



Section 21
Safety Health
and
Environmental
Manual

2023

Hearing Conservation

BRIESER CONSTRUCTION GENERAL CONTRACTORS		Developed:	3/8/2008
		Revised:	10/25/2016
CORPORATE SAFETY, HEALTH & ENVIRONMENTAL MANUAL		Revision:	08
		Reviewed:	01/2023
STANDARD OPERATING PROCEDURE:		Hearing Conservation	
CROSS REFERENCE:	29 CFR 1910.95 Occupational Noise Exposure; 29 CFR 1926.52, Occupational noise exposure; 29 CFR 1926.101, 2003 Department of Environmental and Occupational Health Sciences, University of Washington Hearing Protection;		

SUMMARY

To establish a hearing conservation program to protect Brieser employees from harmful occupational noise exposures.

Scope:

The program includes an assessment of work area sound levels, employee noise exposure monitoring, engineering and administrative control measures, measurements of employee hearing acuity, provision of hearing protective devices, if necessary, employee informational sources, and employee training in noise hazard recognition and control measures.

DEFINITIONS

Action Level - An 8-hour time weighted average of 85 decibels measured on the A-scale (dBA), slow response, or equivalently, a dose of fifty percent (50%).

Audiogram - A chart, graph or table resulting from an audiometric test showing an individual's hearing threshold levels as a function of frequency.

Continuous Noise - On-going noise, the intensity of which remains at a measurable level without interruption over an indefinite period or a specified period. (Examples car interior, turbine hum, transformer hum).

DECIBEL (DB) - Unit of measurement of sound level (intensity)
dBA (decibels A - Weighted) - A unit of measurement of sound level corrected to the A scale. The ear does not respond equally to all frequencies but is less efficient at low and high frequencies than it is at medium or speech range frequencies. To maintain a single number representing the sound level of a noise containing a wide range of frequencies, an A-weighted scale is used to approximate the ears response to the noise.

IMPULSIVE (OR IMPULSE) NOISE - Noise of short duration (typically, less than 500 milliseconds), especially of high intensity, abrupt onset and rapid decay, and often RAPIDLY CHANGING SPECTRAL COMPOSITION. (EXAMPLES GUNSHOTS, EXPLOSION, IMPACTS, SONIC BOOMS).

Intermittent Noise - Fluctuating noise whose level falls one or more times to very low or unmeasurable values during an exposure. (Examples process noise, traffic, airports).
Representative Exposure - Measurement of an employee's noise dose of 8-hour time weighted average sound level that is considered representative of exposures of other employees in the workplace.

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Standard Threshold Shift - As used in this procedure, a standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more in 2000, 3000, and 4000 Hz in either ear.

User:

Applies to all Brieser employees, including visitors and subcontractors that work within areas that may contain noise hazards

Methods:

◇ Hazard Assessment

- A study performed September 2004 by the University of Washington School of Public Health and Community Medicine Department of Environmental and Occupational Health Sciences shall be used as a guideline for all of Briesers operations.

Table 1 shows information from full-shift measurements on laborers. The average level measured was 83.6 dBA. However, nearly half of all measurements were above 85 dBA, the 8-hour allowable limit. Above this level, hearing protectors are required. About one in ten measurements was above 90 dBA. Almost two-thirds of all measurements also included exposure above 115 dBA, the level above which hearing protectors are always required.

Table 1. Work shift noise level information on 122 laborers

Category	Result
Average full-shift noise level	83.6 dBA
Average length of measured work shifts	8 hr 25 min
% of full-shift average levels above 85 dBA	44%
% of full-shift average levels over 90 dBA	15%
% of work shifts with any noise above 115 dBA	64%

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Table 2 is a list of task and tool exposures for laborers.

Table 2. Tasks, in order of increasing average noise level

Tasks	Average noise level (dBA)	Maximum noise level (dBA)
Layout	80.1	103.1
Manual Material Handling	82.7	106.5
Interior Finish	85.2	110.5
Operating Forklift	85.3	114.6
Finishing Concrete	85.3	114.7
Grouting	86.1	116.0
Wood Framing	86.5	112.8
Floor Leveling	87.5	109.6
Hanging Plastic	88.6	113.9
Placing Concrete	91.5	116.6
Stripping Forms	91.7	117.8
Building Forms	92.1	115.8
Break, Rest, Lunch, Cleanup	92.3	114.4
Rigging	92.6	128.6
"Other" Tasks	95.4	119.6
Demolition	99.3	112.1
Chipping Concrete	102.9	120.3

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Table 3 is a listing of common tools used on a typical construction job-site.

Table 3. Tools, in order of increasing average noise level

Tools	Average noise level (dBA)	Maximum noise level (dBA)
Screw Gun, Drill Motor	85.8	112.5
Hand Power Saw	87.9	107.3
Stationary Power Tool	88.2	105.0
Chopsaw	88.2	114.2
Hammer, Mallet, Sledge	90.2	116.4
"Other" Tools	91.8	119.0
No Tool	92.8	118.0
Rotohammer	95.8	113.4
Rattle Gun	98.4	131.1
Chipping Gun	103.0	119.2

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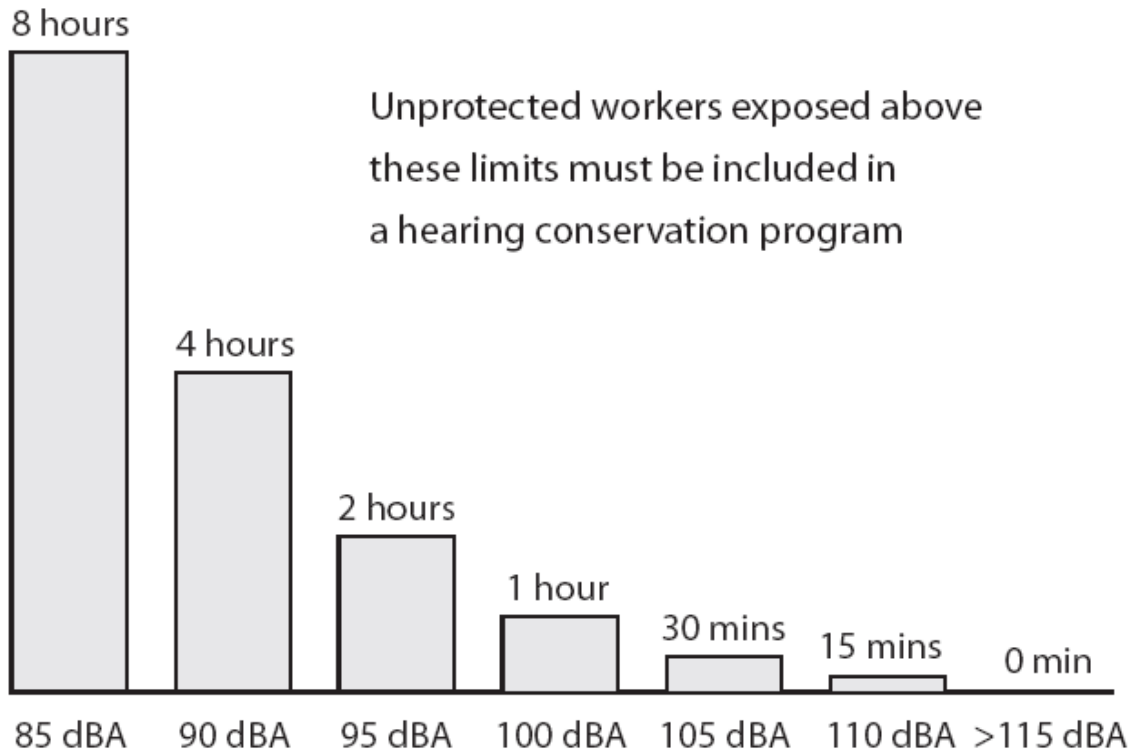
Employee exposure monitoring:

Employee exposure monitoring is a detailed noise survey that is designed to determine the employees 8 hour TWA dose. Employee exposure monitoring is conducted in areas where there is a potential for exposure above an 8 hour TWA of 85 dBA or when human factors suggest that noise exposures exceed the 85 dBA level. These human factors include; employee complaints about the loudness of noise, indications that employees may be suffering hearing loss, or noisy conditions which make normal conversation difficult.

- Audio-dosimetry is the preferred method of evaluating employee exposure. In order for the exposure monitoring to be meaningful, the following should be taken into consideration when planning the monitoring event: The monitoring should be representative of the employees exposure; All continuous, intermittent, and impulsive sound levels from 80 dB to 130 dB should be integrated into the computation of the dose; The monitoring should enable the proper selection of hearing protective devices; To ensure accuracy, instruments should be calibrated before and after the monitoring event.
- Employee exposure monitoring is repeated periodically or when changes are detected in the employee audiometric tests. Results of the monitoring are

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recorded on the Personal Sound Level Dosimeter Sheet Form II. Copies of monitoring results are maintained by the Safety Manager.



◇Engineering and administrative control measures:

- Processes and equipment that may cause exposure to unacceptable noise levels shall be controlled by engineering and / or administrative controls wherever feasible, with consideration of available technology and economic impact. Consideration of the effects of noise shall be included as a factor in replacement, modification, and addition of facilities and equipment. Branch Health and Safety Managers shall review equipment design, layout, installation and purchasing criteria to evaluate noise exposure potential.

◇Hearing protective devices:

- Hearing protective devices are made available without cost to any employee who may be exposed to noise above the Action Level of 85 dBA TWA. Hearing protection must be worn in areas with posted warning signs for noise hazards and during tasks that specify hearing protective devices as

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part of the personal protective equipment (PPE). Hearing protective devices are individually issued and employees are provided the opportunity to select their own personal hearing protectors from a variety of suitable devices. Training on the proper fit and usage of hearing protective devices is given prior to employee usage in the workplace. Employees are responsible for the care and maintenance of their hearing protective devices. Hearing protectors are replaced as necessary due to wear or deterioration.

- Using the NRR:

The Hearing Conservation Amendment to the Occupational Noise Standard (OSHA, 1983) describes six methods for using the NRR to determine a worker's protected A-weighted noise exposure. These methods vary according to the instrumentation and parameters used to determine the unprotected noise levels. However, they can be summarized into two basic formulas, depending on whether unprotected exposure levels were measured on a C-weighted or an A-weighted scale.

- For C-weighted measurements:

- $\text{protected dBA} = \text{unprotected dBC} - \text{NRR}$

Where the protected dBA and the unprotected dBC are 8-hour time-weighted averages determined according to the Occupational Noise Standard. This method is how the NRR was designed to be used. For example, if a protector has an NRR of 17 dB and it is used in an environmental noise level of 95 dBC, the noise level entering the ear could be expected to be 78 dBA [95 - 17 = 78] or lower in 98% of the cases if the protector is worn according to manufacturer's specification.

- For A-weighted measurements:

- $\text{protected dBA} = \text{unprotected dBA} - [\text{NRR} - 7]$

Where, again, the protected and unprotected dBA are 8-hour time-weighted averages determined according to the Occupational Noise Standard. This method is an adaptation for those whose instrumentation does not have C-weighting capabilities. The 7 dB correction factor is used to account for the de-emphasis of low-frequency energy inherent to the A-weighting scale. So, for example, if a protector has an NRR of 17 dB and it is used in an environmental noise level of

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95 dBA, the noise level entering the ear could be expected to be 85 dBA [95 - (17 - 7) = 85] or less in 98% of the cases.

- NIOSH recommends derating the NRR by a multiplicative factor of 75% for earmuffs, 50% for slow-recovery foam earplugs and custom earplugs, and 30% for all other earplugs. This variable derating scheme considers the real world performance of most different types of hearing protector (NIOSH, 1998). Also, the NIOSH derating scheme does not affect the 7-decibel dBC to dBA correction as it is applied to the NRR only, derated or not. This compendium uses the NIOSH derating of the NRR when searching for hearing protectors based on the compendium user's input of noise exposure levels in dB A or octave band levels. Hearing protector attenuation shall be evaluated for the specific noise environments in which the protector will be used. The methods used for attenuation shall be consistent with the methods described in Appendix B of 29 CFR 1910.95. Hearing protective devices will be selected that attenuate employee exposure to below the Action Level of 85 dBA TWA. This goal is also used for employees who have experienced a standard threshold shift.
- Tasks specifying hearing protective equipment shall be documented in accordance with the requirements of Brieser Personal Protective Equipment Program.

◇ Employee notification, information and training

- Each employee who is exposed to noise levels in excess of 85dBA TWA shall be notified by the Safety Manager. Employees shall be given the

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opportunity to observe noise monitoring. The results of the noise monitoring shall be made available to employees.

- A copy of the OSHA Occupational Noise Exposure Standard (29 CFR 1910.95) is available upon request to the Brieser Safety Manager
- The training program is administered by the Brieser Health and Safety Department.
- Initial training is given to employees, including supervisors, whose job classification requires the use of hearing protective devices.
- Training is provided annually when audiometric testing is conducted.
- Training is consistent with changes in the PPE and work processes at Brieser Construction.

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◇ Medical Surveillance:

- Audiometric testing:
 - Audiometric testing is included in the Brieser Medical Surveillance Program. A baseline audiogram is given for each exposed employees within 6 months of first exposure. Baseline audiograms must be given within six months of employment. The audiometric testing is performed by an approved medical provider.
 - Prior to establishment of a baseline audiogram at least 14 hours without exposure to workplace noise is observed
 - Annual audiograms shall be offered to all employees
 - Employees are notified of the results of each audiogram. If it is determined that a standard threshold shift has occurred, the affected employee shall be informed, in writing, within 21 days of the determination. Other employees similarly exposed who are not using hearing protection will be evaluated and hearing protection will be provided by Brieser, if warranted. Other employees similarly exposed who are using hearing protectors will be evaluated and re-fitted with hearing devices with better attenuation, if warranted.
 - The employee shall be referred for a clinical audiological evaluation or an ontological examination, as appropriate, if additional testing is necessary or if the employer suspects that a

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medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.

II. Forms:

- ◇ Sound Level Survey (Form I)
- ◇ Personal Sound Level Dosimeter Sheet (Form II)

III. Regulatory / Permit Requirements:

- ◇ Section 1904.10 Recording criteria for cases involving occupational hearing loss. Any employees noise induced hearing loss is defined for recordkeeping purposes as a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more in either ear at 2000, 3000 and 4000 hertz (Standard Threshold Shift), and the employee’s total hearing level is 25 decibels (dB) or more above audiometric zero (also averaged at 2000, 3000 and 4000 hertz) in the same ear (s) must be recorded on the company’s OSHA 300 form.

IV. Recordkeeping:

- ◇ Results from the general noise survey and employee monitoring are recorded on the Sound Level Survey Form I or the Personal Sound Level Dosimeter Sheet Form II. The results are maintained by the Safety Manager.

Sound Level Survey Form I

Facility: _____ Date: _____
 Instrument Used: _____ Serial Number: _____
 Calibrator Used: _____ Serial Number: _____
 Calibration Reading: Beginning Level _____ Ending Level: _____
 Survey Conducted By: _____

Single Hearing Protection ≥ 85 dBA Double Hearing Protection ≥ 96.5 dBA*

*Double hearing protection level is calculated using a single hearing protector with a NRR rating of 30 dBA

Person/Equipment	Sound Level (dBA)	Comments

ROUTING	SCAN	SAFETY/INDUSTRIAL HYGIENE/NOISE MONITORING/SOUND LEVEL SURVEY/MMDDYY PERSON AND OR EQUIPMENT
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Personal Sound Level Dosimeter Sheet

Facility: _____ Date: _____

Survey Conducted By: _____

Calibrator Serial Number: _____



Employee: _____

Dosimeter Model Used: _____ Dosimeter Serial Number: _____

Calibration Reading: Beginning _____ Time Dosimeter Testing Starts: _____

Ending _____ Time Dosimeter Testing Ends: _____

TWA Reading: _____ Hearing Protection Worn? Yes No

Comments:



Employee: _____

Dosimeter Model Used: _____ Dosimeter Serial Number: _____

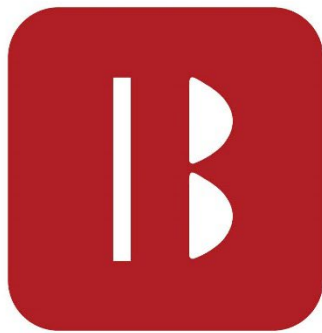
Calibration Reading: Beginning _____ Time Dosimeter Testing Starts: _____

Ending _____ Time Dosimeter Testing Ends: _____

TWA Reading: _____ Hearing Protection Worn? Yes No

Comments:

ROUTING	SCAN	SAFETY/INDUSTRIAL HYGIENE/NOISE MONITORING/SOUND PERSONAL SOUND LEVEL DOSIMETER/MMDDYY PERSON
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Brieser
CONSTRUCTION

**BRIESER CONSTRUCTION
SAFETY & HEALTH MANUAL
SECTION 21
HEARING CONSERVATION
SUB-SECTION
TRAINING**

EMPLOYEE TRAINING CERTIFICATION & ACKNOWLEDGMENT

Brieser Construction

Date: _____ Location: _____

Trainer's Name and Title: _____

Trainer Qualifications: _____

Length of Training: Hours/Minutes _____ Time: _____ AM/PM
TO: _____ AM/PM

Purpose of Training (check one):

_____ Hearing Conservation (Management
Approval Needed)

TITLE: HEARING CONSERVATION

Note: Please consult Section 21 Hearing Conservation in Brieser Safety Manual for training content.

Discussed and/or Viewed:

- Discussed OSHA Standard 29 CFR 1910.95 Occupational Noise Exposure; 29 CFR 1926.52, Occupational noise exposure; 29 CFR 1926.101, 2003 Department of Environmental and Occupational Health Sciences, University of Washington Hearing Protection;
- Definitions
- Identifying Hazards
- Control Hazards
- Select Proper Hearing Protection
- Proper Use of Hearing Protectors

ROUTING	PERSONNEL MANAGER	Add to Training Database
	SCAN	SAFETY/HEARING/ (PURPOSE OF TRAINING)/MMDDYY TRAINING CERTIFICATION

Signature of Instructor _____ Employee
Signature _____

Please Note: If more than one employee is being trained use Attendance Roster pg. 14 Sect. 21 Hearing Conservation

ATTENDANCE ROSTER
Brieser Construction

EMPLOYEE NAME (Print or Type)	EMPLOYEE SIGNATURE	TRADE	JOB TITLE
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

ROUTING	PERSONNEL MANAGER	Add to Training Database
	SCAN	SAFETY/HEARING/TRAINING/MMDDYY TRAINING CERTIFICATION

Hearing Conservation Quiz

Name: _____ Date: _____

1. Employee participation in the Hearing Conservation Program is required when exposed to an 8-hour TWA noise level of ____ dB.

2. Hearing damage can easily be repaired with surgery.
True or False
3. Describe a sign of hearing loss:

4. Name two off-work activities that may expose you to high noise levels.

5. Your company keeps records of noise monitoring and hearing tests.
True or False
6. A noise dosimeter is used to test an employee's hearing capability.
True or False
7. Describe one of the ways noise impacts the workplace

8. Name two kinds of hearing protection devices:

9. In order to look for hearing loss, how often are hearing tests conducted?

10. Name one of the ways management attempts to control employee noise exposure.

Hearing Conservation Quiz

Answer sheet

- 1) Employee participation in the HCP is required when exposed to **85 decibels** for an 8-hour TWA.
- 2) **False**. Hearing damage cannot be repaired or replaced. Hearing can only be aided once it is damaged.
- 3) Difficulty hearing people; noise or ringing; TV or radio is too loud for others.
- 4) Mowing the lawn, using a table saw, riding a motorcycle, attending a sporting event.
- 5) **True**. These records are available for employee review upon request.
- 6) **False**. Noise dosimeters are worn by employees to determine their level of noise exposure.
- 7) Disrupts communication, causes employee fatigue, distracts or irritates, reduces morale.
- 8) Ear plugs, earmuffs, canal caps.
- 9) Hearing tests are conducted annually.
- 10) Engineering or administrative controls.

