

Acoustic Brick Panel

オーディオブリックパネル

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Summary

The traditional method for brick walls to absorb sound was the perforated bond pattern or use of hollow bricks. But these method had several problems such as shortage of skillful workers, or inconvenience in reinforcing.

This paper reports the newly developed sound absorbing brick panel to solve these problems. The porous bricks and hollow bricks filled with glasswool are combined in the panel to achieve the desired acoustic effect.

れんがの持つ風合い・美粧性を損なうことなく吸音性能を持たせるため、透かして積んだり、れんが自身に穴を設けたりする方法が従来とられてきた。しかし施工には、熟練したれんが職人の不足、補強方法等多くの問題点があった。

ここで紹介するオーディオブリックパネルは、前述した問題から施工を合理化させるために開発したユニットパネルで、グラスウールを詰めた中空又は多孔れんがの組合せにより、希望する吸音性を得ることができる。

1. Introduction

Our living or working places should have proper propagation of sound. Some parts of walls and ceilings should reflect sound, while some parts should absorb sound. Especially concert halls require severe conditions on proportion of reflection and absorption of sound.

Bricks are popular facing materials not only for external walls but also for interior walls. However, the special works are required for the interior walls where proper acoustics is necessary.

The traditional method to use bricks where sound should be absorbed was the perforated bond pattern with backing of sound-absorbing material or use of porous bricks. But these methods had several problems such as shortage of skillful workers, difficulty in controlling the work at the construction site or inconvenience in reinforcing, and higher building cost as the result of these problems.

This paper reports on the newly developed acoustic bricks - hollow bricks padded with glasswool or foam-brick. These sound-absorbing bricks have wide selection of shape, size, opening ratio and color. By combining different types of these bricks, the desired acoustic effect is obtained for any type of halls and studios.

They are combined to form the acoustic brick panels at the factory and easily installed without mortar at the construction site. They can be, of course, also laid by hands at the site.

2. Property of Acoustic Bricks

The acoustic bricks are hollow bricks padded with glasswool or foam-brick as shown in Fig. 1.

Fig. 1 Acoustic bricks

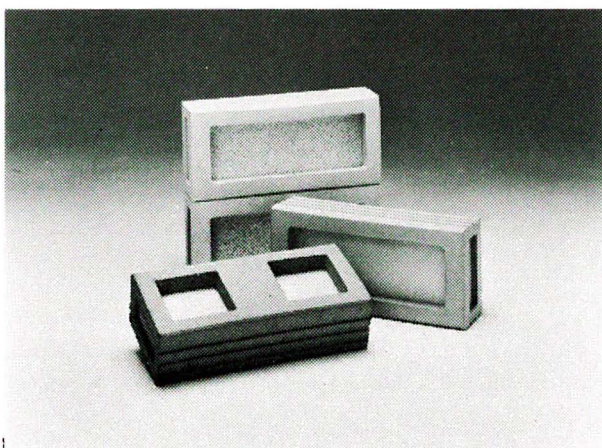


Table 1 shows types of acoustic bricks.

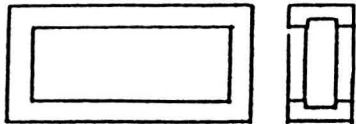
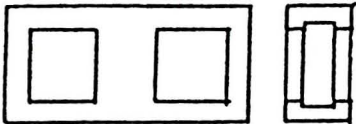
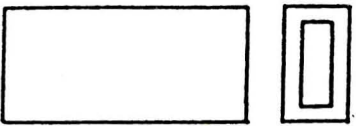


Type of brick	Sound-absorbing materials	Weight	Size (mm)
	glasswool foam brick	880 ^g	210x97.5x55
	glasswool foam brick	1100 ^g	"
	—	1520 ^g	"
	glasswool foam brick	480 ^g	97.5x97.5x55
	—	710 ^g	"

Table 1. Types of bricks

Twelve bricks compose a panel, three in the horizontal row and four in the vertical row, in the straight bond or the stretching bond.

The size of the acoustic brick panel is:

435 x 660 x 55mm

The weight of a panel is 66kg/m².

3. Installation of The Acoustic Brick Panel and Hand-laying of Acoustic Bricks

Fig. 2 shows the installation of the acoustic brick panel and Fig. 3 shows hand-laying of acoustic bricks.

Fig. 2 Installation of the acoustic brick panel

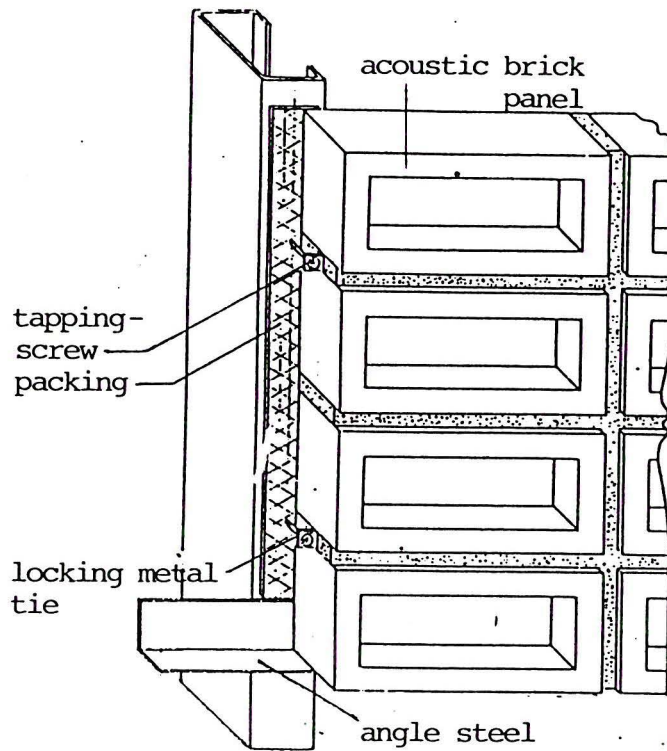
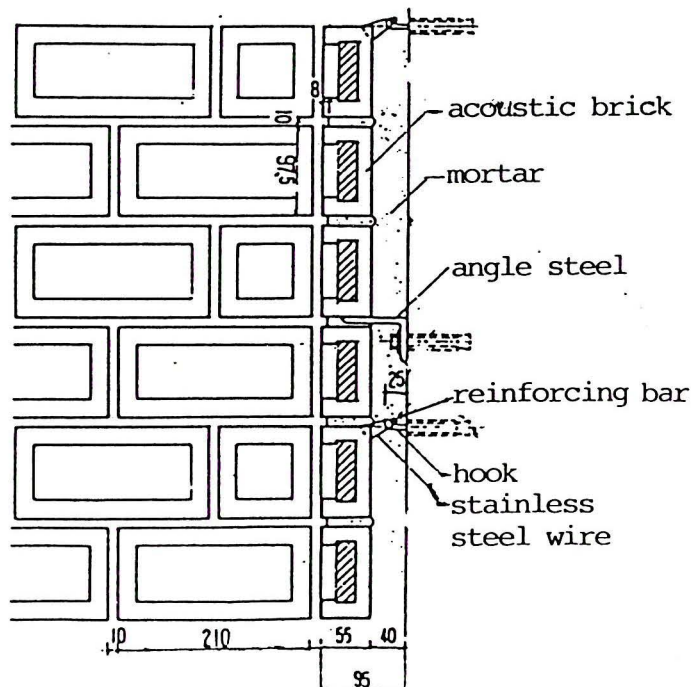


Fig. 3 Hand-laying of acoustic bricks



4. Data on The Sound Absorbing Coefficient of The Acoustic Brick Panel

The following Figures 4 - 9 show the sound absorbing coefficient of various acoustic brick panels:

Fig. 4 Opening ratio 50%
Padded with foam brick

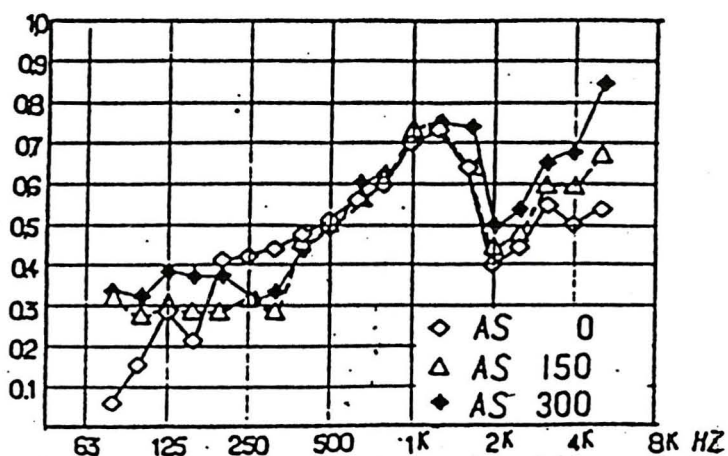
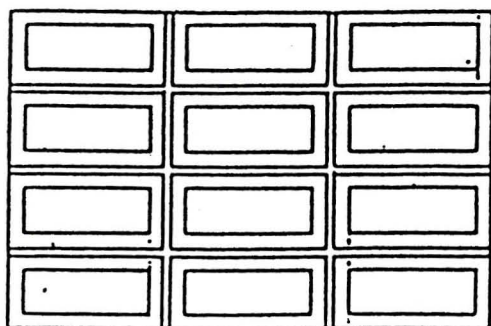


Fig. 5 Opening ratio 36%
Padded with foam brick

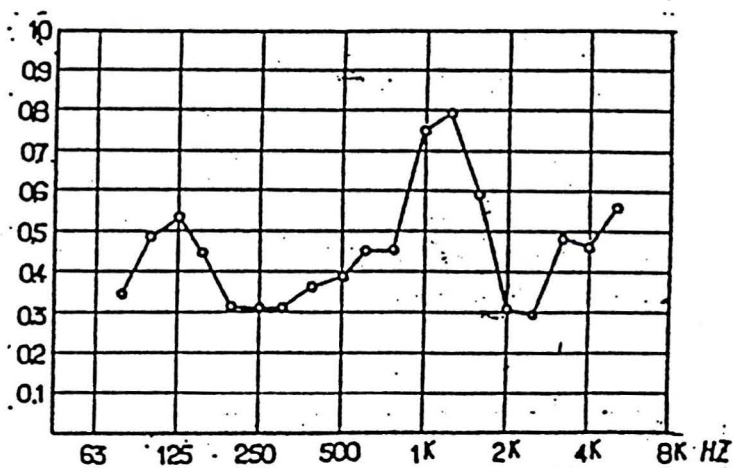
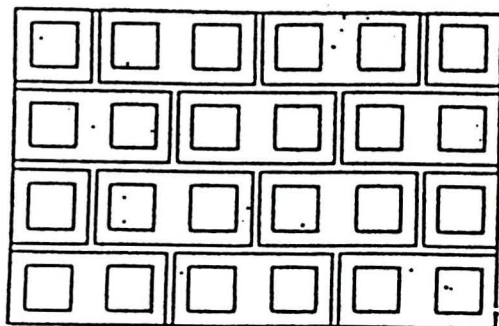


Fig. 6 Opening ratio 17%
Padded with foam brick

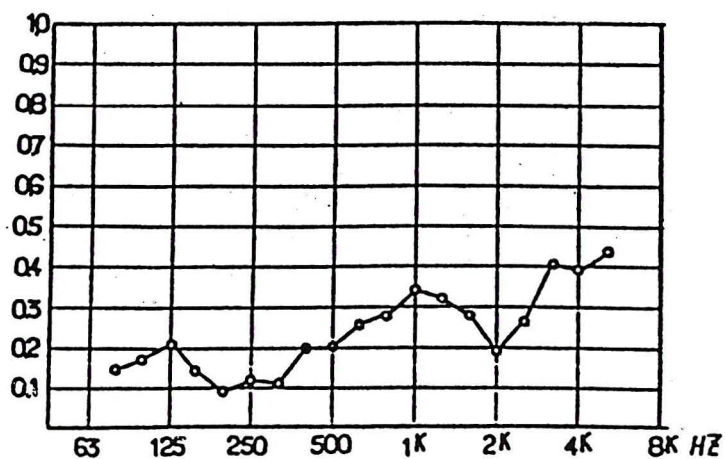
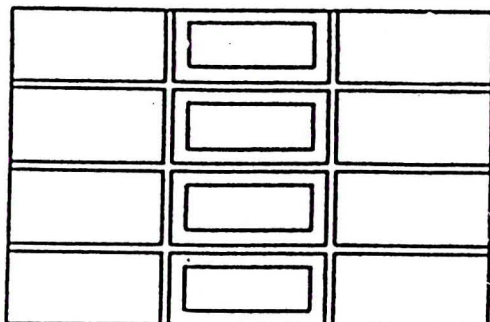


Fig. 7 Opening ratio 23%
Padded with foam brick

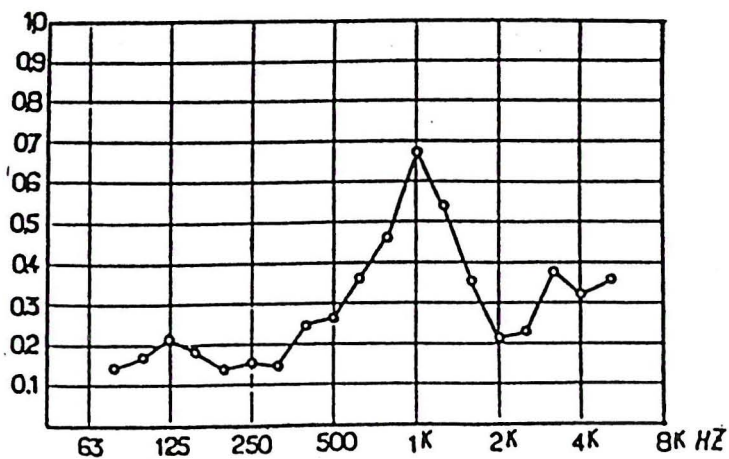
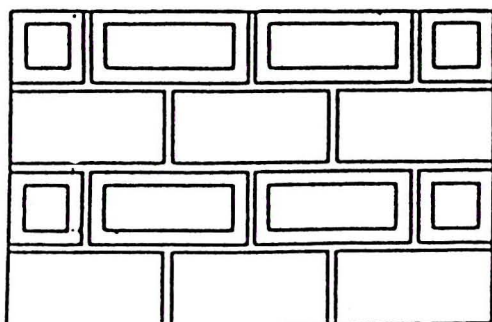


Fig. 8 Opening ratio 36%
Padded with glasswool

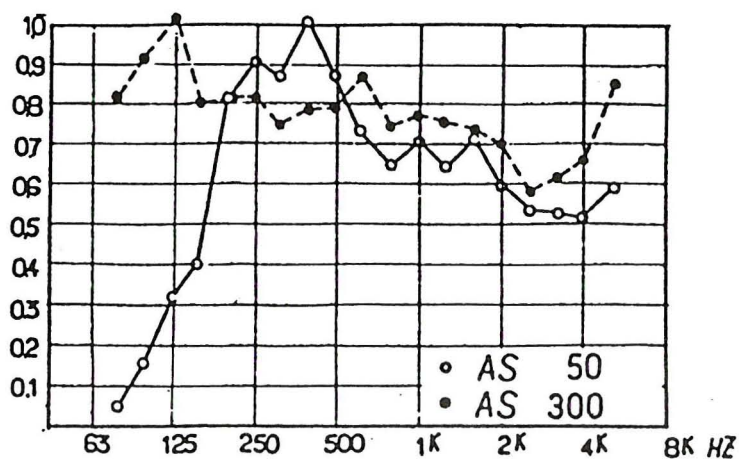
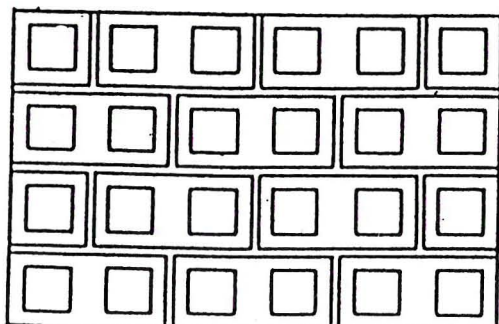
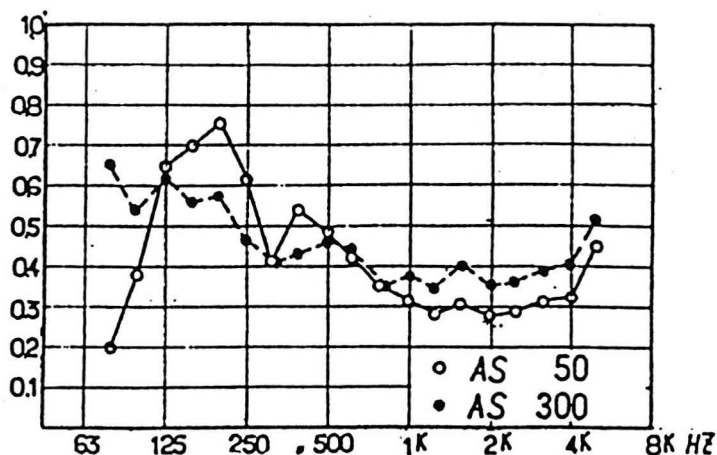
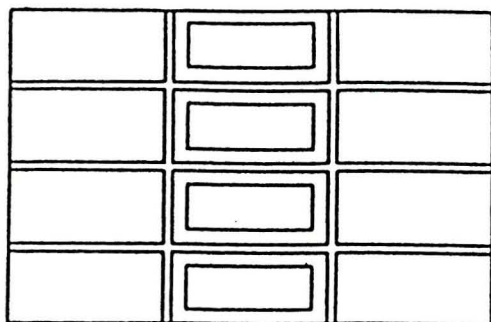


Fig. 9 Opening ratio 17%
Padded with glasswool



5. An Example of The Audio Room with The Acoustic Brick Panel

Fig. 10 shows the audio room of Mr. Tachiki's residence in Tokyo. This is a good example to show that the attractive interior design of brick wall is compatible with the required acoustic effect.

Generally the audio room should be designed on the following articles:

1. Sound insulation against neighbours
2. Noise control of the air-conditioning equipments
3. Acoustic design for sound reflection and absorption.

This room, located in the basement, was in the desirable condition for sound insulation. The sound insulation was needed only to the windows and doors facing to the alley. The air-tight double sheets of sashes were used for windows and the sound insulating double doors were used for entrances.

The acoustic brick panels were used as the front wall at the back of the loudspeaker. As panels were prefabricated, the installation of panels were finished in one day without any trouble.

After the room was completed the acoustic effect was measured and it was proved that the room had the expected sound reflection and absorption.

Fig. 11 shows the length of reverberation of this audio room.

Fig. 10 Mr. Tachiki's Audio Room

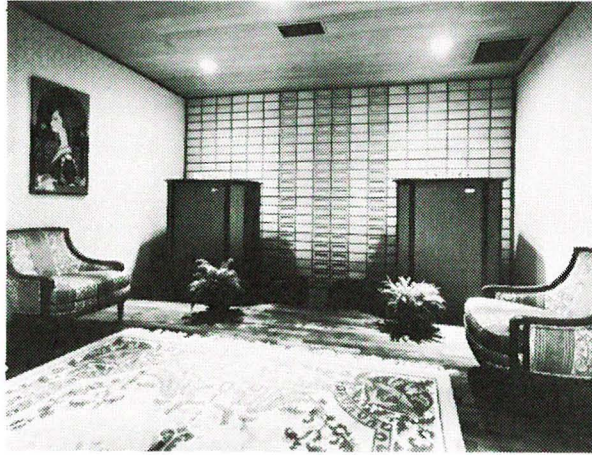


Fig. 11 Reverberation Time in Mr. Tachiki's Audio Room

