



DENVER AMENDMENT PROPOSAL FORM FOR PROPOSALS TO THE 2019 DENVER BUILDING CODE AMENDMENTS AND THE 2021 INTERNATIONAL CODES

DENVER
THE MILE HIGH CITY

2021 CODE DEVELOPMENT CYCLE

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Email: Antonio.caro@denvergov.org **Representing (organization or self):** Organization

2) One proposal per this document is to be provided with clear and concise information.

Is a separate graphic file provided ("X" to answer): ___ Yes or ___ No

3) Highlight the code and acronym that applies to the proposal

<u>Acronym</u>	<u>Code Name</u>	<u>Acronym</u>	<u>Code Name</u>
DBC-AP	Denver Building Code–Administrative Provisions	IPC	International Plumbing Code
IBC	International Building Code	IRC	International Residential Code
IECC	International Energy Conservation Code	IFGC	International Fuel Gas Code
IEBC	International Existing Building Code	IMC	International Mechanical Code
IFC	International Fire Code	DGC	Denver Green Code

AMENDMENT PROPOSAL

Please provide all the following items in your amendment proposal.

Code Sections/Tables/Figures Proposed for Revision:

Instructions: If the proposal is for a new section, indicate (new), otherwise enter applicable code section.

510

Proposal:

Instructions: Show the proposal using ~~strikeout~~, underline format.

Place "X" next to choice that best defines your proposal: ___ X Revision X New Text ___
Delete/Substitute ___ Deletion

Section 510 Emergency Responder Radio Coverage is replaced as follows:

SECTION 510

EMERGENCY RESPONDER RADIO ENHANCEMENT COVERAGE SYSTEM (RES)

510.1 Where required. Buildings shall have *approved* radio coverage in accordance with Section 510 for emergency responders as follows:

1. High-rise buildings
2. Underground buildings (constructed in accordance with Section 405 of the *International Building Code*)
3. Airport buildings and structures
4. In accordance with Section 510.1.1

510.1.1 Compliance testing. New buildings of 50,000 gross square feet or more and all new Group E and I occupancies over 10,000 gross square feet sf on any story shall be tested upon substantial construction completion and where lacking required coverage, shall be provided with an RES. Buildings having compliant initial radio coverage shall be tested every five years thereafter in accordance with Section 510.3.1.1 for continued adequacy of emergency responder radio communications coverage. Buildings failing to meet the minimum coverage requirements after testing shall be provided with a RES in accordance with Section 510.

Where it is determined by the *fire code official* the radio coverage system is not needed, written documentation of the adequacy of existing radio coverage shall be maintained on site.

510.1.2 Emergency responder radio coverage in existing buildings. For existing high-rise, underground buildings, I-1, I-2 and I-3 occupancies and airport buildings, when undergoing an upgrade to install a Mass Notification System (MNS) or complete fire alarm head-end equipment replacement, the building shall be tested to Section 510 for public safety radio coverage and where deficient, RES coverage shall be provided. Buildings with currently acceptable signal strength shall be retested at five-year intervals in accordance with Section 510.3.1.1 to ensure continued compliant radio coverage. Where it is determined by the *fire code official* the radio coverage system is not needed, written documentation of the adequacy of existing radio coverage shall be maintained on site.

510.2 Emergency responder radio enhancement system coverage in buildings. Buildings shall have *approved* radio coverage for emergency responders within the building based upon the existing coverage levels of the Department of Safety communication system at the exterior of the building. Systems shall be designed per Section 510 and NFPA 1221. Systems shall operate at the frequency of 806-816MHz and 851-861MHz. This section shall not require improvement of the existing Department of Safety communication system. Active components Bi-directional Amplifiers (BDA), Distributed Amplifier System (DAS) controller, UPS), of the RES system shall be installed in a room separated from the remainder of the building by a minimum 1-hour fire-resistance rated fire barrier constructed in accordance with Section 707 of the *International Building Code* or a one-hour fire resistance rated horizontal assembly constructed in accordance with Section 711 of the *International Building Code* or both. The Emergency Responder Radio Enhancement Coverage system shall be a standalone system totally dedicated to public safety and no components of this system may be shared with any other radio or cell phone systems. Modification, alteration, repair or removal of any RES system or component is specifically prohibited without the approval of the *fire code official*.

Exception: Where it is determined by the *fire code official* that current radio coverage within the building is adequate, written documentation of the compliance of radio coverage shall be maintained on site. See Section 510.3.1 for testing requirements.

510.2.1 Coverage Requirement. The radio system control channel signal level shall exceed -100 dBm at 95 percent or more of the locations measured within each floor plate. Equivalently, the service area reliability shall be 95 percent or greater on each floor of the structure and parking areas. All designated areas of refuge, Fire Command Centers, stairwells, main building lobbies and elevator lobbies shall have 100 percent signal coverage of -100dBm or stronger. Inbound and outbound signals shall be sufficient to provide usable voice communications throughout the coverage areas and sufficient to provide not less than a Delivered Audio Quality (DAQ) of 3.0 or an equivalent Signal-to-Interference-Plus-Noise Ratio (SINR) applicable to the technology for either analog or digital signals.

510.3 Radio systems. The RES system shall meet the coverage requirements defined in this section, and comprise one of following; bi-directional amplifiers with radiating (“leaky coax”) cable, a discrete distributed antenna system or other fire department *approved* equivalent technology. Radio communications systems shall only operate on the frequency range of 806-816MHz and 851-861MHz. All active electronic components in the RES system shall be powered by a dedicated uninterruptible power source (UPS) with a minimum backup time of 12 hours with all amplifiers at rated output. The UPS input circuit shall be a dedicated circuit and any cord and plug connection(s) shall be secured in an *approved* cabinet to prevent inadvertent disconnection. The circuit shall also be connected to the emergency generator where one is provided. The circuit shall be provided with a “lock-on” device. The RES system shall be maintained in an operative condition at all times.

Exceptions:

1. In buildings provided with an emergency generator in accordance with Section 604, UPS minimum battery capacity shall be permitted to be 4 hours.
2. Where a legally required standby generator is installed in accordance with Section 604, and the UPS input circuit is automatically transferred to the generator source, UPS minimum battery capacity shall be permitted to be 4 hours.

510.3.1 Requirements. The system shall effectively operate throughout the structure in accordance with this section. Radio communication coverage is required throughout parking garages and all areas below grade. Acceptance of the installed communication system shall be based upon Fire Department approval of the acceptance test as described below. All RES equipment shall be FCC compliant including but not limited to FCC 47 CFR Part 90.219. Equipment shall be listed in accordance with UL 2524.

510.3.1.1 Acceptance test. Test procedures shall comply with DFD Policy 510-1. Measurement locations shall be uniformly distributed to the extent practical. There shall be at least 10 sampling measurements per 4,000 square feet (one per every 20-foot X 20-foot square) of gross building area. Adequate radio coverage shall be determined for the structure and parking areas separately. Elevators, stairways and enclosed areas within each grid must be included in the testing. Where grid points exhibit marginal RF signal levels, DFD personnel will perform a radio test to determine if intelligible transmissions can be made through the enhanced radio system to and from the individual grid point without the need for retransmission. If this test fails, communications will be considered inadequate at that grid location and that grid will have failed to meet the required signal level.

510.3.1.2 Periodic testing. RES shall be tested annually and at five-year intervals in accordance with DFD Policy 510-1. Additional testing may be required by the department where building modifications have the potential to degrade system performance. Denver Fire Department 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.

510.3.1.3 Failure detection. RES equipment, including the RES amplifier and DAS controller if available, shall have failure detection circuitry which provides detection of mechanical, electrical and power failure of these components, as well as oscillation detection capability which will reduce the amplifier output to zero in the event of system oscillation. Detection of any failure output from an amplifier or main DAS controller, if provided, shall annunciate at the building fire alarm panel and result in a distinct local audible notification and transmission of a supervisory signal to the central monitoring station. RES system repairs shall be accomplished within 72 hours.

510.3.1.4 Permits. A construction permit is required prior to installation, ~~or~~ replacement, or expansion of any RES. Submittal and approval of shop drawings are required to obtain a permit. Permits shall only be issued to companies possessing a current Denver Electrical Signal or Electrical Contractors license and a valid Fire Department issued certificate. An annual Denver Fire Department permit for the RES shall be obtained and maintained current by the building owner. Alterations, modifications, repairs and required testing of RES shall require an operational permit issued by the department to the DFD licensed contractor performing the work.

510.3.1.5 Information signs. A legible sign stating “**THIS BUILDING IS EQUIPPED WITH A PUBLIC SAFETY RADIO REPEATER SYSTEM**” shall be conspicuously posted at the fire alarm panel. An additional sign stating, “**THIS BUILDING IS EQUIPPED WITH A PUBLIC SAFETY RADIO REPEATER SYSTEM-- DO NOT TAMPER WITH OR DISCONNECT,**” shall be located at each RES amplifier location. Signs shall be constructed of plastic or metal and shall be *approved* by the *fire code official*.

510.3.1.6 Shop drawings. Shop drawings, including RF grids, shall be submitted in accordance with Appendix O and *approved* prior to installation of any RES. Drawings shall be a deferred submittal in accordance with Section 133.5 of the *Administration of the Denver Building Code* and Section 105.7.10. Documents shall be of sufficient clarity and detail to fully describe the proposed installation and equipment. Handwritten notes or comments on drawings are not acceptable.

510.3.1.7 System Monitoring. The RES shall be monitored by a listed fire alarm control unit, or where approved by the *fire code official*, shall sound an audible signal at a constantly attended on-site location. Automatic supervisory signals shall include the following:

1. Loss of normal AC power supply.
2. System battery charger failure.
3. Malfuction of the donor antenna(s).

4. Failure of active RF-emitting device(s).
5. Low-battery capacity at 70-percent reduction of operating capacity.
6. Failure of critical system components.
7. The communications link between the fire alarm system and the RES.
8. Oscillation of active RF-emitting device(s).

510.3.1.8 RES antenna density. Systems shall be engineered to minimize the near-far effect and shall include sufficient antenna density to address reduced gain conditions.

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

Supporting Information (Required):

All proposals must include a written explanation and justification as to how they address physical, environmental, and/or customary characteristics that are specific to the City and County of Denver. The following questions must be answered for a proposal to be considered.

- Purpose: What does your proposal achieve?

Original DFD requirements were established in 2009 & have been edited as the national code has evolved with RES systems. The above changes incorporate the latest changes and adapt to adopt the latest technologies and associated regulations.

- Reason: Why is your proposal necessary?

To maintain pace with the national code.

- Substantiation: Why is your proposal valid? (i.e. technical justification)

It merges DFD's traditional requirements and methods with the latest code language.

Bibliography and Access to Materials (as needed when substantiating material is associated with the amendment proposal):

Other Regulations Proposed to be Affected

***For proposals to delete content from the 2019 Denver Green Code in conjunction with adding it to other mandatory Denver codes and/or regulations, only.**

Please identify which other mandatory codes or regulations are suggested to be updated (if any) to accept relocated content.

Referenced Standards:

List any new referenced standards that are proposed to be referenced in the code.

Impact:

How will this proposal impact cost and restrictiveness of code? ("X" answer for each item below)

Cost of construction: x Increase ___ Decrease ___ No Impact
 Cost of design: x Increase ___ Decrease ___ No Impact
 Restrictiveness: x Increase ___ Decrease ___ No Impact

Departmental Impact (City use only):

This amendment proposal increases/decreases/is neutral to the cost of plans review.

This amendment increases/decreases/is neutral to the cost of inspections.

Neutral/neutral