DIVISION OF PLANNING AND PERMITTING
FREDERICK COUNTY, MARYLAND
Department of Permits and Inspections

30 North Market Street • Frederick, Maryland 21701
Phone (301) 600-2313 • Fax (301) 600-2309

Frederick County Policy for Emergency Responder Radio Communications Enhancement System (ERRCES)/ Two-way Radio Communications Enhancement System

Code Requirements for BDA's

NFPA 1 Fire Code (2018 edition)

- 11.10.1 In all new and existing buildings, minimum radio signal strength for fire department communication shall be maintained at a level determined by AHJ.

- 11.10.2 Where required by the AHJ, two-way radio communication enhancement shall comply with NFPA 1221.

- 11.10.3 Where a two-way radio communication enhancement system is required and such system, components, or equipment has a negative impact on the normal operation of the facility at which it is installed, the AHJ shall have the authority to accept an automatically activated responder system.

NFPA 72 Section 14.4.9 (2016 edition)

14.4.9 In-Building Emergency Radio Communication Systems. In-building emergency radio communication systems shall be inspected and operationally tested in accordance with the requirements of NFPA 1221.

NFPA 1221 Section 9.6 (2016 edition)

9.6 Two-Way Radio Communications Enhancement Systems.

9.6.1 All system components shall be designed, installed, tested, inspected, and maintained in accordance with the manufacturers' published instructions and the requirements of Section 9.6.

9.6.2 Pathway survivability levels shall be as described in Section 5.10. [72:24.3.13.1]

9.6.2.1 Two-way radio communications enhancement systems shall comply with 9.6.2.1.1 through 9.5.2.1.4. [72:24.3.13.8]

9.6.2.1.1* Where a two-way radio communications enhancement system is used in lieu of a two-way in-building wired emergency communications system, it shall have a pathway survivability of Level 1, Level 2, or Level 3. [72:24.3.13.8.1]

Exception: Where leaky feeder cable is utilized as the antenna, it shall not be required to be installed in metal raceway. [72:24.3.13.8.1]

9.6.2.1.1.1 The feeder and riser coaxial cables shall be rated as plenum cables that match the building's fire rating and pathway survivability.

9.6.2.1.1.2 The feeder coaxial cables shall be connected to the riser coaxial cable using hybrid coupler devices of a value determined by the overall design. [72:24.3.13.8.1.2]

9.6.2.1.2 Where a two-way radio communications enhancement system is used in lieu of a two-way in-building wired emergency communications system, the design of shall be approved by the AHJ. [72:24.3.13.8.2]

9.6.2.1.1* Where a two-way radio communications enhancement system is used in lieu of a two-way in-building wired emergency communications system, it shall have a pathway survivability of Level 1, Level 2, or Level 3. [72:24.3.13.8.1]

Exception: Where leaky feeder cable is utilized as the antenna, it shall not be required to be installed in metal raceway. [72:24.3.13.8.1]

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9.6.2.1.2 Where a two-way radio communications enhancement system is used in lieu of a two-way in-building wired emergency communications system, the design of the system shall be approved by the AHJ. [72:24.3.13.8.2]

9.6.5.2 The building manager/owner shall suspend and correct equipment installations that degrade the performance of the public safety radio system or public safety radio enhancement system.

9.6.5.3 Systems that share infrastructure with non-public safety services shall ensure that the coverage and performance of the public safety communications channels are not degraded below the level of performance identified in 9.6.7 and 9.6.8, regardless of the amount of traffic carried by the non-public safety services.

9.6.6 Approval and Permits

9.6.6.1 Plans shall be submitted for approval prior to installation.

9.6.6.2 At the conclusion of successful acceptance testing, a renewable permit shall be issued for the public safety radio enhancement system where required by the AHJ.

9.6.7* Radio Coverage.

9.6.7.1 Radio coverage shall be provided through the building as a percentage of floor area as specified in section below through section amplification components.

9.6.7.2 The system shall adhere to the maximum acceptable propagation delay standard provided by the AHJ.

9.6.7.3 Radio coverage shall be determined by the AHJ.

9.6.7.4 Critical Areas. Critical areas, including fire command centers, fire pump rooms, exit stairs, exit passageways, elevator lobbies, standpipe cabinets, sprinkler sectional valve locations, and other areas deemed critical by the AHJ, shall be provided with 99 percent floor area radio coverage.

9.6.7.5 General Building Areas. General building areas shall be provided with 90 percent floor area radio coverage.

9.6.7.6 Amplification Components. Buildings and structures that cannot support the required level of radio coverage shall be equipped with a system that included RF emitting devices that are certified by the radio licensing authority to achieve the required adequate radio coverage.

9.6.8* Signal Strength.

9.6.8.1* Inbound. A minimum inbound signal strength sufficient to provide usable voice communications, as specified by the AHJ, shall be provided throughout the coverage area. The inbound signal level shall be sufficient to provide a minimum of DAQ 3.0 for either analog or digital signals.

9.6.9 Isolation. If a donor antenna exists, isolation shall be maintained between the donor antenna and all inside antennas to a minimum of 20 dB under all operating conditions.

9.6.10 System Radio Frequencies. The public safety radio enhancement system shall be capable of transmitting all radio frequencies, as required by the AHJ assigned to the jurisdiction, and be capable of using any modulation technology in current use by the public safety agencies in the jurisdiction.
9.6.10.1 List of Assigned Frequencies. The AHJ shall maintain a list of all inbound/outbound frequency pairs for distribution to system designers

9.6.10.2* Frequency Changes. Systems shall be upgradeable to allow for instances where the jurisdiction changes or adds system frequencies to maintain radio system coverage as it was originally designed

9.6.11 System Components.

9.6.11.1* Component Approval. RF emitting devices and cabling used in the installation of the public safety two-way radio communications enhancement systems shall be approved by the AHJ, and all RF emitting devices shall have certification of the radio licensing authority and be suitable for public safety use prior to installation.

9.6.11.2 Component Enclosures. All repeater, transmitter, receiver, signal booster components, external filters, and battery system components shall be contained in a NEMA4- or NEMA4X-type enclosure(s).

(1) A storage battery dedicated to the system with 12 hours of 100 percent system operation capacity

(2) An alternative power source of 12 hours at 100 percent system operation capacity as approved by the AHJ

9.6.11.3 RF Emitting Devices. RF emitting devices shall meet the following requirements in addition to any other requirements determined by the AHJ:

(1) RF emitting devices shall have the certification of the radio licensing authority prior to installation.

(2) All RF emitting devices shall be compatible with both analog and digital communications, as required to be used by the radio licensing authority and the AHJ, simultaneously at the time installation.

9.6.12 Power Supplies. At least two independent and reliable power supplies shall be provided for all RF emitting devices and other components of the system: one primary and one secondary.

9.6.12.1 Primary Power Source. The primary power source shall be supplied from a dedicated branch circuit and comply with NFPA 72.

9.6.12.2 Secondary Power Source. The secondary power source shall consist of one of the following:

9.6.12.3 Monitoring Integrity of Power Supplies. Monitoring the integrity of power supplies shall be in accordance with 9.1.2.2.

9.6.13 System Monitoring.

9.6.13.1 Fire Alarm System. The system shall include automatic supervisory signals for malfunctions of the two-way radio communications enhancement systems that are annunciated by the fire alarm system in accordance with NFPA 72, and shall comply with the following:

(1) Monitoring for integrity of the system shall comply with NFPA 72, Chapter 10.

(2) System supervisory signals shall include the following:

(a) Donor antenna malfunction
(b) Active RF emitting device failure
(c) Low-battery capacity indication when 70 percent of the 12-hour operating capacity has been depleted
(d) System component failure

(3) Power supply supervisory signals shall include the following for each RF emitting device and system component:

(a) Loss of normal ac power
(b) Failure of battery charger

(4) The communications link between the fire alarm system and the two-way radio communications enhancement system must be monitored for integrity.

9.6.13.2 Dedicated Panel.

(1) A dedicated monitoring panel shall be provided within the fire command center to annunciate the status of all RF emitting devices and system component locations. The monitoring panel shall provide visual and labeled indications of the following for each system component and RF emitting device:

(a) Normal ac power
(b) Loss of normal ac power
(c) Battery charger failure
(d) Low battery capacity (to 70 percent depletion)
(e) Donor antenna malfunction
(f) Active RF emitting device malfunction
(g) System component malfunction

(2) The communication link between the dedicated monitoring panel and the two-way radio communications enhancement system must be monitored for integrity.

9.6.14 Technical Criteria. The AHJ shall maintain a document of technical information specific to its requirements that shall contain, as a minimum, the following:

(1) Frequencies required

(2) Location and effective radiated power (ERP) of radio sites used by the public safety radio enhancement system

(3) Maximum propagation delay (in microseconds)

(4) List of specifically approved system components

(5) Other supporting technical information necessary to direct system design

International Building Code (2018 edition)
Section 403.4.5 Response Radio Coverage shall be in accordance with Section 510 of the International Fire Code (2018 edition).