UDC: 69.002.5

TO STUDY THE EFFECT OF VIBRATION IN VEHICLES ON THE HEALTH OF THE DRIVER

Uktamov Sardor-Teacher (Namangan Institute of Engineering and Construction, Uzbekistan).

Annotation. This article describes the factors that cause vibrations in vehicles, their impact on the health of the driver and passengers, and a theoretical study of the devices that suppress these vibrations.

Keywords: *vibration, mean square value of acceleration, vibration frequency, vibration amplitude, vibration dampers.*

Introduction

The rapid development of technical progress is also the reason for the increase in demand for today's vehicles. Currently, all types of vehicles produced are equipped with modern exotic parts. In particular, the main part of the vibration generated by road irregularities during movement, when moving on personal and public transports, is extinguished by modern hanging parts of vehicles. This ensures smooth movement.

Vibrations are one of the most important factors in human life. Existing vibrations can be beneficial or harmful. Existing or generated vibrations should be extinguished and prevented as much as possible. The same vibrations that need to be extinguished occur when road construction machines are moving [1; page4]. At the same time, excessive vibration of the frame of road construction machines has a negative impact on human health. Excessive vibrations can be caused by a variety of sources, in particular, vibrations from road engine machinery, aerodynamic forces, road roughness and abnormal tire pressure, and other sources. The bulk of these vibrations are vibrations that occur on uneven roads. Prevention of this is done by the suspension of road construction machines. For the convenience of passengers, it is necessary to determine and know the

vibration limit of the frame of road construction machines. Because the vertical vibration frequency of road construction machines is not normal, say, if the vibration of road construction machines is slowly extinguished, firstly, it affects the machine stagnation and management deteriorates, and secondly, the road construction machine driver gets tired quickly. Conversely, if the vibration is quickly extinguished, this will transmit the forces generated by the road unevenness to the vehicle frame. This has a negative effect on the driver's body. Vibrations can characterize convenient movement on road construction machines during its movement, the noise generated by the tire and suspension from an uneven road, and the permeability of each sound, the noise generated by various mechanical devices, and can be distinguished as follows. When you activate any of them, a drop-down menu called Functions will appear on the screen. This occurs in accordance with the above workflow. After activating the selected function, a second set of buttons called Processes will appear [6; page 3].

Materials and methods

When evaluating vibrations, the average squared value of the acceleration on the vertical or three axis is important (weighted relocations acceleration).

Acceleration relocations. The value is determined as follows:

$$a_w = \left[\frac{1}{T}\int_0^T a_w^2(t)dt\right]^2, \text{[m/s}^2\text{]} \quad (1)$$

here,

a_w (t) - acceleration time shift, m/s^2;

T-time spent experimenting, seconds;

If the vibration frequency is less than 1 Gts, it causes some symptoms in passengers, and the range of 0.1-0.8 Gts is an uncomfortable limit. With regular traffic on highways, the quality and technical parameters are required to change due to the electronically resilient cardboard [7; page 4]. Table 1 shows the permissible vibration amplitude for public transport. Permissible vertical acceleration for vehicles

Table 1.

Acceleration of vibrations	Reaction in transport
Less than 0.315 m/s^2	Convenient
0.315 m/s^2 and 0.63 m / s^2 respectively	A little uncomfortable
0.5 m/s^2 and 1 m/s^2 respectively	Quite uncomfortable
0.8 m/s^2 and 1.6 m/s^2 respectively	Uncomfortable
1.25 m/s^2 and 2.5 m/s^2 respectively	Very uncomfortable
2 m/s^2 and large	Extremely uncomfortable

Vibrations affect human organisms at different frequencies. The normative vibration frequencies accepted for human health and their limits are given in Table 2. Permissible vibration frequency values of human body parts (GOST 12.1.012).

Table 2.

№	Name of human organs	Frequency of vibration of human organs (Hz)
1	Head	20-30
2	Eyes	20-90
3	Shoulder blade	4-5
4	Chest	5-10
5	Wrist	5-10
6	Spinal cord	10-12
7	Hands	30-100
8	Legs	2-20
9	Belly	4-8
10	Hand picked	30-50

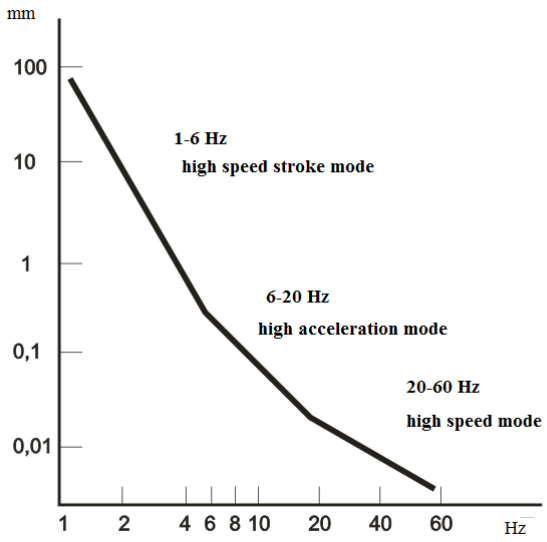
The vibration of the human body is a complex process, and several criteria have been developed to facilitate its detection (SAE Society of Automotive

Engineers, 1965) [3]. One uses the Janeway comfort criterion for vertical vibrations.

The graph depicting the Janeway comfort criterion is shown in Figure 1. It shows the accepted amplitude values of the normal oscillation frequency [4].

It differs in the frequency of mutual oscillations, i.e. the range of the first range is 1-6 Hz. In this case, the peak value of the jerk corresponds to the cubic equation.

When the oscillation is 1 Hz (2π rad / s), its amplitude is required not to exceed 12.6 ms^{-3} / $(2\pi^{-1})^3$ = 0.0508 ms^{-3}, i.e.. Here is the maximum displacement amplitude allowed. For the second range, the maximum acceleration value and speed of 6–20 Hz is in the form of a quadratic equation of this rotational frequency. Its acceleration value is less than 0.33 m/s and its high speed value is less than 2.7 m/s in the vibration frequency range around 20-60 Hz. The main limit of this SAE criterion is used only in vertical sinusoidal oscillations [2; page 3].



1-picture. The graph of the dependence of Jane on the vertical vibration, which is limited for convenience to passengers [2]. In the work of the author below, the empirical equation of dependence on frequency, vibration amplitude of discomfort (discomfort) is defined:

$$X[sm^2] = 7.62 \cdot 10^{-3}(1+\frac{125}{f^2}) \quad (2)$$

Here is the frequency of vibration.

The absence of vibrations in the vehicles at the normative level leads to the occurrence of many diseases, due to its work productivity, rapid violations of work stools, as well as a negative impact on the health of drivers and passengers. In particular, it is widely used in solving problems such as identification of residential and non-residential areas built in the protection zone of the highway and the protection zone belonging to the highway, orientation to state geodetic networks or planned elevation networks [8; page 5]. In order to avoid such negative consequences, it is possible to eliminate road unevenness, use devices that ensure the absorption of vibrations, thereby ensuring that the vibrations comply with the requirements of the international standard.

Reference:

1. International Organization for Standardization, ISO 2631-5 Mechanical Vibration and shock (2004), international standard.
2. ГОСТ 12.1.012, Система стандартов безопасности труда. Вибрациўнная безопасность. Общие требования.
3. SAE Society of Automative Engineers, 1965.
4. Eshkabilov S.,Kutilimuratov K., Vehicle suspension estimation using transmissibility, transfer function and modal analysis, ТАДИ вестник журнал, 2011, №3-4, 59-66б.
5. Кутлимуратов К.Р, Юнусов А.Ғ., Автомобил йўллари равонлигини спектрал зичлик орқали баҳолаш, ТАДИ вестник журнал, 2011, №3-4.
6. Mukhammadyusuf Ergashev, M.Mamajonov, M.Kholmirzayev “Automation and modulation of highways in gis software”, *https://www.modern-j.ru/5-59-2020* “Теория и практика современной науки" №5(59) 2020.
7. Mukhammadyusuf Ergashev, Valisher Abdurakhimov “The use of basic gps stations, which are situated in Namangan, in the field of automobile roads”, *https://www.iupr.ru/5-72-2020* “Экономика и социум" №5(72) 2020.
8. Inamov A.N., Ergashev M.M., Nazirqulova N.B., Saydazimov N.T. “The role of geo information technologies in management and design of the state cadastre of

roads" https://saarj.com/academicia-current-issue "ACADEMICIA (An International Multidisciplinary Research Journal)" Vol. 10 Issue 11, November 2020.