**Chapter 21 Emergency Control Function Interfaces**

21.1\* Application

The provisions of Chapter 21 shall cover the minimum requirements and methods for emergency control function interfaces to fire alarm systems and emergency communications systems in accordance with this chapter.

21.1.1

The requirements of Chapters 7, 10, 14, 17, 18, 23, 24, and 26 shall apply, unless otherwise noted in this chapter.

21.1.2

The requirements of this chapter shall not apply to Chapter 29 unless otherwise stated.

21.2 General

21.2.1\*

Emergency control functions shall be permitted to be performed automatically.

21.2.2

The performance of automatic emergency control functions shall not interfere with power for lighting or for operating elevators.

21.2.3

The performance of automatic emergency control functions shall not preclude the combination of fire alarm services with other services requiring monitoring of operations.

21.2.4\*

Emergency control function interface devices shall be located within 3 ft (0.9 m) of the component controlling the emergency control function where the control circuit is not configured as a Class D circuit.

21.2.5

The emergency control function interface device shall function within the voltage and current limitations of the fire alarm control unit.

21.2.6

The installation wiring between the fire alarm control unit and the emergency control function interface device shall be Class A, Class B, Class D, Class N, or Class X in accordance with Chapter 12.

21.2.7

Emergency control functions shall not interfere with other operations of the fire alarm system.

21.2.8

The method(s) of interconnection between the fire alarm system and emergency control function interface device shall be monitored for integrity in accordance with Section 12.6.

21.2.9

The method(s) of interconnection between the emergency control function interface device and the component controlling the emergency control function shall comply with the applicable provisions of NFPA 70.

21.2.10

The method(s) of interconnection between the emergency control function interface device and the component controlling the emergency control function shall be achieved by one of the following recognized means:

Electrical contacts listed for the connected load

Data communications over a signaling line circuit(s) dedicated to the fire alarm or shared with other premises operating systems

Other listed methods

21.2.11

If a fire alarm system is a component of a life safety network and it communicates data to other systems providing life safety functions, or it receives data from such systems, the following shall apply:

The path used for communicating data shall be monitored for integrity. This shall include monitoring the physical communications media and the ability to maintain intelligible communications.

Data received from the network shall not affect the operation of the fire alarm system in any way other than to display the status of life safety network components.

Where non-fire alarm systems are interconnected to the fire alarm system using a network or other digital communications technique, a signal (e.g., heartbeat, poll, ping, query) shall be generated between the fire alarm system and the non-fire alarm system. Failure of the fire alarm system to receive confirmation of the transmission shall cause a trouble signal to indicate within 200 seconds.

21.3\* Elevator Phase I Emergency Recall Operation

21.3.1

All fire alarm initiating devices used to initiate elevator Phase I Emergency Recall Operation shall be connected to the required building fire alarm system.

21.3.2\*

In facilities without a required building fire alarm system, fire alarm initiating devices used to initiate elevator Phase I Emergency Recall Operation shall be connected to either a nonrequired building fire alarm system or a dedicated function fire alarm control unit that shall be designated as "elevator recall control and supervisory control unit," permanently identified on the dedicated function fire alarm control unit and on the record drawings.

21.3.3 Phase I Emergency Recall Operation Initiation

21.3.3.1

Unless otherwise permitted by 21.3.3.2 or required by the authority having jurisdiction, only the elevator lobby, elevator hoistway, elevator machine room, elevator machinery space, elevator control room, and elevator control space smoke detectors or other automatic fire detection as permitted by 21.3.10 shall be used to initiate Elevator Phase I Emergency Recall Operation.

21.3.3.2

A waterflow switch shall be permitted to initiate Elevator Phase I Emergency Recall Operation upon activation of a sprinkler installed at the bottom of the elevator hoistway (the elevator pit), provided the waterflow switch and pit sprinkler are installed on a separately valved sprinkler line dedicated solely for protecting the elevator pit, and the waterflow switch is provided without time-delay capability.

21.3.4

Each fire alarm initiating device used to initiate elevator Phase I Emergency Recall Operation shall be capable of initiating the elevator recall function when all other devices on the same initiating device circuit have been manually or automatically placed in the alarm condition.

21.3.5\* Elevator Lobby Detector Location

21.3.5.1

A lobby smoke detector shall be located on the ceiling within 21 ft (6.4 m) of the centerline of each elevator door within the elevator bank under control of the detector.

21.3.5.2

For lobby ceiling configurations exceeding 15 ft (4.6 m) in height or that are other than flat and smooth, detector locations shall be determined in accordance with Chapter 17.

21.3.6

Smoke detectors or other automatic fire detection as permitted in 21.3.10 shall not be installed in unsprinklered elevator hoistways unless they are required by ASME A17.1/CSA B44, Safety Code for Elevators and Escalators, for actuation of the elevator hoistway smoke relief equipment and/or to initiate Elevator Phase I Emergency Recall Operation as specified in 21.3.14.1(2) and 21.3.14.2(2) for either of the following:

Hoistway machinery spaces containing a motor controller or driving machine

Control spaces located in the hoistway

21.3.7\*

Fire Alarm Initiating Device(s) Inside Elevator Hoistways. Fire alarm initiating device(s) required to be installed inside an elevator hoistway by other sections of this Code or by other governing laws, codes, or standards shall be required to be accessible for service, testing, and maintenance from outside the elevator hoistway.

21.3.8\*

When sprinklers are required in elevator hoistways by other codes and standards, fire alarm initiating devices shall be installed to initiate Elevator Phase I Emergency Recall Operation in accordance with ASME A17.1/CSA B44, Safety Code for Elevators and Escalators, and the following shall apply:

Where sprinklers are located at the top of the hoistway, the fire detection device(s) shall be located at the top of the hoistway.

Where sprinklers are located at the bottom of the hoistway (the pit), fire detection device(s) shall be installed in the pit in accordance with Chapter 17.

Outputs from the fire alarm system to the elevator system shall comply with 21.3.14.

The fire alarm initiating device(s) shall be installed in accordance with Chapter 17.

21.3.9\*

Smoke detectors shall not be installed in elevator hoistways to initiate Elevator Phase I Emergency Recall Operation unless listed for the environmental conditions.

21.3.10\*

If ambient conditions prohibit installation of automatic smoke detection used to initiate elevator Phase I Emergency Recall Operation, other automatic fire detection initiating devices shall be permitted.

21.3.11

When actuated, any fire alarm initiating device that is used to initiate elevator Phase I Emergency Recall Operation shall be annunciated at the building fire alarm control unit or at the fire alarm control unit described in 21.3.2.

21.3.12

Actuation of the elevator hoistway, elevator machine room, elevator machinery space, elevator control space, or elevator control room smoke detectors or other automatic fire detection as permitted by 21.3.10 shall cause separate and distinct visible annunciation at the building fire alarm control unit or at the fire alarm control unit described in 21.3.2.

21.3.13

Where approved by the authority having jurisdiction, the detectors used to initiate Elevator Phase I Emergency Recall Operation shall be permitted to initiate a supervisory signal in lieu of an alarm signal.

21.3.14

The following three separate outputs from the building fire alarm control unit or the fire alarm control unit described in 21.3.2 to the elevator system shall be provided to implement Elevator Phase I Emergency Recall Operation in accordance with Section 2.27 of ASME A17.1/CSA B44, Safety Code for Elevators and Escalators, as required in 21.3.14.1 and 21.3.14.2:

Designated level associated output

Alternate level associated output

Elevator machine room, elevator machinery space, elevator control space, or elevator control room associated output

21.3.14.1\* Elevator Phase I Emergency Recall Operation to Designated Level

For each elevator or group of elevators operating in a group automatic operation, an output shall be provided from the fire alarm system to the elevator system in response to the following:

Activation of smoke detector(s) or other automatic fire detection as permitted by 21.3.10 located at any associated elevator(s) lobby other than the lobby at the designated level

Activation of smoke detector(s) or other automatic fire detection as permitted by 21.3.10 located at any associated elevator(s) machine room, elevator machinery space containing a motor controller or driving machine, elevator control space, or elevator control room, except where such rooms or spaces are located at the designated level

Activation of smoke detector(s) or other automatic fire detection as permitted by 21.3.10 located at any associated elevator(s) hoistway when sprinklers are located in those hoistways, unless otherwise specified in 21.3.14.2(3)

21.3.14.2\* Elevator Phase I Emergency Recall Operation to Alternate Level

For each elevator or group of elevators operating in a group automatic operation, an output shall be provided from the fire alarm system to the elevator system in response to the following:

Activation of smoke detector(s), or other automatic fire detection as permitted by 21.3.10, located at the designated level lobby served by the elevator(s)

Activation of smoke detector(s), or other automatic fire detection as permitted by 21.3.10, located in the elevator machine room, elevator machinery space containing a motor controller or driving machine, elevator control space, or elevator control room serving the elevator(s) if such rooms or spaces are located at the designated level

\*Activation of the fire alarm initiating device(s) identified in 21.3.14.1(3) if they are installed at or below the lowest level of recall in the elevator hoistway and the alternate level is located above the designated level

21.4 Elevator Power Shutdown

21.4.1\*

When heat detector(s) are used to actuate the disconnecting means described in 2.8 of ASME A17.1/CSA B44, Safety Code for Elevators and Escalators, to disconnect the main line power supply to the affected elevator and any other power supplies used to move the elevator, upon or prior to the activation of sprinkler(s), the detector(s) shall have both a lower temperature rating and a lower response time index (RTI) as compared to the sprinkler(s).

21.4.2\*

The heat detector(s) specified in 21.4.1 shall be placed within 24 in. (610 mm) of each sprinkler and be installed in accordance with the requirements of Chapter 17.

21.4.2.1

Engineering methods, such as those specified in Annex B, shall be permitted to be used to select and place heat detectors to ensure response prior to any sprinkler operation under a variety of fire growth rate scenarios.

21.4.3\*

If pressure or waterflow switches are used to actuate the disconnecting means specified in 21.4.1, the use of devices with time-delay capability shall not be permitted.

21.4.4\*

Control circuit(s) of the disconnecting means specified in 21.4.1 shall be monitored for the presence of operating voltage.

21.4.5

Loss of voltage to the control circuit(s) in 21.4.4shall cause a supervisory signal to be indicated at the building fire alarm control unit or at the control unit specified in or in 21.3.2.

21.4.6

The devices specified in 21.4.2 and 21.4.3 shall be monitored for integrity by the fire alarm control unit specified in 21.3.1 or 21.3.2.

21.5\* Fire Service Access Elevators

Where one or more elevators are specifically designated and marked as fire service access elevators, temperature and presence of smoke in elevator lobbies, machine rooms, control rooms, machinery spaces, or control spaces shall be continuously monitored and displayed on a building fire alarm system annunciator(s), or other annunciator(s) as approved by the authority having jurisdiction.

21.6\* Occupant Evacuation Elevators (OEE)

21.6.1 Elevator Status

Where elevators are to be used for occupant self-evacuation during fires and non-fire emergencies, they shall comply with Sections 21.5 and 21.6.

21.6.2 Occupant Evacuation Operation (OEO)

Outputs from the fire alarm system to the elevator system shall be provided to implement elevator occupant evacuation operation in accordance with Section 2.27 of ASME A17.1/CSA B44, Safety Code for Elevators and Escalators, as required in 21.6.2.1 through 21.6.2.5.

21.6.2.1 Applicability

OEO shall only be initiated upon an automatic or manual signal from the fire alarm system to the elevator system.

21.6.2.1.1\*

OEO shall apply separately to each individual elevator and to elevators having group automatic operation or designated as an elevator group or group of elevators.

21.6.2.1.2\*

OEO shall function per 21.6.2.1.1 only prior to Elevator Phase I Emergency Recall Operation.

21.6.2.2 Partial Building Evacuation

Where an elevator or group of elevators is designated for use by occupants for self-evacuation, the provisions of 21.6.2.3 through 21.6.2.6 shall apply for partial building evacuation.

21.6.2.3 Initiation

OEO shall be initiated by either manual means from the Fire Command Center (FCC) or Emergency Command Center in accordance with 21.6.2.4 or by actuation of an automatic fire alarm initiating device in accordance with 21.6.2.3.1.

21.6.2.3.1\*

An active automatic fire alarm initiating device that does not initiate Elevator Phase I Emergency Recall Operation shall cause the fire alarm system to provide a signal to the elevator system indicating the floor of an active alarm, except as prohibited by 21.6.2.3.6.

21.6.2.3.2\*

The floors to be evacuated shall be a contiguous block of floors designated as "the elevator evacuation zone" consisting of at least the floor with an active alarm, two floors above the floor with the active alarm, and two floors below the floor with the active alarm.

21.6.2.3.3\*

When the floor designated as the elevator discharge level falls within the elevator evacuation zone, it is not to be evacuated by the elevator(s), and the fire alarm system shall initiate a voice message to instruct the occupants on that level to exit the building.

21.6.2.3.4

If activation of an automatic fire alarm initiating device that does not initiate Elevator Phase I Emergency Recall Operation occurs on an additional floor(s), including the elevator discharge level at any time while OEO is in effect, the elevator evacuation zone shall be expanded to include all floors with an active alarm, all floors between the highest and lowest floor with an active alarm, plus two floors above the highest floor with an active alarm and two floors below the lowest floor with an active alarm.

21.6.2.3.5

If the first active alarm is on the elevator discharge level, automatic initiation of OEO shall not be permitted for all elevators having that same elevator discharge level.

21.6.2.3.6\*

When the first active alarm is on an elevator discharge level, the fire alarm system shall not send a signal to the elevator system for that alarm or any other active alarm that does not initiate Elevator Phase I Emergency Recall Operation for that group of elevators.

21.6.2.4\* Manual Floor Selection

21.6.2.4.1

A means shall be furnished at the FCC to provide for the manual selection of each floor in the building.

21.6.2.4.2

The manual floor selection shall be actuated only by authorized or emergency personnel.

21.6.2.4.3

When OEO is not yet in effect and a manual floor selection is made to initiate OEO, a signal shall be sent to the elevator system simulating an active alarm for that floor.

21.6.2.4.4

When OEO is in effect and a manual floor selection is made, the elevator evacuation zone shall be expanded as described in 21.6.2.3.4.

21.6.2.4.5

Each manual selection means shall have the capability to cancel a manually actuated output signal.

21.6.2.5\* Fire Alarm Output Signals to Elevator System

21.6.2.5.1

Output from the fire alarm system to the elevator system shall identify each floor with an actuated automatic fire alarm initiating device.

21.6.2.5.2

Output from the fire alarm system to the elevator system shall include the following:

Floor(s) with any actuated fire alarm initiating device(s)

Floor(s) selected by manual means from the FCC

21.6.2.5.3

The identified floor(s) shall be displayed on the building fire alarm system annunciator at the FCC or on a listed non-fire alarm system annunciator or other annunciator as approved by the authority having jurisdiction.

21.6.2.6\* Occupant Notification

The in-building emergency voice/alarm communications system shall transmit messages coordinated with the elevator system's variable message signs in all elevator lobbies.

21.6.2.6.1

Automatic voice evacuation messages shall be transmitted to the elevator evacuation zone floors to indicate the need to evacuate and that elevator service is available.

21.6.2.6.2

Automatic voice messages shall be transmitted to the floors that are not in the elevator evacuation zone and are served by the group, to inform occupants that elevator service is not available.

21.6.2.6.3\*

Automatic voice messages shall be transmitted to the floors in the elevator evacuation zone when no elevators serving that elevator evacuation zone are available.

21.6.2.6.4\*

Where required by the building code, the emergency voice/alarm communications system's loudspeaker(s) located in each OEE lobby shall be connected to a separate notification zone for manual paging only.

21.6.2.6.4.1

Individual paging zones per each OEE lobby on each floor or a grouped paging zone for all OEE lobbies on a floor shall be permitted if approved.

21.6.2.6.4.2

A vertical paging zone for each elevator group shall be permitted if approved.

21.6.2.6.5

Visual notification appliances (strobes) shall comply with 24.5.17.3(1), 24.5.17.3(2), and 24.5.17.3(3).

21.6.2.7 Total Evacuation

A means to initiate total building evacuation labeled "ELEVATOR TOTAL BUILDING EVACUATION" shall be provided at the FCC.

21.6.2.7.1

When the total building evacuation means is actuated, the fire alarm system shall provide a signal to the elevator system indicating that all floors in the building are to be evacuated.

21.6.2.7.2

When the total building evacuation means is actuated, the in-building fire emergency voice/alarm communications system shall transmit an evacuation message throughout the building.

21.6.2.8\* Suspension of OEO for an Individual Elevator or Group of Elevators

When OEO has been suspended, the in-building fire emergency voice/alarm communications system shall transmit messages coordinated with the elevator system's variable message signs in compliance with 21.6.2.6.

21.6.2.9\* Partial Termination of OEO

21.6.2.9.1

OEO shall be terminated for a specific group of elevator(s) when the signal(s) provided in 21.3.14.1 and 21.3.14.2 associated with this group of elevator(s) has initiated Elevator Phase I Emergency Recall Operation for this group of elevator(s).

21.6.2.9.2

When OEO has been partially terminated, the in-building fire emergency voice/alarm communications system shall transmit messages coordinated with the elevator system's variable message signs in compliance with 21.6.2.6.

21.6.2.10\* Total Termination of OEO

OEO shall be terminated for all elevators in the building upon reset of the fire alarm system.

21.7 Heating, Ventilating and Air-Conditioning (HVAC) Systems

21.7.1

The provisions of Section 21.7 shall apply to the basic method by which a fire alarm system interfaces with the heating, ventilating, and air-conditioning (HVAC) systems.

21.7.2\*

If connected to the fire alarm system serving the protected premises, all detection devices used to cause the operation of HVAC systems, smoke dampers, fire dampers, fan control, smoke doors, or fire doors shall be monitored for integrity in accordance with Section 12.6.

21.7.3

Connections between fire alarm systems and the HVAC system for the purpose of monitoring and control shall operate and be monitored in accordance with applicable NFPA standards.

21.7.4

Smoke detectors mounted in the air ducts of HVAC systems shall initiate a supervisory signal.

21.7.4.1

Smoke detectors mounted in the air ducts of HVAC systems in a fire alarm system without a constantly attended location or supervising station shall be permitted to initiate an alarm signal.

21.7.4.2

Smoke detectors mounted in the air ducts of HVAC systems shall be permitted to initiate an alarm signal where required by other governing laws, codes, or standards.

21.7.5

If the fire alarm control unit actuates the HVAC system for the purpose of smoke control, the automatic alarm-initiating zones shall be coordinated with the smoke control zones they actuate.

21.7.6

If carbon monoxide detection or a dedicated carbon monoxide system initiates a ventilation response, a smoke control response of the fire alarm system shall take precedence over the response of the carbon monoxide detectors during a fire alarm condition.

21.7.7

Where interconnected as a combination system, a fire fighter's smoke control station (FSCS) shall be provided to perform manual control over the automatic operation of the system's smoke control strategy.

21.7.8

Where interconnected as a combination system, the smoke control system programming shall be designed such that normal HVAC operation or changes do not prevent the intended performance of the smoke control strategy.

21.8 High Volume Low Speed (HVLS) Fans

Where required by NFPA 13, all HVLS fans shall be interlocked to shut down upon actuation of a sprinkler waterflow switch that indicates waterflow in the area served by the fans.

21.9 Door and Shutter Release

21.9.1

The provisions of Section 21.9 shall apply to the methods of connection of door and shutter hold-open release devices and to integral door and shutter hold-open release, closer, and smoke detection devices.

21.9.2

Other than smoke detectors used only for door and shutter release and not for open area protection, all detection devices used for door and shutter hold-open release service shall be monitored for integrity in accordance with Section 12.6.

21.9.3

Unless installed as Class D circuits in accordance with 12.3.4, all door and shutter hold-open release and integral door and shutter release and closure devices used for release service shall be monitored for integrity in accordance with Section 12.6.

21.9.4

Magnetic door and shutter holders that allow doors to close upon loss of operating power shall not be required to have a secondary power source.

21.10 Electrically Locked Doors

21.10.1\*

Electrically locked doors in a required means of egress shall unlock in the direction of egress where required by other laws, codes, and governing standards.

21.10.2

For all means of egress doors connected in accordance with 21.10.1 where secondary power supplies of fire alarm control units are used, they shall comply with 10.6.7.

21.10.3\*

Secondary power supplies of fire alarm control units shall not be utilized to maintain means of egress doors in the locked condition unless the fire alarm control unit is arranged with circuitry and sufficient secondary power to ensure that the means of egress doors will unlock within 10 minutes of loss of primary power.

21.10.4

Locks powered by independent power supplies dedicated to lock power and access control functions, and that unlock upon loss of power, shall not be required to comply with 21.10.2.

21.10.5

If means of egress doors are unlocked by the fire alarm system, the unlocking function shall occur prior to, or concurrent with, activation of any public-mode notification appliances in the area(s) served by the normally locked means of egress doors.

21.10.6

All doors that are required to be unlocked by the fire alarm system in accordance with 21.10.1 shall remain unlocked until the fire alarm condition is manually reset.

21.11\* Exit Marking Audible Notification Systems

21.11.1

Where required by other governing laws, codes, standards, or the authority having jurisdiction, exit marking audible notification appliances shall be actuated by the building fire alarm system.

21.11.2

Exit marking systems shall meet the requirements of Chapter 18.