

INTERIOR SOUND AMBIENT INSULATION

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ABSTRACT: The paper is presented some aspect about of interior sound ambient insulation by using sonic-absorbent materials. Certain practical aspects of manufacturing panels with properties of sonic insulation are described. These special materials are from alpha-plastic gypsum with two or three layers, which get good results in insulation of interior ambient of houses.

1. INTRODUCTION

The Improving of acoustical properties for some ambient rooms behaves at two distinguished stages:

- Sound insulation of room against to outside;
- Optimization of sonic answer of inside room.

The outside sound insulation is made by improving the sound insulation of walls room, reduced the transfer of sonic energy from inside to outside, respectively by reverse and from absorption or diffusion of sound energy, which leads to optimization of sonic answer of room. To realize the best results is demand to do measurements of acoustics.

An important factor to take on in view is made the best of complementary properties for used materials. In manufacturing of panels, plates, ceilings sonic-absorbent would be choose the optimal solution that consists in using of materials and sonic insulation techniques which assured the minimal required values of sonic insulation in such a way that to be carried out the noise level limits [1-4, 6-8].

The framing assessing into noise level limits consists in:

- The calculus of equivalent continues noise level- L_{ech} , on the base of weight sound level- L_A in dB(A) and exposing time in 48 hours.
- The comparison between equivalent continues level and limit level.

$$L_{ech} = L_A \text{ [dB(A)]} \quad (1)$$

The framing evaluation in limit level of acoustic efficiency for technical measurements of noise suppressing on special analysis is made. For the urban area, the noise limits are differentially on typical urban area, in conformity with Tab. 1 [3,4].

Tab. 1. Limits of noise for some urban area [3,4]

No. crt.	Protected urban area	Noise limits for outside buildings [dB(A)]
1	Living area	50
2	Rest area	45
3	Protected endowment	45
4	Center of district	55
5	Downtown	60

The framing evaluation in limit levels of acoustic efficiency for technical measurements of noise suppressing produced of different sources' inside houses, etc., is made by measurement of noise spectrum in octave bands, with central frequencies of

31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000Hz and making comparison with the curves- C_z from diagram of Fig.1 [2,3].

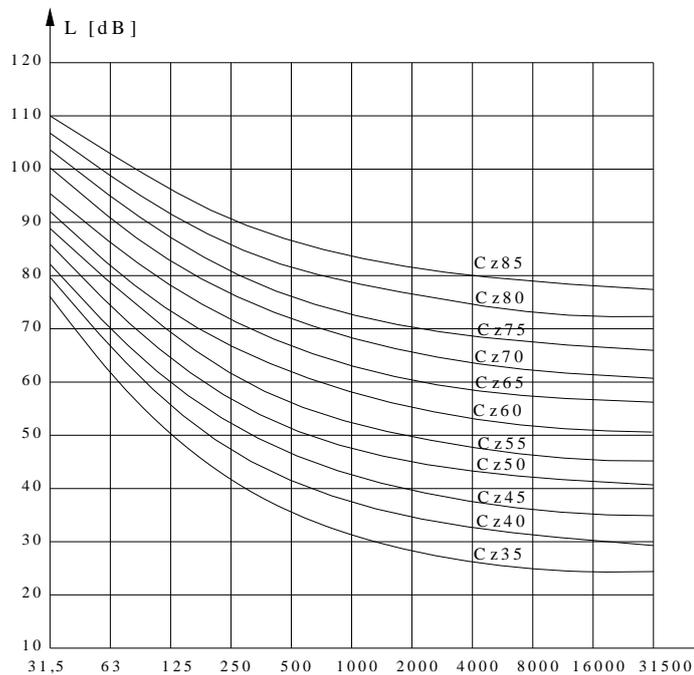


Fig. 1. Limits curves of noise [2,3].

2. PRACTICAL ASPECTS ABOUT OF FABRICATION'S SONIC-ABSORBENT PANELS

One essential demand to realized the best values for sound insulation is that the panels, ceilings, walls to have a greater weight per square unit. With more dense and thick are the wall's panels and plate-holder ceiling with that inner absorber factor is better and enough big. On that time, the most efficient building materials as sound insulation are thick stone's walls, bricks, cement, and panels and ceilings from plaster gypsum (re-gypsum), which have the natural frequency (F_n) and critical frequency (F_c) at lower level at inner end of audio band. More that, for the cement and bricks' walls these frequencies values are not enough, which involved additional layers from thick materials such as from alpha-modeling plaster gypsum that named ri-gypsum, or places, PAL.

The masses of additional layers must to be enough big to change strongly the lost transmission of sound-TL. The panels of alpha-modeling plaster gypsum are mounted at a predictable distance of original surface's wall by some structures of wood or aluminum. The air between sonic-absorbent material and wall's surface is behaved as reactive medium, going to arise the transmission lost of sound-TL. The gap between plate of alpha-plaster gypsum and building's wall forms an acoustic filter, focused on a natural frequency (F_n) of a combination of materials as plaster gypsum-air-brick (cement), which depends of these walls weights and the gap of them. Near this sound frequency (F_n) occurs a down (pit) in the characteristic's transmission lost-TL.

To realize a lower absorbent factor of filter with a greater resonance of system is demand that between the air gap of alpha-plaster gypsum's wall and brick (cement) wall to be filled with sonic-absorbent material (glass wool, Toplan, etc.) leads to damper of air oscillations at resonant frequency, by suppressing this. In Fig.2 is presented a section through this sonic-absorbent building, composed from a brick (cement) wall-1, an additional layer-2 of alpha-plaster gypsum (ri-gips, etc), which is mounted by a support of

wood or aluminum, fixed of wall with a layer of mineral wool-3 for suppressing the ultrasounds of system.

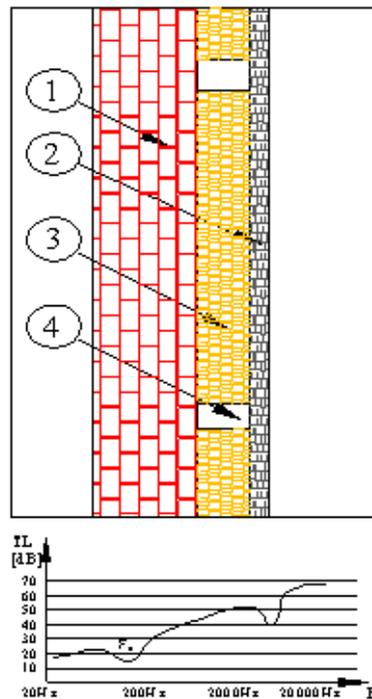


Fig.2. The simple sonic-absorbent building with alpha-plaster gypsum [7].

The distance between walls of sound absorbent form an acoustic system, where the transmission lost is rising with this distance. If it's applied a second layer of alpha-plaster gypsum occurs two acoustic systems, each of them with a natural frequency (F_n) given by the mass of these plates and the distance between them.

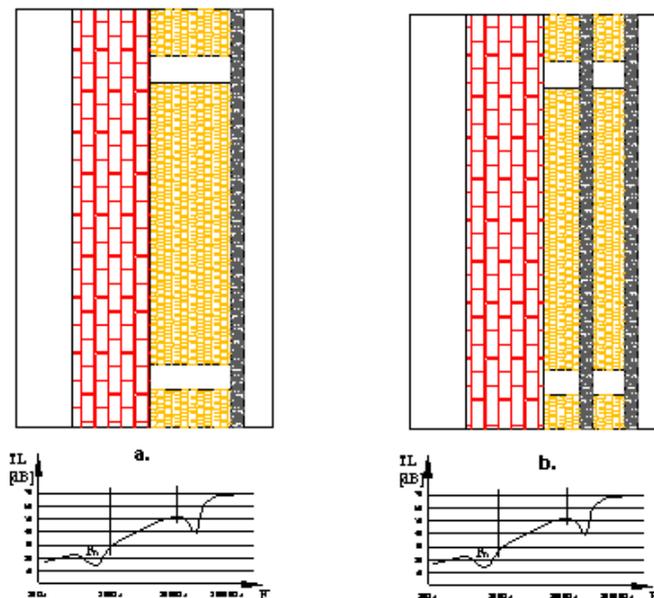


Fig.3. Double sonic-insulation building with two plates of plaster gypsum (a) and with three plates of plaster gypsum (b) [7]

The principal of sonic wave's absorbent into a sonic-absorbent material consists in the air molecules that transport of sonic wave get into fibers of absorbent material lead to knock of them and lost kinetic energy, which is transformed in heat in such a way that sonic waves gone into and remained in material have less energy and low amplitude. With what the fibers sonic-absorbent materials are thicker and have more resistance against air with that the absorption is better until at a point where the air circulation is stop, this became gradually reflective at sonic waves by blocked them.

At thick materials as alpha-plaster gypsum are realized the compositions with braked polymeric materials or expandable ceramics materials. These special materials under minute particle shape have the aim to delay the transmission of sounds through material, which became an obstacle leads to rise the distance covered (Fig.4).

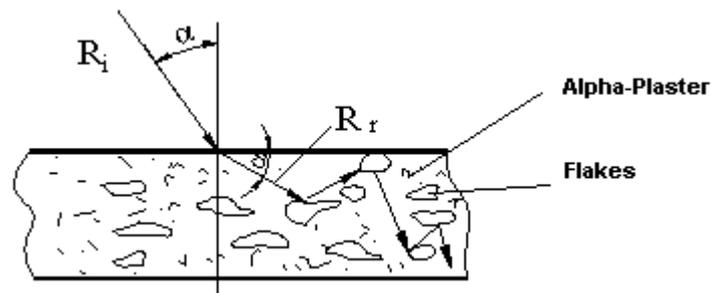


Fig. 4. The delay of sound transmission through composed materials

4. CONCLUSIONS

This paper has presented some practical aspects about manufacturing of sonic-absorbent panels from alpha-plaster gypsum used for sonic insulation buildings.

This technique leads to important economies in material cost, and increasing of sonic-absorbent coefficient, the thickness of sonic-absorbent layer being more reducer in dimensions.

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