

Section 917 - Radio Amplification for New Construction

917.01, Subdivision 1. Except as otherwise provided, no person shall erect, construct, change the use of or provide an addition of more than 20% to, any building or structure or any part thereof, or cause the same to be done which fails to support adequate radio coverage for the Minnesota Regional Radio Communications System, including but not limited to firefighters and police officers.

Subd. 2. This section shall not apply to: buildings of less than 8,500 square feet, or any building constructed of wood frame; provided none of the aforementioned buildings make use of any metal construction or any below-grade levels or parking areas.

Subd. 3. Any part of any R-3 occupancy building, including below-grade levels and parking areas, is exempt from the requirements of this section.

Subd. 4. For the purposes of this section, parking structures and stairwells are included in the definition of "building" and stair shafts and elevators are included in the definition of "all parts of the building."

Subd. 5. For purposes of this section, adequate radio coverage shall be an average received field strength of no less than -93 dBm, or 1% BER, measured at 30 to 36 inches above the floor over 90% of the area of each floor and other critical areas determined by the Fire Chief or the Fire Chief's designee such as fire command centers, stairwells, elevators, high hazard areas, basements, and parking areas. Without an in-building radio system, only the received signal level standard must be achieved, as the talk-out path is equivalent to the talk-in path in this regional radio system.

917.11, Subdivision 1. Amplification systems allowed. Buildings and structures which cannot support the required level of radio coverage shall be equipped with either a radiating cable system or an internal multiple antenna system with or without FCC type accepted bi-directional 800 MHz amplification as needed.

Subd. 2. If amplification is used in the system, all required FCC authorizations must be obtained prior to the use of the system.

Subd. 3. If any part of the installed system or systems contains an electrically powered component, the system shall be capable of operating on an independent battery and/or generator system for a period of at least 12 hours without external power input. The battery system shall automatically charge in the presence of an external power input.

917.13 Subdivision 1. Testing procedures. Acceptance test procedure. With or without an in-building radio system, it will be the building owner's responsibility to have the regional radio system performance tested to ensure that two-way coverage on each floor of the building is a minimum of 90% of the total floor area and the critical areas designated.

Subd. 2. Talk-in From the Regional Radio System Coverage Testing. The talk-in coverage testing process shall be the same for buildings with and without in-building amplification systems.

Subd. 3. During test measuring, the center of the test equipment receive antenna shall be between 30 and 36 inches above the floor.

Subd. 4. On each floor of a building to be tested, the floor space, except for designated critical areas, shall be divided into square or rectangular areas of approximately the same size and shape. Each floor shall have at least ten grid areas; however, the maximum size of grid areas shall not exceed 2,500 square feet.

Subd. 5. In buildings with support columns laid out in a grid, the corners of each grid may be arranged at the columns for ease in identifying grid corners while testing is in progress. In buildings, such as a warehouse, with large open areas, tests shall be conducted near the center of each grid although the exact center may not be easily accessible due to the location of large machinery, storage racks, and the like.

Subd. 6. In buildings with divided office spaces, with or without floor to ceiling patricians, tests shall be conducted in an office at or near the center of a grid. In buildings with a large open area and an attached two-story, split-level office or other area, the lower level of the two-story, split-level attachment shall be considered as an extension of the large open area.

Subd. 7. In multi-story buildings and parking ramps, testing shall begin at the lowest level, including any subgrade level(s), and continue up one floor at a time. In-building amplification may only be required on the lowest level or levels of a multi-story building or parking ramp.

Subd. 8. Average radio signal field strength shall be measured and recorded in each grid and in each designated critical area defined above. Average field strength may be obtained through use of an instantaneous measuring instrument and a computer that samples the actual field strength at very short time intervals and averages the sample values. As an alternative, a field strength measuring instrument with an analog or digital readout of average field strength may also be used. Measurements shall be made while the measuring instrument is moved over a distance of four to ten feet. If the average field strength varies over the measurement path, the lowest (most negative) value shall be recorded. The test instrumentation used shall have been calibrated within the six-month period prior to the testing.

Subd. 9. The percentage of area passed shall be calculated as 100 times the result of dividing the number of grids and critical areas that are at least at -93 dBm or 1% BER by the total number of grids and critical areas tested.

Subd. 11. The donor antenna in an in-building amplification system may receive up to 87 800 MHz radio frequencies of approximately equal field strength from the regional system, plus some others of approximately equal field strength from other radio systems. At any time, the donor antenna may be receiving at least 60 radio frequencies of approximately equal level in the pass band ranges. For that reason, it shall be assumed that the output level of talk-in amplifiers will be at $+ 3.2$ dBm per channel maximum. Therefore, grid and critical areas tests shall be conducted while the head end amplifier is disconnected and a signal of $+ 3.2$ dBm is inserted into the connector downstream from the headend amplifier.

- a) Any in-building talk-in amplification system shall have pass band filters before the input to the first (headend) amplifier that shall pass 806 to 817 MHz and 821 to 824 MHz only.
- b) In the future, within six months after notification by the Fire Chief or the Fire Chief's designee, the pass band filter frequency range shall be changed in accordance with instructions, or an additional pass band filter for 700 MHz band frequencies shall be added.
- c) When the donor antenna is installed, the average signal level received on the Hennepin East site control channel shall be measured at the antenna connector. A signal at that average received signal level shall be inserted into the cable to the headend amplifier and filter while the output level of the headend amplifier is measured, and the output level of the amplifier shall be set at $+ 29 + 1$ dBm.

Subd. 13. Alternative in-building amplification systems that do not involve broadband pass band filters will be accepted provided that similar testing can be demonstrated.

Subd. 15. Talk-out to the Regional Radio System Testing.

With an in-building amplification system, the talk-out (to the regional 800 MHz radio system) shall be measured at the same grid and critical area locations as the talk-in measurements were made. The measurements shall be made using a three-watt portable radio with a well-charged battery to transmit into the in-building radio system while field strength is measured out of the connector that is normally attached to the donor antenna.

Subd. 17. To pass, the field strength at the donor antenna shall be the measured value at the connector plus the donor antenna gain and minus a free space loss factor. The free space loss factor shall be -93 dB for a distance of one mile to the nearest Hennepin East base radio location, adjusted by 6 dB each time the distance is halved or doubled. The acceptable range for passing shall be between -65 and -95 dBm.

Subd. 19. 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 each year during the annual tests. In the event that the measurement results become lost, the building owner will be required to rerun the acceptance test to reestablish the gain values.

917.15, Subdivision 1. Annual tests. When an in-building radio system is required, the building owner shall test all active components of the system, including but not limited to amplifiers, power supplies and backup batteries, a minimum of once every 12 months.

Subd. 2. Amplifiers shall be tested to ensure that the gain is the same as it was upon initial installation and acceptance.

Subd. 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.

Subd. 4. If within the one-hour test period, in the opinion of the testing technician, the battery exhibits symptoms of failure, the test shall be extended for additional one-hour periods until the testing technician confirms the integrity of the battery.

Subd. 5. All other active components shall be checked to determine that they are operating within the manufacturer's specifications for the intended purpose.

917.17, Subdivision 1. Five-year tests. In addition to the annual test, the building owner shall perform a radio coverage test a minimum of once every five years to ensure that the radio system continues to meet the requirements of the original acceptance test.

Subd. 2. A radio test shall also be performed whenever there is a change in or to the building that may have an impact on coverage. Examples of the types of changes that may change radio coverage are:

- a) interior remodeling that adds and/or changes partitions
- b) removal of windows
- c) the addition of metalized treatment to window surfaces.

Subd. 3. The procedure described in division 917.13 shall be used for these tests.

917.19, Subdivision 1. Qualifications of testing personnel. All tests shall be conducted, documented and signed by qualified and competent personnel that includes: persons in possession of a current FCC license, or a current technician certification issued by the Associated Public-Safety Communications Officials International (APCO) or the Personal Communications Industry Association (PCIA), or a qualified radio engineer licensed as a registered professional engineer by the State of Minnesota and approved by the City of Hopkins.

Subd. 2. Testing personnel shall have test equipment that is appropriate for the testing procedure, and that test equipment shall have been calibrated within six months prior to the testing.

917.21 All test records shall be retained on the inspected premises by the building owner and a copy shall be submitted to Fire Department officials.

917.23 Field testing. Fire and police personnel, after providing reasonable notice to the owner or the owner's representative, shall have the right to enter onto the property to conduct testing to be certain that the required level of radio coverage is present.

917.25 All cost to implement this ordinance and testing of equipment shall be paid by building owner.

(Added Ord. 2006-968)