EduVision: Journal of Innovations in Pedagogy and Educational Advancements
Volume 2, Issue 4, April 2026
brightmindpublishing.com
ISSN (E): 3061-6972
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THE IMPACT OF NOISE IN PRODUCTION ON HUMAN HEALTH

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Abstract
This article presents the results of measuring the amount of noise that occurs in production according to Sanitary Rules and Norms 008-20 “Permissible sanitary standards and rules of noise in residential areas, public buildings and housing buildings”.

Keywords: Noise equivalence level, Shumomer UT353, noise propagation.

Introduction

SIGN IN: Acoustic pollution, resulting from the acceleration of modern urbanization processes, has today become one of the primary environmental factors compromising human psychophysiological health. Statistical analyses show that one in five mental pathologies recorded worldwide is directly related to chronic noise load, and this problem is also clearly manifested in the experience of developed countries. Specifically, while noise is recognized in Japanese national reports as the primary factor reducing the population's quality of life, studies by English and French scientists show that a significant portion of patients suffering from nervous disorders, and even one in five patients in psychiatric hospitals, went mad due to high-intensity noise exposure. The impact of high-frequency acoustic oscillations on fetal development is particularly dangerous, and it has been scientifically proven to cause congenital defects and functional anomalies in newborns.

In order to combat these global threats and protect the population's gene pool, fundamental reforms have also been implemented in the country's healthcare system.

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In particular, the population's need for medical services is being met through the modernization of primary health care, the expansion of the family polyclinic network, and the creation of a centralized emergency medical care system. The creation of national reproductive health programs and national screening centers serves as an important mechanism for the early prevention of hereditary and congenital diseases. Nevertheless, the accumulated environmental problems and systemic shortcomings in the urban environment necessitate the development of new, more advanced approaches to public health protection that strictly control anthropogenic factors (in particular, noise pollution).

Information About Measurement Results

In the era of modern technical progress, the problems of protection against noise, which is extremely dangerous to human health, are among the most pressing issues. Noise can negatively affect a person's hearing organs, causing them to experience partial or total hearing loss.

It leads to the disruption of the functioning of the brain and cardiovascular system, which are the centers of the nervous system, as well as the gastrointestinal system, and as a result, to the development of chronic nervous disease (neuritis). Exceeding the sanitary norms of noise prepares the ground for rapid nervous exhaustion and leads to metabolic disorders in the body, a decrease in labor productivity, an increase in defects, and an increase in accidents. Furthermore, a high level of noise leads to a decrease in labor productivity when performing certain tasks. In this regard, reducing noise levels and protecting people from noise is a very important task.

Noise consists of the sum of oscillations of various wavelengths and amplitudes, and exceeding sanitary standards leads to a negative impact on the human body. Sources of noise can be vibrating, oscillating objects that produce sound waves propagating in solid, liquid, and gaseous media, which a person perceives as sound waves. The physical values of such oscillations are the root-mean-square values, which are expressed by the sound amplitude A and the oscillation frequency f (the number of oscillations per second), Hz.

Human auditory organs are capable of perceiving sound waves with a frequency in the range of 20000 Hz. Sound waves below 16 Hz are called infrasound, and waves above 20,000 Hz are called ultrasound, and our auditory organs are unable to perceive them. The human ear perceives sound waves ranging from 1000 Hz to 3000 Hz very

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well.

1. Familiarization with the UT353 schemeter and bringing it into working order;

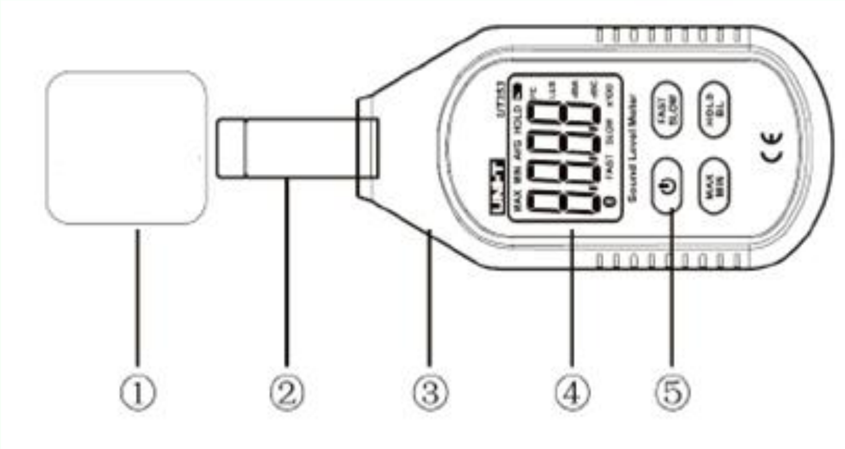

Figure 1. General structure of the Schumer UT353. 1 - windscreen, 2 - microphone, 3 - device body, 4 - display, 5 - control buttons.

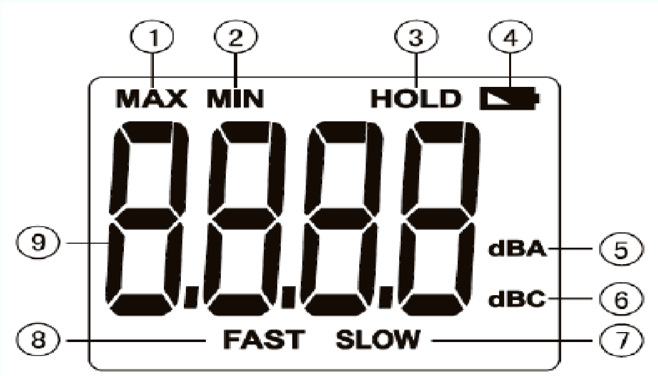

Figure 2. Information displayed on the UT353 Schumer display.
1-highest reading, 2-lowest reading, 3-stop reading, 4-battery reading, 5-A filter, 6-S filter, 7-slow reading at time unit, 8-fast reading at time unit, 9-indicator.

Environmental requirements during device operation:

- Operating conditions up to 2000 m above sea level;
- Pollution level 2;
- Working temperature and humidity: up to 80% at 0-30 °C, up to 45% at 40-50 °C;
- Storage temperature and humidity -20...+60 °C, up to 80%;
- Measurement accuracy ±1.5 dBA;
- Duration of unsupervised operation is 5 minutes.

To bring the device into working order, the batteries are installed on it, and the functionality of all buttons is checked. After checking that it meets environmental

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requirements during operation and automatically turns off after 5 minutes if left unattended, it is brought into working condition.

2. Measurement of noise occurring during production;

The noise measurement workstation is located within a specific room at a distance of 1.5 m from the window, and in open conditions at a distance of 7.5 m from the source at a height of 1.5 ± 0.1 m. Once the device is powered on, the counts on its display will be recorded.

3. Processing of measured results;

Since noise is a rapidly changing value, the obtained calculations are processed using the "Uncertainty Method" as follows.

I, Sulaymonov Muhriddin Faxriddin o‘g‘li, performed measurements of noise propagation velocity occurring in production and the processing of measurement results under laboratory conditions in room 210k of the Faculty of Highways.

Table 1.Results obtained;

№	M_{max}	M_{min}	$M_{o‘rta}$
1	70	48.5	59.25
2	90.5	50.7	70.6
3	63.5	53.7	58.6
4	74.5	57.5	66

The average value of the obtained counts is determined:

$$E=\frac{1}{n}\sum_{i=1}^{n} Ei=\frac{59.25+70.6+58.6+66}{4}=63.61 \text{ dB}$$

Determines the deviation from the mean:

$$U_A(E)=\sqrt{\frac{(59.25-63.61)^2+(70.6-63.61)^2+(58.6-63.61)^2+(66-63.61)^2}{4(4-1)}}=2.86 \text{ dB}$$

Deviation of the device from the actual value:

$$U_B(A)=\frac{\Delta E}{\sqrt{4}}=\frac{2.86}{\sqrt{4}}=1.43$$

Total standard deviations:

$$U_C(E)=\sqrt{U_A(E)+U_B(A)}=\sqrt{2.86^2+1.43^2}=3.19$$

The confidence probability of the obtained counts is determined as follows:

$$U(E)=k*U_C(E)=2*3.19=6.38$$

For the confidence probability (clutch probability) R=0.95 (recommended by the

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uncertainty calculation), we calculate the measurement uncertainty at k=2.
Finally, the average value is added to U (E).

$$U(E)+E_i=6.38+63.61=69.99 \text{ dB}$$

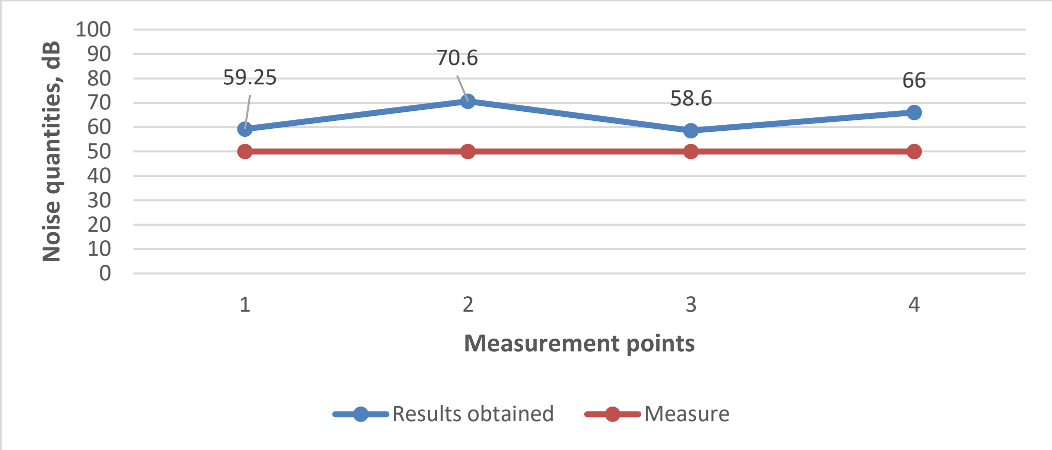

Figure 3. Graph constructed based on the results obtained using the UT353 Schumer device.

In this article, I determined the average noise value within the building structure, the deviation of the device, i.e., the Shumomer UT353, from the actual value to the average value, and the reliability probability of the obtained calculations.

Table 2.Comparison with the standard provided in SanQvaN №008-09

№	**Place of work, type of labor activity**	**Equivalent noise level, dBA**
1	Workspaces inside the building: committee, design bureau, laboratories	50
2	Accounting and analytical laboratories and workshops	60
3	Laboratories and workshops using dispatch services and voice messages	65
4	Workshops with noisy units and equipment	75
5	All jobs except those listed above	80
6	Places where drivers of road construction vehicles work and are serviced	80

Conclusions And Recommendations

As a result of the laboratory studies conducted, the acoustic environment in the classroom was analyzed. A comparative analysis of the results obtained with the regulatory requirements of SanQvaN №008-09 showed that the equivalent noise level significantly exceeds the established building norm of 50 dBA. It has been established that this situation reduces the effectiveness of cognitive activity in the educational process and negatively affects the psychophysiological state of students and faculty.
To eliminate acoustic discomfort and reduce noise pressure, the following complex of engineering and biological measures is proposed:

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1. **Creation of phytomeliorative barriers:** Creating multi-level green shields around the educational building consisting of broad-leaved trees with noise-absorbing and dissipative properties. This method not only reduces the amplitude of sound waves but also improves the microclimate.
2. **Acoustic screens and engineering structures**: Installation of special noise-absorbing screens in roadside areas to limit aerodynamic noise from traffic flows. These structures reduce the noise entering the building by diffusing sound energy.
3. **Improving the airtightness and insulation properties of the building:** The exterior envelope (door and window blocks) should be equipped with modern multi-chamber windows with high sound insulation coefficients and elastic seals. This protects the interior of the building from external noise.

The proposed set of measures allows for the reduction of noise levels in classrooms to regulatory levels.

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