

## HEARING CONSERVATION PROGRAMME

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**Keywords:** hearing loss preventive programme, noise over 87 dB  
**Abstract:** Implementing a hearing conservation programme at work can prevent hearing loss caused by occupational exposure to noise and can contribute to educating and motivating the employees to protect themselves from exposure to noise.

**Cuvinte cheie:** Rezumat: Implementarea unui program de conservare a auzului la locul de muncă poate preveni pierderea auditivă cauzată de expunerea profesională la zgomot și poate contribui la educarea și motivarea salariaților pentru a se proteja de expunerea la zgomot.  
program de conservare a auzului, zgomotul peste 87 dB

Noise is one of the most well known and widespread contaminant in the environment. The noise is not an infant hazard. In his work „De Morbis 1700 Artificium Diatriba” Ramazzini notes that workers who have modelled the copper „have the ears so affected ... that they become hard of hearing and deaf with the passing of time”

The advent of exposure to noise in the environment and subsequent manufacturing industry, justified both start investigating the adverse effects as well as the interest for this predominantly occupational environment.

Exposure to noise has multiple consequences justifying the cost of the measures to be taken to reduce them.

This article aims to demonstrate that implementation of a hearing conservation programme at work can prevent hearing loss caused by occupational exposure to noise and can contribute to educating and motivating the employees to protect themselves from exposure to noise.

### PHASES OF THE HEARING LOSS PREVENTIVE PROGRAMME

#### 1. Evaluation and registering the exposure to noise

Noise exposure assessment involves measuring, recording and interpreting the results of the noise level measurements. The study was carried out on workers of a factory producing chemical equipment, exposed to a noise level of 87 dB(A).

We conducted sound level measurements using a digital set top box type 651, Quest model 2900, with weighting networks A, C and LIN. Limiting the maximum permitted is 85 dB(a) Leq for a daily eight-hour exposure.

The stations that have registered the largest overrun of the limit values for noise are: Heating system (heavy and light), Toolroom, Machining Workshop and Forging Workshop.

The measured values were between 87,6 dB (A) and 97,9 DB(a) in the studied sections. The first actions arising after measuring levels of exposure are determining the periodicity of the evaluation as well as work stations that will be analyzed;

This will make the transition from the initial assessment to the monitoring process.

I have established the following jobs which will be monitored: coppersmith, locksmith, foreman, welder, lathe machine operator, milling machine operator, forger, quality inspector, crane operator, sander, dyer, grinder, cutter, creaser, tracer.

For these jobs, audiometry will be done annually. Employees who work in these places will be included in the target programmes for hearing conservation.

Following the assessment of exposure to noise I made a list with work places with levels over 87 dB (A) and I made a map of the noise of the unit, which highlighted areas where employees are involved in the hearing conservation program and where the wearing of hearing protection equipment is mandatory. Employees can benefit from knowing the level of daily personal noise exposure for each post. The level measured shall be recorded in medical records of workers. The mention of personal daily exposure to noise in the medical records of employees is useful for assessing the results of the hearing conservation program and/or for establishing the diagnosis of professionalism, where appropriate.

#### 2. Means of technical and organisational measures for prevention of noise reduction

I requested the employer to carry out a technical study on the reduction of noise in areas where workers must wear hearing protection as well as to establish control actions resulting from this study. We have identified major sources of noise in these workshops.

These are: the operations of the milling, gouging, polishing, sanding, riveting, cutting, stamping, forging, moving machinery, bridges, air compressors.

He also instituted technical measures to reduce noise at source through constructive changes made to the technical equipment and by adopting special attenuation devices. Set screens are put to isolate the source of the noise. Employees' opinions were recorded regarding exposure to noise, the

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effectiveness of the measures for the prevention and the usefulness of previous interventions.

### 3. Training and motivation

The process of forming refers on the one hand to the formation of multidisciplinary teams that participate in the elaboration and implementation of the programme of the hearing conservation and on the other hand to the formation of a preventive attitude among employees based on sensory information and risk control. At this stage it is pursuing the development of a preventive attitude of employees towards the risk of hearing loss. It starts from informing employees daily exposure, their involvement in the programme (request for opinion on actions taken), training on how to use hearing protection equipment. It is very important that the Manager's attitude, through personal example wearing hearing protection equipment and the participation of the training sessions.(4) Manager's participation is a powerful motivation.

It is recommended that programme personnel to recall to the employees, at least once every three months, formally or informally, the timing of the activities, the results of the stage of the hearing conservation programme.(2,3) Motivating employees to participate in the programme is extremely important and not always easy, because hearing loss happens very slowly over many years and affects high frequencies initially and not on the conversational and interfering very little with the social life of the person exposed. The use of suggestive posters in conspicuous places particularly in precincts with exposure to noise can increase adherence to the programme. Staff participation in the hearing conservation programme is examined on the occasion of the annual assessment of the unit personnel; around this time individual feedback on the program can be obtained and it can convey personalized information (such as information related to individual non-occupational exposures to noise) and the evolution of auditory acuity.

### 4. Hearing protection

Equipment must be individualized in view of the particularities of the auditory channel for each employee. Safety inspector will offer several variants in which the employee can choose the one that assures maximum comfort (the choice must be made between at least two types of ear protection and a helmet for protection - it is preferable that the employee is to have three earplugs and two headsets) (1).

Essential criteria for selecting the type of auditory protectors are (2):

- the comfort of wearing protective equipment by checking the adjustment of the headset and the earplugs; -the perceived convenience of employee (protective gear is specially adapted to each employee);
- the real attenuation that can be achieved (earplugs made a minimum of 10 dB attenuation and headsets 15-35 dB). In order to assess the degree of protection it will be carried out a new audiometric examination at the end of a day of activity for each employee, with the aim of verifying the use and efficiency of appropriate equipment.

### 5. Audiometry

The main conditions for achieving fair refers to the audiogram: cabin, the audiometer and transducers. Basic rules imposed by this standard are as follows:

- the examinations to be carried out in the soundproofed cabin;
- examined subject may not be exposed to noise at least 2 hours prior to the test;
- the examination shall be preceded by the registration of data about how well the patient thinks he hears, if the

thinks he had a hearing deficit, if he has been previously exposed to contaminant ototoxic, whether it had the ototoxic disorders of middle ear and internal. It is very important that the history of hearing of the employees to be updated annually and released to the medical specialist who interpret the audiometry. Two types of tests are usually made: tonal audiometry using pure tones for testing hearing and speech audiometry using words with one or two syllables. Tonal audiometry allows assessment of the threshold of detection of sounds, while speech audiometry is assessing the level of understanding of words.

For ears that have an asymmetry of hearing is absolutely necessary to cover the ear that is not tested to avoid erroneous results. Masking technique requires skill and experience. If the examination is done improperly, the results will change from one reviewer to another and will create confusion for both patients and doctor who concludes on the outcome. Tonal audiometry represents basic examination of hearing. Because the sound reaches the inner ear in two different ways (the bone and air), the tonal audiometry will test both. First test is the bone conduction by the eardrum and bones: audio signal is routed through a headphone in one ear, then the other ear. In a second stage, the sound is sent by a bone vibrator placed behind the ear on the mastoid, separately for both ears. This examination will allow studying bone sound conduction through the bones of the skull. The result of this test gives two curves for each ear. The interpretation of these curves allows us appraisal loss of hearing and deafness. Tonal audiometry can measure the degree of discomfort that the noise level becomes uncomfortable, sometimes painful. It allows searching the frequencies at which they appear tinnitus. According to the standard mentioned above, the technician carrying out audiogram – in the case of occupational health services nurse trained in performing these tests - provides immediate results of the audiogram to the employees and establishes a relationship with the correct use of hearing protectors. Audiometry interpretation is done by the occupational health doctor who must inform employees about:

- hearing their status when compared with a normal hearing in relation to their age;
- any amendments to their hearing;
- recommendations for better protection at the workplace and outside of the workplace and, if necessary, for a specialist examination, or medical treatment.

In addition, occupational health doctor that interprets the audiogram looking for significant differences for all the frequencies of the audiometric test, not just for the characteristic of professional hearing loss and follow the development in time of the hearing. At this time, the interpretation of the results of the audiogram is different for the doctors of occupational medicine and ear-nose -throat physicians, based on thresholds of demarcation between the various physiological and pathological: occupational physicians take into account correction for hearing loss age. Consensus in the interpretation of audiometry in terms of exposure to occupational noise is desirable, so as not to create confusion among patients or staff without medical training involved in hearing conservation programs. For employees whose performance deteriorated compared with the previous examination, it is necessary to identify the causes and to initiate new actions or technical training organization, as appropriate

### Programme evaluation (1,2)

The correct evaluation of the programme cannot be done without the involvement of the Manager in both the

allocation of resources for evaluation and designation and leverage to the person responsible for implementing the programme and reception of feedback to employees. The person responsible for the programme oversees the five-phases of the hearing conservation programme and provides the framework for all actions set out in the schedule to conduct timely. Members of the programme team verify that all objectives have been met and if there are records to prove their fulfilment. Doctor of occupational medicine is the one who coordinates all aspects of evaluation of audiometry. Most of the time he is the one who informs employees about their hearing problems and the one who makes the final recommendations. Especially in companies with many exposed, he is the one who drafted the final report on the annual audiometry assessment.

There is also a responsibility of employees who must communicate in advance if protective equipment is not suitable, if they have respected the rules at work, and if they understand how to do the audiometry. Only by fulfilling the responsibilities of all those involved in the programme can draw a conclusion on the effectiveness of the technical and organisational measures and effectiveness of hearing protection equipment.

An active communication between team members hearing conservation programme and the staff at all hierarchical levels is essential. Evaluation of the effectiveness of the programme on the prevention of noise-induced hearing loss in the workplace is achieved through audiometric data analysis. This task rests with the doctor of occupational medicine, his conclusions are the ones that give the final size of the objectives of the programme.

### **Conclusions:**

Hearing conservation benefits relates to the employee in the professional and social context as well as the employer.

The most important advantages are:(1)

- identification of the risk of hearing loss and deafness;
- descriptions and identification of employees to be implicitly included in the hearing conservation programme;
- classification of employee exposure depending on the noise level to which they are exposed in order to establish priorities for intervention;
- assessment of the noise sources in order to establish means of intervention;
- evaluation of the results of measures to control exposure to noise;
- increased efficiency;
- hearing loss prevention leads to a better quality of life by keeping interpersonal verbal communication, ability to receive signals from the audible warning;
- decrease in sensation of auditory fatigue because of exposure to noise;

The employer receives directly the results of hearing conservation programme for workers because they are more productive and more efficient, and their ability to communicate is not altered.

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