the test.
- Low frequency signal is 6-10 times more effective than the high frequency devices



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Why the change?

- Due to the results from the Victoria University study, in 2006, the Fire Protection Research Foundation (FPRF) funded two additional research studies on the issue
- Focus was on the effectiveness of the 3000 Hz tone on high risk groups
 - Waking effectiveness of alarms and adults who are hard of hearing
 - Waking effectiveness of alarms for the alcohol impaired



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FPRF Study

- The studies tested six signals:
 1. 400 Hz Square wave signal
 2. 520 Hz Square wave signal
 3. 3000 Hz pure tone (standard)
 4. Bed shaker (under mattress)
 5. Pillow shaker
 6. Strobe light in T-3 pulse



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FPRF Conclusions

- The low frequency signal with a fundamental frequency of 520 Hz is the most effective signal for waking people.
 - Low frequency signal woke 92% between 55 dBA and 75 dBA
 - 3000 Hz signal woke 56% between 55 dBA and 75 dBA
- The low frequency signal is superior bed/pillow shakers and strobe lights.



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Low Frequency Appliances



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Sounder Base Activation

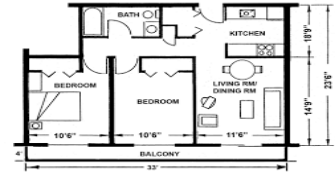


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Frequently Asked Question



- Do low frequency sounders need to be provided in the bedroom and the common areas of a dwelling unit or just the bedrooms?

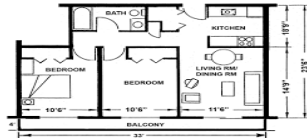


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Frequently Asked Question



- A.18.4.5.2 (13)-The intent of this section is to require the low frequency signal in areas intended for sleeping and areas that might reasonably be used for sleeping. This would require low frequency in the bedroom and the living room area.



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Audibility vs. Intelligibility



- Audibility – Can you hear the signal?
- Intelligibility – Can you understand the signal?



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Voice Alarm Messages



- Voice messages shall not be required to meet the audibility requirements for public mode signaling, but shall meet intelligibility requirements.
 - Chapter 14 does not require voice signals to be measured for audibility.
 - Sound produced from a voice system is modulated and a meaningful measurement cannot be determined.

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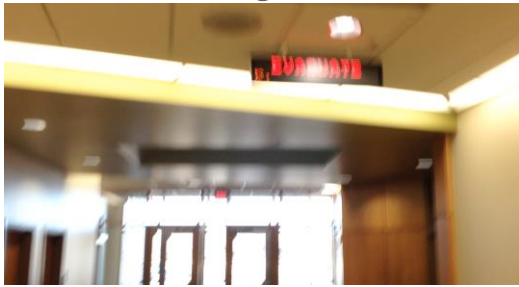
Voice Alarm Systems



- Areas that may not require voice intelligibility (18.4.10.2.1):
 - Private bathrooms;
 - Mechanical/elevator equipment rooms or similar areas;
 - Elevator cars
 - Kitchen/storage rooms/closets

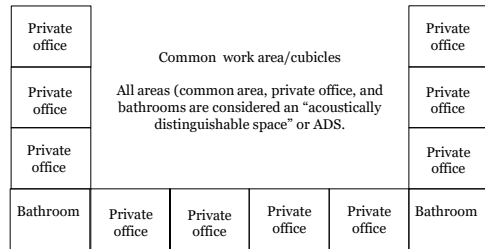
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Visible Alarm-Other



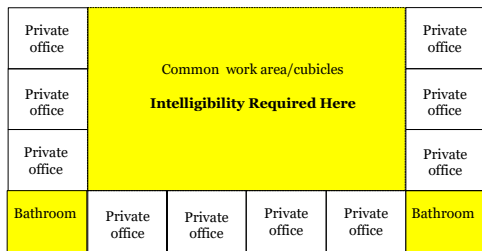
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Voice Alarm Systems-Office Building



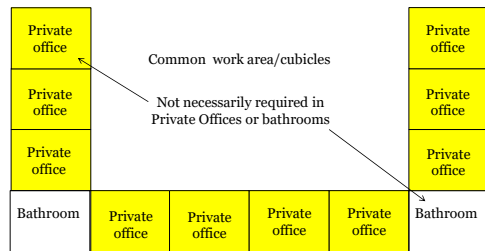
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Voice Alarm Systems-Office Building



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Voice Alarm Systems-Office Building



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Chapter 23

Protected Premises FA Systems

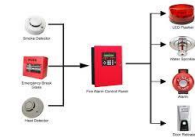
- Application
- General
- System Features
- System Performance & Integrity
- Performance for Initiating Device Circuits
- Performance for Signaling Line Circuits
- Performance for Notification Appliance Circuits
- System Requirements



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Chapter 23 (cont.)

- In-Building Fire Emergency Voice/Alarm Communications
- Prerecorded (Digital) Voice and Tone Fire Alarm Systems
- Two-Way Communication Service
- Signal Annunciation



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Chapter 23 (cont.)

- Suppression System Actuation
- Off-Premises Signals
- Guard's Tour Supervisory Service
- Suppressed Signal Systems
- Protected Premises Fire Safety Functions
- Special Requirements for Low-Power Radio (Wireless) Systems



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Protected Premises Fire Alarm Systems

- 23.3.2 Features of non-required systems shall be established by the system designer based on the goals and objectives of the system owner.
- 23.3.2.1-Non-required protected premises systems and components shall meet the requirements of this Code.

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Protected Premises Fire Alarm Systems

• Dedicated Function Fire Alarm Systems

- New term in the 2007 Edition
- "A *protected premises fire alarm system installed specifically to perform fire safety function(s) where a building fire alarm system is not required*"
- Intended to address "systems" where notification appliances and/or detectors are not required by model codes

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Protected Premises Fire Alarm Systems

• Dedicated Function Fire Alarm Systems

- Where codes, standards, or AHJs require monitoring of specific functions, but do not require a building fire alarm system, a dedicated function fire alarm system is appropriate.
 - Elevator recall
 - Sprinkler system
 - HVAC detectors
- Other functions of the fire alarm system are not required.

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Protected Premises Fire Alarm Systems

• Section 23.8.1.2-Systems may have a pre-signal feature when approved by the authority having jurisdiction.

- A pre-signal feature must meet the following criteria:
 - FA sounds only in offices, control rooms, fire brigade stations or other constantly attended location (no general evacuation throughout)
 - Transmission to supervising station (when required) shall commence upon activation from the initial fire alarm signal

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Protected Premises Fire Alarm Systems

• Pre-signal features (cont.):

- Requires human action to activate the general fire alarm (manual pull)
- Pre-signal should only be considered in limited cases when approved by the AHJ



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Protected Premises Fire Alarm Systems

- Section 23.8.1.3-Fire alarm systems may utilize positive alarm sequencing (PAS) when approved by the AHJ
- PAS must comply with the following:
 - FA signal must be acknowledged within 15 seconds of when the signal is received
 - If signal is not acknowledged within 15 seconds, notification signal and general evacuation shall commence.

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Protected Premises Fire Alarm Systems

- PAS must comply with the following (cont.):
 - If signal is acknowledged, a delay of the evacuation signal of up to 180 seconds begins for staff to investigate the source of the alarm signal.
 - If FA system is not reset after 180 seconds ends, notification appliances commence and general evacuation shall begin.

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Protected Premises Fire Alarm Systems

- PAS must comply with the following (cont.):
 - If a second automatic fire detector is actuated during the investigation (180 second) phase, notification appliances and general evacuation shall be activated.
 - If any other FA initiating device is actuated (manual pull), notification signals and evacuation shall be activated
 - The FA system shall provided a means for bypassing the PAS

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Chapter 24-Emergency Communication Systems



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Emergency Communication Systems

- Section 24.3.1-Emergency communication systems shall be capable of reproduction of prerecorded, synthesized, or live messages with voice intelligibility
 - Can require alternate or additional languages
 - It is recommended speakers be distributed around the building rather than high power output of a few speakers.

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Emergency Communication Systems

- 24.3.4 Ancillary Functions
 - Emergency Communication Systems may be used for ancillary functions such as:
 - General paging
 - Background music
 - Non-emergency functions
 - Primary function (emergency notification) must take precedence and cannot be compromised



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Emergency Communication Systems

- 24.4.1.2.1-Voice evacuation messages shall be preceded and followed by a minimum of two cycles of the emergency evacuation signal specified in section 18.4.2 (T3 pattern).

- Goal is to get people's attention with the T3 pattern and then move into the voice instructions.



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Voice Alarm in Sleeping Areas

- In occupancies where sleeping accommodations are provided, a low-frequency tone shall be provided in the sleeping areas that complies with chapter 18.
- In areas where sleeping accommodations are provided, but message is communicated to those awake (public, common areas, etc.), low frequency is not required.



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Chapter 26-Supervising Station FA Systems



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Chapter 26

- Supervising Station Fire Alarm Systems
 - Application
 - General
 - Alarm Systems for Central Station Service
 - Proprietary Supervising Station Systems
 - Remote Supervising Station Systems
 - Communication Methods for Supervising Station Alarm Systems

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Supervising Station Fire Alarm Systems

- Three options for monitoring a fire alarm system:
 - Central Station
 - Proprietary Supervising Station
 - Remote Supervising Station
 - Remote Station represents roughly 85-90% of all monitored fire alarm systems (Source: AFAA)

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Fire Alarm Signal (Pre)Verification

- 2010 Edition-Allows monitoring companies to verify alarm signals for Remote Station Service only before dispatching when approved by the AHJ
- IAFC introduced proposal to NFPA 72 to require verification on all fire alarm signals.
 - IAFC proposal was modified
 - It was allowed only for remote station when approved by AHJ but verification cannot be more than 90 seconds.

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Supervising Station Alarm Systems

- 2013 Edition
- 26.2.4 Alarm Signal Content-When required by the AHJ, alarm signals transmitted to a supervising station shall be by addressable device or zone identification (“Point ID”)



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Chapter 26 – Changes

02/07 Communication Methods:

- Active Multiplex
- DACTs
- McCulloh
- 2-Way Radio
- 1-Way Radio
- Direct Connect
- Private Microwave
- Other Technologies

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Chapter 26

10/13 Communication Methods

- ~~Active Multiplex~~
- DACTs
- ~~McCulloh~~
- 2-Way Radio
- 1-Way Radio
- ~~Direct Connect~~
- ~~Private Microwave~~
- Other Technologies

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Monitoring Options

- Single Transmission Technologies
 - Cell
 - Internet
 - Radio
- Multiple Transmission Technologies
 - Digital alarm communicator transmitters (DACTs)

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Active vs. Passive Methods

- Active = More Reliable
 - The communications method indicates at the supervising station quickly when the communications pathway is interrupted
 - Ex: Cell, Radio, IP Communications
- Passive = Less Reliable
 - The communications method does not indicate when it is down; discovery is only when attempts are made to use it
 - Ex: DACTs



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Chapter 26 – DACTS

- Definition: Digital Alarm Communicator Transmitter (DACT)
 - A system component at the protected premises to which initiating devices or groups of devices are connected. The DACT seizes the connected telephone line, dials a preselected number to connect to a DACR, and transmits signals indicating status change of the initiating device (NFPA 72)

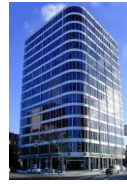
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DACT Background & History

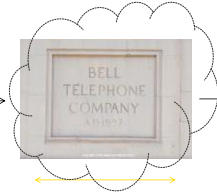
- First introduced in the 1980s.
- Determined (twice!) by TC to be unreliable.
- DACT proponents were successful on the third attempt to get into the standard, but with precautions for redundancy.
- Uses plain-old telephone service (POTS) phone lines

IF AT FIRST
YOU DON'T
SUCCEED,
TRY, TRY
AGAIN!

DACT Background & History



Regulated by NFPA 72



Regulated by phone company



Regulated by NFPA 72

DACT Background & History

- DACTs need to do the following when sending a signal:
 - Seize the telephone line
 - Disconnect any other uses of the phone line
 - No public telephone lines
- NFPA 72 does NOT require a dedicated phone line.



DACT Background & History

- Transmission channels for DACTs
 - First channel must be a loop start POTS (copper) telephone line.
 - Second channel could be either another telephone line, cellular telephone service, radio, or IP.



DACT Background & History

- THE TRADITIONAL WAY (as originally proposed)
 - Use two end-to-end copper POTS telephone lines
 - Connect to the fire alarm system via a RJ-31X jack



DACT Background & History

- Original concept of redundancy



- Original intent was to have phone lines on opposite ends

Frequently Asked Question

- Can non-traditional phone service (fiber-optic or broadband) be used with a DACT?



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Frequently Asked Question

- Can non-traditional phone service (fiber-optic or broadband) be used with a DACT?
- ANSWER: Yes, as long as the service is provided through a managed facilities-based voice network (MFVN)



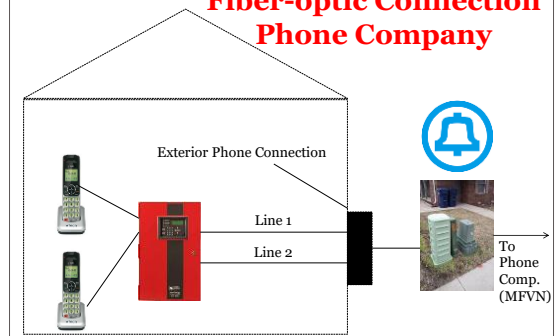
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Chapter 26 – DACTs

- Option 1
- Using telephone company fiber optic
 - Regular telephone company fiber optic lines
 - CODEC fiber optic lines is the same as end-to-end copper lines
 - All equipment is telephone company owned
 - **PROBLEM: Standby power supplies are generally only 8 hours, not 24 hours**

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Fiber-optic Connection Phone Company

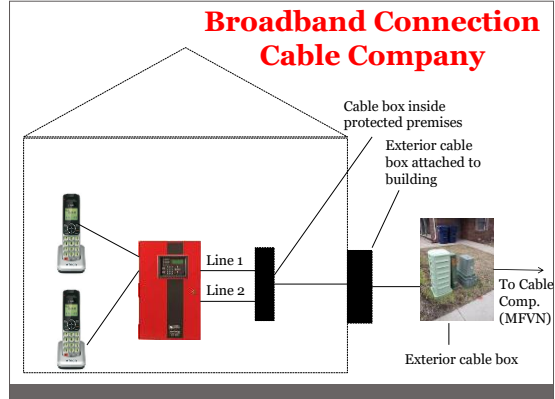


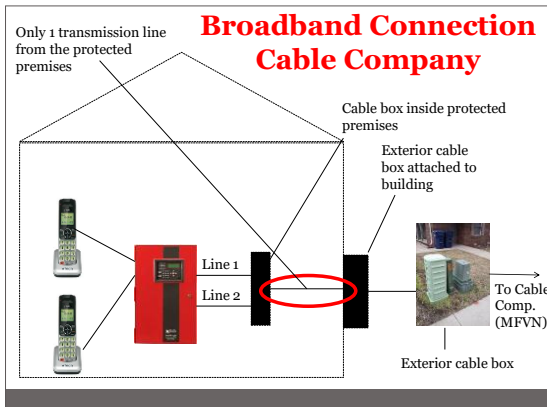
Chapter 26 – DACTs

- Option 2
- Cable company broadband
 - Cable company telephone service
 - CODEC is usually compatible with telephone company standards
 - **PROBLEM: Some equipment may be customer owned**
 - **PROBLEM: Standby power supplies are generally 8 hours, not 24 hours**

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Broadband Connection Cable Company





Chapter 26 – DACTs

- Using VoIP telephonic pathways
 - Service similar to “Vonage”, “Magic Jack”, or “Ooma”.
 - **PROBLEM: Lines are generally not compatible with telephone company equipment.**
 - **PROBLEM: Equipment is customer owned.**
 - **PROBLEM: Standby power is generally non-existent.**

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Chapter 26 – DACTs

- Using VoIP
 - Service similar to “Vonage”, “Magic Jack”, or “Ooma”.
 - **PROBLEM: Lines are generally not compatible with telephone company equipment.**
 - **PROBLEM: Equipment is customer owned.**
 - **PROBLEM: Standby power is generally non-existent.**

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The following table summarizes the requirements found in NFPA 72 2010.

Voice Provider Type	Telco			Cable	Internet
Product Examples	Verizon, AT&T, Landline, CenturyLink	Verizon, AT&T Landline	Verizon FiOS, AT&T UVerse	Comcast, TWC, Cox Cable Digital Voice	Vonage, MagicJack, Google Voice
Voice Equipment Location	Central Office	Remote Terminal	Customer Premises	Customer Premises	Customer Premises
Technology Used	Analog	Digital	VoIP	VoIP	VoIP
NFPA 72 AHJN Requirements					
Managed Facilities-based	●	●	●	●	No
Functional equivalence to traditional PSTN line	●	●	●	●	No
Proactive management	●	●	●	●	No
Loop start telephone circuit	●	●	●	●	●
8 hour standby power for voice equipment providing dialtone	●	●	○	●	No
24 hours standby power at the “central office”	●	●	●	●	No
Safeguards to protect from unauthorized access	●	●	○	●	No
Notification to have alarm system re-tested	○	○	○	●	No
Professional installation ensuring line seizure	●	●	●	●	No
Disaster recovery plans	●	●	●	●	No

● indicates conformance to new NFPA requirements
○ indicates needs AHJ verification

Chapter 26 – 2013 Edition

- The second line on a DACT must be a different technology (i.e. radio, IP)
- If there are two telephone lines on a DACT, time tests must be every 6 hours.

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Chapter 26 – DACTs

- *With each passing day, more and more communications services migrate to broadband and IP-based services, leaving the public switched telephone network and plain-old telephone service as relics of a by-gone era.*
- AT&T Filing to the FCC, 21 Dec. 2009

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Chapter 29

• Single & Multiple Station Alarms and Household Fire Alarm Systems

- Application
- Purpose
- Basic Requirements
- Assumptions
- Detection and Notification
- Power Supplies



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Smoke Alarms & Household FA Systems

- Equipment Performance
- Installation
- Optional Functions
- Maintenance and Tests
- Markings and Instructions



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Household Smoke Alarms

• Section 29.8.1.4

- Continues language requiring smoke alarms in one & two family dwellings to be replaced after 10 years or when they fail to operability test.



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THANK YOU!

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WSAFM Fire Prevention Institute

Thank you for Coming!



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