

Building and Equipment Design Features

Chapters 5 through 12

- **Chapter 5** Fire Service Features
- **Chapter 6** Building Services and Systems
- **Chapter 7** Fire and Smoke Protection Features
- **Chapter 8** Interior Finish, Decorative Materials and Furnishings
- **Chapter 9** Fire Protection and Life Safety Systems
- **Chapter 10** Means of Egress
- **Chapter 11** Construction Requirements for Existing Buildings
- **Chapter 12** Energy Systems
- **Chapters 13 through 19** (Reserved.)

International Fire Code (IFC) Part III contains requirements that provide firefighters with a means of accessing a building and establishing a fire protection water supply for that building. Chapter 5 contains requirements for address numbers on buildings and provisions for fire department access roadways. Chapter 6 contains requirements for building systems, such as elevators, commercial cooking operations, commercial clothes dryers and refrigeration systems. When specified by the *International Building Code* (IBC), buildings constructed using fire-resistant materials must be properly maintained to ensure the specified fire-resistance ratings are maintained. Chapter 7 specifies the requirements for maintenance of fire-resistance-rated construction.

Interior finish and decorative materials or furnishings offer fuel contribution and surfaces through which a fire can spread and transport heat and smoke to other parts of

a room or to other rooms. Chapter 8 contains requirements for regulating wall and ceiling finishes, decorative materials and furnishings.

Fire protection systems and life safety systems are required in accordance with Chapter 9. Chapter 9 specifies the requirements for automatic sprinkler systems, alternative fire-extinguishing systems, fire alarm and detection systems, standpipes, portable fire extinguishers and other fire appliances, emergency alarm systems, mass notification, smoke and heat vents, smoke control systems, carbon monoxide alarms, and gas detection systems. For materials that can have a detonation or deflagration hazard, Chapter 9 specifies the requirements for explosion control systems.

Merriam-Webster's *New Collegiate Dictionary* defines egress as "a place or means of going out." In the event of a fire or an emergency that requires the occupants to safely exit a building, Chapter 10 establishes the minimum requirements for means of egress from buildings.

Chapter 11 sets forth retroactive construction requirements for existing buildings. These provisions establish minimum fire-resistance rating requirements for shafts as well as minimum means of egress requirements in existing buildings. It also establishes retroactive requirements for the installation of automatic sprinkler systems and fire alarm systems in existing buildings or occupancies.

Chapter 12 addresses energy storage and energy generation systems. This chapter includes emergency and standby power, portable generators, solar photovoltaic power, fuel cells and energy storage systems. This chapter includes other battery technologies, fuel cell power systems and energy storage systems, such as capacitor energy storage. ■



510.4.1.1, 510.4.1.2

ERCES Signal Strength

510.4.2.8, 510.4.2.9

Emergency Responder Communications Enhancement System (ERCES)

608.1.1

CO₂ Mechanical Refrigeration Systems

608.1, 608.9

Ammonia Mechanical Refrigeration Systems

608.12

Storage of Refrigerants

705.2.7

Rolling Fire Door Testing

803.11.1

Foam Plastics

903.2

Sprinklers on Batteries for Telecommunication

903.2, 903.3

Sprinklers for Battery Storage, Testing and Vehicle Repair

903.2.8.3

Sprinklers in Group R-4

903.3.1.1.1

Sprinkler System Exempt Locations

903.3.1.2

NFPA 13R Sprinkler Installations

903.4, 903.3.9

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904.12

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904.14.1

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905.3, 905.4

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Standpipes on Stages

907.2.1

Group A Fire Alarm

907.2

Fire Detection for Lithium-Ion and Lithium Metal Batteries

907.2.11.3

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907.5.2.1.3

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907.10

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Explosion Hazard—Flammable Gas and Consumer Fireworks

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914.3.1.1

Sprinkler Risers in High-Rise Buildings

914.6.1

Sprinklers Under Catwalks

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Fire Alarms in Special Amusement Areas

915.1

Carbon Monoxide Alarms

915.2

Carbon Monoxide Detection Locations

915.3, 915.5

CO Alarms and Fire Alarms

917.2

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Table 1004.5, 1004.8

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Egress from Occupiable Roofs

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1010.2.6

Stairway Doors

1010.2.9

Access Control Systems

1010.2.14

Elevator Lobby Exit Access Doors

1013.2

Low-Level Exit Signs in Group R-1

1017.2.3

Group H-5 Exit Access Travel Distance Increase

1029.3

Construction of Egress Courts

1032.2.2, 1104.16.5.1, 1104.16.7

Fire Escape Maintenance

1103.9

Carbon Monoxide Alarms in Existing Buildings

1107

Existing Lithium-Ion Energy Storage Systems

1201.1, 1207.1

Energy Storage Systems Under Utility Control

1205.2.3

Markings for Building-Integrated Photovoltaic Systems

1207.2.1

Energy Storage System Commissioning Plan

Tables 1207.1.3, 1207.5, 1207.6

Energy Storage System Technologies

1207.5.5

Sprinklers for Energy Storage Systems

1207.11

Energy Storage Systems in Group R-3 and R-4

510.4.1.1, 510.4.1.2

ERCES Signal Strength

CHANGE TYPE: Modification

CHANGE SUMMARY: The measurement of the downlink signal strength in an ERCES system is based on the Delivered Audio Quality of 3.0.

2024 CODE TEXT: 510.4.1.1 Minimum signal strength into the building. The minimum ~~inbound~~ downlink signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the fire code official. The ~~inbound~~ downlink signal level shall be a ~~minimum of -95 dBm throughout the coverage area and sufficient to provide not less than a Delivered Audio Quality (DAQ) of 3.0 throughout the coverage area using either narrowband analog, digital or wideband LTE signals or an equivalent bit error rate (BER), or signal-to-interference-plus-noise-ratio (SINR) applicable to the technology for either analog or digital signals.~~

510.4.1.2 Minimum signal strength out of the building. The minimum ~~outbound~~ uplink signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the fire code official. The ~~outbound~~ uplink signal level shall be sufficient to provide not less than a delivered audio quality (DAQ) of 3.0 using either narrowband analog, digital or wideband LTE signals or an equivalent bit error rate (BER), or an equivalent SINR applicable to the technology for either analog or digital signals.

CHANGE SIGNIFICANCE: In-building, two-way emergency responder communication enhancement systems (ERCES) must be listed and address fire safety and shock safety. A minimum acceptable signal criteria must be achieved and maintained throughout 95 percent of all areas on each floor of a building. A stronger signal must be maintained in critical areas. These areas include exit stairways, exit passageways, elevator lobbies, equipment rooms and fire command centers.



Signal strength must be of sufficient strength to have radios function throughout a building. (Photo courtesy of AlenaPaulus/E+ via Getty Images)

In some buildings, there may be additional areas that are considered critical for communication. Minimal signal strength has been set at -95 dBm inbound signal strength and a delivered audio quality (DAQ) of 3.0.

Changes to the 2024 IFC clarify the intent in Section 510.4.1 to provide usable communications for all technologies available for ERCES. Several solutions are available such as analog, digital and LTE technologies. Many communications systems are in use by public safety agencies in the United States and have different operational characteristics. The prescribed signal strength is specified as a DAQ of 3.0 for analog, digital or LTE signals. However, for analog and digital signals, other measurement methods can be acceptable. These other methods are the bit error rate (BER) and the signal-to-interference-plus-noise ratio (SINR).

The signal strength of the downlink signal is no longer required to meet two criteria. The measurement of -95 dBm is not required and the DAQ of 3.0 is the threshold to meet. The definition of DAQ 3.0 is “speech is understandable with slight effort, with occasional repetition due to noise or distortion.”

510.4.2.8, 510.4.2.9

Emergency Responder Communications Enhancement System (ERCES)

CHANGE TYPE: Modification

CHANGE SUMMARY: Additional requirements are included for emergency responder communications enhancement systems to deal with signal interference and the near-far effect.

2024 CODE TEXT: 510.4.2.8 Radio communication antenna density Near-far effect. Systems shall be engineered to minimize the near-far effect. In-building, two-way emergency responder communication coverage system designs shall include sufficient antenna density to address reduced gain conditions. Where a signal booster is required by the RF system designer, the dynamic range of the in-building emergency responder communications enhancement system shall be designed to minimize the effects of strong signal automatic gain control on weak signal uplink performance.

Exception:—Systems where all portable devices within the same band use active power control features:

510.4.2.9 Noise interference. Where a signal booster is used, signal booster type(s) and the uplink signal and noise levels shall be coordinated with and approved by all frequency license holder(s) that may be adversely impacted by any transmitted noise resulting from the in-building emergency responder communications enhancement system. Systems shall be in compliance with all frequency licensing authority requirements.

SECTION 202 DEFINITIONS

EMERGENCY RESPONDER COMMUNICATIONS ENHANCEMENT SYSTEM (ERCES). An infrastructure solution installed within a building to enhance the communications capabilities for first responders that utilizes solu-



Large concrete and steel buildings can be difficult to send a signal through. A booster may be required. (Photo courtesy of Erik Isakson/Tetra images via Getty Images)