EXPRO
هيئة كفاءة الإنفاق والمشروعات الحكومية
Expenditure Efficiency & Projects Authority

National Manual for Assets and Facilities Management Volume 10, Chapter 4

Hearing Conservation Program Procedure

Document No. EOM-KSH-PR-000010 Rev 001

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Document Submittal History:

Revision:	Date:	Reason For Issue
000	28/03/2020	For Use
001	18/08/2021	For Use

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1.0 PURPOSE

The purpose of this Procedure is to provide guidelines as to the requirements that will enable Entities to make informed decisions on equipment, training, and procedural requirements to protect personnel against hearing loss due to noise exposure.

2.0 SCOPE

The scope of this procedure applies to all management systems in Facilities and all personnel conducting work as per Government Operations and Maintenance (O&M) Contracts throughout the Kingdom of Saudi Arabia.

3.0 DEFINITIONS

Definitions	Description
Attenuation	The reduction of noise achieved by physical barriers, mufflers, personal hearing protection devices, distance, etc.
A-Weighted Network	A scale incorporated in sound level instruments that most approximates the response of the human ear to various sound frequencies.
Continuous Sound	Sound intervals no greater than 1 second apart.
dB(A)	A unit representing the sound in decibels measured on the A-weighting network of a sound level meter/dosimeter. Sound is filtered to replicate the noise heard by the human ear, and this unit is therefore more appropriate for determining worker exposure to noise.
Decibel (dB)	A unit of measurement of sound level.
Dose	Exposure to sound levels expressed as a percentage of the occupational exposure limit. A 100% dose requires participation in a Hearing Conservation Program (HCP).
Employee Exposure	Employee exposure means exposure to noise without regard to use of hearing protection.
Exchange Rate	The concept that an increase or decrease of 3 dB(A) noise level will double or halve the allowable noise dose. For example, a noise increase from 85 dB(A) to 88 dB(A) will decrease allowable exposure time from 8 to 4 hours.
FM	Facility Manager
HCP	Hearing Conservation Program
HSSE	Health, Safety, Security and Environment
IHRS	Industrial Hygiene Records System
Impulse/Impact Sound	A sound burst that is characterized by a sharp rise and rapid decay in sound levels and is greater than 1 second in duration between sound intervals.
Noise	Noise is defined as unwanted sound pressure. The physiological injury caused by working in elevated noise levels is explained as damage to the hair-like nerve follicles located in the cochlea, which transmit hearing sensation from the inner ear to the brain. Repeated and/or prolonged exposure to elevated levels of noise will result in auditory fatigue of these follicles and eventual function failure of the cochlea.
Noise Dosimeter	An instrument that integrates a function of sound pressure over a period in such a manner that it directly indicates a noise dose. The instrument is set at a 3 dB(A) exchange rate.
Noise Reduction Rating (NRR)	The number of decibels by which the hearing protection device has the capability to reduce noise levels. The reduction equivalent of the device is: Ear muff = 75% of NRR Foam ear plugs = 50% of NRR All other ear protection = 30% of NRR
Occupational Exposure Limit (OEL)	The exposure levels and allowable exposure periods that are defined in Table 1 below. An 8-hour time-weighted average (TWA) of 85 dB(A), or 100% dose, will require an HCP to be in place.

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Definitions	Description
Overexposure	Exposure that exceeds the noise level durations defined in Table 1 below regardless of the use of hearing protection devices.
Sound Level Meter	An instrument used to measure instantaneous noise levels. It is typically used for point source measurements of equipment or activities and/or establishment of boundaries. This instrument should not be used to determine 8-hour Time Weighed Average TWAs for OEL comparison.
Standard Threshold Shift (STS)	A change in hearing threshold relative to an average of 10 dB or more at 2,000; 3,000; and 4,000 Hz in either ear. This shift is permanent hearing loss and is an occupational illness.
Temporary Threshold Shift (TTS)	A temporary but reversible hearing loss following excessive sound pressure level exposure that may occur from short-term noise exposures.
Time-Weighted Average (TWA)	The sound level for an 8-hour exposure period covering a range of 80–140 dB(A) with 85 dB(A) criterion and 3 dB exchange rate.

4.0 REFERENCES

- OSHA 29 CFR 1910.95 Occupational Noise Exposure
- OSHA 29 CFR 1926.101 Hearing Protection
- EOM-KSS-PR-000003 Personal Protective Equipment Procedure
- EOM-KSS-PR-000033, Job Hazard Analysis & Pre-Start Briefing Procedure

5.0 RESPONSIBILITIES

5.1 Facility Manager or Contractor Responsible

- The FM shall ensure that this procedure is implemented. If an onsite HSE representative has not been designated, the responsible FM shall coordinate with the designated HSE Responsible to determine requirements.

5.2 HSE Responsible

- Assessment of the 8-hour TWA exposure levels in decibel and percentage dose for each task and for routine activities that may exceed the 85 dB(A) OEL. Historical data may be used but with caution because facilities conditions may not be the same as the historical data. Exposure assessments shall be performed by a person experienced with the use of sound-measuring instruments, noise standards, and control methods.
- A personal protective equipment (PPE) program that complies with Section 6.6 of EOM-KSH-PR-00005 Personal Protective Equipment Procedure and this procedure.
- Evaluation and implementation of engineering controls for tasks that exceed 85 dB(A) TWA.
- A site-specific Hearing Conservation Training Program adapted to site conditions.
- Accurate maintenance records maintained on the facility and input into the Industrial Hygiene Records System (IHRS).
- Actions to correct any deficiencies that deviate from compliance with this Procedure.
- Ensuring that employees wear hearing protection if noise levels may exceed 85 dB(A) TWA or 100% dose limit.
- Ensure noise measuring devices applied at noisy work site such as workshops and construction sites.
- Ensuring that equipment has been properly evaluated and accepted for their work environment.

5.3 Supervision

- Ensuring that work areas and tasks under their responsibility have been assessed for noise and that locations with high noise levels are posted in compliance with this Procedure.
- Ensuring that engineering and administrative controls have been assessed for their work locations/tasks and ensuring the implementation of such controls.

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- Identifying and alerting HSE of employees who are or will be potentially affected by the requirements of this Procedure.
- Identifying employees who may be exposed above 85 dB(A) TWA or 100% dose.
- Ensuring that employees who may be exposed above 85 dB(A) TWA or 100% dose have been trained in accordance with the Entity's HCP training requirements.
- Enforcing the requirements of this Procedure.

5.4 Employees

- Attending HCP training.
- Wearing PPE.
- Complying with this procedure.

6.0 REQUIREMENTS

6.1 Exposure Prevention and Control

The Entity/facility will be required to develop and implement an HCP that meets or exceeds the requirements of this procedure if the Hazard Assessment Review indicates potential noise exposure at or above the levels specified in Table 1. All Entities and facilities shall meet the requirements of the local standard but cannot be less stringent than this procedure. However, if the local standard is ***more stringent***, the local standard will take precedence.

When noise monitoring results indicate that any worker may be exposed to levels exceeding the 85 dB(A) (TWA) OEL derived from Table 1, the worker will be enrolled in the Entity HCP. Key components of the HCP will include:

- Written HCP process.
- Noise monitoring.
- Training.
- Hearing protection devices.
- Program assessment.
- Engineering and administrative controls.
- Posting.
- Employee exposure notification.

6.2 Hazard Assessment Review and Planning

A noise hazard assessment review shall be performed during activity planning and before implementation to identify known tasks and activities with the potential to exceed the 85 dB(A) 8-hour TWA and dose limits. The Entity/facility may refer to historical data, plant and equipment noise emission tables, and other sources where applicable but must be verified through onsite monitoring. In many cases, manufacturers and suppliers have a legal duty to provide information on noise levels generated by their equipment. If otherwise, then an assessment per the requirements of this Procedure is essential.

Each Entity/facility shall plan for:

- Noise measurement assessments during work activities, including instrumentation (where applicable).
- Employee training.
- Employee hearing protection devices.
- Assessment and implementation of engineering controls.
- Assessment and implementation of administrative controls.
- The requirement for engineering controls and/or hearing protection shall be evaluated by the Facility HSE Responsible based on OSHA 29 CFR 1910.95 Occupational Noise Exposure. The results of this evaluation shall be included in the Job Hazard Analysis.

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6.3 Noise Monitoring

Noise surveys will be conducted when noise levels have the potential to exceed 85 dBA and/or when the adequacy of engineering controls and personal protective equipment is evaluated.

6.3.1 Occupational Exposure Limit Values for Noise

The acceptable noise levels for employee exposure without the use of hearing protection is shown in (Table 1). Hearing protection, with the appropriate adjusted NRR, must be provided for exposures exceeding those outlined in (Table 1). Noise monitoring shall be performed to ensure that individuals are not exposed to noise beyond the defined limits.

Hours duration per day	Sound level [dBA]
16	82
12	83
10	84
8	85
4	88
2	91
1	94
30 min	97
15 min	100
7.5 min	103
357 sec	104
283 sec	105
89 sec	110
28 sec	115

Table 1: Noise Level Duration, 3 dBA Exchange Rate

6.3.2 Instrumentation

The calibration of both the sound level meter and the dosimeter will be checked before and after each use in accordance with the manufacturer's recommendations.

All sound level meters shall have the capacity to measure continuous sound from 80 dB(A) to 140 dB(A) on the “A” scale network. The sound level meter shall meet design and operation specifications applicable to the authority having jurisdiction and meet the requirements of this Core Process (i.e., 3 dB(A) exchange rate).

All noise dosimeters shall have the capacity to measure continuous noise on the “A” scale network using a 3 dB(A) exchange rate and must be capable of integrating all continuous, intermittent, and impulse noise levels from 80 dB(A) to 140 dB(A). The dosimeter shall be able to indicate the time/duration the noise level was at or above 115 dB(A). Dosimeters shall be capable of determining TWA dB(A) measurement and percent dose. Dosimeters shall meet design and operation specifications applicable to the authority having jurisdiction and meet the requirements of this core process (i.e., 3 dB(A) exchange rate).

6.3.3 Noise Monitoring Strategy

The noise monitoring strategy will be designed by the HSE Responsible, or designee, to identify employees for inclusion in the HCP and to enable the proper selection of hearing protectors and engineering and/or administrative controls. Noise monitoring shall be performed by HSE persons knowledgeable in noise monitoring strategy, noise monitoring equipment and standards, and the requirements of this Procedure. Entities shall not exceed the limits found in Table 1 without engineering controls and personal protective equipment in place.

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Area monitoring should not be used to determine an employee's exposure. Area monitoring should be used only to determine boundary noise levels, posted areas, point source noise levels, and general environmental conditions.

Initial noise monitoring surveys shall be conducted at the start of work activities. Monitoring surveys shall be conducted when:

- The activities and job classifications with the potential to result in worker exposures exceeding the 85 dB(A) OEL are being identified.
- The adequacy of engineering, administrative, and PPE control measures is being assessed.
- There is a change in process, equipment or controls that may increase noise exposures to levels above the 85 dB(A) OEL.

A representative number of workers in each job task and job classification shall be monitored. If there is no discrimination of work tasks between employees within a job classification, all workers within that job classification shall be considered to have similar exposure. The resulting exposure data shall be applied to all affected employees, by name. A representative number of employees shall be considered the number of employees that will produce reliable statistical data and justification of the correlation application.

6.4 Noise Prevention Methods

6.4.1 Engineering Controls

The first lines of defense against noise exposure are design features and engineering controls. Entities and facilities shall always provide onsite verification of the effectiveness of the control measures through noise monitoring data. Specific engineering controls may include:

- Redesign or modification should be considered before engineering control measures.
- Alternative work methods that will not require noisy equipment.
- Noise source isolation such as erecting suitable sound barrier material between the machines and employees.
- Vibration dampeners.
- Mufflers.
- Equipment with noise reduction controls in place.
- Equipment with low noise output and local noise attenuation fitted to it.
- Other feasible engineering controls when noise is inherent in the task.

6.4.2 Administrative Controls

The second line of defense against noise exposure is administrative controls. Entities and facilities shall provide onsite verification of the effectiveness of the control measures through noise monitoring data. Specific administrative controls may include:

- Ensuring that equipment is well maintained and the noise attenuation equipment is fitted and working.
- Arranging noise-producing plant equipment, as practicable, at a distance from employees.
- Limiting access, when feasible, to noisy areas and planning work methods that will reduce exposure times to noise, and shutting down noisy equipment when it is not needed.
- Erecting signs and barriers prohibiting unauthorized personnel from entering noisy areas.
- Monitor the HCP, including the effective use of protective hearing devices.
- Installing signs mandating personnel to wear hearing protection at noisy place.

6.4.3 Personal Protective Equipment (PPE)

The HSE Responsible shall select the proper hearing protective devices based on the noise levels and the NRR of the devices.

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- Hearing protectors shall be used when engineering and/or administrative controls have not yet been determined, are not feasible, or fail to reduce noise levels to the 85 dB(A) OEL.
- Double hearing protection shall be used when exposure reaches 105 dB(A), as defined in Table 1.

Each Entity and facility shall provide a selection of at least two types of earplugs (formable, pre-molded, banded, or custom) and one type of earmuff that meets appropriate attenuation requirements. Employees must wear suitable and effective hearing protectors always when the 85 dB(A) and 105 dB(A) OELs have been exceeded. Provisions shall be made to engage the employees in the selection of suitable devices.

Provisions shall be made that afford employees ready access to hearing protection devices. Rules shall be enacted requiring devices to be carried by employees participating in the program.

6.5 Hearing Protection Device Selection

Hearing protection shall not interfere with the wearing of other PPE. In areas where hearing protection or noise levels interfere with communications, suitable alternative arrangements shall be in place for alerting employees in the event of an emergency.

Hearing protection device selection shall be compatible with other required PPE, cleanliness, comfort, ear canal size, communication needs, and intermittency of exposure. The selection of an appropriate standard of hearing protection will be based on noise dosimeter data.

The adequacy of noise attenuation will be reevaluated based on the monitored noise level and the protection device NRR rating whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. If necessary, more effective hearing protectors will be provided.

Note: *Employees who have experienced a standard threshold shift must wear hearing protectors for any noise level period above 85 dB(A). Attenuation by the hearing protection device shall reduce the exposure level to or below 85 dB(A).*

Figure 1: Hearing Protective Equipment

6.6 Training

Employees who are exposed to noise at or above the levels defined in Table 1 will receive the training required by this program. Training shall be repeated annually for each employee. Information provided in the training shall be updated, as necessary, to be consistent with changes in protective equipment, work processes, and/or activities.

As a minimum, the following training topics must be discussed:

- Facility-specific noise hazards and noise levels of typical equipment used.
- Early symptoms of hearing loss.
- Hearing physiology.
- Engineering controls being used.
- The purpose of hearing protectors, including the advantages, disadvantages, and attenuation levels of various types of protectors.
- Instruction on selection, fitting, use, and care of hearing protectors.
- Practical (hands-on) training in fitting and use of the hearing protection in use at the site.

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Informational materials for the hearing conservation program will be available to affected employees or their representatives. In addition to the training, supervisors are to demonstrate leadership and share the appropriate control measures with employees.

6.7 Audiometric Testing

Where applicable, personnel engaged in work where high noise levels cannot be attenuated may be subjected to screening, which may include a baseline test, to assess if any impairment has occurred. Any such testing shall be in accordance with the requirements of the authority having jurisdiction for the Entity/facility location.

Entities/facilities that are required to perform audiometric testing by either contract or host country regulations shall ensure compliance with applicable requirements.

6.8 Employee Notification

Employees exposed at or above an 8-hour TWA of 85 dB(A) will be notified of the results of the monitoring. Affected workers will be notified verbally, or by posting, or in writing within 48 hours of any noise exposure above levels defined in Table 1. Attachment 3 provides a sample employee notification form. Verbal notification can be documented in a tool box meeting. Any posting must be in a conspicuous location. If the notification is in writing, documentation must be maintained in the individual's file.
I
Noise monitoring records shall be provided to employees upon receipt of a formal written request.

6.9 Documentation

Noise monitoring forms **Attachment 1 - EOM-KSH-TP-000015 - Noise Monitoring Form Template**, employee notification forms **Attachment 2 - EOM-KSH-TP-000016 - Employee Notification Form Template**, noise testing results/data and training records shall be maintained for at least 75 years within the controlled document system.

7.0 ATTACHMENTS

1. Hearing Conservation Program Flowchart
2. EOM-KSH-TP-000015 - Noise Monitoring Form Template
3. EOM-KSH-TP-000016 - Employee Notification Form Template

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Attachment 1 - EOM-KSH-TP-000015 - Noise Monitoring Form Template

PART I

DATE: _____

EMPLOYEE NAME: _____
*(If more than one, please list on other side)

SOCIAL SECURITY NO.: _____
(or other unique ID Number)

JOB CODE: _____ TASK DESCRIPTION: _____

JOB SITE LOCATION: _____ PROJECT NO.: _____

EMPLOYER NAME: _____ TELEPHONE NO.: _____

PART II

AREA SAMPLE: _____ PERSONAL SAMPLE: _____ NUMBER OF WORKERS EXPOSED: _____

HEARING PROTECTION IN USE? YES ☐ NO ☐ IF YES, NRR _____

RUN TIME: _____ SOUND LEVEL: _____ dBA PEAK LEVEL: ___ dBA

TL- RUN TIME TWA: _____ dBA

TL- 8-HOUR TWA: _____ dBA

TL- 8-HOUR DOSE: _____ %

SAMPLED BY: _____ TITLE: _____ DATE: _____

SAMPLE

PART III

NOISE MEASURING INSTRUMENT NAME: _____ SERIAL NO.: _____

CALIBRATING INSTRUMENT NAME: _____ SERIAL NO.: _____

BEFORE SURVEY CHECK/CALIBRATION: ___OK ___NOT OK; TIME: _____ AM PM; AT _____ dB; CODE: _____

AFTER SURVEY CHECK/CALIBRATION: ___OK ___NOT OK; TIME: _____ AM PM; AT _____ dB; CODE: _____

CALIBRATED BY: _____ TITLE: _____ DATE: _____

PART IV

NOTE 1. The noise measuring instrument must be set in the "run" mode to obtain the above data.
NOTE 2. LTL-TWA readings ³ 85 dBA shall require compliance with hearing conservation requirements.
NOTE 3. PARTS I and II will be used to update the Health Database.
NOTE 4. The original copy of this form shall be maintained by PDCC (project document control center).
NOTE 5. CODE -- an encoded number which identifies the internal switch setting (refer to Instrument - Instruction manual).
NOTE 6. OL-Time is the length of time the noise equaled or exceeded 115 dBA.

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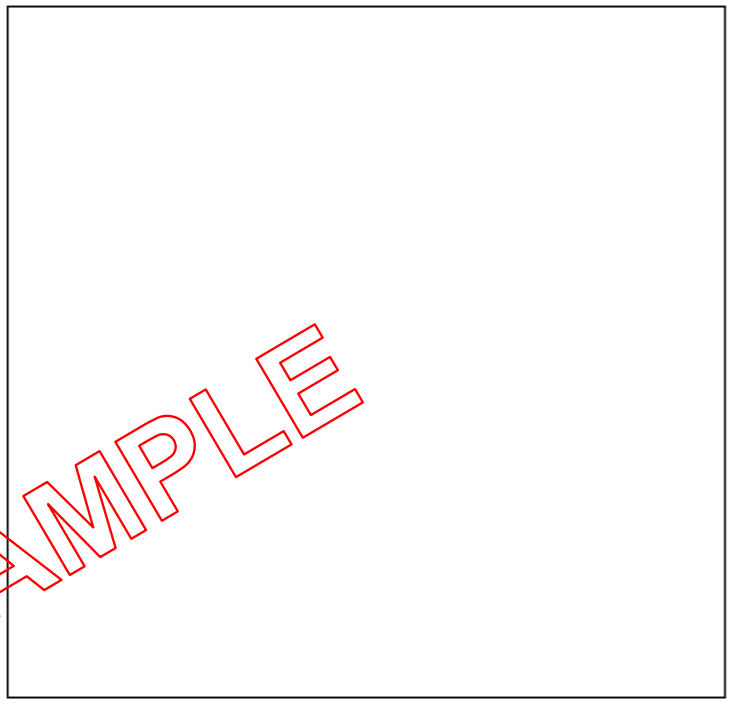
DIAGRAM

(Use Number That Corresponds to Measurement Location)



Noise Level Duration
3 dBA Exchange Rate

Hours duration per day	Sound level [dBA]
16	82
12	83
10	84
8	85
4	88
2	91
1	94
30 min	97
15 min	100
7.5 min	103
3.75 min	106
1.88 min	109
.94 min	112
28.12 sec	115

SAMPLE

ADDITIONAL COMMENTS: _____

RECOMMENDATIONS: _____

SURVEYED BY: _____

TITLE: _____

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Attachment 2 - EOM-KSH-TP-000016 - Employee Notification Form Template

Preparer:
Project and Project No.:
Work Location:
Work Being Conducted:

HAZARD: Noise				
Employee's Name/ Badge #	**Date of Monitoring**	**Monitor No.**	**Results: 8-hour average (TWA)**	**8-hour Exposure Limit***
			dB(A)	85 dB(A)
			dB(A)	85 dB(A)

SAMPLE

Hearing protection in use: Type, manufacturer, model, NRR

_____

_____

_____

Hearing Protection adequate: Yes/No

Current engineering controls in place: Write in type

_____

_____

_____

Current safe work practices in place: List

_____

_____

_____

Corrective Actions Required when Personal Exposure is Above Occupational Exposure Limit(s)	
Corrective Action Needed (Substitution, Engineering Controls, Administrative Controls, PPE):	**Implementation Due Date:**

HSE Signature	**Date**
Signature of Worker	**Date Received**

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