



CITY OF SCOTTSDALE AMENDMENTS
TO THE
NATIONAL ELECTRICAL CODE
2014 EDITION

Ordinance No. 4284, Resolution No. 10602

2016 City of Scottsdale Building Codes and Amendments

SCOTTSDALE REVISED CODE

CHAPTER 31 – BUILDINGS AND BUILDING REGULATIONS

ART. III. NATIONAL ELECTRICAL CODE AND SCOTTSDALE AMENDMENTS

Section 31-70. Adoption of National Electrical Code.

The National Electrical Code (NEC), 2014 Edition, as published by the National Fire Protection Association, declared a public record by city Resolution No. 10602, is adopted by reference as part of the city Building Code.

Sec. 31-71. NEC relationship to IBC.

To the extent that Chapter 1 of the National Electrical Code, 2014 Edition, conflicts with the city amendments to Chapter 1 of the International Building Code, 2015 Edition, the amendments to the International Building Code prevail.

Sec. 31-72. NEC Chapter 2 WIRING AND PROTECTION – amendments.

(a) *ARTICLE 230 SERVICES, is amended by adding 230.63 as follows:*

230.63 Location.

All service equipment rated 800 amperes or more located inside a building shall be enclosed within a room or space separated from the rest of the building by at least one-hour fire-resistive occupancy separation.

(b) *Subsections (2), (3), (4), (5), (6) and (7) of 250.118 Types of Equipment Grounding Conductors, are amended as follows, and paragraph d. of subsection (5) is deleted:*

250.118 Types of Equipment Grounding Conductors.

(2) Rigid metal conduit, with an individual equipment grounding conductor.

(3) Intermediate metal conduit, with an individual equipment grounding conductor.

(4) Electrical metallic tubing, with an individual equipment grounding conductor.

(5) Listed flexible metal conduit (with an individual equipment grounding conductor) meeting all of the following conditions:

a. The conduit is terminated in listed fittings.

b. The circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.

c. The combined length of flexible metal conduit and flexible metal tubing and liquid-tight flexible metal conduit in the same ground-fault current path does not exceed 1.8 m (6 ft).

(6) Listed liquid-tight flexible metal conduit (with an individual equipment grounding conductor) meeting all of the following conditions:

a. The conduit is terminated in listed fittings.

- b. For metric designators 12 through 16 (trade sizes 3/8 through 1/2), the circuit conductors contained in the conduit are protected by overcurrent devices rated at 20 amperes or less.
 - c. For metric designators 21 through 35 (trade sizes 3/4 through 1 1/4), the circuit conductors contained in the conduit are protected by overcurrent devices rated not more than 60 amperes and there is no flexible metal conduit in the same ground-fault path.
 - d. The combined length of flexible metal conduit and flexible metal tubing and liquidtight flexible metal conduit in the same ground-fault current path does not exceed 1.8 m (6 ft).
 - e. If used to connect equipment where flexibility is necessary to minimize the transmission of vibration from equipment or to provide flexibility for equipment that requires movement after installation, an equipment grounding conductor shall be installed.
- (7) Flexible metallic tubing, with an individual equipment grounding conductor, where the tubing is terminated in listed fittings and meeting the following conditions.
- a. The circuit conductors contained in the tubing are protected by overcurrent devices rated at 20 amperes or less.
 - b. The combined length of flexible metal conduit and flexible metal tubing and liquid-tight flexible metal conduit in the same ground-fault current path does not exceed 1.8 m (6 ft).

Sec. 31-73. NEC Chapter 3 WIRING METHODS AND MATERIALS – amendments.

(a) *358.10 Uses Permitted, is amended by deleting subsection (B).*

(b) *358.12 Uses Not Permitted, is amended by adding the following:*

- (7) In concrete, in the earth, or in areas subject to severe corrosive influences.

Sec. 31-74. NEC Chapter 8 COMMUNICATIONS SYSTEMS – amendments.

Article 810 Radio and Television Equipment, is amended by adding the following:

V. Public Safety Radio Amplification Systems.

810-80 Radio Coverage.

Except as otherwise provided, each non-residential and multifamily building and structure shall support the city's public safety radio communications. The frequency ranges required to support public safety radio communications shall be 769MHz to 775MHz and 799MHz to 805MHz. Within sixty (60) days of the Federal Communications Commission (FCC) action regarding other frequencies, the property owner, at its cost, shall modify the system if the FCC requires or makes available other frequencies.

The minimum standards are:

- (1) Radio signal strength of -95 decibel milliwatts in 95% of the area of each floor of the building when transmitting to and from the city's public safety communications system.

- (2) Average delivered audio quality (DAQ) rating of three (3) for signal strength and intelligibility, as determined by city, in 95% of the area of each floor of the building when transmitting to and from the city's public safety communications system.
- (3) 95% reliability.
- (4) 100% coverage at the minimum levels set forth in 810-80 (1) and (2) above, in all stairwells, stairways, and designated emergency ingress and egress paths.
Before a certificate of occupancy is issued, the applicant shall provide evidence, to the building official's satisfaction, of compliance with this division V of ARTICLE 810.

810-81 Signal Quality.

The signal strength and intelligibility rating scales are:

Signal strength:

- 0 - no detectable signal
- 1 - barely detectable
- 2 - detectable with difficulty
- 3 - detectable at all times
- 4 - strong signal, detectable at all times

Intelligibility:

- 0 - unintelligible
- 1 - intelligible with extreme difficulty (many repetitions required)
- 2 - intelligible with difficulty (repetition required)
- 3 - intelligible (repetition seldom required)
- 4 - intelligible at all times

810-82 Amplification Systems.

Buildings and structures which cannot meet the minimum standards for the city's public safety communications shall be equipped with an FCC-certified amplification system, including a radiating cable system or an internal distributed antenna system, to meet the minimum standards.

- (1) All active in-building coverage devices shall be FCC-certified Part 90 Type.
- (2) All system components shall be 100% compatible with analog and digital modulation after installation without additional adjustments or modifications.
- (3) The signal booster shall include filters to reject frequencies below and above the public safety bands by a minimum of 35dB.
- (4) The propagation delay of any in-building amplification system shall not exceed 15 microseconds. The delay value includes the cumulative delays in signal boosters, coaxial cables, fiber optics, etc. used within the in-building system.
- (5) Outside-to-inside antenna isolation (loss) shall be at least 16dB more than the highest gain reading of the boosted inside signal.
- (6) Active system devices shall be encased in NEMA 4 dust/waterproof case and clearly labeled "City of Scottsdale Public Safety Radio."

(7) If the system includes an externally-powered component, the system shall be able to operate independently on a battery or generator for at least four (4) hours without external power. The battery system shall automatically charge from the external power.

810-83 Testing Procedures.

(A) Initial Tests. The property owner, at its cost, may have the building tested for radio coverage by a BDA equipment manufacturer certified technician or an FCC licensed technician. The property owner shall submit the test results and documentation in the format required by the city to the city's radio communications office.

(B) Testing Procedure for Certificate of Occupancy. The city radio communications staff shall perform tests after all windows, building cladding, and drywall have been installed on all floor levels. Each floor of the building may be divided into a grid of approximately 40 equal areas. The tester shall communicate through the city's public safety communications system, using a city public safety portable radio.

The tester shall select a spot located approximately in the center of the grid and key the radio to verify two-way communications with the city's radio communications system. Once a spot is selected, prospecting for a better spot within the grid area is not permitted. Only two non-adjacent areas may fail the test.

If three (3) areas fail the test, the floor may be divided into 80 equal areas; only four (4) non-adjacent areas may fail the test. If the floor fails the 80 equal areas test, the property owner shall bring the area into compliance before contacting the city's radio communications office for retesting.

The results of testing shall be documented in detail that demonstrates that the building or structure is in compliance with the standards set forth in section 810-80.

(C) Annual Tests. Upon providing five (5) days written notice to the property owner or the property owner's representative, city staff may enter the property, buildings and structures, at reasonable times, to test radio signal quality and coverage.

(D) Radio Signal Strength Test Equipment. Signal strength tests shall be performed using a calibrated spectrum analyzer test set utilizing an omni-directional antenna with minimal gain. The resolution bandwidth shall be set to 10KHz.

(E) Delivered Audio Quality Test Set. All tests shall be performed with the radio unit antenna at a height of four (4) feet above the floor or ground.

(F) Buildings Failing Annual Test. If a building fails the annual test, the property owner shall bring the building into compliance with the standards set forth in section 810-80 within sixty (60) days of receiving the test results.

810-84 Waivers.

The city may waive the requirements of division V of ARTICLE 810 for buildings which do not have below grade spaces or parking. The waiver request shall be in writing and submitted to the building official before a certificate of occupancy is issued.

810-85 As-Built Plans; Building Frequencies.

(A) As-Built Plans. The property owner shall provide the city's radio communications office a set of as-built drawings of the amplification system. The plans shall be provided in the format required by the city and include: the location of all amplification equipment, the manufacturer and model of the equipment, the routes of all cabling, the location of all antennas, all electrical circuits serving the amplification system, and additional information requested by the city.

(B) Building Frequencies. Upon request from the city, the property owner shall give the city a list of the radio frequencies used at the building and property.

810-86 Communications Affected by New Building or Structure.

Where a new building or structure causes an existing building or structure that was in compliance with section 810-80 to fall out of compliance, and both the new and existing building or structure are owned by the same property owner, the property owner, at its cost, shall bring the existing building or structure into compliance with the standards set forth in section 810-80 within sixty (60) days of the city's written notice to do so.

810-87 Access to Install Amplification Equipment. The building official may deem a newly constructed or modified building or structure to cause an existing building or structure previously in compliance with communication requirements to be out of compliance. If so, the property owner of the newly constructed or modified building or structure shall allow the city to install a public safety radio amplification system on or within the building, structure or property, to bring the non-complying structure into compliance with communication requirements, without compensation to the property owner.

810-88 Public Safety Communications Interference. No person shall install, operate, or allow the use of equipment, methodology or technology that interferes or is likely to interfere with the optimum effective use or operation of the city's public safety communications system. If such interference occurs, use of the equipment, methodology or technology that causes the interference shall cease immediately until corrective measures are taken to eliminate such interference. Any such corrective measures shall be made at no cost to the city.