



Riverside County Fire Department

Office of the Fire Marshal

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Technical Policy

Title: Emergency Responder Radio Coverage Systems		
Technical Policy: # TP 19-002	Effective Date: 08/15/2019	Revised Date: 01/07/2020
Code References: 2019 California Fire Code, Sections 104.1, 104.7.2, 510, and 907.2.12.2		

Purpose

The Riverside County Fire Department (RCFD) Office of the Fire Marshal (OFM) has prepared this policy to provide guidance to building officials, contractors, architects, business owners, consultants and the general public on local interpretations and practices that are considered to be in compliance with the 2019 California Fire Code (CFC). In accordance with CFC Section 510.4.2.2, the purpose is to provide specific technical information and requirements for emergency responder radio coverage systems in new buildings served by Riverside County Public Safety Agencies. The intent is to clarify aspects of the code that are vague or non-specific by addressing selected issues under normal conditions. The requirements of this policy shall not be construed as altering any existing code, law or regulation which may require fire protection features not covered or alluded to in these requirements, nor shall they waive any requirements of any code, law or regulation. The reader is cautioned that the guidance detailed in this policy may or may not apply to their specific situation, and that the OFM retains final authority to determine compliance.

Scope (CFC 510.1)

All new buildings shall have approved radio coverage systems for emergency responders within the building in accordance with this Technical Policy based upon the existing coverage levels of the public safety communication systems at the exterior of the building.

Exceptions:

1. Buildings and structures that are three (3) stories or less, do not exceed 50,000 square feet in area on any single story, and do not have any complete or partial below grade building levels. Should there be complete or partial below grade levels, then this Technical Policy applies to those levels only.
2. Wood-constructed residential buildings and structures four (4) stories or less that do not have any complete or partial below grade building levels and that are not built integral to an above ground parking structure. Should there be complete or partial below grade levels, then this Technical Policy applies to those levels only.
3. Areas within elevator cabs and elevator shafts.
4. Where approved by the Building Official and the Fire Marshal, a wired communication system in accordance with CFC Section 907.2.12.2 shall be permitted to be installed or maintained instead of an approved radio coverage system.
5. Where it is determined by the Fire Marshal that the radio coverage system is not needed. Application for use of this exception requires a radio study assessing existing radio signal strengths at the project location and expected resulting radio signal strengths within all areas of the building based on proposed construction and use. Resulting minimum radio signal strength shall comply with the minimum radio signal strength required in this

Technical Policy. The radio study shall be completed and signed by an FCC Licensed Technician and shall be submitted to and approved by the Fire Marshal prior to building permit issuance. Testing shall be conducted during construction at a time approved by the Fire Marshal to confirm acceptable minimum radio signal strength as defined in this Technical Policy. At a minimum, all drywall, doors, windows, exterior siding, and any roof mounted solar panels shall be installed prior to testing. Proposed test procedure and acceptance criteria shall be based on the acceptance test procedure defined in this Technical Policy, shall be submitted two weeks in advance of proposed testing and shall be approved by the Fire Marshal prior to test. Test shall be conducted by an FCC Licensed Technician and witnessed by RCFD. Successful test shall be documented by the FCC Licensed Technician and a test report submitted to and approved by the Fire Marshal prior to Certificate of Occupancy. Failure to demonstrate compliance with acceptance criteria during the test will require submittal and installation of an approved emergency responder radio coverage system within the building in accordance with this Technical Policy prior to issuance of any Certificate of Occupancy or as otherwise approved by the Fire Marshal.

6. In facilities where emergency responder radio coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the Fire Marshal shall have the authority to accept an automatically activated emergency responder radio coverage system.

This Technical Policy shall not require improvement of the existing public safety communication systems.

Definitions

FCC Licensed Technician: An individual who is qualified with a Federal Communications Commission (FCC) General Radiotelephone Operator License (GROL/PG), or equivalent, to review design plans and perform tests in affected structures to measure compliance with the specifications set forth in this Technical Policy.

Riverside County Public Safety Agencies: Fire and Law Enforcement agencies with jurisdiction at the project location.

Requirements

Construction Permit (CFC 510.3)

A construction permit for the installation of or modification to emergency responder radio coverage systems and related equipment is required prior to installation. Construction documents and equipment data sheets shall be submitted to the Building Department with jurisdiction and OFM for review and approval. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

Minimum Qualifications of Personnel (CFC 510.5.2)

The minimum qualifications of the system designer and lead installation personnel shall include both of the following:

1. A valid FCC-issued general radio operators license.
2. Certification of in-building system training issued by a nationally recognized organization, school or a certificate issued by the manufacturer of the equipment being installed.

These qualifications shall not be required where demonstration of adequate skills and experience satisfactory to the Fire Marshal is provided.

Technical Requirements (CFC 510.4 – 510.4.2.8)

Systems, components and equipment required to provide the emergency responder radio coverage system shall comply with the following:

Radio Signal Strength. The building shall be considered to have acceptable emergency responder radio coverage when signal strength measurements in 95 percent of all areas on each floor of the building meet the following signal strength requirements:

Minimum Signal Strength into the Building. A minimum signal strength of -95 dBm shall be receivable within the building.

Minimum Signal Strength out of the Building. A minimum signal strength of -95 dBm shall be received by Riverside County Public Safety agencies radio systems when transmitted from within the building.

System Design. The emergency responder radio coverage system shall be designed in accordance with the following:

Amplification Systems Allowed. Buildings and structures that cannot support the required level of radio coverage shall be equipped with a radiating cable system, a distributed antenna system with Federal Communications Commission (FCC)-certified signal boosters, or other system approved by the Fire Marshal in order to achieve the required adequate radio coverage.

Frequencies. The Riverside County Public Safety Agencies radio systems operate within the VHF highband (150-170 MHz) and 700/800 MHz band. Specific frequencies shall be determined upon the geographical location of the project site.

Standby Power. Emergency responder radio coverage systems shall be provided with standby power in accordance with CFC Section 604. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 24 hours.

Signal Booster Requirements. If used, signal boosters shall meet the following requirements:

1. All signal booster components shall be contained in a National Electrical Manufacturer's Association (NEMA) 4-type waterproof cabinet.
2. Battery systems used for the emergency power source shall be contained in a NEMA 4-type waterproof cabinet.
3. The signal booster system and battery system shall be electrically supervised and monitored by a supervisory service, or when approved by the Fire Marshal, shall sound an audible signal at a constantly attended location
4. Equipment shall have FCC certification prior to installation.

Additional Frequencies and Change of Frequencies. The emergency responder radio coverage system shall be capable of modification or expansion in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC.

Installation Requirements (CFC 510.5 – 510.5.4)

The installation of the emergency responder radio coverage system shall be in accordance with the following:

Approval Prior to Installation. Amplification systems capable of operating on frequencies licensed to any public safety agency by the FCC shall not be installed without prior coordination and approval of the Fire Marshal.**Acceptance Test Procedure.** Where an emergency responder radio coverage system is required, and upon completion of installation, the building owner shall have the radio system tested by an FCC Licensed Technician and witnessed by RCFD to verify that two-way coverage on each floor of the building is not less than 90 percent. The test procedure shall be conducted as follows:

1. Each floor of the building shall be divided into a grid of 20 approximately equal test areas.
2. The test shall be conducted using calibrated portable radios of the latest brand and model used by Riverside County Public Safety Agencies talking through the agencies radio communications systems.
3. Failure of not more than two nonadjacent test areas shall not result in failure of the test.
4. In the event that three of the test areas fail the test, in order to be more statistically accurate, the floor shall be permitted to be divided into 40 equal test areas. Failure of not more than four nonadjacent test areas shall not result in failure of the test. If the system fails the 40-area test, the system shall be altered to meet the 90-percent coverage requirement.
5. A test location approximately in the center of each test area shall be selected for the test, with the radios enabled to verify two-way communications to and from the outside of the building through the Riverside County Public Safety Agency's radio communications systems. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location shall be considered failure of that test area. Additional test locations shall not be permitted.
6. The gain values of all amplifiers shall be measured and the test measurement results shall be kept on file with the building owner so that the measurements can be verified during annual tests. In the event that the measurement results become lost, the building owner shall be required to rerun the acceptance test to reestablish the gain values.
7. As part of the installation, a spectrum analyzer or other suitable test equipment shall be utilized to ensure spurious oscillations are not being generated by the subject signal booster. This test shall be conducted at the time of installation and subsequent annual inspections.
8. At the conclusion of the acceptance testing, a report, documenting the procedure and results, shall be submitted to and approved by the Fire Marshal prior to issuance of the Certificate of Occupancy.

FCC Compliance. The emergency responder radio coverage system installation and components shall also comply with all applicable federal regulations including, but not limited to, FCC 47 CFR Part 90.219.

Maintenance (CFC 510.6 – 510.6.4)

The emergency responder radio coverage system shall be maintained operational at all times in accordance with the following:

Testing and Proof of Compliance. The emergency responder radio coverage system shall be inspected and tested annually or where structural changes occur including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:

1. In-building coverage test as described in the Acceptance Test Procedure section of this Technical Policy.
2. Signal boosters shall be tested to verify that the gain is the same as it was upon initial installation and acceptance.
3. Backup batteries and power supplies shall be tested under load of a period of 1 hour to verify that they will properly operate during an actual power outage. If within the 1-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional 1-hour periods until the integrity of the battery can be determined.
4. Other active components shall be checked to verify operation within the manufacturer's specifications.
5. At the conclusion of the testing, a report, which shall verify compliance with the Acceptance Test Procedure section of this Technical Policy, shall be submitted to the Fire Marshal.

Additional Frequencies. The building owner shall modify or expand the emergency responder radio coverage system at his or her expense in the event frequency changes are required by the FCC or additional frequencies are made available by the FCC. Prior approval of a public safety radio coverage system on previous frequencies does not exempt this section.

Field Testing. Riverside County Public Safety Agency personnel shall have the right to enter onto the property at any reasonable time to conduct field testing to verify the required level of radio coverage.