



Brockton Fire Department
Fire Prevention Bureau
560 West Street
Brockton, Massachusetts 02301
Office 508-583-2933
Fax 508-584-3416



Specification for Emergency Responder Radio Coverage in Buildings

The Brockton Fire Department has developed this specification in conjunction with the requirements of the 780 CMR, Commonwealth of Massachusetts Building Code, 9th Edition (eff. 1/1/2018). (Section 916)

The installation and operation of radio based emergency responder communication systems must comply with this document which contains the installation specifications. Testing shall be scheduled with and observed by the Brockton Fire Department. (508) 583-4422 Ext. 905

Property owners who maintain compliance with this specification are granted permission to operate these radio amplifiers on frequencies licensed to the Brockton Fire Department, Brockton Police Department, and Plymouth County Control by the Federal Communications Commission. Failure to maintain compliance with this specification will result in the automatic withdrawal of said permissions.

Should a property owner elect to install the communications equipment voluntarily the installation must comply with all of the requirements contained herein.

Prior to the construction of an Emergency Responder Communication System, a permit must be applied for and submitted to:

Brockton Fire Department
Fire Prevention Bureau
560 West Street
Brockton, MA 02301

Revision: 2

Effective Date: January 1, 2018
Deputy Chief Joseph Solomon
Brockton Fire Department

Department	Dispatch	Contact	
Fire Department	508-583-2323	D.C. Joseph Solomon	508-922-3137
Police Department	508-894-5204		
Plymouth County Control	508-830-6200	Lt. Scott Billings	508-830-6200

SECTION 101 – GENERAL

101.1 Scope. Systems, components and equipment required to provide emergency responder radio coverage shall be in accordance with this specification.

101.2 Permit. A permit is required from the Brockton Fire Department for installation of or modification to emergency responder radio coverage systems and related equipment. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

101.3 Non-Interference. No amplification system capable of operating on frequencies or causing interference on frequencies assigned to an agency by the FCC shall be installed without prior coordination and approval of the Authority Having Jurisdiction. The building manager/owner shall suspend and correct other equipment installations that degrade the performance of the public safety radio system or public safety radio enhancement system.

SECTION 102 – DEFINITIONS

102.1 Definitions. For the purpose of this specification, certain terms are defined as follows:

AGENCY. Any emergency responder department within the jurisdiction that utilizes radio frequencies for communication. This includes, but may not be limited to: the Brockton Fire Department, Brockton Police Department and Plymouth County Control.

SECTION 103 – TECHNICAL REQUIREMENTS

103.1 System design. The emergency responder radio coverage system shall be designed in accordance with Sections 103.1.1 through 103.1.6, as follows:

103.1.1 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 code official* in order to achieve the required adequate radio coverage.

103.1.2 Technical criteria.

Channel Name/Trunked Radio System Talkgroup	Assignment	RX Freq N or W	RX Tone/NAC	TX Freq N or W	Tx Tone/NAC	Mode
Brockton Fire 1	FD Primary	453.1250 N	206.5	458.1250 N	206.5	A
Brockton Fire 2	FD Tactical	453.6375 N	94.8	458.6375 N	94.8	A
Brockton Police 1	PD Primary	482.7125 N	203.5	485.7125 N	125	A
Brockton Police 2	PD Secondary	482.8625 N	203.5	485.8625 N	203.5	A

Radio ID 9999 shall be used by radio shop

The *fire code official* shall provide specific technical information as needed

103.1.3 Primary power. The emergency responder radio coverage system shall be powered by a dedicated independent circuit of sufficient size. The circuit shall be clearly marked. The location of the electrical panel shall be clearly marked at location approved by the fire official.

103.1.4 Secondary power. The emergency responder radio coverage system shall be equipped with a secondary source of power. The secondary source of power shall be either a battery system or an emergency generator. The secondary power supply shall supply power automatically when the primary power source is lost. The secondary source of power shall be capable of operating the emergency responder radio coverage system for a period of at least 12 hours.

103.1.4.1 Battery systems. If used, the active components of the installed system or systems shall be capable of operating on an independent battery system for a period of at least 12 hours without external power input. The battery system shall automatically charge in the presence of external power input.

103.1.5 Signal booster requirements. If used, signal boosters shall meet the following requirements:

1. All signal booster components shall be contained in a NEMA4-type waterproof cabinet.
2. The battery system shall be contained in a NEMA4-type waterproof cabinet.
3. The system shall include automatic alarming of malfunctions of the signal booster and battery system. Any resulting trouble alarm shall be automatically transmitted to an approved central station or proprietary supervising station as defined in NFPA 72 or, when approved by the *fire code official*, shall sound an audible signal at a constantly attended location.
4. Equipment shall have FCC certification prior to installation.

103.1.6 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.

103.2 Installation requirements. The installation of the public safety radio coverage system shall be in accordance with Sections 103.2.1 through 103.2.5, as follows:

103.2.1 Approval prior to installation. No amplification system capable of operating on frequencies licensed to any public safety agency by the FCC shall be installed without prior coordination and approval of the *fire code official*.

103.2.2 Installer Identification. Permit submittals shall note the name(s), license number(s) and license expiration date(s) of the contractor(s) designing and installing the system.

103.2.3 Minimum qualifications of personnel. The minimum qualifications of the system designer and lead installation personnel shall include:

1. A valid FCC-issued General Radio Operators License, and
2. Certification of in-building system training issued by a nationally recognized organization or school or a certificate issued by the manufacturer of the equipment being installed.

103.2.4 Permit submittal. The permit application submittal by a qualified individual as listed in 103.2.3 shall include at a minimum:

1. A narrative report describing system methodology, operation, and supervision,
2. One line diagram of total system,
3. Schematic and detail drawings of the proposed system core component location(s),
4. Primary and secondary power locations,
5. Battery calculations, and
6. Cut sheets for all equipment to be installed.

103.2.5 System Monitoring. System monitoring shall meet the requirements of NFPA 72 2010 Edition, 24.5.2.6.1-24.5.2.6.2

103.2.6 Acceptance test procedure. When an emergency responder radio coverage system is required, and upon completion of installation, the building *owner* shall have the radio system tested to ensure that two-way coverage on each floor of the building is a minimum of 95 percent. The test procedure shall be conducted for each frequency as follows:

1. Each floor of the building shall be divided into a grid of 20 approximately equal areas.

2. The test shall be conducted using a calibrated portable radio of the latest brand and model used by the agency talking through the agency's radio communications system.
3. A maximum of one area shall be allowed to fail the test.
4. In the event that two of the areas fail the test, in order to be more statistically accurate, the floor may be divided into 40 equal areas. A maximum of two nonadjacent areas shall be allowed to fail the test. If the system fails the 40-area test, the system shall be altered to meet the 95 percent coverage requirement.
5. A test location approximately in the center of each grid area shall be selected for the test, then the radio shall be enabled to verify two-way communications to and from the outside of the building through the public agency's radio communications system. Once the test location has been selected, that location shall represent the entire area. If the test fails in the selected test location, that grid area shall fail; prospecting for a better spot within the grid area shall not be allowed.
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 insure spurious oscillations are not being generated by the subject signal booster. This test shall be conducted at time of installation and subsequent annual inspections.

103.2.7 Equipment labels. All installed equipment shall be labeled "BDA Radio Equipment".

103.2.8 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 90.219.

103.2.9 Occupancy Requirement. An approved 2010 NFPA 72 "Fire Alarm and Emergency Communication Record of Completion" shall be completed for system commissioning and building occupancy.

103.3 Maintenance. The emergency responder radio coverage system shall be maintained in accordance with Sections 103.3.1 through 103.3.5, as follows:

103.3.1 Maintenance. The public radio coverage system shall be maintained operational at all times.

103.3.2 Permit required. A permit is required and shall be obtained prior to modification or alteration of the emergency responder radio coverage system.

103.3.3 Testing and proof of compliance. The emergency responder radio coverage system shall be inspected and tested annually or whenever 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 Section 103.2.6.
2. Signal boosters shall be tested to ensure 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 for a period of one hour to verify that they will properly operate during an actual power outage. If within the one-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional one-hour periods until the integrity of the battery can be determined.
4. All other active components shall be checked to verify operation within the manufacturer's specifications.
5. A copy of all test reports shall be sent to the *fire code official*, owner, and remain with the system.

103.3.4 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.

103.3.5 Field testing. 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.