

**THE BASICS OF
FIRE ALARM PLAN
REVIEW**

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WHERE TO START

State of Michigan Building Code

(International Building Code as Amended)

Details When & Where Fire Alarms are Required

MBC/IBC REFERENCES

Chapter 9 International Fire Code

NFPA 72 National Fire Alarm & Signaling Code

Michigan Electrical Code/NFPA 70

ATTENTION

Pay attention to definitions in any of the codes you use!!!!!!

ATTENTION

You will have to read the code to learn the fine points.

Some items are not included in this program.

MICHIGAN BUILDING CODE

Chapter 9: Fire Protection Systems

901.2 Fire protection systems shall be installed, repaired, operated and maintained in accordance with this code and the International Fire Code.

Any fire protection system for which an exception or reduction to the provisions of this code has been granted shall be required to be a required system.

MICHIGAN BUILDING CODE

Exception: Any fire protection system or portion thereof not required by this code shall be permitted to be installed for partial or complete protection provided that such systems meet the requirements of this code.

MICHIGAN BUILDING CODE

901.3 No Person shall remove or modify any fire protections system installed or maintained under the provisions of this code or the International Fire Code without approval by the building official.

MICHIGAN BUILDING CODE

901.5 Acceptance Tests, Fire protection systems shall be tested in accordance with the requirements of this code and the IFC. When required, the test shall be conducted in the presence of the building official.

It shall be unlawful to occupy portions of a structure until the required fire protection systems within that portion of the structure have been tested and approved.

MICHIGAN BUILDING CODE

901.6 Where required, fire protection systems shall be monitored by an approved supervising station in accordance with NFPA 72.

901.6.1 Fire alarm systems required by the provisions of Section 907.2 of this code and Sections 907.2 & 907.9 of the IFC shall be monitored by an approved supervising station in accordance with Section 907.6.5.

MICHIGAN BUILDING CODE

907.1.2 Shop drawings for fire alarm systems shall be submitted for review and approval prior to system installation, and shall include, but not be limited to, all of the following:

- 1. A floor plan that indicates the use of all rooms.

SHOP DRAWINGS (CON'T)

- 2. Location of alarm-initiating devices.
- 3. Locations of alarm notification appliances, including candela rating for visible alarm notification appliances.
- 4. Location of fire alarm control unit, transponders & notification power supplies.

SHOP DRAWINGS (CON'T)

- 5. Annunciators.
- 6. Power connection.
- 7. Battery calculations.
- 8. Conductor type & size.
- 9. Voltage drop calculations.
- 10. Mfg. data sheets indicating model numbers & listing information for equipment, devices, and materials

SHOP DRAWINGS (CON'T)

- 11. Details of ceiling height & construction.
- 12. The interface of fire control functions.
- 13. Classification of the supervising station.

EQUIPMENT

907.1.3 Systems & components shall be **"listed & approved"** for the purposed for which they are installed.

"See code commentary"

INTERNATIONAL FIRE CODE (IFC)

901.2 Construction Documents, review, & approvals.
901.2.1 Statement of Compliance. Before requesting final approval of the installation, where required by the fire code official, the installing contractor shall furnish a written statement to the fire code official that the subject fire protection system has been installed in accordance with approved plans and has been tested in accordance with the manufacturer's specifications and appropriate installation standard. Any deviations from the design standards shall be noted and copies of the approvals for such deviation shall be noted and copies of the approvals for such deviations shall be attached to the written statement.

INTERNATIONAL FIRE CODE (IFC)

- 907.1.1 Construction documents: Same as MBC.
- 907.1.2 Fire alarm shop drawings: Same as MBC
- 907.1.3 Equipment: Same as MBC

NFPA 72 NATIONAL FIRE ALARM & SIGNALING CODE (2013)

7.4 Shop Drawings (Installation Documentation)
Note: Major changes to chapter 7 from previous editions.

NFPA 72 NATIONAL FIRE ALARM & SIGNALING CODE (2013)

10.18.1.1 The AHJ shall be notified prior to installation or alteration of equipment or wiring.

Note the asterisk

10.18.1.2* At the AHJ's request, complete information regarding the system or system alterations, including specifications, type of system or service, shop drawings, input/output matrix, battery calculations, and notification appliance circuit voltage drop calculations, shall be submitted for approval.

WHERE ARE FIRE ALARM SYSTEMS REQUIRED?

First: What is a Fire Alarm System?

WHAT IS A FIRE ALARM SYSTEM?

Fire Alarm System.

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.

(NFPA 72, 3.3.105)

FIRE ALARM SYSTEM

Combination System.

A fire alarm system in which components are used, in whole or in part, in common with a non-fire signaling system.

(NFPA 72, 3.3.105.1*)

Household Fire Alarm System.

A system of devices that uses a fire alarm control unit to produce an alarm signal in the household for the purpose of notifying the occupants of the presence of a fire so that they will evacuate the premises.

(NFPA 72, 3.3.105.2)

FIRE ALARM SYSTEM

Municipal System
A public emergency alarm reporting system.
(NFPA 72, 3.3.105.3)

Protected Premises (Local) Fire Alarm System
A fire alarm system located at the protected premises.
(NFPA 72, 3.3.105.4*)

FIRE ALARM SYSTEM
PROTECT PREMISES

Building Fire Alarm System
A protected premises fire alarm system that includes any of the features identified in 23.3.3.1 and that serves the general fire alarm needs of a building or buildings and that provides fire department or occupant notification or both.
(NFPA 72, 3.3.105.4.1)

FIRE ALARM SYSTEM
PROTECT PREMISES

Dedicated Function Fire Alarm System
A protected premises fire alarm system installed specifically to perform emergency control functions where a building fire alarm system is not required. (See NFPA 72, 23.8.5)
(NFPA 72, 3.3.105.4.2)

FIRE ALARM SYSTEM

PROTECT PREMISES

Releasing Fire Alarm System

A protected premises fire alarm system that is part of a fire suppression system and/or that provides control inputs to a fire suppression system related to the fire suppression system's sequence of operation and outputs for other signaling and notification. (See NFPA 72, 23.11)

(NFPA 72, 3.3.105.4.3) e.g. Deluge fire suppression

WHERE REQUIRED

An approved fire alarm system installed in accordance with the provisions of this code and NFPA 72 shall be provided in new buildings and structures in accordance with Sections 907.2.1 through 907.2.23 and provide occupant notification in accordance with Section 907.5, unless other requirements are provided by another section of this code.

MBC 907.2 IFC 907.2

WHERE REQUIRED

Not fewer than one manual fire alarm box shall be provided in an approved location to initiate a fire alarm signal for fire alarm systems employing automatic fire detectors or waterflow detection devices. Where other sections of this code allow elimination of fire alarm boxes due to sprinklers, a single fire alarm box shall be installed.

Exceptions: Elevator recall
R-2 unless required by fire code official and not to be accessible to the public.

MBC 907.2 IFC 907.2

WHERE REQUIRED – GROUP A

Manual fire alarm system 300 >
 Manual fire alarm boxes not required if occupant notification provided through activation of fire sprinkler system

Emergency voice/alarm communications 1,000>

MBC 907.2.1 IFC 907.2.1

WHERE REQUIRED – GROUP B

Where one of the following exist

1. Combined occupant load for all floor is 500 or >
2. Occupant load is > 100 persons above or below lowest level of exit discharge.
3. Fire area contains an ambulatory care facility.

MBC 907.2.2 IFC 907.2.2

WHERE REQUIRED – GROUP B (CON'T)

Exception: Manual fire alarm boxes not required if fire sprinkler system is present.

MBC 907.2.2 IFC 907.2.

See requirements for Ambulatory care facilities
 MBC 907.2.2.1 IFC 907.2.2.1

WHERE REQUIRED – GROUP E

Manual fire alarm system that initiates the occupant notification signal utilizing an emergency voice/alarm communications system. If sprinkler protection and smoke detection is installed they must be connected to bldg. fire alarm system.

Exceptions:

1. Occupant load of 50 or <
2. Emergency voice/alerts communications not required with occupant load of 100 or < provided that activation of the manual fire alarm system initiates an approved occupant notification signal

NEW

WHERE REQUIRED – GROUP E (CON'T)

3. Manual fire alarm boxes not required where all of the following apply:

- 3.1 Interior corridors are protected by smoke detectors.
- 3.2 Auditoriums, cafeterias, gyms and similar areas are protected by heat detectors or other approved detection devices.
- 3.3 Shops and labs involving dust or vapors are protected by heat detectors or other approved detection devices.

WHERE REQUIRED – GROUP E (CON'T)

4. Manual fire alarm boxes shall not be required where all of the following apply

- 4.1 Approved fire sprinklers throughout
- 4.2 The emergency voice/alert communications system is activated on water flow.
- 4.3 Manual activation is provided from a normally occupied location.

MBC 907.2.3 IFC 907.2.3

WHERE REQUIRED – GROUP F

Manual fire alarm system that activates the occupant notification system where both of the following conditions exist:

1. Two or more stories in height
2. Combined occupant load of 500 or > above or below the lowest level of exit discharge

Exception: Manual fire alarm boxes are not required if a fire sprinkler system is installed in accordance with Section 903.3.1.1 and the notification system is activated by the sprinkler system.

MBC 907.2.4 IFC 907.2.4

WHERE REQUIRED – GROUP H

A manual fire alarm system required in Group H-5 and in occupancies used for manufacture of organic coatings.

Automatic smoke detection system is required for highly toxic gases, organic peroxides and oxidizers.

MBC 907.2.5 IFC 907.2.3.5

WHERE REQUIRED – GROUP I

A manual fire alarm system that activates the occupant notification system is required.

An automatic smoke detection system that activates the occupant notification system is required.

Exception:

1. Manual fire alarm boxes in sleeping units of I-1, I-2 not required at exits if located at care provider control station or constantly attended location
2. Occupant notification system not required to be activated where private mode signaling is installed and approved by fire code official and staff evacuation responsibilities are included in emergency plans.

MBC 907.2.6 IFC 907.2.3.6

WHERE REQUIRED – GROUP I (CON'T)

Group I-1

Automatic smoke detection system required in corridors, waiting areas open to corridors and habitable spaces other than sleeping units and kitchens. Activation in accordance with 907.5

Exceptions:

- 1. Smoke detection not required if sprinkler system throughout.
- 2. Smoke detection not required for exterior balconies.

MBC 907.2.6 IFC 907.2.3.6

Single & multiple station smoke alarms shall be installed in accordance with 907.2.11

MBC 907.2.6.1 IFC 907.2.3.6.1

WHERE REQUIRED – GROUP I (CON'T)

Group I-2

Automatic smoke detection system required in corridors of I-2 Condition 1 and spaces permitted to be open to the corridors. The system shall be activated in accordance with Section 907.4. Group I-2 Condition 2 occupancies shall be equipped with an automatic smoke detection system.

Exceptions:

MBC 907.2.6.2 IFC 907.2.3.6.2

WHERE REQUIRED – GROUP I (CON'T)

Group I-3

Manual fire alarm system and automatic smoke detection system required to alert staff.

MBC 907.2.6.3 IFC 907.2.3.6.3

Actuation of automatic fire extinguishing system, a manual fire alarm box or a fire detector shall initiate an approved fire alarm signal that automatically notifies staff.

MBC 907.2.6.3.1 IFC 907.2.6.3.1

Manual fire alarm boxes not required where fire alarm box is at staff position and where staff has direct supervision

MBC 907.2.6.3.2 IFC 907.2.6.3.2

Automatic smoke detection required throughout resident housing areas with exceptions

MBC 907.2.6.3.3 IFC 907.2.6.3.3

WHERE REQUIRED – GROUP M

Manual fire alarm system that activates occupant notification system required where one of the following conditions exist:

1. Combined occupant load of all floors is 500 or >
2. Occupant load is >100 persons above or below the level of exit access.

Exceptions:

1. Manual fire alarms system not required in covered or open mall buildings comply with section 402 of the MBC.
2. Manual fire alarm boxes are not required when the building is sprinkled throughout and that system operates the occupant notification system.
3. **MBC 907.2.7 IFC 907.2.7**

WHERE REQUIRED – GROUP M (CON'T)

During times that the mall is occupied, the initiation of a signal from a manual fire alarm box or from a water flow switch shall not be required to activate the alarm notification appliances when the alarm signal is activated at a constantly attended location from which evacuation instructions shall be initiated over an emergency voice/alarm communications system.

MBC 907.2.7.1 IFC 907.2.7.1

WHERE REQUIRED – GROUP R

R-1

Fire alarm system and smoke alarms installed per 907.2.8.1 - 907.2.8.3

Manual fire alarm system that activates the occupant notification system is required.

Exceptions:

1. Manual fire alarm system is not required in buildings not more than 2 stories in height where all individual sleeping units and contiguous attic and crawl spaces are separated from each other and public or common areas by minimum 1-hr fire partitions and each individual sleeping unit has an exit directly to a public way, Egress court or yard.

MBC 907.2.8.1 IFC 907.2.8.1

WHERE REQUIRED – GROUP R (CON'T)

R-1

Exceptions:

- 2. Manual fire alarm boxes throughout when the building is protected throughout by a sprinkler system, the notifications appliances are activated by the sprinkler system and a manual fire alarm box is installed in an approved location.

MBC 907.2.8.1 IFC 907.2.8.1

WHERE REQUIRED – GROUP R (CON'T)

R-1

Automatic smoke detections system is required that activates the occupant notification system that is installed in all interior corridors serving sleeping rooms.

Exception:

Automatic smoke detection is not required in buildings that do not have interior corridors .

MBC 907.2.8.2 IFC 907.2.8.2

WHERE REQUIRED – GROUP R (CON'T)

R-1

Single and multiple-station smoke alarms are required in accordance with 907.2.11

MBC 907.2.8.3 IFC 907.2.8.3

WHERE REQUIRED – GROUP R (CON'T)

R-2

Fire alarm systems and smoke alarms required

MBC 907.2.9 IFC 907.2.9

Manual fire alarm system that activates occupant notification system required where any of the following conditions exist:

1. Any dwelling unit or sleeping unit is located 3 or more stories above the lowest level of exit discharge.
2. Any dwelling unit or sleeping unit is located more than one story below highest level of exit discharge serving the unit.
3. The building contains more than 16 dwelling units or sleeping units

MBC 907.2.9.1 IFC 907.2.9

WHERE REQUIRED – GROUP R (CON'T)

R-2

Exceptions:

1. FA system not required if bldg not more than 2 stories in height, 1-hr separation between units, corridors, crawl spaces & attics and each unit has direct exit to public way or egress court yard.
2. Manual pull stations not required if bldg is protected with sprinkler system.
3. FA system not required in bldgs not having an interior corridor, protected with sprinkler system, and egress door opening to exit access or open ended corridors. Note: Only sprinkler alarm required.

MBC 907.2.9.1 IFC 907.2.9

WHERE REQUIRED – GROUP R (CON'T)

R-3

Nothing specified for R-3 occupancies.

See 310.5 of the Michigan Building Code.

WHERE REQUIRED – GROUP R (CON'T)

R-4

Fire alarm system & smoke alarms required.

Exception:

- 1. Manual fire alarm system not required if bldg is not more than 2 stories in height, 1-hr separation between sleeping room, corridors, crawl spaces and each sleeping unit has direct exit to public way or egress court or yard.
- 2. Manual fire alarm boxes not required where all of the following conditions exist:
 - + Bldg sprinkled throughout
 - + Notification appliances are activated by sprinkler system.
 - + Not fewer than one manual fire alarm box is installed at an approved location.

WHERE REQUIRED – GROUP R (CON'T)

R-4

Fire alarm system & smoke alarms required.

- 3. Manual fire alarm boxes in residential or patient sleeping areas not required at exits where located at all nurses' control stations or other constantly attended.....

MBC 907.2.10.1 IFC 907.2.10.1

WHERE REQUIRED – GROUP R (CON'T)

Single-and-multiple-station smoke alarms

R-1

- 1. In sleeping areas.
- 2. In every room in the path of the means of egress from the sleeping area to the door leading from the sleeping unit.
- 3. In each story within the sleeping unit, including basements. For sleeping units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper story.

MBC 907.2.11.1 IFC 907.2.11.1

WHERE REQUIRED – GROUP R (CON'T)

Single-and-multiple-station smoke alarms

R-2, R-3, R-4, and I-1

Regardless of occupant load

- 1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.
- 2. In each room used for sleeping purposes.

MBC 907.2.11.2 IFC 907.2.11.2

WHERE REQUIRED – GROUP R (CON'T)

Single-and-multiple-station smoke alarms (Con't)

R-2, R-3, R-4, and I-1

Regardless of occupant load

- 3. In each story within a dwelling unit, including basements but not including crawl spaces and uninhabitable attic. In dwelling or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.

MBC 907.2.11.2 IFC 907.2.11.2

WHERE REQUIRED – GROUP R (CON'T)

Single-and-multiple-station smoke alarms (Con't)

R-2, R-3, R-4, and I-1

Smoke alarms shall not be installed in the following locations unless this would prevent placement of a smoke alarm in a location required by Sections 907.2.11.1 or 907.2.11.2

- 1. Ionization smoke alarms shall not be installed less than 20 ft horizontally from a permanently installed cooking appliance.

MBC 907.2.11.3 IFC 907.2.11.3

NEW

WHERE REQUIRED – GROUP R (CON'T)

Single-and-multiple-station smoke alarms
(Con't)

R-2, R-3, R-4, and I-1

- 2. Ionization smoke alarms with an alarm-silencing switch shall not be installed less than 10 ft horizontally from a permanently installed cooking appliance.

MBC 907.2.11.3 IFC 907.2.11.3 **NEW**

WHERE REQUIRED – GROUP R (CON'T)

Single-and-multiple-station smoke alarms
(Con't)

R-2, R-3, R-4, and I-1

- 3. Photoelectric smoke alarms shall not be installed less than 6 ft horizontally from a permanently installed cooking appliance.

MBC 907.2.11.3 IFC 907.2.11.3 **NEW**

WHERE REQUIRED – GROUP R (CON'T)

Single-and-multiple-station smoke alarms
(Con't)

Smoke alarms shall be installed not less than 3 feet horizontally from the door or opening of a bathroom that contains a bathtub or shower unless this would prevent placement of a smoke alarm.

MBC 907.2.11.4 IFC 907.2.11.4 **NEW**

WHERE REQUIRED – GROUP R (CON'T)

Single-and-multiple-station smoke alarms
(Con't)

Where more than one smoke alarms is required within an individual dwelling unit or sleeping unit in Group R or I-1 occupancies, the smoke alarms shall be interconnected... Wireless is allowed.

The alarms must be heard in all bedrooms over background noise levels with all intervening doors closed.

MBC 907.2.11.5 IFC 907.2.11.5

WHERE REQUIRED – GROUP R (CON'T)

Single-and-multiple-station smoke alarms
(Con't)

Primary power from commercial power with battery backup.

Smoke alarm with integral strobes not equipped with battery back-up shall be connected to an emergency electrical system in accordance with Section 604.IFC

MBC 907.2.11.56 IFC 907.2.11.6 Partially NEW

WHERE REQUIRED – GROUP R (CON'T)

Single-and-multiple-station smoke alarms
(Con't)

Smoke detectors listed in accordance with UL 268 and provided as part of the building fire alarm system shall be an acceptable alternative to single-and multiple-station smoke alarms.

- ✦ FA system complies with Section 907
- ✦ Activation of a smoke detector in a dwelling unit shall initiate alarm notification within the dwelling unit or sleeping unit per 907.6.6

MBC 907.2.11.7 IFC 907.2.11.7 **NEW**

WHERE REQUIRED – GROUP R (CON'T)

**Single-and-multiple-station smoke alarms
(Con't)**

- ✦ Activation of a smoke detector in a dwelling unit does not activate notification appliances outside of the unit provided there is a supervisory signal and monitored in accordance with 907.6.6

MBC 907.2.11.7 IFC 907.2.11.7

NEW

**AUTOMATIC SMOKE DETECTION
WHERE REQUIRED**

An automatic smoke detections system that activates the occupant notification system in accordance with Sections 907.5 shall be installed in corridors, waiting areas open to the corridor, and habitable spaces other than sleeping units and kitchens.

Exceptions:

1. Smoke detection not required in habitable spaces if sprinkler protection is provided throughout.
2. Automatic smoke detections system not required in bldgs without interior corridors where sleeping units have a means of egress door that opens directly to an exit or to an exterior exit access that leads to an exit.

MBC 907.2.10.2 IFC 907.2.10.2

**SMOKE ALARMS
WHERE REQUIRED**

**Single- and multiple-station smoke alarms
Group R-1**

Installed in all of the following locations:

1. Sleeping areas.
2. In every room in the path of the means of egress from the sleeping area to the door leading from the sleeping area.
3. In each story within the sleeping unit, including basements

MBC 907.2.11.1 IFC 907.2.11.1

**SMOKE ALARMS
WHERE REQUIRED**

Single- and multiple-station smoke alarms
Group R-2, R-3, R-4, & I

Single or multiple – station smoke alarms shall be installed and maintained regardless of occupant load.

1. On ceiling or wall outside of each separated sleeping area in the immediate vicinity of bedrooms.
2. In each sleeping room
3. Installed on each story including basements but not crawl spaces and uninhabitable attics.....

MBC 907.2.11.2 IFC 907.2.11.2

**SMOKE ALARMS
WHERE REQUIRED**

Single- and multiple-station smoke alarms
Other code sections talk about installation near kitchens and bathrooms and other occupancies

**COMPONENTS OF A FIRE
ALARM SYSTEM**

Manual

- **Fire Alarm Control Unit (FACU)** formerly called a fire alarm control panel (FACP)
- **Initiating Devices** – for our discussion usually a manual fire alarm box. Formerly called a manual pull station.
- **Notification Appliances**
- **Monitoring** –required by the MBC & IFC

COMPONENTS OF A FIRE ALARM SYSTEM

Automatic

- **Fire Alarm Control Unit (FACU)** formerly called a fire alarm control panel (FACP)
- **Initiating Devices**
 1. Analog Initiating Device (Sensor)
 2. Automatic Extinguishing System Supervisory Device
 3. Nonrestorable Initiating Device

COMPONENTS OF A FIRE ALARM SYSTEM

Automatic (Con't)

4. Restorable Initiating Device
 5. Supervisory Signal-Initiating Device
- **Notification Appliances**
 - **Monitoring** – required by the MBC (Do not confuse with requirements for Dedicated Function & Releasing Fire Alarm Systems)

FUNDAMENTALS

What is the difference between a **Smoke Alarm**
And a **Smoke Detector?**

FUNDAMENTALS

A smoke alarm senses a fire and sounds an alarm.

Also see definition for
Single-station Alarm Device

FUNDAMENTALS

A smoke detector senses a fire and sends a signal to a Fire Alarm Control Unit which activates notification appliances.

FUNDAMENTALS

POWER SUPPLIES

At least **2** independent & reliable power sources

(NFPA 72 10.6.3 & 10.6.3.2)

1 primary source
1 secondary source

Or

POWER SUPPLIES (CON'T)

An Uninterruptible Power Supplies (UPS)

(NFPA 72 10.6.3.1 & 10.6.4)

PRIMARY POWER SOURCE PRIMARY SOURCE

Dedicated Branch Line can be

1. Commercial light & power
2. Engine-driven generator where a person specifically trained in its operation is on duty at all times.
3. Engine-driven generator or equivalent arranged for cogeneration with commercial light & power

NFPA 72, 10.6.5.1 (1), (2), & (3)

PRIMARY POWER SOURCE PRIMARY SOURCE

Circuit Identification & Accessibility

The location of the branch circuit disconnecting means shall be permanently identified at the control unit.

NFPA 72, 10.6.5.1

PRIMARY POWER SOURCE
PRIMARY SOURCE

Circuit Identification & Accessibility

System circuit disconnecting means shall be permanently identified as to its purpose in accordance with the following:

1. "FIRE ALARM" for fire alarm systems
2. "EMERGENCY COMMUNICATIONS" for emergency communications systems.
3. "FIRE ALARM/ECS" for combination fire alarm & emergency communications systems

NFPA 72, 10.6.5.2

PRIMARY POWER SOURCE
PRIMARY SOURCE

Circuit Identification & Accessibility

For fire alarm/or signal systems, the circuit disconnecting means shall have a red marking

NFPA 72, 10.6.5.3

The red marking shall not damage the overcurrent protective device or obscure the manufacturer's markings. NFPA 72, 10.6.5.2.3 MEC 70, 760.14

PRIMARY POWER SOURCE
PRIMARY SOURCE

Circuit Identification & Accessibility

The circuit disconnecting means shall be accessible only to authorized personnel.

NFPA 72, 10.6.5.2.5

Where a circuit breaker is the disconnect means, a listed locking device shall be installed.

NFPA 72, 10.6.5.4

PRIMARY POWER SOURCE
PRIMARY SOURCE

Circuit Identification & Accessibility
The branch circuits(s) and branch protection shall be protected against physical damage.
NFPA 72, 10.6.5.3
Note: This is achieved through the requirements found in the Michigan Electrical Code (NFPA 70).

SECONDARY POWER SOURCE

Two ways to provide secondary power

- **Storage Batteries** dedicated to the system in accordance with 10.6.10
- **Automatic-starting**, engine driven generator serving the dedicated branch circuit specified in 10.6.10 and arranged in accordance with 10.6.11.3.1, and storage batteries dedicated to the system with a minimum 4-hr capacity arranged in accordance with 10.6.10

NFPA 72, 10.6.7.3

SECONDARY POWER SOURCE
STORAGE BATTERIES

Capacity
Shall have the capacity to operate the fire alarm system in a non-alarm mode for 24-hrs
AND
After the 24-hr non-alarm mode the system shall be capable of operation for 5 minutes.
Note: there are instances where a longer time may be required.
NFPA 72, 10.6.7.2

SECONDARY POWER SOURCE STORAGE BATTERIES

Continuity of Power

Batteries to automatically provide power within 10 second of the loss of the primary power.

NFPA 72, 10.6.6.1

Batteries and UPS arranged in accordance with NFPA 111, Standard on Stored Electrical Energy.

NFPA 72, 10.6.6.3.1

SECONDARY POWER SOURCE STORAGE BATTERIES

Marking of Batteries

Batteries are to be marked with the month/year by the mfg. Where not marked with the month/year then the installer must obtain the date code and mark the battery with the month/year of battery mfg.

NFPA 72, 10.6.10.1

FIRE ALARM SIGNAL DEACTIVATION

Turning off activated alarm notification is allowed but notification deactivation means shall be key operated or located within a locked cabinet, or arranged to provide equivalent protection.

NFPA 72, 10.13

FIRE ALARM SIGNAL ACTIVATION

If you deactivate the fire alarm signal it must be able to be activated by a fire condition.
If you deactivate the fire alarm signal when there is no alarm condition then an audible trouble notification signal must sound until the system is restored to normal.

NFPA 72, 10.13.5

INSTALLATION & DESIGN

All systems shall be installed in accordance with the specifications and standards approved by the AHJ

NFPA 72, 10.4.1*

Devices and appliances shall be located & mounted so that accidental operation or failure is not caused by vibration or jarring.

NFPA 72, 10.4.2

INSTALLATION & DESIGN

Equipment shall be installed in locations where conditions do not exceed the voltage, temperature, and humidity limits specified in the manufacturer's published instructions.

NFPA 72, 10.4.3

In areas that are not continuously occupied, automatic smoke detection shall be provided at the location of each fire alarm control unit(s), notification appliance circuit power extender, and supervising station transmitting equipment to provide notification of fire at that location

NFPA 72, 10.4.4*

INSTALLATION & DESIGN

Annunciation & Annunciation Zoning
Alarm Annunciation

Visible annunciation of the location of an operated initiating device shall be by an indicator lamp, alphanumeric display, printout, or other approved means.

Don't confuse term "Annunciation" with occupant notification

NFPA 72, 10.18.1.1.1

INSTALLATION & DESIGN

Annunciation & Annunciation Zoning
Supervisory and Trouble Annunciation

Visible annunciation of the location of an operated initiating device shall be by an indicator lamp, alphanumeric display, printout, or other approved means.

NFPA 72, 10.18.2.1.1

INSTALLATION & DESIGN

Annunciation & Annunciation Zoning
Supervisory and Trouble Annunciation

Visible annunciation of the location of an operated initiating device shall be by an indicator lamp, alphanumeric display, printout, or other approved means.

NFPA 72, 10.18.2.1.1

INSTALLATION & DESIGN

Annunciation Access & Location

Visible annunciation of the location of an operated initiating device shall be by an indicator lamp, alphanumeric display, printout, or other approved means.

NFPA 72, 10.18.2.1.1

INSTALLATION & DESIGN

The fire alarm system shall identify the specific initiating device address, location, device type, floor level where applicable and status including of normal, alarm, trouble and supervisory status, as appropriate.

NOTE: This is new for 2015 and would indicate that an addressable fire alarm system is required.

MBC, 907.6.3 IFC, 907.6.3

INSTALLATION & DESIGN

EXCEPTIONS TO 907.6.3

1. Fire alarm systems in single story bldgs less than 22,500ft²
2. Fire alarm systems that only include manual fire alarm boxes waterflow initiating devices and not more than 10 additional alarm-initiating devices.
3. Special initiating devices that do not support individual device identification.
4. Fire alarm systems or devices that are replacing existing equipment.

MBC, 907.6.3 IFC, 907.6.3

INSTALLATION & DESIGN

Annunciation

The initiating device status shall be annunciated at an approved on-site location.

MBC, 907.6.3.1 IFC, 907.6.3.1

All required annunciation shall be readily accessible to responding personnel.

NFPA 72, 10.18.3.1

INSTALLATION & DESIGN

Annunciation Zoning

Each floor is a separate zone.

NFPA 72, 10.18.5.1

If each floor is divided into zones by fire or smoke barrier walls and occupants are removed from one zone to another zone on one floor then each zone is annunciated separately

NFPA 72, 10.18.5.2

INSTALLATION & DESIGN

Annunciation Zoning

Where multiple bldgs are served by this system then each bldg must be separately.

NFPA 72, 10.18.5.3

INSTALLATION & DESIGN

Monitoring Integrity of Installation Conductors & other Signaling Channels

Unless otherwise permitted or required by 12.6.3 through 12.16.14, all means of interconnecting equipment, devices, and appliances and wiring connections shall be monitored for the integrity of the interconnecting conductors or equivalent path so that the occurrence of a single open or ground fault condition in the installation conductors or other signaling channels is automatically indicated within 200 seconds.

NFPA 72, 12.6

INSTALLATION & DESIGN

Monitoring Integrity of Power Supplies

Unless otherwise permitted or required by 10.6.9.1.3 and 10.6.9.1.6, all primary & secondary power supplies shall be monitored for the presents of voltage at the point of connection to the system.

NFPA 72, 106.9

INSTALLATION & DESIGN

Approval & Acceptance

MBC, 901.5 & 907.7

IFC, 901.5 & 907.7

NFPA 72, 14.4.1

Who conducts the Acceptance Test
Bldg. Inspectors, Electrical Inspectors
Fire Inspectors

All Working Together!!!

**INITIATING DEVICES
GENERAL REQUIREMENTS**

Protection From Mechanical Damage

Where subject to mechanical damage and initiating device shall be protected and the protection device must be listed.

NFPA 72, 17.4.2

**INITIATING DEVICES
GENERAL REQUIREMENTS**

Protection From Mechanical Damage

Where subject to mechanical damage and initiating device shall be protected and the protection device must be listed.

NFPA 72, 17.4.2

**INITIATING DEVICES
GENERAL REQUIREMENTS**

Supported Independently

Supported independently of their attachment to the circuit conductors.

NFPA 72, 17.4.3

**INITIATING DEVICES
GENERAL REQUIREMENTS**

Accessibility

Initiating devices shall be installed in a manner that provides accessibility for periodic inspection, testing, and maintenance.

(NFPA 72, 17.4.4)

**INITIATING DEVICES
GENERAL REQUIREMENTS**

Accessibility

Where smoke detectors are installed in concealed locations more than 10 ft. above the finished floor or in arrangements where the detector's alarm or supervisory indicator is not visible to responding personnel, the detectors shall be provided with remote alarm or supervisory indication in a location acceptable to the AHJ.

(NFPA 72, 17.4.7)

**INITIATING DEVICES
GENERAL REQUIREMENTS**

Accessibility

Where smoke detectors are installed in concealed locations more than 10 ft. above the finished floor or in arrangements where the detector's alarm or supervisory indicator is not visible to responding personnel, the detectors shall be provided with remote alarm or supervisory indication in a location acceptable to the AHJ.

(NFPA 72, 17.4.7)

**INITIATING DEVICES
DETECTOR COVERAGE**

Partial
Where codes such as the MBC list the areas to be covered.

Selective
Intended to address only a specific hazard.

NFPA 72, 17.5.3.2

**INITIATING DEVICES
DETECTOR COVERAGE**

Nonrequired
Installed for reasons of achieving specific fire safety objectives, but not required by law, codes , or standards but must be installed per NFPA 72 except for prescriptive spacing criteria of chapter 17.

NFPA 72, 17.5.3.3

**INITIATING DEVICES
TYPES OF DETECTORS**

- Air Sampling-Type Detector
- Automatic Fire Detector
- Combination Detector
- Electrically Conductivity Heat Detectors
- Fire-Gas Detector
- Fixed-Temperature Detector
- Flame Detector

INITIATING DEVICES
TYPES OF DETECTORS

- Heat Detector
- Line-type Detector
- Multi-Criteria Detector
- Multi-Sensor Detector
- Other Fire Detector

INITIATING DEVICES
TYPES OF DETECTORS

Heat Sensing Fire Detector

- ✗ Fixed temperature
- ✗ Rate-compensation
- ✗ Rate –of-rise

Further classified

- ✗ Spot-type device
- ✗ Line-type device

NFPA 72, 17.6

INITIATING DEVICES
TYPES OF DETECTORS

Heat Sensing

INITIATING DEVICES
SMOKE-SENSING DETECTORS

Performance-based vs Prescriptive designs
Performance-based design shall state the performance objective of the system. This includes the description of the detector placement and the intended response of the fire alarm control unit to the detector activation.

NFPA 72, 17.7.1.1

INITIATING DEVICES
SMOKE-SENSING DETECTORS

The prescriptive requirements shall be applied only where detectors are installed in ordinary in door locations.

NFPA 72, 17.7.1.4

INITIATING DEVICES
SMOKE-SENSING DETECTORS

The selection and placement of smoke detectors shall take into account both the performance characteristics of the detector and the area into which the detectors are to be installed to prevent unintentional alarms or improper operation after installation.

NFPA 72, 17.7.1.1

INITIATING DEVICES
SMOKE-SENSING DETECTORS

Unless specifically designed and listed for expected conditions smoke detectors shall not be used if any of the following conditions exist.

1. Temperature below 32 degrees F
2. Temperature above 100F
3. Relative humidity above 93%
4. Air velocity greater than 300 ft/min

NFPA 72, 17.7.1.8*

INITIATING DEVICES
SMOKE-SENSING DETECTORS

Location of smoke detectors shall be based on an evaluation of potential ambient sources of smoke, moisture, dust, or fumes, and electrical or mechanical influences, to minimize nuisance alarms.

NFPA 72, 17.7.1.9*

INITIATING DEVICES
SMOKE-SENSING DETECTORS

The effect of stratification shall below the ceiling shall be taken into account.

NFPA 72, 17.7.1.10*

INITIATING DEVICES SMOKE-SENSING DETECTORS

Smoke detectors are to be marked with their nominal production sensitivity and tolerance (%per foot obscuration), as required by the listing.

NFPA 72, 17.7.2*

INITIATING DEVICES SMOKE-SENSING DETECTORS

Location & Spacing

The location & spacing of smoke detectors shall be based upon the anticipated smoke flows due to the plume and ceiling jet produced by the anticipated fire, as well as other pre-existing ambient airflow that could exist in the protected compartment

NFPA 72, 17.7.3.1.1*

INITIATING DEVICES SMOKE-SENSING DETECTORS

Ceiling Jet

Plumb

Smoke plumb and Jet Example

INITIATING DEVICES SMOKE-SENSING DETECTORS

The design shall account for the contribution of the following factors in predicting detector response to the anticipated fires to which the system is intended to respond:

- (1) Ceiling shape and surface
- (2) Ceiling height
- (3) Configuration of contents in the protected area
- (4) Combustion characteristics and probable equivalence ratio of the anticipated fires involving the fuel loads within the protected area
- (5) Compartment ventilation
- (6) Ambient temperature, pressure, altitude, humidity, and atmosphere

NFPA 72, 17.7.3.1.2

INITIATING DEVICES SPOT TYPE SMOKE DETECTORS

Spot-type smoke detectors shall be located on the ceiling or, if on a sidewall, between the ceiling and 12 in. (300 mm) down from the ceiling to the top of the detector.

NFPA 72, 17.7.3.1.2

INITIATING DEVICES SPOT TYPE SMOKE DETECTORS

Accessibility & the maintenance of spot detectors cannot be overemphasized.

Other types of detection may be necessary.

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
4" distance
is gone
)

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS

To minimize dust contamination, smoke detectors, where installed under raised floors, shall be mounted only in an orientation for which they have been listed.

NFPA 72, 7.3.2.2

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS

INITIATING DEVICES SPOT TYPE SMOKE DETECTORS

In the absence of specific performance-based design criteria, one of the following requirements shall apply:

1. The distance between smoke detectors shall not exceed a nominal spacing of 30 ft . (9.1 m) and there shall be detectors within a distance of one-half the nominal spacing, measured at right angles from all walls or partitions extending upward to within the top 15 percent of the ceiling height.

INITIATING DEVICES SPOT TYPE SMOKE DETECTORS

The 30 ft (9.1 m) spacing is a guide for prescriptive designs. The use of such a spacing is based upon customary practice in the fire alarm community.

Where there are explicit performance objectives for the response of the smoke detection system, the performance-based design methods outlined in Annex B should be used.

For the purposes of this section, "nominal 30 ft (9.1 m)" should be determined to be 30 ft ±5 percent [± 18 in.].

NFPA 72, A.17.7.3.2.3.1

INITIATING DEVICES SPOT TYPE SMOKE DETECTORS

2. All points on the ceiling shall have a detector within a distance equal to or less than 0.7 times the nominal 30 ft. (9.1 m) spacing (0.7S).

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS

This is useful in calculating locations in corridors or irregular areas. For irregularly shaped areas, the spacing between detectors can be greater than the selected spacing, provided the maximum spacing from a detector to the farthest point of a sidewall or corner within its zone of protection is not greater than 0.7 times the selected spacing (0.7S).

NFPA 72, A.17.7.3.2.3.1(2)

INITIATING DEVICES

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS

In all cases, the manufacturer's published instructions shall be followed.

NFPA 72, 17.7.3.2.3.2

Other spacing shall be permitted to be used depending on ceiling height, different conditions, or response requirements.

NFPA 72, 17.7.3.2.3.3

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Joist & Beams

Solid joists shall be considered equivalent to beams for smoke detector spacing guidelines.

NFPA 72, 17.7.3.2.4.1

For level ceilings, the following shall apply:

1. For ceilings with beam depths of less than 10 percent of the ceiling height (0.1 H), smooth ceiling spacing shall be permitted. Spot-type smoke detectors shall be permitted to be located on ceilings or on the bottom of beams.

NFPA 72, 7.3.2.4.2

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Joist & Beams

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Joist & Beams (Con't)

(2) For ceilings with beam depths equal to or greater than 10 percent of the ceiling height (0.1 H), the following shall apply:

- (a) Where beam spacing is equal to or greater than 40 percent of the ceiling height (0.4 H), spot-type detectors shall be located on the ceiling in each beam pocket.
- (b) Where beam spacing is less than 40 percent of the ceiling height (0.4 H), the following shall be permitted for spot detectors:
 - i. Smooth ceiling spacing in the direction parallel to the beams and at one-half smooth ceiling spacing in the direction perpendicular to the beams
 - ii. Location of detectors either on the ceiling or on the bottom of the beams

NFPA 72, 7.3.2.4.2

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Joist & Beams (Con't)

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Joist & Beams (Con't)

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Joist & Beams (Con't)

(3)* For beam pockets formed by intersecting beams, including waffle or pan-type ceilings, the following shall apply:

(a) For beam depths less than 10 percent of the ceiling height (0.1 H), spacing shall be in accordance with 17.7.3.2.4.2(1).

(b) For beam depths greater than or equal to 10 percent of the ceiling height (0.1 H), spacing shall be in accordance with 17.7.3.2.4.2(2).

NFPA 72, 7.3.2.4.2.(3)

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Joist & Beams (Con't)
(4)* For corridors 15 ft (4.6 m) in width or less having ceiling beams or solid joists perpendicular to the corridor length, the following shall apply:
(a) Smooth ceiling spacing shall be permitted.
(b) Location of spot-type smoke detectors on ceilings, sidewalls, or the bottom of beams or solid joists
NFPA 72, 7.3.2.4.2.(4)

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Joist & Beams (Con't)
(5) For rooms of 900 ft² (84 m) or less, the following shall be permitted:
(a) Use of smooth ceiling spacing
(b) Location of spot-type smoke detectors on ceilings or on the bottom of beams
NFPA 72, 7.3.2.4.2.(5)

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Joist & Beams (Con't)
(5) For rooms of 900 ft² (84 m) or less, the following shall be permitted:
(a) Use of smooth ceiling spacing
(b) Location of spot-type smoke detectors on ceilings or on the bottom of beams
NFPA 72, 7.3.2.4.2.(5)

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Joist & Beams (Con't)
Note: Similar requirements for sloping ceilings with beams. See 17.7.3.2.4.3

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS
Peaked Ceilings
Detectors shall first be spaced and located within 36 in. (910 mm) of the peak, measured horizontally. The number and spacing of additional detectors, if any, shall be based on the horizontal projection of the ceiling.
NFPA 72, 17.7.3.3

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS

Shed Ceilings

Detectors shall first be spaced and located within 36 in. (910 mm) of the peak, measured horizontally. The number and spacing of additional detectors, if any, shall be based on the horizontal projection of the ceiling.

NFPA 72, 7.3.4

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS

Raised Floors & Suspended Ceilings

Spaces beneath raised floors and above suspended ceilings shall be treated as separate rooms for smoke detector spacing purposes. Detectors installed beneath raised floors or above suspended ceilings, or both, including raised floors and suspended ceilings used for environmental air, shall not be used in lieu of providing detection within the room.

NFPA 72, 7.3.5

INITIATING DEVICES
SPOT TYPE SMOKE DETECTORS

Projected Beam-Type Smoke Detector
Considered equivalent to a row of spot-type smoke detectors for level or sloping ceiling application.

NFPA 72, 7.3.7

INITIATING DEVICES

HEATING, VENTILATING, HVAC

In spaces served by air-handling systems, detectors shall not be located where airflow prevents operation of the detectors.

NFPA 72, 7.4.1*

INITIATING DEVICES

HEATING, VENTILATING, HVAC

Detectors should not be located in a direct airflow or closer than 36 in. (910 mm) from an air supply diffuser or return air opening. Supply or return sources larger than those commonly found in residential and small commercial establishments can require greater clearance to smoke detectors. Similarly, smoke detectors should be located farther away from high velocity air supplies. See B.4.10.

NFPA 72, A.7.4.1

INITIATING DEVICES

HEATING, VENTILATING, HVAC

In under-floor spaces and above-ceiling spaces that are used as HVAC plenums, detectors shall be listed for the anticipated environment as required by 17.7.1.8. Detector spacing's and locations shall be selected on the basis of anticipated airflow patterns and fire type.

NFPA 72, A.7.4.2

INITIATING DEVICES
HEATING, VENTILATING, HVAC

Detectors placed in environmental air ducts or plenums shall not be used as a substitute for open area detectors. Where detectors are used for the control of smoke spread, the requirements of 17.7.5 shall apply. Where open area protection is required, 17.7.3 shall apply.

NFPA 72, 7.4.3*

INITIATING DEVICES
HEATING, VENTILATING, HVAC

Smoke detectors installed in ducts shall be listed for the air velocity, temperature and humidity present in the duct. Duct detectors shall be connected to the building's fire alarm control unit when a fire alarm system is required. Activation of a duct smoke detector shall initiate a visible and audible supervisory signal at a constantly attended location and shall perform the intended fire safety function in accordance with the IFC & MBC.

MBC 907.3.1 IFC 907.3.1

INITIATING DEVICES
HEATING, VENTILATING, HVAC

Smoke detectors installed in ducts shall be listed for the air velocity, temperature and humidity present in the duct. Duct detectors shall be connected to the building's fire alarm control unit when a fire alarm system is required. Activation of a duct smoke detector shall initiate a visible and audible supervisory signal at a constantly attended location and shall perform the intended fire safety function in accordance with the IFC & MBC.

MBC 907.3.1 IFC 907.3.1

INITIATING DEVICES HEATING, VENTILATING, HVAC

In facilities that are required to be monitored by a supervising station, duct smoke detectors shall report only as a supervisory signal & not as a fire alarm. They are not to be used as a substitute for required open detection.

MBC 907.3.1 IFC 907.3.1

INITIATING DEVICES HEATING, VENTILATING, HVAC

Exceptions:

- ✘ The supervisory signal at a constantly attended location is not required where duct smoke detectors activate the bldgs fire alarm system.
- ✘ In occupancies not required to be equipped with a fire alarm system actuation shall activate a visible and an audible signal in an approved location. Smoke detector trouble signal shall activate a visible or audible signal in an approved location and

MBC 907.3.1 IFC 907.3.1

INITIATING DEVICES SD FOR DOOR RELEASE

Automatic-closing doors installed where required shall be automatic-closing by the actuation of smoke detectors install in accordance with Section 907.3..... And shall not have more than a 10 sec delay

MBC 716, 5.9

**INITIATING DEVICES
SD FOR DOOR RELEASE**

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.

NFPA 72, 17.7.5.6.1

**INITIATING DEVICES
SD FOR DOOR RELEASE**

Smoke detectors that are used exclusively for smoke door release service shall be located and spaced as required by 17.7.5.6.

NFPA 72, 17.7.5.6.2 MBC 907.3. IFC 907.3.

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INITIATING DEVICES
SPRINKLER WATER FLOW ALARMS

Activation of the initiating device shall occur within 90 seconds of waterflow at the alarm-initiating device when flow occurs that is equal to or greater than that from a single sprinkler of the smallest orifice size installed in the system.

NFPA 72, 17.12.2* MBC 907.3. IFC 907.3.

INITIATING DEVICES
DETECTION OF OPERATION OF OTHER AUTOMATIC EXTINGUISHING SYSTEMS

The operation of fire extinguishing systems or suppression systems shall initiate an alarm signal by alarm-initiating devices installed in accordance with their individual listings.

Includes: flow of H2o in foam systems, pump activity, differential pressure, pressure in suppression systems, and mechanical operation of a release mechanism.

NFPA 72, 17.13* MBC 907.3. IFC 907.3.

INITIATING DEVICES
MANUALLY ACTUATED ALARM-INITIATING DEVICES

Manually actuated alarm-initiating devices for initiating signals other than for fire alarm shall be permitted if the devices are differentiated from manual fire alarm boxes by a color other than red and labeling.

NFPA 72, 17.14.1

INITIATING DEVICES

MANUALLY ACTUATED ALARM-INITIATING DEVICES

Manually actuated alarm-initiating devices shall be securely mounted.

NFPA 72, 17.14.3

Manually actuated alarm-initiating devices shall be mounted on a background of contrasting color.

NFPA 72, 14.6

INITIATING DEVICES

MANUALLY ACTUATED ALARM-INITIATING DEVICES

The operable part of a manually actuated alarm-initiating device shall be not less than 42 in. (1.07 m) and not more than 48 in. (1.22 m) from the finished floor.

NFPA 72, 17.14.5

INITIATING DEVICES

MANUALLY ACTUATED ALARM-INITIATING DEVICES

The operable part of a manually actuated alarm-initiating device shall be not less than 42 in. (1.07 m) and not more than 48 in. (1.22 m) from the finished floor.

NFPA 72, 17.14.5

Listed protective covers shall be permitted to be installed over single- or double action manually actuated alarm-initiating devices.

NFPA 72, 17.14.7*

INITIATING DEVICES

MANUALLY ACTUATED ALARM-INITIATING DEVICES

Manual fire alarm boxes shall be installed so that they are conspicuous, unobstructed, and accessible.

NFPA 72, 17.14.8.2

Unless installed in an environment that precludes the use of red paint or red plastic, manual fire alarm boxes shall be red in color.

NFPA 72, 17.14.8.3*

INITIATING DEVICES

MANUALLY ACTUATED ALARM-INITIATING DEVICES

17.14.8.4 Manual fire alarm boxes shall be located within 5 ft (1.5 m) of each exit doorway on each floor.

NFPA 72, 17.14.8.3

17.14.8.5* Additional manual fire alarm boxes shall be provided so that the travel distance to the nearest manual fire alarm box will not exceed 200 ft (61 m), measured horizontally on the same floor.

NFPA 72, 17.14.8.*)

INITIATING DEVICES

MANUALLY ACTUATED ALARM-INITIATING DEVICES

Manual fire alarm boxes shall be located within 5 ft (1.5 m) of each exit doorway on each floor.

NFPA 72, 17.14.8.4

Additional manual fire alarm boxes shall be provided so that the travel distance to the nearest manual fire alarm box will not exceed 200 ft (61 m), measured horizontally on the same floor.

NFPA 72, 17.14.8.5*)

INITIATING DEVICES

MANUALLY ACTUATED ALARM-INITIATING DEVICES

Manual fire alarm boxes shall be mounted on both sides of grouped openings over 40 ft (12.2 m) in width, and within 5 ft (1.5 m) of each side of the grouped opening.

NFPA 72, 17.14.8.6

INITIATING DEVICES

SUPERVISORY SIGNAL – INITIATING DEVICES

- × Control valves
- × Pressure Supervisory
 1. Pressure tanks
 2. Dry-type sprinklers low & high pressure
 3. Steam Pressure
 4. Water Level
 5. Water Temp
 6. Room Temp

NFPA 72, 17.16

NOTIFICATION APPLIANCES

All notification appliances installed in conformity with Chapter 18 shall be listed for the purpose for which they are used.

NFPA 72, 18.3.1

NOTIFICATION APPLIANCES

All notification appliances installed in conformity with Chapter 18 shall be listed for the purpose for which they are used.

NFPA 72, 18.3.1

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

NFPA 72, 18.3.3.1

NOTIFICATION APPLIANCES

Appliances subject to mechanical damage shall be suitably protected. All notification appliances installed in conformity with Chapter 18 shall be listed for the purpose for which they are used.

NFPA 72, 18.3.4.1

If guards, covers, or lenses are employed, they shall be listed for use with the appliance.

NFPA 72,18.3..4.2

NOTIFICATION APPLIANCES AUDIBLE CHARACTERISTICS

An average ambient sound level greater than 105 dBA shall require the use of a visible notification appliance(s) in accordance with Section 18.5 where the application is public mode or Section 18.6 where the application is private mode.

NFPA 72, 18.4.1.1

NOTIFICATION APPLIANCES AUDIBLE CHARACTERISTICS

Sound from normal or permanent sources, having a duration greater than 60 seconds, shall be included when measuring maximum ambient sound level. Sound from temporary or abnormal sources shall not be required to be included when measuring maximum ambient sound level.

NFPA 72, 18.4.1.3

NOTIFICATION APPLIANCES AUDIBLE CHARACTERISTICS

Voice messages shall not be required to meet the audibility requirements of 18.4.3 (Public Mode Audible Requirements), 18.4.4 (Private Mode Audible Requirements), 18.4.5 (Sleeping Area Requirements), or 18.4.6 (Narrow Band Tone Signaling for Exceeding Masked Thresholds), but shall meet the intelligibility requirements of 18.4.10 where voice intelligibility is required.

NFPA 72, 18.4.1.5*

NOTIFICATION APPLIANCES DISTINCTIVE EVACUATION SIGNAL

To meet the requirements of Section 10.10, the alarm audible signal pattern used to notify building occupants of the need to evacuate (leave the building) or relocate (from one area to another) shall be the standard alarm evacuation signal consisting of a three-pulse temporal pattern. The pattern shall be in accordance with Figure 18.4.2.1 and shall consist of

the following in this order:

- (1) "On" phase lasting 0.5 second ± 10 percent
- (2) "Off" phase lasting 0.5 second ± 10 percent for three successive "on" periods
- (3) "Off" phase lasting 1.5 seconds ± 10 percent

Exception: Where approved by the authority having jurisdiction, continued use of the existing consistent evacuation signaling scheme shall be permitted.

NFPA 72, 18.4.2.1*

**NOTIFICATION APPLIANCES
DISTINCTIVE EVACUATION SIGNAL**

**NOTIFICATION APPLIANCES
OPERATING MODE**
Private or Public

Private: Private Operating Mode. Audible or visible signaling only to those persons directly concerned with the implementation and direction of emergency action initiation and procedure in the area protected by the fire alarm system.

**NOTIFICATION APPLIANCES
OPERATING MODE**
Public Mode

To ensure that audible public mode signals are clearly heard, unless otherwise permitted by 18.4.3.2 through 18.4.3.5, they shall have a sound level at least 15 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5 ft. (1.5 m) above the floor in the area required to be served by the system using the A-weighted scale (dBA).

NFPA 72, 18.4.3.1* **MBC 907.5.2.1** **IFC 907.5.2.1**

NOTIFICATION APPLIANCES

OPERATING MODE

Public Mode

To ensure that audible public mode signals are clearly heard, unless otherwise permitted by 18.4.3.2 through 18.4.3.5, they shall have a sound level at least 15 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5 ft. (1.5 m) above the floor in the area required to be served by the system using the A-weighted scale (dBA).

NFPA 72, 18.4.3.1* MBC 907.5.2.1 IFC 907.5.2.1

NOTIFICATION APPLIANCES

OPERATING MODE

Public Mode

The maximum sound pressure level for audible alarm notification appliances shall be 110 dBA at the minimum hearing distance from the audible appliance. Where the average ambient noise is greater than 95 dBA, visible alarm notification appliances shall be provided in accordance with NFPA 72 and audible alarm notification appliances shall not be required.

MBC 907.5.2.1 .2 IFC 907.5.2.1.2

OPERATING MODE

NOTIFICATION APPLIANCES

OPERATING MODE

Public Mode

Where approved by the authority having jurisdiction or other governing codes or standards, the requirements for audible signaling shall be permitted to be reduced or eliminated when visible signaling is provided in accordance with Section 18.5.

NFPA 72, 18.4.3.2

NOTIFICATION APPLIANCES

OPERATING MODE

Public Mode

Audible alarm notification appliances installed in elevator cars shall be permitted to use the audibility criteria for private mode appliances detailed in 18.4.4.1.

NFPA 72, 18.4.3.2

NOTIFICATION APPLIANCES

OPERATING MODE

Public Mode

If approved by the authority having jurisdiction, audible alarm notification appliances installed in restrooms shall be permitted to use the audibility criteria for private mode appliances detailed in 18.4.4.1.

NFPA 72, 18.4.3.4

NOTIFICATION APPLIANCES

OPERATING MODE

Public Mode

A signaling system arranged to stop or reduce ambient noise shall produce a sound level at least 15 dB above the reduced average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds after reduction of the ambient noise level, whichever is greater, measured 5 ft (1.5 m) above the floor in the area required to be served by the system using the A-weighted scale (dBA).

NFPA 72, 18.4.3.5.1

NOTIFICATION APPLIANCES

OPERATING MODE

Private Mode

To ensure that audible private mode signals are clearly heard, they shall have a sound level at least 10 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds, whichever is greater, measured 5 ft (1.5m) above the floor in the area required to be served by the system using the A-weighted scale (dBA).

NFPA 72, 18.4.4.1*

NOTIFICATION APPLIANCES

SLEEPING AREAS

Where audible appliances are installed to provide signals for sleeping areas, they shall have a sound level of at least 15 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds or a sound level of at least 75 dBA, whichever is greater, measured at the pillow level in the area required to be served by the system using the A-weighted scale (dBA).

NFPA 72, 18.4.4.1*

NOTIFICATION APPLIANCES

SLEEPING AREAS

Audible appliances provided for the sleeping areas to awaken occupants shall produce a low frequency alarm signal that complies with the following:

- (1) The alarm signal shall be a square wave or provide equivalent awakening ability.
- (2) The waveform shall have a fundamental frequency of 520 Hz ± 10 percent.
- (3)* The notification equipment shall be listed for producing the low frequency waveform.

NFPA 72, 18.4.5.3*

NEW

NOTIFICATION APPLIANCES

SLEEPING AREAS

Narrow Band Tone Signaling for Exceeding Masked Thresholds.

(NFPA 72, 18.4.6*)

Exit Marking Audible Notification Appliance.

- ✘ Directional Sounder
- ✘ Different sound from notification appliance.

NFPA 72, 18.4.7

LOCATION OF AUDIBLE NOTIFICATION APPLIANCES FOR BUILDING OR STRUCTURE

If ceiling heights allow, and unless otherwise permitted by 18.4.8.2 through 18.4.8.5, wall-mounted appliances shall have their tops above the finished floors at heights of not less than 90 in. (2.29 m) and below the finished ceilings at distances of not less than 6 in. (150 mm).

NFPA 72, 18.4.8.1

LOCATION OF AUDIBLE NOTIFICATION APPLIANCES FOR BUILDING OR STRUCTURE

Ceiling-mounted or recessed appliances shall be permitted.
(NFPA 72, 18.4.8.2)

If combination audible/visible appliances are installed, the location of the installed appliance shall be determined by the requirements of 18.5.5.
NFPA 72, 18.4.8.3

LOCATION OF AUDIBLE NOTIFICATION APPLIANCES FOR BUILDING OR STRUCTURE

Ceiling-mounted or recessed appliances shall be permitted.
(NFPA 72, 18.4.8.2)

If combination audible/visible appliances are installed, the location of the installed appliance shall be determined by the requirements of 18.5.5.
NFPA 72, 18.4.8.3

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

The flash rate shall not exceed two flashes per second (2 Hz) nor be less than one flash every second (1 Hz) throughout the listed voltage range of the appliance.
(NFPA 72, 18.5.3.1)

The maximum light pulse duration shall be 20 milliseconds with a maximum duty cycle of 40 percent.
NFPA 72, 18.5.3.2 **NEW**

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

The flash rate shall not exceed two flashes per second (2 Hz) nor be less than one flash every second (1 Hz) throughout the listed voltage range of the appliance.

(NFPA 72, 18.5.3.1)

Lights used to signal occupants to seek information or instructions shall be clear, nominal white, or other color as required by the emergency plan and the authority having jurisdiction for the area or building.

NFPA 72, 18.5.3.5

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

The strobe synchronization requirements of this chapter shall not apply where the visible notification appliances located inside the building are viewed from outside of the building.

NFPA 72, 18.5.3.6*

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

Wall-mounted appliances shall be mounted such that the entire lens is not less than 80 in. (2.03 m) and not greater than 96 in. (2.44 m) above the finished floor or at the mounting height specified using the performance-based alternative of 18.5.5.6.

NFPA 72, 18.5.5.1*

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

If ceiling heights exceed 30 ft (9.14 m), ceiling-mounted visible notification appliances shall be suspended at or below 30 ft (9.14 m) or at the mounting height determined using the performance-based alternative of 18.5.5.6, or wall-mounted visible notification appliances shall be installed in accordance with Table 18.5.5.4.1(a).

NFPA 72, 18.5.5.4.6*

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

Visible appliances listed for mounting parallel to the floor shall be permitted to be located on the ceiling or suspended below the ceiling.

NFPA 72, 18.5.5.3*

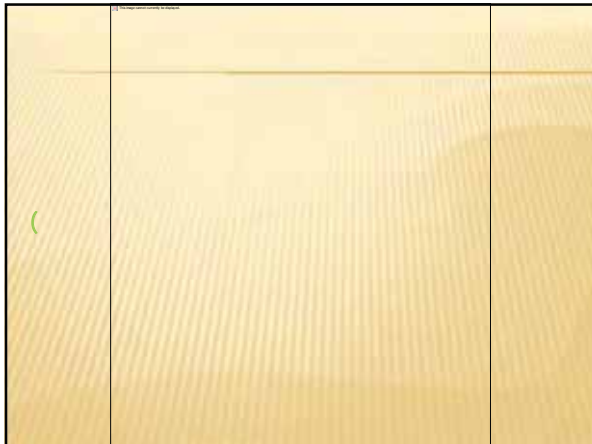
STRUCTURE

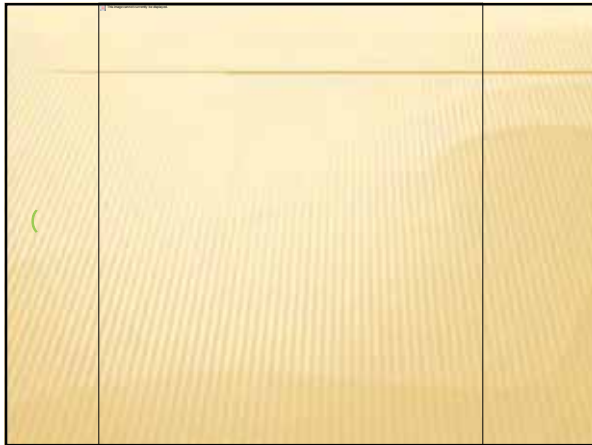
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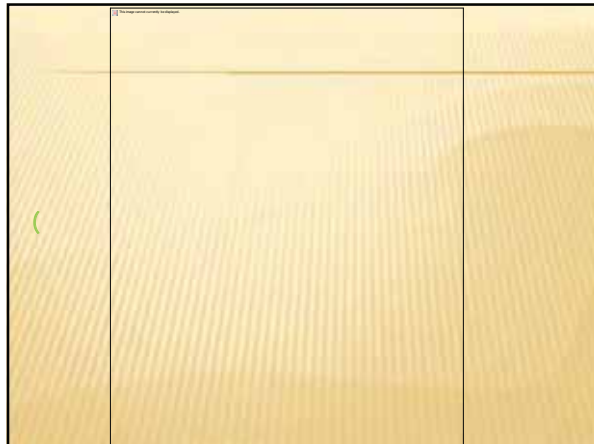




VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

Table 18.5.5.4.1(b) shall be used if the ceiling-mounted visible notification appliance is at the Center of the room. If the ceiling-mounted visible notification appliance is not located at the center of the room, the effective intensity (cd) shall be determined by doubling the distance from the appliance to the farthest wall to obtain the maximum room size.

NFPA 72, 18.5.5.4.7



VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

Spacing in Corridors

Paragraph 18.5.5.5 shall apply to corridors not exceeding 20 ft (6.1 m) in width.

NFPA 72, 18.5.5.5.2

In a corridor application, visible appliances shall be rated not less than 15 cd.

NFPA 72, 18.5.5.5.3

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

Spacing in Corridors

Corridors greater than 20 ft (6.1 m) wide shall comply with the spacing requirements for rooms in accordance with 18.5.5.4.

NFPA 72, 18.5.5.5.4

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

Spacing in Corridors

Visible notification appliances shall be located not more than 15 ft (4.57 m) from the end of the corridor with a separation not greater than 100 ft (30.5 m) between appliances.

NFPA 72, 18.5.5.5.5*

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

Spacing in Corridors

If there is an interruption of the concentrated viewing path, such as a fire door, an elevation change, or any other obstruction, the area shall be treated as a separate corridor.

NFPA 72, 18.5.5.5.6

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

Spacing in Corridors

In corridors where more than two visible notification appliances are in any field of view, they shall flash in synchronization.

NFPA 72, 18.5.5.5.7

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

Sleeping Areas

Combination smoke detectors and visible notification appliances or combination smoke alarms and visible notification appliances shall be installed in accordance with the applicable requirements of Chapters 17, 18, and 29.

NFPA 72, 18.5.5.7.1

VISIBLE APPLIANCES FOR BUILDINGS OR STRUCTURE

Sleeping Areas

Distance from Ceiling to Top of Lens

>24" Minimum intensity = 110 cd

< 24" Minimum intensity = 177 cd

NFPA 72, 18.5.5.7.1

TYPES OF MONITORING AGENCIES

- ✘ Protected Premises
- ✘ Central Station: runner service & UL 827
- ✘ Remote Supervising Station
 - See 26.5.3 Comply w/ NFPA 1221 Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems or central station
- ✘ Proprietary Supervising Station

NFPA 72, 18.5.5.7.1

MONITORING

Fire alarm systems required by this chapter or by the IFC shall be monitored by an approved supervising station in accordance with NFPA 72.

Exception: not required for

- ✘ Smoke alarms
- ✘ Smoke detectors in Group I-3
- ✘ Auto sprinkler systems in 1 & 2 family dwellings

MBC 907.6.6 IFC 907.6.6

MICHIGAN ELECTRICAL CODE NFPA 70

Cables shall be installed in metal raceway or rigid nonmetallic conduit where passing through a floor or wall to a height of 7 ft. above the floor, unless adequate protection can be afforded by building construction or unless an equivalent solid guard is provided

MEC 760.53(2), 760.130(B)(2)

**MICHIGAN ELECTRICAL CODE
NFPA 70**

Cables shall be installed in rigid metal conduit, rigid nonmetallic conduit, intermediate metal conduit, liquid tight flexible nonmetallic conduit or electrical metallic tubing where installed in hoistways.

Exception: As provided for in 620.21 for elevators and similar equipment.

MEC 760.53(A)(3), 760.130(B)(3)

**MICHIGAN ELECTRICAL CODE
NFPA 70**

Refer to Article 760 to determine what type of cable can be used in the manner shown on the drawings.

FA circuits installed in a neat workmanlike manner and supported by the building structure.

MEC 760.24(A)

**MICHIGAN ELECTRICAL CODE
NFPA 70**

Abandoned fire alarm cables shall be removed unless marked for future use.

MEC 760.25

RECORDS

Record Retention

A complete record of the tests and operations of each system shall be kept until the next test and for 1 year thereafter unless more stringent requirements are required elsewhere in this Code.

NFPA 72 7.7.1.1

Required documents regarding system design and function shall be maintained for the life of the system.

NFPA 72, 7.7.1.4

Seven horizontal lines for notes.

RECORDS

Records of completion per NFPA 72 are required.

MBC 907.7.2 IFC 907.7.2 NFPA 72, 7.2.1, 7.5.6

Seven horizontal lines for notes.

DOCUMENT ACCESSIBILITY

With every new system, a documentation cabinet shall be installed at the system control unit or at another approved location at the protected premises.

NFPA 72, 7.7.2.1

The documentation cabinet shall be sized so that it can contain all necessary documentation.

NFPA 72, 7.7.2.2

Seven horizontal lines for notes.

DOCUMENT ACCESSIBILITY

All record documentation shall be stored in the documentation cabinet.

NFPA 72, 7.7.2.3*

The documentation cabinet shall be prominently labeled - SYSTEM RECORD DOCUMENTS.

NFPA 72, 7.7.2.5
