

APPENDIX L

ASSISTIVE LISTENING SYSTEMS PERFORMANCE STANDARDS

SECTION L101 GENERAL

L101.1 Scope. The provisions of this appendix shall control the performance standards of assistive listening systems.

SECTION L102 INDUCTION LOOP SYSTEM

L102.1 Induction loop system specifications.

1. If the ambient electromagnetic noise (generally caused by lighting regulation systems or major power supplies) produces a field strength exceeding 30 mA/meter at frequencies that would decrease the signal-to-noise ratio specified in Item 4, then it is recommended that, unless the noise can be reduced, an induction loop system not be considered.
2. If the electromagnetic signal produced by a nearby induction loop system spills over into a new user area being considered for a different induction loop system and produces an average magnetic field strength exceeding 15 mA/meter, then it is recommended that, unless the use of each system can be scheduled so as not to occur simultaneously, an induction loop system not be considered in the new area.
3. Given an input signal to the amplifier that has a constant level over a minimum frequency range of 100 Hz to 8,000 Hz, the measured frequency response of the magnetic field generated by the induction loop system over that range shall not vary by more than +/-3 decibels from the value of 1,000 Hz. In actual usage, graphic equalization of the output signal is allowed.
4. Given an output power level equal to the average value specified in Item 6, the minimum signal-to-noise ratio of the program signal carried by the electromagnetic field shall be at least 30 decibels.
5. Given a 1,000 Hz input signal to the amplifier that has a level sufficient to produce the minimum signal-to-noise ratio specified in Item 4, the harmonic distortion between the input signal and the program signal carried by the electromagnetic field shall not vary by more than 5 percent over the field strength range specified in Item 6.
6. Given a 1,000 Hz sinusoidal input signal, at a level equal to the long-time average level of a speech signal, the average value of the magnetic field strength generated within the user area by the loop shall equal 100 mA/meter +/-3 decibels.

The maximum value of the magnetic field strength for a system set to the above recommended average value shall be 400 mA/meter (derived on the basis that

the difference of the maximum short-time average level between a speech signal - approximately 0.125 seconds - and the long-time average level is approximately 12 decibels).

Both measurements shall be made 48 inches (1219 mm) above floor level at any point within the user area.

7. If a hand-held receiver with[in] earphone is used, the specifications in Items 3, 4 and 5 shall apply. Additionally, the sound pressure level generated by the receiver and earphone shall be at least 80 decibels.
The maximum high-frequency average sound pressure level generated by the receiver earphone shall not exceed 130 decibels.
8. The system must have inputs capable of accepting signals at line level and microphone level and must be capable of interfacing with existing public address systems or stand alone.
9. Any stand-alone devices powered by 110-120 volt AC used as part of the system must have been tested by an approved laboratory.
10. All input and output wiring must comply with NFPA 70. Output wiring may be enclosed in nonmetallic raceways or molding.
11. The installation of all stand-alone components of the system must comply with all state and local codes.

SECTION L103 INFRARED SYSTEM

L103.1 Infrared system specifications.

1. If the ambient infrared light (generally caused by other infrared light-generating devices or direct sunlight) produces interference, it is recommended that, unless the interfering infrared light can be reduced, infrared systems not be considered.
2. Given an input signal to the transmitter within the range of levels specified in Item 6 over a minimum frequency range of 200 Hz to 8,000 Hz, the measured frequency response of the output signal generated by the receiver and transducer over that range shall not vary by more than +/-5 decibels from the value at 1,000 Hz. In actual usage, graphic equalization of the output signal is allowed.
3. Given an input signal to the transmitter within the range of levels specified in Item 6, the minimum signal-to-noise ratio of the output generated by the receiver and transducer shall be 35 decibels at all frequencies specified in Item 2.

4. Given an input signal of 1,000 Hz to the transmitter at a level sufficient to produce the minimum signal-to-noise ratio specified in Item 3, the harmonic distortion produced by the receiver and transducer shall not be more than 5 percent.
 5. Given a 1,000 Hz sinusoidal input signal at a level within the range specified in Item 6, the following are the possible transducers:
 - 5.1 If using a neckloop as an output transducer, generate a magnetic field strength of at least 150 mA/meter. The peak field strength shall not exceed 600 mA/meter. Measurements shall be made at the geometric center of the plane of the neckloop.
 - 5.2 If using a silhouette as an output transducer, generate a magnetic field strength of at least 50 mA/meter (the peak field strength shall not exceed 200 mA/meter). Measurements shall be made at a distance of 10 centimeters from the silhouette.
 - 5.3 If using a miniature earphone as an output transducer, generate a sound pressure level of at least 80 decibels. The maximum high-frequency average sound pressure level shall not exceed 130 decibels.
 - 5.4 If a direct input cable is used between the output of the receiver and the input of a hearing aid boot or shoe, generate a minimum voltage range of 2 mV to 800 mV and match a boot/shoe input impedance of 50 ohms or greater. The plugs at either end shall be molded 2-pin, 3-pin and/or 3.5-millimeter mini-plug (stereo or mono).
 6. The system must have inputs capable of accepting signals at line level and microphone level and must be capable of interfacing with existing public address systems or stand alone.
 7. The minimum light level of the transmitted infrared carrier signal must be sufficient so that a receiver can produce the specifications in Items 2, 3, 4 and 5 at any point within the user area.
 8. Any stand-alone devices powered by 110-120 volt AC used as part of the system must be tested by an approved laboratory.
 9. All input wiring must comply with NFPA 70.
 10. The installation of all stand-alone components of the system must comply with all state and local codes.
2. Given an input signal to the transmitter within the range of levels specified in Item 6 over a minimum frequency range of 100 Hz to 8,000 Hz, the measured frequency response of the output signal generated by the receiver and a transducer over that range shall not vary by more than +/-5 decibels from the value at 1,000 Hz. In actual usage, graphic equalization of the output signal is allowed.
 3. Given an input signal to the transmitter within the range of levels specified in Item 6, the minimum signal-to-noise ratio of the output generated by the receiver and transducer shall be 35 decibels at all frequencies specified in Item 2.
 4. Given an input signal to the transmitter at 1,000 Hz at a level sufficient to produce the minimum signal-to-noise ratio specified in Item 3, the total harmonic distortion between the input signal and the program signal produced by the receiver and transducer shall not be more than 10 percent.
 5. Given a 1,000 Hz sinusoidal input signal at a level within the range specified in Item 6, the following are among the possible transducers:
 - 5.1 If using a neckloop as an output transducer, generate a magnetic field strength of at least 150 mA/meter. The peak field strength shall not exceed 600 mA/meter. Measurements shall be made at the geometric center of the plane of the neckloop.
 - 5.2 If using a silhouette as an output transducer, generate a magnetic field strength of at least 50 mA/meter. The peak field strength shall not exceed 200 mA/meter. Measurements shall be made at a distance of 10 centimeters from the silhouette.
 - 5.3 If using a miniature earphone as an output transducer, generate a sound pressure level of at least 80 decibels. The maximum high-frequency average sound pressure level shall not exceed 130 decibels.
 - 5.4 If a direct input cable is used between the output of the receiver and the input of a hearing aid boot or shoe, generate a minimum voltage range of 2 mV to 800 mV and match a boot/shoe input impedance of 50 ohms or greater. The plugs at either end shall be molded 2-pin, 3-pin and/or 3.5-millimeter mini-plug (stereo or mono).
 6. The system must have inputs capable of accepting signals at line level and microphone level and must be capable of interfacing with existing public address systems or stand alone.
 7. The minimum sensitivity of the receiver shall be at least 2 uV at 12 decibel SINAD. The maximum RF signal generated by the transmitter shall not exceed 8,000 uV/meter at 30 meters.
 8. Any stand-alone devices powered by 110-120 volt AC used as part of the system must be tested by an approved laboratory.

SECTION L104 FM SYSTEM

L104.1 FM system specifications.

1. If an ambient FM signal (generally caused by other agencies on the same frequency or major power supplies) produces interference, it is recommended that, unless the frequency can be changed, an FM system not be considered.

9. All input and output wiring must comply with NFPA 70.
10. The installation of all stand-alone components of the system must comply with all state and local codes.
11. The frequencies used by the transmitter should be in compliance with applicable FCC rules.

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