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"Challenges and Innovative Solutions of Life Safety in Ensuring Sustainability in Economic Sectors"

Research on Noise Reduction in Industrial Buildings

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Abstract: *This research paper, the effect of noise on the human body was studied, an analysis was made of the available methods and devices for attenuating noise in industrial buildings.*

Keywords: *industrial buildings, measurements, noise reduction, vibration sources.*

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Introduction. Noise assessment can be simple or quite complex depending on circumstances such as the type and size of the workplace, the number of employees and whether previous noise assessment data is available.

Noise assessment can be done with a noise level meter or a noise dose meter. Noise measurements are usually carried out manually and therefore the evaluator is present when the measurements are taken; this has the advantage that the evaluator can directly observe what is being measured. The noise dose meter is designed to be worn by a person for a specified period of time while the person is performing work. In practice, the examiner is not always present during the entire assessment period and may therefore rely on the owner to provide input to the study. In each case, the measuring microphone must be within 6-8 cm of the ear. Both ears may need to be assessed, as well as the most adverse hearing outcomes used for noise management [1-3]. Both types of instruments measure sound pressure changes as sound pressure levels expressed in decibels. The decibel scale is logarithmic or compressed, as the human ear is able to hear a wide range of sound pressures. With the exception of extremely loud noise of an explosive or percussive nature, in which some hearing loss or structural damage occurs, loud noise initially fatigues the sensitive hair cells in the inner ear, causing a shift in hearing threshold. This is called a temporary threshold shift. A simple test can be carried out by workers to assess the impact of occupational noise exposure and its impact on hearing acuity; after you arrive at work, you must turn off the engine, but not the ignition. Turn on your car radio and turn the volume down to an audible level. Do not turn off the radio, but turn off the ignition and go to work. After work, turn on the ignition. The radio should also turn on. If the radio cannot be heard, the temporary threshold shift has occurred during the working day. The hearing threshold change feels dull or blocked, and sometimes there is ringing in the ears. This can last from several hours to several days after exposure.

As a rule, hearing is restored overnight, giving the false impression that everything is in order. However, the effects of regular exposures are cumulative. The hair cells eventually break down, resulting in a permanent threshold shift that is usually not noticed until the damage is well developed. Damaged hair cells are unable to repair themselves; therefore, hearing loss is permanent as there are no medications available and hearing aids cannot restore natural hearing.

Community noise has been recognized for centuries as a health issue. To date, the main findings are health effects such as stress, irritation, sleep disturbance, interference with concentration and activity, increased blood pressure and heart rate, and coronary heart disease. In addition, there is some evidence that the intellectual development of children in bustling suburbs may be compromised compared to those who live in quiet suburbs.

As a rule, workplaces contain various sources of noise that are not always used simultaneously, or sequentially, throughout the entire shift. Therefore, the noise level will change over time. In addition, the movement of workers around machines and work areas can lead to changes in noise exposure. In production environments, it can be costly or not possible to stop production to measure individual noise sources. However, effective noise control requires the identification and analysis of noise sources in order to prioritize sources of attention.

If sources of noise that may cause excessive noise are identified, the next step is to prioritize noise management by determining the length of time each machine or equipment is used during a work shift and the time the operator spends using it or working near it. For example, a device or equipment with a high noise level but short shift use may be given a lower priority for noise reduction than a low noise machine or equipment with long shift use.

Worldwide norms require compliance with the hierarchy of control through control measures considered in the following order:

a) Eliminate the source of noise to which the worker is exposed, as far as practicable.

b) If a method is not practicable, then the noise level to which the worker is exposed should be minimized by replacing quieter equipment or processes, or by using technical control measures.

c) If b method is not practicable, then the noise level should be kept to a minimum through the application of administrative controls.

d) If c method is not practicable, noise levels should be kept to a minimum by providing the worker with personal hearing protection.

Workplace noise that exceeds the exposure standard should, as far as practicable, be reduced to non-hazardous levels. The best way to do this is to eliminate the source of the noise. One way to do this is to no longer do the work that makes the noise. If this is not practical, consideration should be given to replacing the activity or process by changing the noisy components of the activity or process to quieter ones. For example, instead of hitting a piece of metal to bend it, the metal can be heated and then bent with pliers or a press.

Engineering noise controls address management at the source by modifying the source of the noise itself or through shells (for example, made of hard material and an inner surface with a sound-absorbing lining), modifications and additions, placing barriers on noise path or spanning the end of the receiver.

Generally, engineering noise management is the most effective way to manage noise, but can sometimes be costly.

Some basic principles of engineering noise management consist of:

- Installation of vibration sources in machines on insulators or dampers;
- Replacement of metal components with quieter materials such as plastic, nylon or composite components;
- Installation of local enclosures around individual noisy parts

- machines;
- Inclusion of sound-absorbing materials;
- Ensuring air and gas exhausts with the help of mufflers;
- Switching to a quieter fan type, fan blade pitch or number of blades, or installing silencers in ventilation ducts.

Administrative noise control measures aim to reduce the level of noise to which a worker is exposed through organizational methods, e.g. identifying hearing protection zones, noise mapping to identify safe/unsafe noise zones, restructuring work responsibilities to limit exposure time, optimizing maintenance, replacing old installations and equipment with new, quieter installations and equipment.

Methods and materials. The prior art is already familiar with sound absorber designs having installations located between the body. The most commonly used pipe is made of perforated sheet metal and filled with sound-absorbing material. Such a perforated sheet metal pipe is preferably used for coaxial mounting in sound absorbers with a round cross section. In addition, it is known in this particular field of technology that inside the body of the sound absorber there is a helical spiral metal sheet with a length corresponding to the sound absorber, that is, having several coils. With this known type of setup, no sound dampening effect is observed in the low-frequency region, and only a very slight dampening effect is obtained in the mid-frequency region. At best, the sheet metal helix is effective in the high-frequency region, namely by preventing so-called sound radiation [4-6]. However, it has the additional disadvantage that, with respect to the through air flow, a rotating flow superimposition and significant additional pressure losses are created.

Accordingly, from what has been explained above, it should be obvious that this particular area of technology still needs sound absorbing devices that are not associated with the aforementioned shortcomings and limitations of the state of the art proposals. Therefore, the main objective of the present invention is to provide a new and improved design of the sound absorber, which is not associated with the aforementioned disadvantages of the previously considered proposals, and which effectively and reliably satisfies the existing need in the prior art.

Results. The result is an increase in the efficiency of noise suppression. This is achieved by the fact that in a soundproof casing with a vibration isolation system, made in the form of a rectangular parallelepiped, covering the process equipment, the process equipment is installed on at least four vibration-isolating supports, which are based on the floor of the building, while between the base of the process equipment and the cutout in the lower face of the rectangular parallelepiped has a gap designed to prevent the transmission of vibrations from the process equipment to the soundproof enclosure of the casing, and to ensure the required microclimate during the technological process, a fan is installed inside the casing, and the soundproof enclosure is equipped with ventilation channels to eliminate equipment overheating, while the inner walls of the ventilation ducts are treated with sound-absorbing material and acoustically transparent material of the "visible" type, while to reduce the aerodynamic noise of the ventilation system, noise suppressors are provided in the casing, installed respectively on the inlet and outlet ventilation ducts, while on The sound-absorbing element is fixed on the inner surface of the sound-proofing enclosure in the form of smooth and perforated surfaces, between which a multi-layer sound-absorbing structure is placed.

Conclusions.

Thus, it is recommended to use various screens, partitions, casings made of sound-absorbing and sound-insulating materials from the noise of regulatory bodies, in the latter the effect is achieved due to sound reflection, as well as insulating encloses.

References:

1. Bell L. H., Bell D. H. Industrial noise control: Fundamentals and applications. – CRC Press, 2017.
2. Fry A. (ed.). Noise Control in Building Services: Sound Research Laboratories Ltd. – Elsevier, 2013.
3. Bies D. A., Hansen C. H., Howard C. Q. Engineering noise control. – CRC press, 2017.
4. Pirmatov, R. K., & Rashidov, J. G. U. (2020). Research of the acoustic parameters of halls and practical methods of eliminating acoustic defects. The American Journal of Engineering and Technology, 2(12), 7-13.
5. Pirmatov, R., Rashidov, J., & Pirmatov, K. (2021). Method for calculating the insulation of airborne sound by enclose from volumetric-block buildings. In E3S Web of Conferences (Vol. 264). EDP Sciences.
6. Rashidov, J. “Measuring sound insulation of air noise”. Theoretical & Applied Science 12 (2019): 121-123.