

**§ 227.119**

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 1, 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).

**§ 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.

#### 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

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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:

$D = 100 (C1/T1 + C2/T2 + \dots + Cn/Tn)$ , where Cn indicates the total time of exposure at a specific noise level, and Tn 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-1<sup>1</sup>—Continued**

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

<sup>1</sup> 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

$$T = \frac{8}{2^{(L-90)/5}}$$

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-1<sup>1</sup>**

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

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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
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

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

Dose or percent noise exposure	TWA
185	94.4
190	94.6
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
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

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

Dose or percent noise exposure	TWA
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
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, Dock-et Room, 1120 Vermont Ave., Suite 700, Wash- ington, DC 20005, or at the National Archives and Records Administration (NARA). For in- formation on the availability of this mate-

rial at NARA, call 202–741–6030, or go to [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](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.

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<sup>1</sup> 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<sup>2</sup> may be used, if desired.

<sup>1</sup>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).

<sup>2</sup>FRA and OSHA use the same age-correction provisions. FRA’s is found in appendix F

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

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, 1120 Vermont Ave., NW., Suite 700, Washington, DC 20005, 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](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

of part 227 and OSHA's in appendix F of 29 CFR 1910.95.

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, 1120 Vermont Ave., NW., Suite 700, Washington, DC 20005, 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](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).

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 em-

ployer 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

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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
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

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

Years	Audiometric test frequencies (Hz)				
	1000	2000	3000	4000	6000
35	9	6	7	7	11
36	9	7	7	7	11
37	9	7	7	7	12
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

APPENDIX G TO PART 227—SCHEDULE OF CIVIL PENALTIES

Section	Violation	Willful violation
<b>Subpart A—General</b>		
227.3 Application:		
(b)(4) Failure to meet the required conditions for foreign railroad operations	\$2,500	\$5,000
<b>Subpart B—General Requirements</b>		
227.103 Noise monitoring program:		
(a) Failure to develop and/or implement a noise monitoring program	7,500	10,000
(b) Failure to use sampling as required	2,500	5,000
(c) Failure to integrate sound levels and/or make noise measurements as required	2,500	5,000
(d) Failure to repeat noise monitoring where required	2,500	5,000
(e) Failure to consider work environments where hearing protectors may be omitted	2,500	5,000
(f) Failure to provide opportunity to observe monitoring	2,000	4,000
(g) Reporting of Monitoring Results:		
(1) Failure to notify monitored employee	2,500	5,000
(2) Failure to post results as required	2,500	5,000
227.105 Protection of employees:		
(a) Failure to provide appropriate protection to exposed employee	7,500	10,000
(b) Failure to observe and document source(s) of noise exposures	2,500	5,000
(c)–(d) Failure to protect employee from impermissible continuous noise	5,000	7,500
227.107 Hearing conservation program:		
(a) Failure to administer a HCP	7,500	10,000
(b) Failure to compute noise exposure as required	3,500	7,000
227.109 Audiometric testing program:		
(a) Failure to establish and/or maintain an audiometric testing program	7,500	10,000
(b) Failure to provide audiometric test at no cost to employee	2,500	5,000
(c) Failure to have qualified person perform audiometric test	2,500	5,000
(d) [Reserved]		
(e) Failure to establish baseline audiogram as required	3,500	7,000
(f) Failure to offer and/or require periodic audiograms as required	2,500	5,000
(g) Failure to evaluate audiogram as required	2,500	5,000
(h) Failure to comply with follow-up procedures as required	2,500	5,000
(i) Failure to use required method for revising baseline audiograms	2,500	5,000
227.111 Audiometric test requirements:		
(a) Failure to conduct test as required	2,500	5,000

Section	Violation	Willful violation
(b) Failure to use required equipment .....	2,500	5,000
(c) Failure to administer test in room that meets requirements .....	2,500	5,000
(d) Complete failure to calibrate .....	5,000	7,500
(1) Failure to perform daily calibration as required .....	2,000	4,000
(2) Failure to perform annual calibration as required .....	2,000	4,000
(3) Failure to perform exhaustive calibration as required .....	2,000	4,000
227.115 Hearing protectors (HP):		
(a) Failure to comply with general requirements .....	3,000	6,000
(b) Failure to make HP available as required .....	2,500	5,000
(c) Failure to require use of HP at action level .....	5,000	7,500
(d) Failure to require use of HP at TWA of 90 dB(A) .....	5,000	7,500
227.117 Hearing protector attenuation:		
(a) Failure to evaluate attenuation as required .....	2,500	5,000
(b)–(c) Failure to attenuate to required level .....	2,500	5,000
(d) Failure to re-evaluate attenuation .....	2,500	5,000
227.119 Training program:		
(a) Failure to institute a training program as required .....	5,000	7,500
(b) Failure to provide training within required time frame .....	2,500	5,000
(c) Failure of program and/or training materials to include required information .....	2,500	5,000
227.121 Recordkeeping:		
(a) General Requirements:		
(1) Failure to make record available as required .....	2,500	5,000
(3) Failure to transfer or retain records as required .....	2,000	4,000
(b)–(f) Records:		
(1) Failure to maintain record or failure to maintain record with required information .....	2,000	4,000
(2) Failure to retain records for required time period .....	2,000	4,000

**PART 228—HOURS OF SERVICE OF RAILROAD EMPLOYEES**

**Subpart A—General**

- Sec.
- 228.1 Scope.
- 228.3 Application.
- 228.5 Definitions.

**Subpart B—Records and Reporting**

- 228.7 Hours of duty.
- 228.9 Railroad records; general.
- 228.11 Hours of duty records.
- 228.17 Dispatcher’s record of train movements.
- 228.19 Monthly reports of excess service.
- 228.21 Civil penalty.
- 228.23 Criminal penalty.

**Subpart C—Construction of Employee Sleeping Quarters**

- 228.101 Distance requirement; definitions.
- 228.103 Approval procedure: construction within one-half mile (2,640 feet) (804 meters).
- 228.105 Additional requirements; construction within one-third mile (1,760 feet) (536 meters) of certain switching.
- 228.107 Action on petition.

APPENDIX A TO PART 228—REQUIREMENTS OF THE HOURS OF SERVICE ACT: STATEMENT OF AGENCY POLICY AND INTERPRETATION  
 APPENDIX B TO PART 228—SCHEDULE OF CIVIL PENALTIES

APPENDIX C TO PART 228—GUIDELINES FOR CLEAN, SAFE, AND SANITARY RAILROAD PROVIDED CAMP CARS

AUTHORITY: 49 U.S.C. 20103, 20107, 21101–21108; 28 U.S.C. 2461, note and 49 CFR 1.49.

SOURCE: 37 FR 12234, June 21, 1972, unless otherwise noted.

**Subpart A—General**

**§ 228.1 Scope.**

This part—  
 (a) Prescribes reporting and record keeping requirements with respect to the hours of service of certain railroad employees; and  
 (b) Establishes standards and procedures concerning the construction or reconstruction of employee sleeping quarters.

[43 FR 31012, July 19, 1978]

**§ 228.3 Application.**

(a) Except as provided in paragraph (b), this part applies to all railroads.  
 (b) This part does not apply to:  
 (1) A railroad that operates only on track inside an installation which is not part of the general railroad system of transportation; or  
 (2) Rapid transit operations in an urban area that are not connected with