

Noise level and impact research on representatives of different professions employed in an open and closed space.

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Abstract

This study includes, based on labor safety principles and standards, a study of one of the most important physical factors, noise levels and impacts, in open and closed public places. It is known that the physical factor of noise contributes to the formation of a harmful work environment and has a negative impact on the representatives of various professions, increases the risk of psychophysiological overload and reduces the ability to work.

Keywords: *Safety, Occupational safety, Danger, Harmful work environment, Noise; Psychophysiological, noise meter.*

1. Introduction

Occupational Safety and Health (OSH), also often referred to as Occupational Health and Safety (OHS), Occupational Health, or Occupational Safety, is a multidisciplinary field that deals with the safety, health, and well-being of people in a variety of professions.

The goal of the Occupational Safety and Health Program is to provide a safe and healthy work environment for employees.

Globally, more than 2.78 million people die in the workplace as a result of accidents or illness, which means one death every fifteen seconds. There are an additional 374 million non-fatal work-related injuries each year. It is estimated that the economic rate of occupational injury and death accounts for almost four percent of global GDP each year.

Under common law, employers have an obligation to ensure the safety of their employees (also called a duty of care) a reasonable approach to the safety of their employees.

Consider one of the issues of labor safety, noise. Noise is any unwanted sound or a disordered combination of sounds of different frequencies and intensities, which has an adverse effect on the human body and causes occupational disease, deafness. Noise by physical nature is the mechanical vibrations of a flexible environment, gas, liquid, solid body particles within the perception of a human hearing analyzer (16 Hz - 20 kHz), noise is divided according to the nature and time characteristics of the spectrum.

Noise has its beginnings and origins of formation, let's consider each of them:

- **Traffic** is the main source of noise in urban areas with the highest share of noise pollution. The number of vehicles, speed, urban development and traffic system are the main parameters that have an impact on noise propagation. Also, the share of heavy vehicles in the common motor park is allocated;
- **Technological and household equipment**, as well as human activities belong to the sources of internal noise in the dwelling;
- Micro-district (quarter) noise sources, **activities related to human life and activities**. For example, playgrounds and sports fields, area cleaning and more.
- **Writing and energy infrastructure** are sources of external noise

As already mentioned, noise is also divided into time, Permanent and Unstable noises according to time characteristics. Consider each:

⊗ **Permanent noise**, the sound level of which in the work area, 8-hour work cycle or in the storerooms of residential and public buildings, in the area of residential development, when measured "slowly" on the time characteristic of the noise meter changes by no more than 5 dB;

⊗ **Unstable noise**, the level of which in the work area during the 8-hour working day, in the work shift or in the area of the residential development, when measured "slowly" on the time characteristic of the noise meter, changes in time by not less than 5 dB.

Unstable noise in turn is divided into three parts:

✓ **Fluctuating noise** in time, the sound level of which changes continuously over time;

✓ **Intermittent noise**, the pitch of which changes step by step (5 dB and above). In addition, the duration of the intervals during which the noise level is constant is 1 second or more.

✓ **Impulse noise** consisting of one or more sound signals with a duration of less than 1 s each, in addition, the sound levels in dB, measured according to the temporal characteristics - "pulse" and "slow" differ by not less than 7 dB.

There are permissible noise norms according to state standards.

Acoustic Permissible noise norms are different for day (07:00 to 23:00) and night (23:00 to 07:00) periods.

Permissible noise standards in residential areas are similar to the IFC (International Finance Corporation Standards used in international projects) guidelines and the requirements of Georgian law, with only a small time difference of one hour. Permissible noise norms are defined in accordance with the state standards by the Order №297 / N of the Minister of Labor, Health and Social Affairs of Georgia on 16 of August 2001 on the Approval of the Norms of the Quality of the Environment. This order set

the permissible noise levels as well as the maximum permissible level for different areas. Standard noise requirements for residential and commercial areas are defined as follows:

Noise levels established by the legislation of Georgia Recipient status	Time interval	Average permissible noise level (dB)	Maximum permissible noise level (dB)
Residential	7:00-23:00	55	70
Residential	23:00- 7:00	45	60
Commercial	Day-Night	60	75

Permissible norms of acoustic noise in the storerooms of residential houses and public / public institutions and their development areas

№	Application functions of storerooms and areas	Permissible norms		
		Day	Evening	Night
1	Educational Institutions and Readings	35	35	35
2	Medical Offices for Treatment of Medical Institutions	40	40	40
3	Residential and sleeping lockers	35	30	30
4	Medical and Rehabilitation Chambers of an inpatient medical institution	35	30	30
5	Hotels / Guest Houses / Motel Rooms	40	35	35
6	Shopping halls and living rooms	55	55	55
7	Restaurants, bars, cafe halls	50	50	50
8	Spectator/Listener Halls and sacral locker rooms	30	30	30
9	Gyms & Pools	55	55	55
10	Small offices (≤ 100 m ³) working lockers and lockers without office equipment	40	40	40
11	Large offices (≥ 100 m ³) work storage facilities and storage facilities with office equipment	45	45	45
12	Council Headings	35	35	35
13	Areas that directly adhere to low-rise (number of floors ≤ 6) residential houses, medical institutions, children's and social services facilities	50	45	40
14	areas that directly decorate multistory residential houses (number of floors > 6),	55	50	45

	cultural, educational, administrative and scientific institutions			
15	Areas that directly target hotels, shopping, services, sports and community organizations	60	55	50

2. Main part

We have already talked about what the noise and the sources of its emergence are, its distinctive characteristics and established norms, however, in order to measure the norms of noise and to complain to one standard, we need a tool called noise, some types of noise measures have the ability to store the received signals on the internal memory and describe each received signal in accordance with the level and date.

To date, noise measurements have evolved so much that it has even moved to the phone's application, thereby making it significantly easier to use it. In the experimental studies we produced, we used the noise of the Digital Sound Level Meter GM1351 model as well as the mobile app. By which in different periods of time and in different environments, we measured the level of noise. The results of this study are quoted in table N1 below.

The purpose of the study was to compare the results obtained in real environments with the data obtained by the legislation of Georgia and the standards of IFC (International Finance Corporation), and to determine whether the noise level in different environments complied with the specified norms and mainly which profession representatives could act negatively.

Table N1

We've taken the anniversary								Noise levels established by the legislation		Results	
N	Date	დრო	Duration of the anniversary, (min)	Location	Minimum noise level (dB)	Medium, (dB)	Maximum noise level, (dB)	Average permissible level of noise, (dB)	Maximum permissible noise level, (dB)	Difference in noise level to maximum permissible level (dB, -, +)	Compatibility with established norms, (abundance, norm)
1	2021/02/10	17:29:38	00:59	E.Ninos hvili Street Surround	42	59	72	55	70	-11	Norm

				ding Area								
2	2021/1 1/30	16:45:5 2	01:24	Stu Classroo m	42	73	82		35	55	18	Excesses
3	2021/1 1/23	22:43:3 7	00:58	Area adjacent to D. Guramis hvili Avenue (M. Deepghe le)	45	84	87		55	70	14	Excesses
4	2021/1 1/20	15:43:5 2	01:03	Restaura nt near Chashna gir	45	76	82		50	70	6	Excesses
5	2021/1 1/20	15:41:4 0	00:44	Surroun ding Beijing St. N5	45	79	82		55	70	9	Excesses
6	2021/1 1/16	18:24:3 1	01:04	Metro Station Technica l Universi ty Escalator (Bukia Region)	44	78	82		55	80	-2	Norm
7	2021/1 1/15	19:34:3 7	01:36	Area around Metro Marjanis hvili	42	72	77		55	80	-8	Norm
8	2021/1 1/15	19:30:4 1	00:12	Near Beijing	76	79	81		55	70	9	Excesses

				St. N8 Area								
9	2021/1 1/15	19:27:1 0	01:16	Metro Tech Universi ty Escalator	43	84	87		55	80	4	Excesses
10	2021/1 1/14	21:26:1 2	01:41	Subway mattress wagon	42	74	82		55	80	-6	Norm

The results of the study, published in the table, show that the average rate of noise in the open space exceeds the norms by 9.5 dB, and as for the average noise level in a closed space, the lecture process in the classroom for example exceeds the permissible limit by 18 dB, and on the metropolitan escalator by 4 dB.

It should be noted that an excess of noise levels in a closed space is mainly due to the frequency and acoustic effect of current conversations, and in the open space, the noise caused by the number of cars and movement of the main source is caused by movement. As a result of a sharp difference in acoustic effect between open and closed spaces, the level of noise operating in the open field is almost 2 times less than the closed space. Based on the data obtained, it can be said that both environments are characterized by non-constant noise.

Based on studies, we have the opportunity to distinguish representatives of the profession who have to work in a harmful environment and psychophysiological overload during the work process.

Mainly, representatives of this profession are: metropolitan escalator controllers, metropolitan patrol inspectors, professors and teachers and external traders.

Mostly professors and teachers are distinguished from these professions, since their work environment and the physical factor of the current noise exceed the permissible norms by 18 dB, which is twice as high as the noise level of employees working in the open space, and even 4.5 times compared to a number of professions.

The negative impact caused by noise causes psychological irritation and moral instability of a person, which in turn is one of the conditions for the deterioration of the criminal situation.

Clearly, working in a supernormized and psychologically overcrowded environment has an invisible, negative effect on the representatives of the profession we define. This issue gains greater relevance in improving public safety and protection. Since controlling the psychophysiological hazard factor for the recovery and depletion of the country's demographic state is one of the leading aspects in the process of forming a healthy civil society.

3. Conclusion.

As the results of the study turned out, the anthrax we took, the maximum noise levels established by the legislation are incompatible with the standard indicators.

With noise-level studies, risk groups working in a harmful work environment, representatives of the profession were identified: escalator controllers, metropolitan patrol inspectors, professors and teachers and external traders.

Among the professions, the profession of professors and teachers, whose working environment, that is, the study process in the classroom and the noise level in it, 2 times and even 4.5 times in some cases, exceeds the working environment of representatives of other professions.

These studies provide the basis for continuing the investigation into the workspaces of representatives of other professions, identify factors that produce harmful environments, identify sources causing noise and develop relevant recommendations to reduce them.

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