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Title 49 —Transportation

Subtitle B —Other Regulations Relating to Transportation

Chapter II —Federal Railroad Administration, Department of Transportation

Part 227 Occupational Safety and Health in the Locomotive Cab

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PART 227—OCCUPATIONAL SAFETY AND HEALTH IN THE LOCOMOTIVE CAB

Authority: 49 U.S.C. 20103, 20103 note, 20166, 20701-20703, 21301, 21302, 21304; 28 U.S.C. 2461 note; and 49 CFR 1.89.

Source: 71 FR 63123, Oct. 27, 2006, unless otherwise noted.

Subpart A—General

§ 227.1 Purpose and scope.

- (a) **General.** The purpose of this part is to protect the occupational safety and health of certain employees who are exposed to occupational dangers while in the cab of the locomotive. This part prescribes minimum Federal safety and health standards for certain locomotive cab occupants. This part does not restrict a railroad or railroad contractor from adopting and enforcing additional or more stringent requirements.
- (b) **Subpart B of this part.** The purpose of subpart B is to protect the occupational safety and health of employees whose predominant noise exposure occurs in the locomotive cab. Subpart B prescribes minimum Federal safety and health noise standards for locomotive cab occupants.

- (c) **Subpart C of this part.** The purpose of subpart C is to protect the occupational safety and health of train employees and certain other employees in the cab of the locomotive of a freight train that is transporting a poison inhalation hazard (PIH) material that, if released due to a railroad accident/incident, would pose an inhalation hazard to the occupants. In particular, subpart C is intended to protect these employees from the risk of exposure to the material while they are located in, or during escape from, the locomotive cab.

[89 FR 5130, Jan. 26, 2024]

§ 227.3 Application.

- (a) Except as provided in paragraph (b) of this section, subpart B of this part applies to all railroads and contractors to railroads.
- (b) Subpart B of this part does not apply to—
- (1) A railroad that operates only on track inside an installation that is not part of the general railroad system of transportation;
 - (2) A rapid transit operation in an urban area that is not connected to the general railroad system of transportation;
 - (3) A rapid transit operation in an urban area that is connected to the general system and operates under a shared use waiver;
 - (4) A railroad that operates tourist, scenic, historic, or excursion operations, whether on or off the general railroad system of transportation; or
 - (5) Foreign railroad operations that meet the following conditions: Employees of the foreign railroad have a primary reporting point outside of the U.S. but are operating trains or conducting switching operations in the U.S.; and the government of that foreign railroad has implemented requirements for hearing conservation for railroad employees; the foreign railroad undertakes to comply with those requirements while operating within the U.S.; and FRA's Associate Administrator for Railroad Safety/Chief Safety Officer determines that the foreign requirements are consistent with the purpose and scope of subpart B of this part. A "foreign railroad" refers to a railroad that is incorporated in a place outside the U.S. and is operated out of a foreign country but operates for some distance in the U.S.
- (c) Except as provided in paragraph (d) of this section, subpart C of this part applies to any railroad that operates a freight train that transports a PIH material, including a residue of such a PIH material, on standard gage track that is part of the general railroad system of transportation.
- (d) Subpart C of this part does not apply to a railroad that operates only on track inside an installation that is not part of the general railroad system of transportation.

[71 FR 63123, Oct. 27, 2006, as amended at 89 FR 5131, Jan. 26, 2024]

§ 227.5 Definitions.

As used in this part—

Accident/incident has the meaning that is assigned to that term by § 225.5 of this chapter.

Action level means an eight-hour time-weighted-average sound level (TWA) of 85 dB(A), or, equivalently, a dose of 50 percent, integrating all sound levels from 80 dB(A) to 140 dB(A).

Administrator means the Administrator of the Federal Railroad Administration or the Administrator's delegate.

Artifact means any signal received or recorded by a noise measuring instrument that is not related to occupational noise exposure and may adversely impact the accuracy of the occupational noise measurement.

Associate Administrator for Railroad Safety/Chief Safety Officer means the Associate Administrator for Railroad Safety/Chief Safety Officer, Federal Railroad Administration, 1200 New Jersey Avenue SE., Washington, DC 20590.

Atmosphere immediately dangerous to life or health (IDLH) means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Atmosphere-supplying device means a respirator that supplies the respirator user with breathing air from a source that is independent of the ambient atmosphere. Such devices include supplied-air respirators and self-contained breathing apparatus units.

Audiogram means a record of audiometric testing, showing the thresholds of hearing sensitivity measured at discrete frequencies, as well as other recordkeeping information.

Audiologist means a professional, who provides comprehensive diagnostic and treatment/rehabilitative services for auditory, vestibular, and related impairments and who

- (1) Has a Master's degree or doctoral degree in audiology and
- (2) Is licensed as an audiologist by a State; or in the case of an individual who furnishes services in a State which does not license audiologists, has successfully completed 350 clock hours of supervised clinical practicum (or is in the process of accumulating such supervised clinical experience), performed not less than 9 months of supervised full-time audiology services after obtaining a master's or doctoral degree in audiology or a related field, and successfully completed a national examination in audiology approved by the Secretary of the U.S. Department of Health and Human Services.

Audiometry means the act or process of measuring hearing sensitivity at discrete frequencies. Audiometry can also be referred to as audiometric testing.

Baseline audiogram means an audiogram, recorded in accordance with § 227.109, against which subsequent audiograms are compared to determine the extent of change of hearing level.

Class I, Class II, and Class III railroads have the meaning assigned by the regulations of the Surface Transportation Board (49 CFR part 120; General Instructions 1-1).

Continuous noise means variations in sound level that involve maxima at intervals of 1 second or less.

Deadheading means the physical relocation of a train employee from one point to another as a result of a railroad-issued oral or written directive.

Decibel (dB) means a unit of measurement of sound pressure levels.

dB(A) means the sound pressure level in decibels measured on the A-weighted scale.

Division headquarters means the location designated by the railroad where a high-level operating manager (e.g., a superintendent, division manager, or equivalent), who has jurisdiction over a portion of the railroad, has an office.

Emergency escape breathing apparatus or EEBA means an atmosphere-supplying respirator device that is designed for use only during escape from a hazardous atmosphere.

Employee means any individual who is engaged or compensated by a railroad or by a contractor to a railroad to perform any of the duties defined in this part.

Exchange rate means the change in sound level, in decibels, which would require halving or doubling of the allowable exposure time to maintain the same noise dose. For purposes of this part, the exchange rate is 5 decibels.

FRA means the Federal Railroad Administration.

Freight car means a vehicle designed to transport freight, or railroad personnel, by rail and includes, but is not limited to, a—

- (1) Box car;
- (2) Refrigerator car;
- (3) Ventilator car;
- (4) Stock car;
- (5) Gondola car;
- (6) Hopper car;
- (7) Flat car;
- (8) Special car;
- (9) Caboose;
- (10) Tank car; and
- (11) Yard car.

Freight train means one or more locomotives coupled with one or more freight cars, except during switching service.

Hazardous material has the meaning assigned to that term by § 171.8 of this title.

Hazmat employee has the meaning assigned to that term by § 171.8 of this title.

Hearing protector means any device or material, which is capable of being worn on the head, covering the ear canal or inserted in the ear canal; is designed wholly or in part to reduce the level of sound entering the ear; and has a scientifically accepted indicator of its noise reduction value.

Hertz (Hz) means a unit of measurement of frequency numerically equal to cycles per second.

In service or in-service when used in connection with a freight train, means each freight train subject to this part unless the train—

- (1) Is in a repair shop or on a repair track;

- (2) Is on a storage track and its cars are empty; or
- (3) Has been delivered in interchange but has not been accepted by the receiving carrier.

Intermodal container means a freight container designed and constructed to permit it to be used interchangeably in two or more modes of transportation.

ISO means the International Organization for Standardization, a network of national standards institutes in 162 countries, including the United States through the American National Standards Institute, that develops international standards to assist in ensuring the safe performance of a wide range of devices, including EEBA's.

Medical pathology means a condition or disease affecting the ear which is medically or surgically treatable.

NIOSH means the National Institute for Occupational Safety and Health, a Federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness, which is part of the Centers for Disease Control and Prevention in the U.S. Department of Health and Human Services and which certifies industrial-type respirators in accordance with the NIOSH respiratory regulations (42 CFR part 84).

Noise operational controls means a method used to reduce noise exposure, other than hearing protectors or equipment modifications, by reducing the time a person is exposed to excessive noise.

Occasional service means service of not more than a total of 20 days in a calendar year.

Otolaryngologist means a physician specializing in diagnosis and treatment of disorders of the ear, nose, and throat.

Periodic audiogram is a record of follow-up audiometric testing conducted at regular intervals after the baseline audiometric test.

Person means an entity of any type covered under 1 U.S.C. 1, including but not limited to the following: a railroad; a manager, supervisor, official, or other employee or agent of a railroad; an owner, manufacturer, lessor, or lessee of railroad equipment, track, or facilities; an independent contractor providing goods or services to a railroad; and any employee of such owner, manufacturer, lessor, lessee, or independent contractor.

PIH material means any of the hazardous materials that are a gas, liquid, or other material defined as a "material poisonous by inhalation" by § 171.8 of this title.

Professional Supervisor of the Audiometric Monitoring Program in a hearing conservation program means an audiologist, otolaryngologist, or a physician with experience and expertise in hearing and hearing loss.

Qualified Technician is a person who is certified by the Council for Accreditation in Occupational Hearing Conservation or equivalent organization; or who has satisfactorily demonstrated competence in administering audiometric examinations, obtaining valid audiograms, and properly using, maintaining, and checking calibration and proper functioning of the audiometers used; and is responsible to the Professional Supervisor of the Audiometric Testing Program.

Railroad means any form of non-highway ground transportation that runs on rails or electromagnetic guide-ways and any entity providing such transportation, including:

- (1) Commuter or other short-haul railroad passenger service in a metropolitan or suburban area and commuter railroad service that was operated by the Consolidated Rail Corporation on January 1, 1979; and

- (2) High speed ground transportation systems that connect metropolitan areas, without regard to whether those systems use new technologies not associated with traditional railroads. The term "railroad" is also intended to mean a person that provides transportation by railroad, whether directly or by contracting out operation of the railroad to another person. The term does not include rapid transit operations in an urban area that are not connected to the general railroad system of transportation.

Representative personal sampling means measurement of an employee's noise exposure that is representative of the exposures of other employees who operate similar equipment under similar conditions.

Residue has the meaning assigned to the term by § 171.8 of this title.

Sound level or Sound pressure level means ten times the common logarithm of the ratio of the square of the measured A-weighted sound pressure to the square of the standard reference pressure of twenty micropascals, measured in decibels. For purposes of this regulation, SLOW time response, in accordance with ANSI S1.43-1997 (Reaffirmed 2002), "Specifications for Integrating-Averaging Sound Level Meters," is required. The Director of the Federal Register approves this incorporation by reference of this standard in this section in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated standard from the American National Standards Institute at 1819 L Street, NW., Washington, DC 20036 or <http://www.ansi.org>. You may inspect a copy of the incorporated standard at the Federal Railroad Administration, Docket Room, 1200 New Jersey Avenue, SE., Washington, DC 20590, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

Standard threshold shift (STS) means a change in hearing sensitivity for the worse, relative to the baseline audiogram, or relative to the most recent revised baseline (where one has been established), of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

State means a State of the United States of America or the District of Columbia.

Switching service means the classification of freight cars according to commodity or destination; assembling of cars for train movements; changing the position of cars for purposes of loading, unloading, or weighing; placing of locomotives and cars for repair or storage; or moving of rail equipment in connection with work service that does not constitute a freight train movement.

System headquarters means the location designated by the railroad as the general office for the railroad system.

Time-weighted-average eight-hour (or 8-hour TWA) means the sound level, which, if constant over 8 hours, would result in the same noise dose as is measured. For purposes of this part, the exchange rate is 5 decibels.

Tourist, scenic, historic, or excursion operations means railroad operations that carry passengers, often using antiquated equipment, with the conveyance of the passengers to a particular destination not being the principal purpose.

Train employee means an individual who is engaged in or connected with the movement of a train, including a hostler, as defined in 49 U.S.C. 21101.

United States means all of the States and the District of Columbia.

[71 FR 63123, Oct. 27, 2006, as amended at 74 FR 25173, May 27, 2009; 89 FR 5131, Jan. 26, 2024]

§ 227.7 [Reserved]

§ 227.9 Penalties.

- (a) Any person who violates any requirement of this part or causes the violation of any such requirement is subject to a civil penalty of at least \$1,114 and not more than \$36,439 per violation, except that: penalties may be assessed against individuals only for willful violations, and, where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury to persons, or has caused death or injury, a penalty not to exceed \$145,754 per violation may be assessed. Each day a violation continues shall constitute a separate offense. See FRA's website at www.fra.dot.gov for a statement of agency civil penalty policy.
- (b) Any person who knowingly and willfully falsifies a record or report required by this part may be subject to criminal penalties under 49 U.S.C. 21311.

[71 FR 63123, Oct. 27, 2006, as amended at 73 FR 79702, Dec. 30, 2008; 77 FR 24421, Apr. 24, 2012; 81 FR 43110, July 1, 2016; 82 FR 16133, Apr. 3, 2017; 83 FR 60748, Nov. 27, 2018; 84 FR 23735, May 23, 2019; 84 FR 37073, July 31, 2019; 86 FR 1758, Jan. 11, 2021; 86 FR 23254, May 3, 2021; 87 FR 15868, Mar. 21, 2022; 88 FR 1127, Jan. 6, 2023; 88 FR 89562, Dec. 28, 2023; 89 FR 106296, Dec. 30, 2024]

§ 227.11 Responsibility for compliance.

Although the duties imposed by this part are generally stated in terms of the duty of a railroad, any person, including a contractor for a railroad, who performs any function covered by this part must perform that function in accordance with this part.

§ 227.13 Waivers.

- (a) A person subject to a requirement of this part may petition the Administrator for a waiver of compliance with such requirement. The filing of such a petition does not affect that person's responsibility for compliance with that requirement while the petition is being considered.
- (b) Each petition for waiver under this section must be filed in the manner and contain the information required by part 211 of this chapter.
- (c) If the Administrator finds that a waiver of compliance is in the public interest and is consistent with railroad safety, the Administrator may grant the waiver subject to any conditions the Administrator deems necessary.

§ 227.15 Information collection.

- (a) The information collection requirements of this part were reviewed by the Office of Management and Budget pursuant to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.) and are assigned OMB control number 2130-NEW.
- (b) The information collection requirements are found in the following sections: §§ 227.13, 227.103, 227.107, 227.109, 227.111, 227.117, 227.119, 227.121, 227.201, 227.203, 227.205, 227.207, 227.209, 227.211, 227.213, and 227.215.

[71 FR 63123, Oct. 27, 2006, as amended at 89 FR 5132, Jan. 26, 2024]

Subpart B—Occupational Noise Exposure for Railroad Operating Employees.

§ 227.101 Scope and applicability.

- (a) This subpart shall apply to the noise-related working conditions of—
 - (1) Any person who regularly performs service subject to the provisions of the hours of service laws governing “train employees” (see 49 U.S.C. 21101(5) and 21103), but, subject to a railroad's election in paragraph (a)(3) of this section, does not apply to:
 - (i) Employees who move locomotives only within the confines of locomotive repair or servicing areas, as provided in §§ 218.5 and 218.29(a) of this chapter, or
 - (ii) Employees who move a locomotive or group of locomotives for distances of less than 100 feet and this incidental movement of a locomotive or locomotives is for inspection or maintenance purposes, or
 - (iii) Contractors who operate historic equipment in occasional service, provided that the contractors have been provided with hearing protectors and, where necessary, are required to use the hearing protectors while operating the historic equipment;
 - (2) Any direct supervisor of the persons described in paragraph (a)(1) of this section whose duties require frequent work in the locomotive cab; and
 - (3) At the election of the railroad, any other person (including a person excluded by paragraph (a)(1) of this section) whose duties require frequent work in the locomotive cab and whose primary noise exposure is reasonably expected to be experienced in the cab, if the position occupied by such person is designated in writing by the railroad, as required by § 227.121(d).
- (b) Occupational noise exposure and hearing conservation for employees not covered by this subpart is governed by the appropriate occupational noise exposure regulation of the U.S. Department of Labor, Occupational Safety and Health Administration located at 29 CFR 1910.95.

§ 227.103 Noise monitoring program.

- (a) **Schedule.** A railroad shall develop and implement a noise monitoring program to determine whether any employee covered by the scope of this subpart may be exposed to noise that may equal or exceed an 8-hour TWA of 85 dB(A), in accordance with the following schedule:
 - (1) Class I, passenger, and commuter railroads no later than February 26, 2008.
 - (2) Railroads with 400,000 or more annual employee hours that are not Class I, passenger, or commuter railroads no later than August 26, 2008.
 - (3) Railroads with fewer than 400,000 annual employee hours no later than August 26, 2009.
- (b) **Sampling strategy.**
 - (1) In its monitoring program, the railroad shall use a sampling strategy that is designed to identify employees for inclusion in the hearing conservation program and to enable the proper selection of hearing protection.
 - (2) Where circumstances such as high worker mobility, significant variations in sound level, or a significant component of impulse noise make area monitoring generally inappropriate, the railroad shall use representative personal sampling to comply with the monitoring requirements of this section, unless the railroad can show that area sampling produces equivalent results.

(c) **Noise measurements.**

- (1) All continuous, intermittent, and impulse sound levels from 80 decibels to 140 decibels shall be integrated into the noise measurements.
- (2) Noise measurements shall be made under typical operating conditions using:
 - (i) A sound level meter conforming, at a minimum, to the requirements of ANSI S1.4-1983 (Reaffirmed 2001) (incorporated by reference, see § 227.103(h)), Type 2, and set to an A-weighted SLOW response;
 - (ii) An integrated sound level meter conforming, at a minimum, to the requirements of ANSI S1.43-1997 (Reaffirmed 2002) (incorporated by reference, see § 227.103(h)), Type 2, and set to an A-weighted slow response ; or
 - (iii) A noise dosimeter conforming, at a minimum, to the requirements of ANSI S1.25-1991 (Reaffirmed 2002) (incorporated by reference, see § 227.103(h)) and set to an A-weighted SLOW response.
- (3) All instruments used to measure employee noise exposure shall be calibrated to ensure accurate measurements.

(d) The railroad shall repeat noise monitoring, consistent with the requirements of this section, whenever a change in operations, process, equipment, or controls increases noise exposures to the extent that:

- (1) Additional employees may be exposed at or above the action level; or
- (2) The attenuation provided by hearing protectors being used by employees may be inadequate to meet the requirements of § 227.103.

(e) In administering the monitoring program, the railroad shall take into consideration the identification of work environments where the use of hearing protectors may be omitted.

(f) **Observation of monitoring.** The railroad shall provide affected employees or their representatives with an opportunity to observe any noise dose measurements conducted pursuant to this section.

(g) **Reporting of monitoring results.**

- (1) The railroad shall notify each monitored employee of the results of the monitoring.
- (2) The railroad shall post the monitoring results at the appropriate crew origination point for a minimum of 30 days. The posting should include sufficient information to permit other crews to understand the meaning of the results in the context of the operations monitored.

(h) **Incorporation by reference.** The materials listed in this section are incorporated by reference in the corresponding sections noted. These incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated materials from the American National Standards Institute at 1819 L Street, NW., Washington, DC 20036 or <http://www.ansi.org>. You may inspect a copy of the incorporated standards at the Federal Railroad Administration, Docket Room, 1200 New Jersey Avenue, SE., Washington, DC 20590, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

- (1) ANSI S1.4-1983 (Reaffirmed 2001), Specification for Sound Level Meters, incorporation by reference (IBR) approved for § 227.103(c)(2)(i).
- (2) ANSI S1.43-1997 (Reaffirmed 2002), Specifications for Integrating-Averaging Sound Level Meters, IBR approved for § 227.103(c)(2)(ii).
- (3) ANSI S1.25-1991 (Reaffirmed 2002), Specification for Personal Noise Dosimeters, IBR approved for § 227.103(c)(2)(iii).

[71 FR 63123, Oct. 27, 2006, as amended at 74 FR 25173, May 27, 2009; 89 FR 5132, Jan. 26, 2024]

§ 227.105 Protection of employees.

- (a) A railroad shall provide appropriate protection for its employees who are exposed to noise, as measured according to § 227.103, that exceeds the limits specified in appendix A of this part.
- (b) In assessing whether exposures exceed 115 dB(A), as set forth in paragraph (a) of this section and appendix A to this part, the apparent source of the noise exposures shall be observed and documented and measurement artifacts may be removed.
- (c) Except as set forth in paragraph (d) of this section, exposure to continuous noise shall not exceed 115dB(A).
- (d) Exposures to continuous noise greater than 115 dB(A) and equal to or less than 120 dB(A) are permissible, provided that the total daily duration does not exceed 5 seconds.

§ 227.107 Hearing conservation program.

- (a) Consistent with the requirements of the noise monitoring program required by § 227.103, the railroad shall administer a continuing, effective hearing conservation program, as set forth in §§ 227.109 through 227.121, for all employees exposed to noise at or above the action level.
- (b) For purposes of the hearing conservation program, employee noise exposure shall be computed in accordance with the tables in appendix A of this part, and without regard to any attenuation provided by the use of hearing protectors.

§ 227.109 Audiometric testing program.

- (a) Each railroad shall establish and maintain an audiometric testing program as set forth in this section and include employees who are required to be included in a hearing conservation program pursuant to § 227.107.
- (b) **Cost.** The audiometric tests shall be provided at no cost to employees.
- (c) **Tests.** Audiometric tests shall be performed by:
 - (1) An audiologist, otolaryngologist, or other physician who has experience and expertise in hearing and hearing loss; or
 - (2) A qualified technician.
- (d) [Reserved]
- (e) **Baseline audiogram.** This paragraph (e) applies to employees who are required by § 227.107 to be included in a hearing conservation program.

(1) ***New employees.***

- (i) Except as provided in paragraph (e)(1)(ii), for employees hired after February 26, 2007, the railroad shall establish a valid baseline audiogram within 6 months of the new employee's first tour of duty.
- (ii) Where mobile test vans are used to meet the requirement in paragraph (e)(1)(i), the railroad shall establish a valid baseline audiogram within one year of the new employee's first tour of duty.

(2) ***Existing employees.***

- (i) For all employees without a baseline audiogram as of February 26, 2007, Class I, passenger, and commuter railroads, and railroads with 400,000 or more annual employee hours shall establish a valid baseline audiogram by February 26, 2009; and railroads with less than 400,000 annual employee hours shall establish a valid baseline audiogram by February 26, 2010.
- (ii) If an employee has had a baseline audiogram as of February 26, 2007, and it was obtained under conditions that satisfy the requirements found in 29 CFR 1910.95(h), the railroad must use that baseline audiogram.
- (iii) If the employee has had a baseline audiogram as of February 26, 2007, and it was obtained under conditions that satisfy the requirements in 29 CFR 1910.95(h)(1), but not the requirements found in 29 CFR 1910.95(h)(2) through (5), the railroad may elect to use that baseline audiogram provided that the Professional Supervisor of the Audiometric Monitoring Program makes a reasonable determination that the baseline audiogram is valid and is clinically consistent with other materials in the employee's medical file.

- (3) Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to occupational noise in excess of the action level. Hearing protectors may be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to occupational noise.

- (4) The railroad shall notify its employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination.

(f) ***Periodic audiogram.***

- (1) The railroad shall offer an audiometric test to each employee included in the hearing conservation program at least once each calendar year. The interval between the date offered to any employee for a test in a calendar year and the date offered in the subsequent calendar year shall be no more than 450 days and no less than 280 days.
- (2) The railroad shall require each employee included in the hearing conservation program to take an audiometric test at least once every 1095 days.

(g) ***Evaluation of audiogram.***

- (1) Each employee's periodic audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and to determine if a standard threshold shift has occurred. This comparison may be done by a qualified technician.
- (2) If the periodic audiogram demonstrates a standard threshold shift, a railroad may obtain a retest within 90 days. The railroad may consider the results of the retest as the periodic audiogram.

- (3) The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. A railroad shall provide all of the following information to the person performing this review:
 - (i) The baseline audiogram of the employee to be evaluated;
 - (ii) The most recent audiogram of the employee to be evaluated;
 - (iii) Measurements of background sound pressure levels in the audiometric test room as required in appendix D of this part: Audiometric Test Rooms; and
 - (iv) Records of audiometer calibrations required by § 227.111.

(h) ***Follow-up procedures.***

- (1) If a comparison of the periodic audiogram to the baseline audiogram indicates that a standard threshold shift has occurred, the railroad shall inform the employee in writing within 30 days of the determination.
- (2) Unless a physician or audiologist determines that the standard threshold shift is not work-related or aggravated by occupational noise exposure, the railroad shall ensure that the following steps are taken:
 - (i) Employees not using hearing protectors shall be fitted with hearing protectors, shall be trained in their use and care, and shall be required to use them.
 - (ii) Employees already provided with hearing protectors shall be refitted, shall be retrained in the use of hearing protectors offering greater attenuation, if necessary, and shall be required to use them.
 - (iii) If subsequent audiometric testing is necessary or if the railroad suspects that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors, the railroad shall refer the employee for a clinical audiological evaluation or an otological examination.
 - (iv) If the railroad suspects that a medical pathology of the ear unrelated to the use of hearing protectors is present, the railroad shall inform the employee of the need for an otological examination.
- (3) If subsequent audiometric testing of an employee, whose exposure to noise is less than an 8-hour TWA of 90 dB, indicates that a standard threshold shift is not persistent, the railroad shall inform the employee of the new audiometric interpretation and may discontinue the required use of hearing protectors for that employee.

(i) ***Revised baseline.*** A railroad shall use the following methods for revising baseline audiograms:

- (1) Periodic audiograms from audiometric tests conducted through February 26, 2009, may be substituted for the baseline measurement by the Professional Supervisor of the Audiometric Monitoring Program who is evaluating the audiogram if:
 - (i) The standard threshold shift revealed by the audiogram is persistent; or
 - (ii) The hearing threshold shown in the periodic audiogram indicates significant improvement over the baseline audiogram.
- (2) Baseline audiograms from audiometric tests conducted after February 26, 2009, shall be revised in accordance with the method specified in appendix C of this part: Audiometric Baseline Revision.

- (j) **Standard threshold shift.** In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual audiogram according to the procedure described in appendix F of this part: Calculation and Application of Age Correction to Audiograms.

[71 FR 63123, Oct. 27, 2006, as amended at 89 FR 5132, Jan. 26, 2024]

§ 227.111 Audiometric test requirements.

- (a) Audiometric tests shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including 500, 1000, 2000, 3000, 4000, 6000, and 8000 Hz. Tests at each frequency shall be taken separately for each ear.
- (b) Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that meet the specifications of and are maintained and used in accordance with ANSI S3.6-2004 "Specification for Audiometers." The Director of the Federal Register approves the incorporation by reference of this standard in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated standard from the American National Standards Institute at 1819 L Street, NW., Washington, DC 20036 or <http://www.ansi.org>. You may inspect a copy of the incorporated standard at the Federal Railroad Administration, Docket Room, 1200 New Jersey Avenue, SE., Washington, DC 20590, Washington, DC 20005, or at the National Archives and Records Administration (NARA). For more information on the availability of this material at NARA, call 202-741-6030, or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.
- (1) Pulsed-tone audiometers should be used with the following on and off times: F-J and J-K shall each have values of 225 ±35 milliseconds (ms).
- (2) Use of insert earphones shall be consistent with the requirements listed in appendix E of this part: Use of Insert Earphones for Audiometric Testing.
- (c) Audiometric examinations shall be administered in a room meeting the requirements listed in appendix D of this part: Audiometric Test Rooms.
- (d) **Audiometer calibration.**
- (1) The functional operation of the audiometer shall be checked before each day's use by testing a person with known, stable hearing thresholds or by appropriate calibration device, and by listening to the audiometer's output to make sure that the output is free from distorted or unwanted sounds. Deviations of 10 decibels or greater require an acoustic calibration.
- (2) Audiometer calibration shall be checked acoustically at least annually according to the procedures described in ANSI S3.6-2004. Frequencies below 500 Hz and above 8000 Hz may be omitted from this check. The audiometer must meet the sound pressure accuracy requirements of section 7.2 of ANSI S3.6-2004 of 3 dB at any test frequency between 500 and 5000 Hz and 5 dB at any test frequency 6000 Hz and higher for the specific type of transducer used. For air-conduction supra-aural earphones, the specifications in Table 6 of ANSI S3.6-2004 shall apply. For air-conduction insert earphones, the specifications in Table 7 of ANSI S3.6-2004 shall apply. Audiometers that do not meet these requirements must undergo an exhaustive calibration.
- (3) Exhaustive Calibration. An exhaustive calibration shall be performed in accordance with ANSI S3.6-2004, according to the following schedule:

- (i) At least once every two years on audiometers not used in mobile test vans. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.
- (ii) At least annually on audiometers used in mobile test vans.

[71 FR 63123, Oct. 27, 2006, as amended at 74 FR 25173, May 27, 2009]

§ 227.113 Noise operational controls.

- (a) Railroads may use noise operational controls at any sound level to reduce exposures to levels below those required by Table A-1 of appendix A of this part.
- (b) Railroads are encouraged to use noise operational controls when employees are exposed to sound exceeding an 8-hour TWA of 90 dB(A).

§ 227.115 Hearing protectors.

- (a) *General requirements for hearing protectors.*
 - (1) The railroad shall provide hearing protectors to employees at no cost to the employee.
 - (2) The railroad shall replace hearing protectors as necessary.
 - (3) When offering hearing protectors, a railroad shall consider an employee's ability to understand and respond to voice radio communications and audible warnings.
 - (4) The railroad shall give employees the opportunity to select their hearing protectors from a variety of suitable hearing protectors. The selection shall include devices with a range of attenuation levels.
 - (5) The railroad shall provide training in the use and care of all hearing protectors provided to employees.
 - (6) The railroad shall ensure proper initial fitting and supervise the correct use of all hearing protectors.
- (b) *Availability of hearing protectors.* A railroad shall make hearing protectors available to all employees exposed to sound levels that meet or exceed the action level.
- (c) *Required use at action level.* A railroad shall require the use of hearing protectors when an employee is exposed to sound levels that meet or exceed the action level, and the employee has:
 - (1) Not yet had a baseline audiogram established pursuant to § 227.109; or
 - (2) Experienced a standard threshold shift and is required to use hearing protectors under § 227.109(h).
- (d) *Required use for TWA of 90 dB(A).* The railroad shall require the use of hearing protectors when an employee is exposed to sound levels equivalent to an 8-hour TWA of 90 dB(A) or greater. The hearing protectors should be used to reduce sound levels to within those levels required by appendix A of this part.

§ 227.117 Hearing protector attenuation.

- (a) A railroad shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. The railroad shall use one of the evaluation methods described in appendix B of this part; "Methods for Estimating the Adequacy of Hearing Protector Attenuation."

- (b) Hearing protectors shall attenuate employee exposure to an 8-hour TWA of 90 decibels or lower, as required by § 227.115.
- (c) For employees who have experienced a standard threshold shift, hearing protectors must attenuate employee exposure to an 8-hour time-weighted average of 85 decibels or lower.
- (d) The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. A railroad shall provide more effective hearing protectors where necessary.

§ 227.119 Training program.

- (a) The railroad shall institute an occupational noise and hearing conservation training program for all employees included in the hearing conservation program.
 - (1) The railroad shall offer the training program to each employee included in the hearing conservation program at least once each calendar year. The interval between the date offered to any employee for the training in a calendar year and the date offered in the subsequent calendar year shall be no more than 450 days and no less than 280 days.
 - (2) The railroad shall require each employee included in the hearing conservation program to complete the training at least once every 1095 days.
- (b) The railroad shall provide the training required by paragraph (a) of this section in accordance with the following:
 - (1) For employees hired after February 26, 2007, within six months of the employee's first tour of duty in a position identified within the scope of this part.
 - (2) For employees hired on or before February 26, 2007, by Class I, passenger, and commuter railroads, and railroads with 400,000 or more annual employee hours, by no later than February 26, 2009;
 - (3) For employees hired on or before February 26, 2007, by railroads with fewer than 400,000 annual employee hours, by no later than February 26, 2010.
- (c) The training program shall include and the training materials shall reflect, at a minimum, information on all of the following:
 - (1) The effects of noise on hearing;
 - (2) The purpose of hearing protectors;
 - (3) The advantages, disadvantages, and attenuation of various types of hearing protectors;
 - (4) Instructions on selection, fitting, use, and care of hearing protectors;
 - (5) The purpose of audiometric testing, and an explanation of the test procedures;
 - (6) An explanation of noise operational controls, where used;
 - (7) General information concerning the expected range of workplace noise exposure levels associated with major categories of railroad equipment and operations (e.g., switching and road assignments, hump yards near retarders, etc.) and appropriate reference to requirements of the railroad concerning use of hearing protectors;
 - (8) The purpose of noise monitoring and a general description of monitoring procedures;

- (9) The availability of a copy of this part, an explanation of the requirements of this part as they affect the responsibilities of employees, and employees' rights to access records under this part;
- (10) How to determine what can trigger an excessive noise report, pursuant to § 229.121(b); and
- (11) How to file an excessive noise report, pursuant to § 229.121(b).

[71 FR 63123, Oct. 27, 2006, as amended at 89 FR 5132, Jan. 26, 2024]

§ 227.121 Recordkeeping.

(a) General requirements –

- (1) **Availability of records.** Each railroad required to maintain and retain records under this part shall:
 - (i) Make all records available for inspection and copying/photocopying to representatives of the FRA, upon request;
 - (ii) Make an employee's records available for inspection and copying/photocopying to that employee, former employee, or such person's representative upon written authorization by such employee;
 - (iii) Make exposure measurement records for a given run or yard available for inspection and copying/photocopying to all employees who were present in the locomotive cab during the given run and/or who work in the same yard; and
 - (iv) Make exposure measurement records for specific locations available to regional or national labor representatives, upon request. These reports shall not contain identifying information of an employee unless an employee authorizes the release of such information in writing.
- (2) **Electronic records.** All records required by this part may be kept in electronic form by the railroad. A railroad may maintain and transfer records through electronic transmission, storage, and retrieval provided that:
 - (i) The electronic system be designed so that the integrity of each record is maintained through appropriate levels of security such as recognition of an electronic signature, or other means, which uniquely identify the initiating person as the author of that record. No two persons shall have the same electronic identity;
 - (ii) The electronic system shall ensure that each record cannot be modified in any way, or replaced, once the record is transmitted and stored;
 - (iii) Any amendment to a record shall be electronically stored apart from the record which it amends. Each amendment to a record shall be uniquely identified as to the person making the amendment;
 - (iv) The electronic system shall provide for the maintenance of records as originally submitted without corruption or loss of data; and
 - (v) Paper copies of electronic records and amendments to those records, that may be necessary to document compliance with this part shall be made available for inspection and copying/photocopying by representatives of the FRA.

(3) **Transfer of records.** If a railroad ceases to do business, it shall transfer to the successor employer all records required to be maintained under this subpart, and the successor employer shall retain them for the remainder of the period prescribed in this part.

(b) **Exposure measurements records.** The railroad shall:

- (1) Maintain an accurate record of all employee exposure measurements required by § 227.103; and
- (2) Retain these records for the duration of the covered employee's employment plus thirty years.

(c) **Audiometric test records.** The railroad shall:

- (1) Maintain employee audiometric test records required by § 227.109, including:
 - (i) The name and job classification of the employee;
 - (ii) The date of the audiogram;
 - (iii) The examiner's name;
 - (iv) The date of the last acoustic or exhaustive calibration of the audiometer;
 - (v) Accurate records of the measurements of the background sound pressure levels in audiometric test rooms;
 - (vi) The model and serial number of the audiometer used for testing; and
- (2) Retain the records required by § 227.107 for the duration of the covered employee's employment plus thirty years.

(d) **Positions and persons designated records.** The railroad shall:

- (1) Maintain a record of all positions or persons or both designated by the railroad to be placed in a Hearing Conservation Program pursuant to § 227.107; and
- (2) Retain these records for the duration of the designation.

(e) **Training program materials records.** The railroad shall:

- (1) Maintain copies of all training program materials used to comply with § 227.119(c) and a record of employees trained; and
- (2) Retain these copies and records for three years.

(f) **Standard threshold shift records.** The railroad shall:

- (1) Maintain a record of all employees who have been found to have experienced a standard threshold shift within the prior calendar year and include all of the following information for each employee on the record:
 - (i) Date of the employee's baseline audiogram;
 - (ii) Date of the employee's most recent audiogram;
 - (iii) Date of the establishment of a standard threshold shift;
 - (iv) The employee's job code; and
 - (v) An indication of how many standard threshold shifts the employee has experienced in the past, if any; and

- (2) Retain these records for five years.

Subpart C—Emergency Escape Breathing Apparatus Standards

Source: 89 FR 5132, Jan. 26, 2024, unless otherwise noted.

§ 227.201 Criteria for requiring availability of EEBA in the locomotive cab.

(a) *In general.*

(1)

- (i) Except as specified in paragraph (b) of this section, a railroad is required to provide an EEBA to each of the following of its employees while the employee is located in the cab of a locomotive of an in-service freight train transporting a PIH material, including a residue of a PIH material:
 - (A) Any train employee;
 - (B) Any direct supervisor of the train employee;
 - (C) Any employee who is deadheading; and
 - (D) Any other employee designated by the railroad in writing and at the discretion of the railroad.
- (ii) Each EEBA provided to an employee identified in paragraph (a)(1)(i) of this section must meet the EEBA-selection criteria of § 227.203 and must have been inspected and be in working order pursuant to the requirements of § 227.207 at the time that the EEBA is provided to the employee.

- (2) Except as specified in paragraph (b) of this section, a railroad shall not use a locomotive to transport a PIH material, including a residue of a PIH material, in an in-service freight train unless each of the employees identified in paragraph (a)(1)(i) of this section while occupying a locomotive cab of the train has access to an EEBA that satisfies the EEBA selection criteria in § 227.203 and that has been inspected and is in working order pursuant to the requirements in § 227.207.

(b) *Exceptions.*

- (1) A railroad is not required to provide an EEBA, or make accessible an EEBA, to an employee while in the locomotive cab of an in-service freight train transporting a PIH material if all of the PIH materials in the train, including a residue of a PIH material, are being transported in one or more intermodal containers.
- (2) This subpart does not apply to any of the following:
 - (i) Employees who are moving a locomotive or group of locomotives coupled to a car or group of cars transporting a PIH material, including a residue of a PIH material, only within the confines of a locomotive repair or servicing area.
 - (ii) Employees who are moving a locomotive or group of locomotives coupled to a car or group of cars transporting a PIH material, including a residue of a PIH material for distances of less than 100 feet for inspection or maintenance purposes.

- (c) **Employee misconduct.** Notwithstanding any exceptions identified in this subpart, any employee who willfully tampers with or vandalizes an EEBA shall be subject to this subpart for purposes of enforcement relating to § 227.213.

§ 227.203 Criteria for selecting EEBA.

In selecting the appropriate EEBA to provide to an employee, the railroad shall do the following:

- (a) Select an atmosphere-supplying EEBA that protects against all PIH materials (including their residue) that are being transported by the freight train while in service.
- (b) Ensure that the type of respirator selected meets the requirements of paragraph (c)(1) of this section regarding minimum breathing capacity and is—
 - (1) Certified for an escape only purpose by NIOSH pursuant to 42 CFR part 84; or
 - (2) Declared by the manufacturer, based on verifiable testing by the manufacturer or an independent third party, to meet the criteria established by one of the following:
 - (i) ISO 23269-1:2008 (incorporated by reference, see § 227.219);
 - (ii) BS EN 13794:2002 (incorporated by reference, see § 227.219); or
 - (iii) BS EN 1146:2005 (incorporated by reference, see § 227.219).
- (c) Document, and provide such documentation for inspection by FRA upon request, the rationale for the final selection of an EEBA by addressing each of the following concerns:
 - (1) **Breathing time.** Each EEBA must be fully charged and contain a minimum breathing capacity of 15 minutes at the time of the pre-trip inspection required under § 227.207(a)(1).
 - (2) **Head and neck protection.** The EEBA selected must provide a means of protecting the individual's head and neck from the irritating effects of PIH materials to facilitate escape.
 - (3) **Accommodation for eyeglasses and a range of facial features.** The EEBA selected must provide a means of protecting each employee who is required to be provided with the EEBA, including those who wear glasses, and allow for the reasonable accommodation of each such employee's facial features, including facial hair.

§ 227.205 Storage facilities for EEBA.

- (a) A railroad may not use a locomotive if it is part of an in-service freight train transporting a PIH material, including a residue of a PIH material, and the locomotive cab is occupied by an employee identified in § 227.201(a)(1)(i)(A) through (D) (subject employee), unless the locomotive cab has appropriate storage facilities to hold the number of EEBA required to be provided.
- (b) The storage facility for each required EEBA must—
 - (1) Prevent deformation of the face piece and exhalation valve, where applicable;
 - (2) Protect the EEBA from incidental damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals;
 - (3) Provide each subject employee located in the locomotive cab with ready access to the EEBA during an emergency; and

- (4) Provide a means for each subject employee to locate the EEBA under adverse conditions such as darkness or disorientation.
- (c) A railroad must comply with the applicable manufacturer's instructions for storage of each required EEBA and must keep a copy of the instructions at its system headquarters for FRA inspection.

§ 227.207 Railroad's program for inspection, maintenance, and replacement of EEBA's; requirements for procedures.

- (a) **General.** Each railroad shall establish and comply with a written program for inspection, maintenance, and replacement of EEBA's that are required under this subpart. The program for inspection, maintenance, and replacement of EEBA's shall be maintained at the railroad's system headquarters and shall be amended, as necessary, to reflect any significant changes. This program shall include the following procedures:
 - (1) Procedures for performing and recording a pre-trip inspection of each EEBA that is required to be provided on a locomotive being used to transport a PIH material and procedures for cleaning, replacing, or repairing each required EEBA, if necessary, prior to its being provided under § 227.201(a);
 - (2) Procedures for performing and recording periodic inspections and maintenance of each required EEBA in a manner and on a schedule in accordance with the manufacturer's recommendations; and
 - (3) Procedures for turning in and obtaining a replacement for a defective, failed, or used EEBA and for recording those transactions.
- (b) **Inspection procedures and records.**
 - (1) A railroad's procedures for pre-trip and periodic inspections of EEBA's shall require that the following information about each pre-trip and periodic inspection be accurately recorded on a tag or label that is attached to the storage facility for the EEBA or kept with the EEBA or in inspection reports stored as paper or electronic files:
 - (i) The name of the railroad performing the inspection;
 - (ii) The date that the inspection was performed;
 - (iii) The name and signature of the individual who made the inspection;
 - (iv) The findings of the inspection;
 - (v) The required remedial action; and
 - (vi) A serial number or other means of identifying the inspected EEBA.
 - (2) A railroad shall maintain an accurate record of each pre-trip and periodic inspection required by this section. Pre-trip inspection records shall be retained for a period of 92 days. Periodic inspection records shall be retained for a period of one year.
- (c) **Procedures applicable if EEBA fails an inspection or is used.** An EEBA that fails an inspection required by this section, is otherwise found to be defective, or is used, shall be removed from service and be discarded or repaired, adjusted, or cleaned in accordance with the following procedures:
 - (1) Repair, adjustment, and cleaning of EEBA's shall be done only by persons who are appropriately trained to perform such work and who shall use only the EEBA manufacturer's approved parts designed to maintain the EEBA in compliance with one of the following standards:

- (i) NIOSH at 42 CFR part 84;
- (ii) ISO 23269-1:2008 (incorporated by reference, see § 227.219);
- (iii) BS EN 1146:2005 (incorporated by reference, see § 227.219); or
- (iv) BS EN 13794:2002 (incorporated by reference, see § 227.219).

- (2) Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed.
- (3) Where applicable, reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.
- (4) An EEBA may not be returned to service unless it meets the requirements in § 227.203.

(d) ***Records of returns, maintenance, repair, and replacement.*** A railroad shall—

- (1) Maintain an accurate record of return, maintenance, repair, or replacement for each EEBA required by this subpart; and
- (2) Retain each of these records for three years.

§ 227.209 Railroad's program of instruction on EEBA's.

(a) ***General.***

- (1) A railroad shall adopt and comply with its written program of instruction on EEBA's for all of its employees in its general EEBA program under § 227.211 (subject employees). The program of instruction shall be maintained at the railroad's system headquarters and shall be amended, as necessary, to reflect any significant changes.
- (2) This program may be integrated with the railroad's program of instruction on operating rules under § 217.11 of this chapter or its program of instruction for hazmat employees under § 172.704 of this title. If the program is not integrated with either of these programs, it must be written in a separate document that is available for inspection by FRA.

(b) ***Subject matter.*** The railroad's program of instruction shall require that the subject employees demonstrate knowledge of at least the following:

- (1) Why the EEBA is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the EEBA.
- (2) The capabilities and limitations of the EEBA, particularly the limited time for use.
- (3) How to use the EEBA effectively in emergency situations, including situations in which the EEBA malfunctions.
- (4) How to inspect, put on, remove, and use the EEBA, and how to check the seals of the EEBA.
- (5) Procedures for maintenance and storage of the EEBA that must be followed.
- (6) The requirements of this subpart related to the responsibilities of employees and the rights of employees to have access to records.
- (7) The hazardous materials classified as PIH materials.

(c) ***Dates of initial instruction and intervals for periodic instruction.***

- (1) The instruction for current subject employees shall be provided on an initial basis no later than 30 days prior to the date of compliance identified in § 227.217. Initial instruction of new subject employees shall occur either 30 days prior to the date of compliance identified in § 227.217 or before assignment to jobs where the deployment of EEBA's on a locomotive is required, whichever is later.
- (2) Initial instruction shall be supplemented with periodic instruction at least once every three years.
- (d) **Records of instruction.** A railroad shall maintain a record of employees provided instruction in compliance with this section and retain these records for three years.

§ 227.211 Requirement to implement a general EEBA program; criteria for placing employees in the general EEBA program.

- (a) **In general.** A railroad shall adopt and comply with a comprehensive, written, general program to implement this subpart that shall be maintained at the railroad's system headquarters. Each railroad shall amend its general EEBA program, as necessary, to reflect any significant changes.
- (b) **Elements of the general EEBA program and criteria for placing employees in program.** A railroad's general EEBA program shall—
 - (1) Identify the individual who implements and manages the railroad's general EEBA program by title. The individual must have suitable training and sufficient knowledge, experience, skill, and authority to enable him or her to manage properly a program for provision of EEBA's. If the individual is not directly employed by the railroad, the written program must identify the business relationship of the railroad to the individual fulfilling this role.
 - (2) Describe the administrative and technical process for selection of EEBA's appropriate to the hazards that may be reasonably expected.
 - (3) Describe the process used to procure and provide EEBA's in a manner to ensure the continuous and ready availability of an EEBA to each of the railroad's employees identified in § 227.201(a)(1)(i)(A) through (D) (while actually occupying the locomotive cab of a freight train in service transporting a PIH material). This description shall include—
 - (i) A description of the method used for provision of EEBA's, including whether the EEBA's are individually assigned to employees, installed on locomotives as required equipment, or provided by other means. If EEBA's are installed on locomotives as required equipment, the means of securement shall be designated.
 - (ii) The decision criteria used by the railroad to identify trains in which provision of EEBA's is not required.
 - (iii) A description of what procedures will govern the railroad at interchange to ensure that the locomotive cab in each in-service freight train transporting a PIH material has an EEBA accessible to each of the employees identified in § 227.201(a)(1)(i)(A) through (D) while in the cab of the locomotive, including what procedures are in place to ensure that the EEBA's provided satisfy the EEBA-selection criteria in § 227.203, satisfy the EEBA-storage criteria in § 227.205, and have been inspected and are in working order pursuant to the requirements in § 227.207.

- (4) Ensure that each of the following employees, except those excluded by § 227.201(b), whose duties require regular work in the locomotive cabs of in-service freight trains transporting a PIH material, including a residue of a PIH material, has the required EEBA available when they occupy the cab of such a train and know how to use the EEBA:
 - (i) Employees who perform service subject to 49 U.S.C. 21103 (train employees) on such trains;
 - (ii) Direct supervisors of train employees on such trains;
 - (iii) Deadheading employees on such trains; and
 - (iv) Any other employees designated by the railroad in writing and at the discretion of the railroad.
- (c) **Records of positions or individuals or both in the railroad's general EEBA program.** A railroad shall maintain a record of all positions or individuals, or both, who are designated by the railroad to be placed in its general EEBA program pursuant to paragraph (b)(4) of this section. The railroad shall retain these records for the duration of the designation and for one year thereafter.
- (d) **Consolidated programs.** A group of two or more commonly controlled railroads subject to this subpart may request in writing that the Associate Administrator for Railroad Safety/Chief Safety Officer (Associate Administrator) treat them as a single railroad for purposes of adopting and complying with the general EEBA program required by this section. The request must list the parent corporation that controls the group of railroads and demonstrate that the railroads operate in the United States as a single, integrated rail system. The Associate Administrator will notify the railroads of his or her decision in writing.

§ 227.213 Employee's responsibilities.

- (a) An employee to whom the railroad provides an EEBA shall—
 - (1) Participate in training under § 227.209;
 - (2) Follow railroad procedures to ensure that the railroad's EEBA—
 - (i) Are maintained in a secure and accessible manner;
 - (ii) Are inspected as required by this subpart and the railroad's program of inspection; and
 - (iii) If found to be unserviceable upon inspection, are turned in to the appropriate railroad facility for repair, periodic maintenance, or replacement; and
 - (3) Notify the railroad of EEBA failures and of use incidents in a timely manner.
- (b) No employee shall willfully tamper with or vandalize an EEBA that is provided pursuant to § 227.201(a) in an attempt to disable or damage the EEBA.

§ 227.215 Recordkeeping in general.

- (a) **Availability of records.**
 - (1) A railroad shall make all records required by this subpart available for inspection and copying or photocopying to representatives of FRA, upon request.
 - (2) Except for records of pre-trip inspections of EEBA's under § 227.207, records required to be retained under this subpart must be kept at the system headquarters and at each division headquarters where the tests and inspections are conducted.

- (b) **Electronic records.** All records required by this subpart may be kept in electronic form by the railroad. A railroad may maintain and transfer records through electronic transmission, storage, and retrieval provided that all of the following conditions are met:
- (1) The electronic system is designed so that the integrity of each record is maintained through appropriate levels of security such as recognition of an electronic signature, or other means, which uniquely identify the initiating person as the author of that record. No two persons have the same electronic identity.
 - (2) The electronic system ensures that each record cannot be modified in any way, or replaced, once the record is transmitted and stored.
 - (3) Any amendment to a record is electronically stored apart from the record that it amends. Each amendment to a record is uniquely identified as to the individual making the amendment.
 - (4) The electronic system provides for the maintenance of records as originally submitted without corruption or loss of data.
 - (5) Paper copies of electronic records and amendments to those records that may be necessary to document compliance with this subpart are made available for inspection and copying or photocopying by representatives of FRA.

§ 227.217 Compliance dates.

- (a) Class I railroads subject to this subpart are required to comply with this subpart beginning no later than 12 months from March 26, 2024.
- (b) Class II railroads subject to this subpart are required to comply with this subpart beginning no later than 12 months from March 26, 2024.
- (c) Class III railroads subject to this subpart and any other railroads subject to this subpart are required to comply with this subpart beginning no later than 18 months from March 26, 2024.

§ 227.219 Incorporation by reference.

Certain material is incorporated by reference into this subpart with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. This incorporation by reference (IBR) material is available for inspection at the FRA and the National Archives and Records Administration (NARA). Contact FRA at: Federal Railroad Administration, 1200 New Jersey Avenue SE, Washington, DC 20590; phone: (202) 493-6052; email: FRALegal@dot.gov. For information on the availability of this material at NARA, visit www.archives.gov/federal-register/cfr/ibr-locations or email fr.inspection@nara.gov. The material may be obtained from the following sources:

- (a) The British Standards Institution, 12110 Sunset Hills Road, Suite 200, Reston, VA 20190-5902, phone: 800-862-4977; website: shop.bsigroup.com.
 - (1) BS EN 1146:2005, Respiratory protective devices—Self-contained, open-circuit compressed air breathing apparatus incorporating a hood for escape—requirements, testing, marking; February 2, 2006; into §§ 227.203(b) and 227.207(c).
 - (2) BS EN 13794:2002, Respiratory protective devices—Self-contained, closed-circuit breathing apparatus for escape—requirements, testing, marking, November 26, 2002; into §§ 227.203(b) and 227.207(c).

- (b) International Organization for Standardization, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland; phone +41-22-749-08-88; website: www.iso.org.
- (1) ISO 23269-1:2008(E), Ships and marine technology—Breathing apparatus for ships—Part 1: Emergency escape breathing devices (EEBD) for shipboard use, First Edition, February 1, 2008; into §§ 227.203(b) and 227.207(c).
- (2) [Reserved]

Appendix A to Part 227—Noise Exposure Computation

This appendix is mandatory.

I. Computation of Employee Noise Exposure

- A. Noise dose is computed using Table A-1 as follows:
 - 1. When the sound level, L , is constant over the entire work day, the noise dose, D , in percent, is given by: $D = 100 C/T$, where C is the total length of the work day, in hours, and T is the duration permitted corresponding to the measured sound level, L , as given in Table A-1.
 - 2. When the work day noise exposure is composed of two or more periods of noise at different levels, the total noise dose over the work day is given by:

$$D = 100 (C_1/T_1 + C_2/T_2 + \dots + C_n/T_n)$$
 where C_n indicates the total time of exposure at a specific noise level, and T_n indicates the duration permitted for that level as given by Table A-1.
- B. The eight-hour TWA in dB may be computed from the dose, in percent, by means of the formula: $TWA = 16.61 \log_{10} (D/100) + 90$. For an eight-hour work day with the noise level constant over the entire day, the TWA is equal to the measured sound level.
- C. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.
- D. Any time that an employee spends deadheading shall be included in the calculation of the noise dose.
- E. A table relating dose and TWA is given in Section II of this Appendix.

TABLE A-1¹

A-weighted sound level, L (decibel)	Duration permitted T (hour)
80	32
81	27.9

¹ Numbers above 115 dB(A) are italicized to indicate that they are noise levels that are not permitted. The italicized numbers are included only because they are sometimes necessary for the computation of noise dose.

A-weighted sound level, L (decibel)	Duration permitted T (hour)
82	24.3
83	21.1
84	18.4
85	16
86	13.9
87	12.1
88	10.6
89	9.2
90	8
91	7.0
92	6.1
93	5.3
94	4.6
95	4
96	3.5
97	3.0
98	2.6
99	2.3
100	2
101	1.7
102	1.5
103	1.3
104	1.1
105	1
106	0.87
107	0.76
108	0.66
109	0.57
110	0.5
111	0.44
112	0.38
113	0.33
114	0.29
115	0.25

¹ Numbers above 115 dB(A) are italicized to indicate that they are noise levels that are not permitted.
The italicized numbers are included only because they are sometimes necessary for the computation of noise dose.

A-weighted sound level, L (decibel)	Duration permitted T (hour)
116	0.22
117	0.19
118	0.16
119	0.14
120	0.125
121	0.11
122	0.095
123	0.082
124	0.072
125	0.063
126	0.054
127	0.047
128	0.041
129	0.036
130	0.031
140	0.078

¹ Numbers above 115 dB(A) are italicized to indicate that they are noise levels that are not permitted. The italicized numbers are included only because they are sometimes necessary for the computation of noise dose.

In the above table the duration permitted, T, is computed by

$$T = \frac{8}{2^{(L-90)/10}}$$

where L is the measured A-weighted sound level.

II. Conversion Between “Dose” and “8-Hour Time-Weighted Average” Sound Level

- A. Compliance with subpart B of part 227 is determined by the amount of exposure to noise in the workplace. The amount of such exposure is usually measured with a dosimeter which gives a readout in terms of “dose.” In order to better understand the requirements of the regulation, dosimeter readings can be converted to an “8-hour TWA.”
- B. In order to convert the reading of a dosimeter into TWA, see Table A-2, below. This table applies to dosimeters that are set by the manufacturer to calculate dose or percent exposure according to the relationships in Table A-1. So, for example, a dose of 91 percent over an eight-hour day results in a TWA of 89.3 dB, and a dose of 50 percent corresponds to a TWA of 85 dB.

- C. If the dose as read on the dosimeter is less than or greater than the values found in Table A-2, the TWA may be calculated by using the formula: $TWA = 16.61 \log_{10} (D/100) + 90$ where TWA = 8-hour time-weighted average sound level and D = accumulated dose in percent exposure.

**TABLE A-2—CONVERSION FROM “PERCENT NOISE EXPOSURE” OR “DOSE” TO
“8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL” (TWA)**

Dose or percent noise exposure	TWA
10	73.4
15	76.3
20	78.4
25	80.0
30	81.3
35	82.4
40	83.4
45	84.2
50	85.0
55	85.7
60	86.3
65	86.9
70	87.4
75	87.9
80	88.4
81	88.5
82	88.6
83	88.7
84	88.7
85	88.8
86	88.9
87	89.0
88	89.1
89	89.2
90	89.2
91	89.3
92	89.4
93	89.5
94	89.6
95	89.6
96	89.7

Dose or percent noise exposure	TWA
97	89.8
98	89.9
99	89.9
100	90.0
101	90.1
102	90.1
103	90.2
104	90.3
105	90.4
106	90.4
107	90.5
108	90.6
109	90.6
110	90.7
111	90.8
112	90.8
113	90.9
114	90.9
115	91.1
116	91.1
117	91.1
118	91.2
119	91.3
120	91.3
125	91.6
130	91.9
135	92.2
140	92.4
145	92.7
150	92.9
155	93.2
160	93.4
165	93.6
170	93.8
175	94.0
180	94.2
185	94.4
190	94.6

Dose or percent noise exposure	TWA
195	94.8
200	95.0
210	95.4
220	95.7
230	96.0
240	96.3
250	96.6
260	96.9
270	97.2
280	97.4
290	97.7
300	97.9
310	98.2
320	98.4
330	98.6
340	98.8
350	99.0
360	99.2
370	99.4
380	99.6
390	99.8
400	100.0
410	100.2
420	100.4
430	100.5
440	100.7
450	100.8
460	101.0
470	101.2
480	101.3
490	101.5
500	101.6
510	101.8
520	101.9
530	102.0
540	102.2
550	102.3
560	102.4

Dose or percent noise exposure	TWA
570	102.6
580	102.7
590	102.8
600	102.9
610	103.0
620	103.2
630	103.3
640	103.4
650	103.5
660	103.6
670	103.7
680	103.8
690	103.9
700	104.0
710	104.1
720	104.2
730	104.3
740	104.4
750	104.5
760	104.6
770	104.7
780	104.8
790	104.9
800	105.0
810	105.1
820	105.2
830	105.3
840	105.4
850	105.4
860	105.5
870	105.6
880	105.7
890	105.8
900	105.8
910	105.9
920	106.0
930	106.1
940	106.2

Dose or percent noise exposure	TWA
950	106.2
960	106.3
970	106.4
980	106.5
990	106.5
999	106.6

Appendix B to Part 227—Methods for Estimating the Adequacy of Hearing Protector Attenuation

This appendix is mandatory.

Employers must select one of the following three methods by which to estimate the adequacy of hearing protector attenuation.

I. Derate by Type

Derate the hearing protector attenuation by type using the following requirements:

- A. Subtract 7 dB from the published Noise Reduction Rating (NRR).
- B. Reduce the resulting amount by:
 - 1. 20% for earmuffs,
 - 2. 40% for form-able earplugs, or
 - 3. 60% for all other earplugs.
- C. Subtract the remaining amount from the A-weighted TWA. You will have the estimated A-weighted TWA for that hearing protector.

II. Method B From ANSI S12.6-1997 (Reaffirmed 2002)

Use Method B, which is found in ANSI S12.6-1997 (Reaffirmed 2002) "Methods for Measuring the Real-Ear Attenuation of Hearing Protectors." The Director of the Federal Register approves the incorporation by reference of this standard in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated standard from the American National Standards Institute at 1819 L Street, NW., Washington, DC 20036, or <http://www.ansi.org>. You may inspect a copy of the incorporated standard at the Federal Railroad Administration, Docket Room, 1200 New Jersey Avenue, SE., Washington, DC 20590, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

III. Objective Measurement

Use actual measurements of the level of noise exposure (as an A-weighted SLOW response dose) inside the hearing protector when the employee wears the hearing protector in the actual work environment.

[71 FR 63123, Oct. 27, 2006, as amended at 74 FR 25173, May 27, 2009]

Appendix C to Part 227—Audiometric Baseline Revision

This appendix is mandatory beginning on February 26, 2009.

I. General

- A. A professional reviewer (audiologist, otolaryngologist, or physician) shall use these procedures when revising baseline audiograms.
- B. Although these procedures can be programmed by a computer to identify records for potential revision, the final decision for revision rests with a human being. Because the goal of the guidelines is to foster consistency among different professional reviewers, human override of the guidelines must be justified by specific concrete reasons.
- C. These procedures do not apply to: The identification of standard threshold shifts (STS) other than an FRA STS^[1] or to the calculation of the 25-dB average shifts that are reportable on the Form FRA F 6180.55a.
- D. Initially, the baseline is the latest audiogram obtained before entry into the hearing conservation program. If no appropriate pre-entry audiogram exists, the baseline is the first audiogram obtained after entry into the hearing conservation program. Each subsequent audiogram is reviewed to detect improvement in the average (average of thresholds at 2, 3, and 4 kHz) and to detect an FRA STS. The two ears are examined separately and independently for improvement and for worsening. If one ear meets the criteria for revision of baseline, then the baseline is revised for that ear only. Therefore, if the two ears show different hearing trends, the baseline for the left ear may be from one test date, while the baseline for the right ear may be from a different test date.
- E. Age corrections do not apply in considering revisions for improvement (Rule 1). The FRA-allowed age corrections from appendix F of Part 227^[2] may be used, if desired, before considering revision for persistent STS. Rule 2 operates in the same way, whether age corrections are used or not.

II. Rule 1: Revision for Persistent Improvement

^[1] OSHA and FRA use the same definition for Standard Threshold Shift (STS). FRA's definition is located in § 227.5. OSHA's definition is located in 29 CFR 1910.95(g)(10)(i).

^[2] FRA and OSHA use the same age-correction provisions. FRA's is found in appendix F of part 227 and OSHA's in appendix F of 29 CFR 1910.95.

If the average of the thresholds for 2, 3, and 4 kHz for either ear shows an improvement of 5 dB or more from the baseline value, and the improvement is present on one test and persistent on the next test, then the record should be identified for review by the audiologist, otolaryngologist, or physician for potential revision of the baseline for persistent improvement. The baseline for that ear should be revised to the test which shows the lower (more sensitive) value for the average of thresholds at 2, 3, and 4 kHz unless the audiologist, otolaryngologist, or physician determines and documents specific reasons for not revising. If the values of the three-frequency average are identical for the two tests, then the earlier test becomes the revised baseline.

III. Rule 2: Revision for Persistent Standard Threshold Shift

- A. If the average of thresholds for 2, 3, and 4 kHz for either ear shows a worsening of 10 dB or more from the baseline value, and the STS persists on the next periodic test (or the next test given at least 6 months later), then the record should be identified for review by the audiologist, otolaryngologist, or physician for potential revision of the baseline for persistent worsening. Unless the audiologist, otolaryngologist, or physician determines and documents specific reasons for not revising, the baseline for that ear should be revised to the test which shows the lower (more sensitive) value for the average of thresholds at 2, 3, and 4 kHz. If both tests show the same numerical value for the average of 2, 3, and 4 kHz, then the audiologist, otolaryngologist, or physician should revise the baseline to the earlier of the two tests, unless the later test shows better (more sensitive) thresholds for other test frequencies.
- B. Following an STS, a retest within 90 days of the periodic test may be substituted for the periodic test if the retest shows better (more sensitive) results for the average threshold at 2, 3, and 4 kHz.
- C. If the retest is used in place of the periodic test, then the periodic test is retained in the record, but it is marked in such a way that it is no longer considered in baseline revision evaluations. If a retest within 90 days of periodic test confirms an FRA STS shown on the periodic test, the baseline will not be revised at that point because the required six-month interval between tests showing STS persistence has not been met. The purpose of the six-month requirement is to prevent premature baseline revision when STS is the result of temporary medical conditions affecting hearing.
- D. Although a special retest after six months could be given, if desired, to assess whether the STS is persistent, in most cases, the next annual audiogram would be used to evaluate persistence of the STS.

Appendix D to Part 227—Audiometric Test Rooms

This appendix is mandatory.

- A. Rooms used for audiometric testing shall not have background sound pressure levels exceeding those in Table D-1 when measured by equipment conforming at least to the Type 2 requirements of ANSI S1.4-1983 (Reaffirmed 2001) and to the Class 2 requirements of ANSI S1.11-2004, "Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters."
- B. The Director of the Federal Register approves the incorporation by reference of ANSI S1.4-1983 (Reaffirmed 2001) and S.1.11-2004 in this section in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated standard from the American National Standards Institute at 1819 L Street, NW., Washington, DC 20036 or <http://www.ansi.org>. You may inspect a copy of the

incorporated standard at the Federal Railroad Administration, Docket Room, 1200 New Jersey Avenue, SE., Washington, DC 20590, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

**TABLE D-1—MAXIMUM ALLOWABLE OCTAVE-BAND SOUND PRESSURE LEVELS FOR
AUDIOMETRIC TEST ROOMS**

Octave-band center frequency (Hz)	500	1000	2000	4000	8000
Sound pressure levels—supra-aural earphones	40	40	47	57	62
Sound pressure levels—insert earphones	50	47	49	50	56

[71 FR 63123, Oct. 27, 2006, as amended at 74 FR 25173, May 27, 2009]

Appendix E to Part 227—Use of Insert Earphones for Audiometric Testing

This appendix is mandatory.

Section 227.111(d) allows railroads to use insert earphones for audiometric testing. Railroads are not required to use insert earphones, however, where they elect to use insert earphones, they must comply with the requirements of this appendix.

I. Acceptable Fit

- A. The audiologist, otolaryngologist, or other physician responsible for conducting the audiometric testing, shall identify ear canals that prevent achievement of an acceptable fit with insert earphones, or shall assure that any technician under his/her authority who conducts audiometric testing with insert earphones has the ability to identify such ear canals.
- B. Technicians who conduct audiometric tests must be trained to insert the earphones correctly into the ear canals of test subjects and to recognize conditions where ear canal size prevents achievement of an acceptable insertion depth (fit).
- C. Insert earphones shall not be used for audiometric testing of employees with ear canal sizes that prevent achievement of an acceptable insertion depth (fit).

II. Proper Use

The manufacturer's guidelines for proper use of insert earphones must be followed.

III. Audiometer Calibration

- A. Audiometers used with insert earphones must be calibrated in accordance with ANSI S3.6-2004, "Specification for Audiometers." The Director of the Federal Register approves the incorporation by reference of this standard in this section in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of the incorporated standard from the American National Standards Institute at 1819 L Street, NW., Washington, DC 20036 or <http://www.ansi.org>. You may inspect a copy of the incorporated standard at the Federal Railroad Administration, Docket Room, 1200 New Jersey Avenue, SE., Washington, DC 20590, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.
- B. Audiometers used with insert earphones must be calibrated using one of the couplers listed in Table 7 of ANSI S3.6-2004.
- C. The acoustical calibration shall be conducted annually.
- D. The functional calibration must be conducted before each day's use of the audiometer.

IV. Background Noise Levels

Testing shall be conducted in a room where the background ambient noise octave-band sound pressures levels meet appendix D to this part.

V. Conversion From Supra Aural Earphones

At the time of conversion from supra-aural to insert earphones, testing must be performed with both types of earphones.

- A. The test subject must have a quiet period of at least 14 hours before testing. Hearing protectors may be used as a substitute for the quiet period.
- B. The supra-aural earphone audiogram shall be compared to the baseline audiogram, or the revised baseline audiogram if appropriate, to check for a Standard Threshold Shift (STS). In accordance with § 227.109(f)(2), if the audiogram shows an STS, retesting with supra-aural earphones must be performed within 90 days. If the resulting audiogram confirms the STS, then it is adopted as the current test instead of the prior one.
- C. If retesting with supra-aural earphones is performed, then retesting with insert earphones must be performed at that time to establish the baseline for future audiometric tests using the insert earphones.

VI. Revised Baseline Audiograms

- A. If an STS is confirmed by the re-test with supra-aural earphones, the audiogram may become the revised baseline audiogram per the requirements of § 227.109(i) for all future hearing tests with supra-aural earphones. The insert-earphone audiogram will become the new reference baseline audiogram for all future hearing tests performed with insert earphones.

- B. If an STS is not indicated by the test with supra-aural earphones, the baseline audiogram remains the reference baseline audiogram for all future supra-aural earphone tests, until such time as an STS is observed. In this case, the insert-earphone audiogram taken at the same time will become the new reference baseline audiogram for all future hearing tests performed with insert earphones.
- C. **Transitioning Employees with Partial Shifts.** Employers must account for the workers who are in the process of developing an STS (e.g., demonstrate a 7 dB average shift), but who at the time of the conversion to insert earphones do not have a 10 dB average shift. Employers who want to use insert earphones must enter the 7 dB shift information in the employee's audiometric test records although it is not an "STS". When the next annual audiogram using insert earphones shows an average threshold shift at 2000, 3000 and 4000 Hz of 3 dB, completing the full shift (7 dB + 3 dB), employers must then label that average shift as an STS. This triggers the follow-up procedures at § 227.109(h).

VII. Records

All audiograms (including both those produced through the use of insert earphones and supra-aural headsets), calculations, pure-tone individual and average threshold shifts, full STS migrations, and audiometric acoustical calibration records, are to be preserved as records and maintained according to § 227.121(c).

[71 FR 63123, Oct. 27, 2006, as amended at 74 FR 25173, May 27, 2009]

Appendix F to Part 227—Calculations and Application of Age Corrections to Audiograms

This appendix is non-mandatory.

In determining whether a standard threshold shift (STS) has occurred, allowance may be made for the contribution of aging to the change in hearing level by adjusting the most recent audiogram. If the employer chooses to adjust the audiogram, the employer shall follow the procedure described below. This procedure and the age correction tables were developed by the National Institute for Occupational Safety and Health in a criteria document. See "Criteria for a Recommended Standard: Occupational Exposure to Noise," Department of Health and Human Services (NIOSH) Publication No. 98-126. For each audiometric test frequency:

- I. Determine from Tables F-1 or F-2 the age correction values for the employee by:
 - A. Finding the age at which the most recent audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz;
 - B. Finding the age at which the baseline audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz.
- II. Subtract the values found in step (I)(B) from the value found in step (I)(A).
- III. The differences calculated in step (II) represented that portion of the change in hearing that may be due to aging.

Example: Employee is a 32-year-old male. The audiometric history for his right ear is shown in

decibels below.

Employee's age	Audiometric test frequency (Hz)				
	1000	2000	3000	4000	6000
26	10	5	5	10	5
27*	0	0	0	5	5
28	0	0	0	10	5
29	5	0	5	15	5
30	0	5	10	20	10
31	5	10	20	15	15
32*	5	10	10	25	20

- a. The audiogram at age 27 is considered the baseline since it shows the best hearing threshold levels. Asterisks have been used to identify the baseline and most recent audiogram. A threshold shift of 20 dB exists at 4000 Hz between the audiograms taken at ages 27 and 32.
- b. (The threshold shift is computed by subtracting the hearing threshold at age 27, which was 5, from the hearing threshold at age 32, which is 25). A retest audiogram has confirmed this shift. The contribution of aging to this change in hearing may be estimated in the following manner:
- c. Go to Table F-1 and find the age correction values (in dB) for 4000 Hz at age 27 and age 32.

	Frequency (Hz)				
	1000	2000	3000	4000	6000
Age 32	6	5	7	10	14
Age 27	5	4	6	7	11
Difference	1	1	1	3	3

- d. The difference represents the amount of hearing loss that may be attributed to aging in the time period between the baseline audiogram and the most recent audiogram. In this example, the difference at 4000 Hz is 3 dB. This value is subtracted from the hearing level at 4000 Hz, which in the most recent audiogram is 25, yielding 22 after adjustment. Then the hearing threshold in the

baseline audiogram at 4000 Hz (5) is subtracted from the adjusted annual audiogram hearing threshold at 4000 Hz (22). Thus the age-corrected threshold shift would be 17 dB (as opposed to a threshold shift of 20 dB without age correction).

TABLE F-1—AGE CORRECTION VALUES IN DECIBELS FOR MALES

Years	Audiometric test frequencies (Hz)				
	1000	2000	3000	4000	6000
20 or younger	5	3	4	5	8
21	5	3	4	5	8
22	5	3	4	5	8
23	5	3	4	6	9
24	5	3	5	6	9
25	5	3	5	7	10
26	5	4	5	7	10
27	5	4	6	7	11
28	6	4	6	8	11
29	6	4	6	8	12
30	6	4	6	9	12
31	6	4	7	9	13
32	6	5	7	10	14
33	6	5	7	10	14
34	6	5	8	11	15
35	7	5	8	11	15
36	7	5	9	12	16
37	7	6	9	12	17
38	7	6	9	13	17
39	7	6	10	14	18
40	7	6	10	14	19
41	7	6	10	14	20
42	8	7	11	16	20
43	8	7	12	16	21
44	8	7	12	17	22
45	8	7	13	18	23
46	8	8	13	19	24
47	8	8	14	19	24
48	9	8	14	20	25
49	9	9	15	21	26
50	9	9	16	22	27

Years	Audiometric test frequencies (Hz)				
	1000	2000	3000	4000	6000
51	9	9	16	23	28
52	9	10	17	24	29
53	9	10	18	25	30
54	10	10	18	26	31
55	10	11	19	27	32
56	10	11	20	28	34
57	10	11	21	29	35
58	10	12	22	31	36
59	11	12	22	32	37
60 or older	11	13	23	33	38

TABLE F-2—AGE CORRECTION VALUES IN DECIBELS FOR FEMALES

Years	Audiometric test frequencies (Hz)				
	1000	2000	3000	4000	6000
20 or younger	7	4	3	3	6
21	7	4	4	3	6
22	7	4	4	4	6
23	7	5	4	4	7
24	7	5	4	4	7
25	8	5	4	4	7
26	8	5	5	4	8
27	8	5	5	5	8
28	8	5	5	5	8
29	8	5	5	5	9
30	8	6	5	5	9
31	8	6	6	5	9
32	9	6	6	6	10
33	9	6	6	6	10
34	9	6	6	6	10
35	9	6	7	7	11
36	9	7	7	7	11
37	9	7	7	7	12

Years	Audiometric test frequencies (Hz)				
	1000	2000	3000	4000	6000
38	10	7	7	7	12
39	10	7	8	8	12
40	10	7	8	8	13
41	10	8	8	8	13
42	10	8	9	9	13
43	11	8	9	9	14
44	11	8	9	9	14
45	11	8	10	10	15
46	11	9	10	10	15
47	11	9	10	11	16
48	12	9	11	11	16
49	12	9	11	11	16
50	12	10	11	12	17
51	12	10	12	12	17
52	12	10	12	13	18
53	13	10	13	13	18
54	13	11	13	14	19
55	13	11	14	14	19
56	13	11	14	15	20
57	13	11	15	15	20
58	14	12	15	16	21
59	14	12	16	16	21
60 or older	14	12	16	17	22