

the coverage area 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.

11.10.8 Mounting of the Donor Antenna(s).

11.10.8.1 To maintain proper alignment with the system designed donor site, donor antennas shall meet one of the following:

- (1) Antennas shall be permanently affixed on the building.
- (2) Where approved, antennas shall be mounted on a movable sled with a visible sign stating "Movement or repositioning of this antenna is prohibited without approval from the AHJ."

11.10.8.2 The antenna installation shall also be in accordance with the applicable requirements of the building code for weather protection of the building envelope.

11.10.9 Radio Communication Antenna Density.

11.10.9.1* In-building emergency responder communication enhancement systems shall be engineered to minimize the near-far effect.

11.10.9.2 In-building emergency responder communication enhancement system designs shall include sufficient antenna density to address reduced gain conditions.

11.10.10 Where an in-building emergency responder communication enhancement system is required and such system, components, or equipment has a negative impact on the normal operations of the facility at which it is installed, the AHJ shall have the authority to accept an automatically activated responder system.

11.10.11 Acceptance Test Procedure. Where an in-building emergency responder communication enhancement system is required, the building owner shall have the system tested on completion of installation to verify that two-way coverage on each floor of the building is not less than the coverage specified in 9.6.7.3 or 9.6.7.4 of NFPA 1221 as applicable.

11.10.11.1 Test Procedure. The test procedure, as required by 11.10.11, 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 a calibrated portable radio of the latest brand and model used by the agency talking through the agency's radio communications system or equipment approved by the AHJ.
- (3) Failure of more than one test area shall result in failure of the test.
- (4) A test location approximately in the center of each test area shall be selected for the test, with the radio enabled to verify two-way communications to and from the outside of the building through the public agency's radio communications system, as follows:
 - (a) Once the test location has been selected, that location shall represent the entire test area.
 - (b) Failure in the selected test location shall be considered to be a failure of that test area and additional test locations shall not be permitted.
- (5) All signal boosters or amplifiers shall be tested to verify that the gain is the same as it was upon initial installation and

acceptance or set to optimize the performance of the system under all operating conditions.

- (6) At the time of installation and at subsequent annual inspections, a spectrum analyzer or other suitable test equipment shall be utilized to ensure spurious oscillations are not being generated by the subject signal booster.
- (7) Systems shall be tested using two portable radios simultaneously conducting subjective voice quality checks, as follows:
 - (a) One portable radio shall be positioned not more than 10 ft (3048 mm) from the indoor antenna.
 - (b) The second portable radio shall be positioned at a distance that represents the farthest distance from any indoor antenna.
 - (c) With both portable radios simultaneously keyed up on different frequencies within the same band, subjective audio testing shall be conducted and comply with DAQ levels as specified in 9.6.8.1 or 9.6.8.2 of NFPA 1221 as applicable.

11.11 Medical Gas and Vacuum Systems. Medical gas and vacuum systems shall comply with NFPA 99.

11.12 Photovoltaic Systems.

11.12.1 General.

11.12.1.1 Photovoltaic systems shall be designed and installed in accordance with Section 11.12.

11.12.1.2 Electrical portions of photovoltaic systems shall be designed and installed in accordance with NFPA 70.

11.12.2 Building-Mounted Photovoltaic (PV) and Building Integrated Photovoltaic (BIPV) Installations.

11.12.2.1* Marking. Photovoltaic systems shall be permanently marked as specified in 11.12.2.1.1 through 11.12.2.1.6.3.

11.12.2.1.1* Rapid Shutdown Marking. Buildings with a rooftop-mounted PV system and buildings with a BIPV system installed as the roof covering shall be provided with permanent labels as described in 11.12.2.1.1.1 through 11.12.2.1.1.9.

11.12.2.1.1.1 Rapid Shutdown Type. The type of PV system rapid shutdown shall be labeled as described in 11.12.2.1.1.1.1 or 11.12.2.1.1.1.2.

11.12.2.1.1.1.1 Buildings with Rapid Shutdown. PV systems that shut down the PV system and reduce shock hazard in the array and conductors leaving the array shall be labeled as follows:

SOLAR PV SYSTEM IS EQUIPPED
WITH RAPID SHUTDOWN.

TURN RAPID SHUTDOWN SWITCH TO THE "OFF"
POSITION TO SHUT DOWN PV SYSTEM AND REDUCE
SHOCK HAZARD IN ARRAY.

11.12.2.1.1.1.2 PV systems that only shut down conductors outside the array shall be labeled as follows:

SOLAR PV SYSTEM IS EQUIPPED
WITH RAPID SHUTDOWN.

TURN RAPID SHUTDOWN SWITCH TO
THE "OFF" POSITION
TO SHUT DOWN CONDUCTORS OUTSIDE
THE ARRAY. CONDUCTORS WITHIN ARRAY REMAIN
ENERGIZED IN SUNLIGHT.

