[37] STUDY ON RANDOM SOUND ABSORPTION PROPERTY AND PERFORMANCE OF POROUS CONCRETE

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ABSTRACT

Purpose of this study is to make clear the sound absorption characteristics of porous concrete under random incidence. Three types of the porous concrete panels with variation of the thickness (specimens) are prepared, and tested for the sound absorption characteristic in the echo chamber. As results, the porous concrete panels have reasonable sound absorption of middle and high frequency. And the maximum and minimum points of sound absorption coefficient tend to transfer to low frequency as the panel is more thick. The lesser sound absorption is recognized at the side end of the panel, and the sound absorption characteristic of the porous concrete panel is affected by the condition of placing, the surface condition and the air void distribution of the panel.

Keywords: porous concrete, sound absorption property, echo chamber, random incidence

Table 1 Mix proportion of porous concrete

Void ratio (in design) (%)	W/C (%)	Unit weight (kg/m³)		
		Water	Cement	Coarse aggregate
24	40	80	200	1600

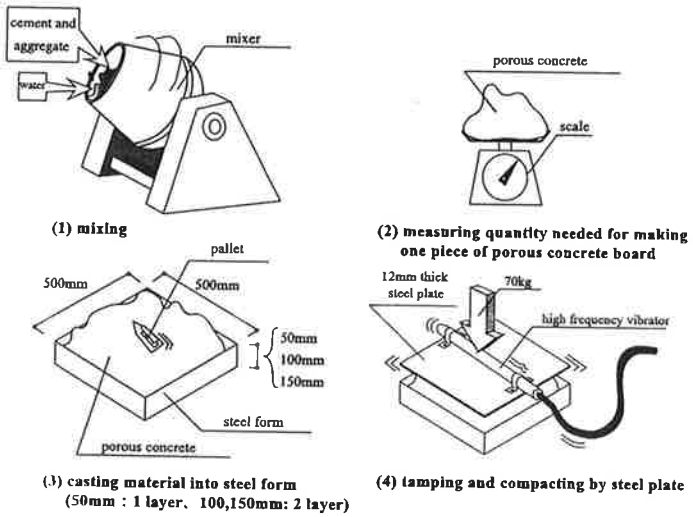


Fig.1 Process of making porous concrete board

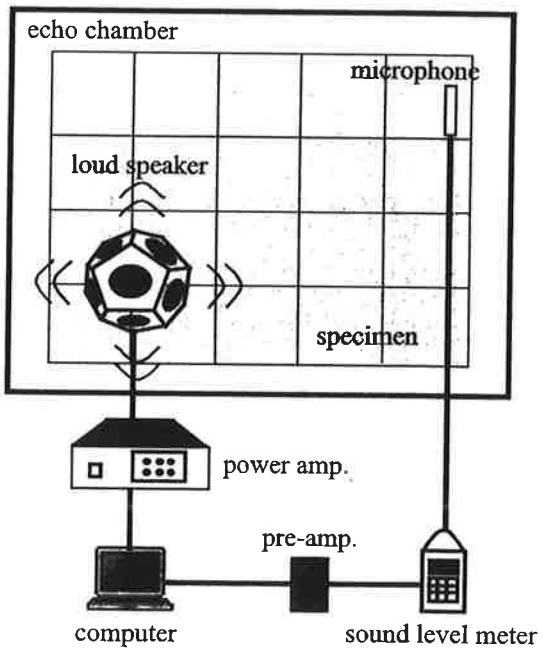


Fig.3 Equipments and system of measuring reverberation time

Table 2 Description about specimen installation

Nickname	Installation
No gap	Place specimens with no gap(no joint) between adjacent specimens. (Default setting)
Side nonabsorbent	Make side surfaces of specimens nonabsorptive by taping and covering the absorbent surfaces.
Gap 5~10mm	Place specimens with gap width 5~10mm between each.
Gap 5~10mm + sand	Place specimens with gap width 5~10mm and with sand under specimens.
Back	Install specimens with back surface facing room side. Here, "back" means the surface which contacts a form board. Otherwise, install specimens in reversed situation.
Double layer 100+50mm	Place 50 mm thick specimen onto 100mm, regarding as 150 mm thick.
With air layer	150mm specimen only. Install air layer with 50mm width between specimen and floor.

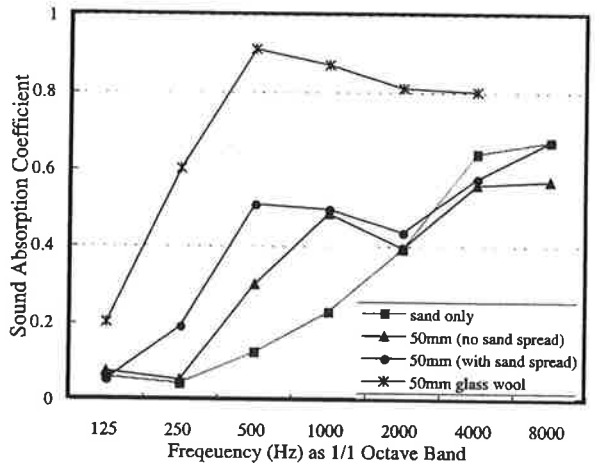


Fig.4 Comparison of sound absorption of 50mm specimen with other material or conditions

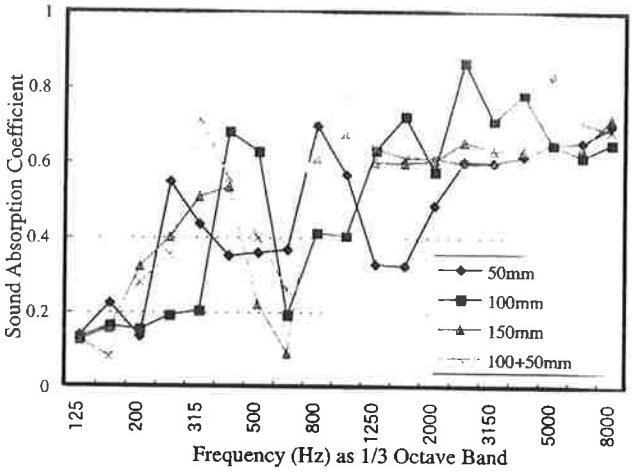


Fig.5 Comparison of sound absorption coefficient between specimens with different thickness (Condition: No gap)

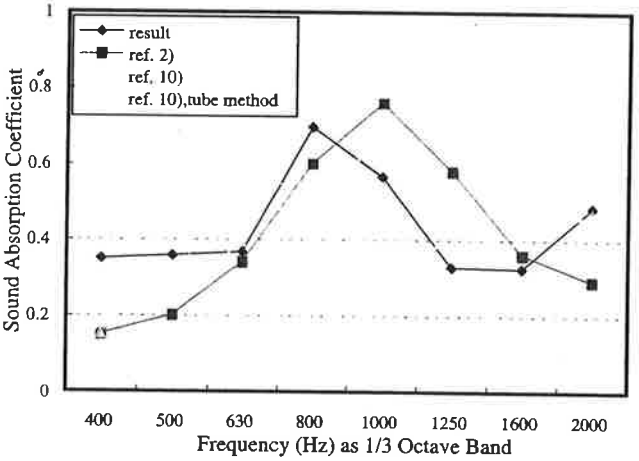


Fig.6 Comparison of sound absorption of 50mm specimen with references (Condition: No gap)

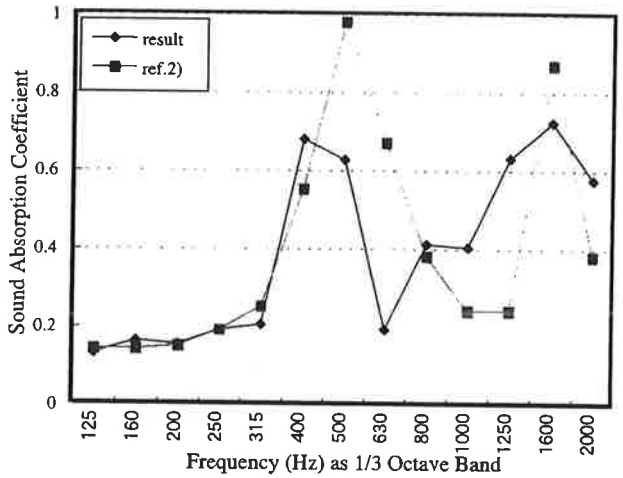


Fig.7 Comparison of sound absorption of 100mm specimen with references (Condition: No gap)

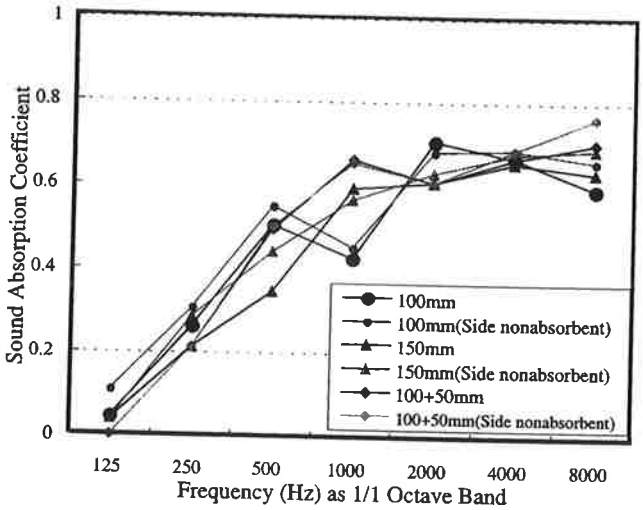
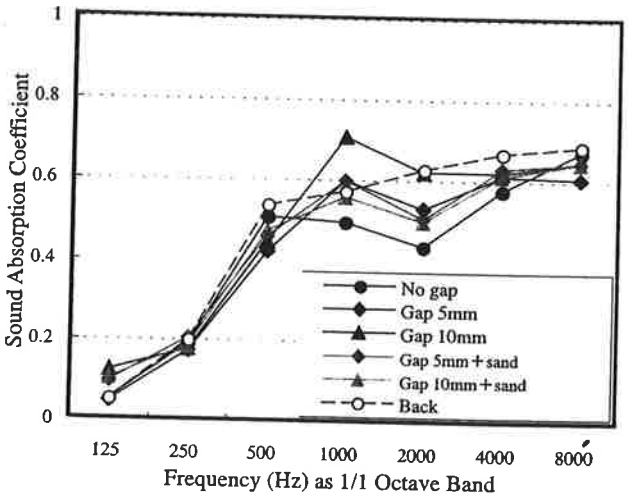
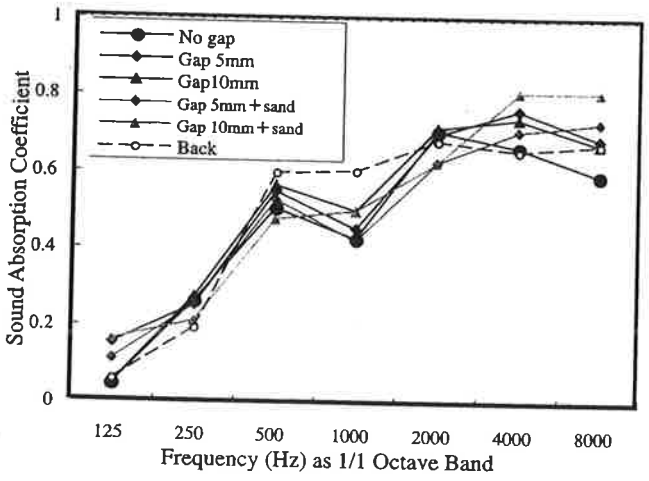


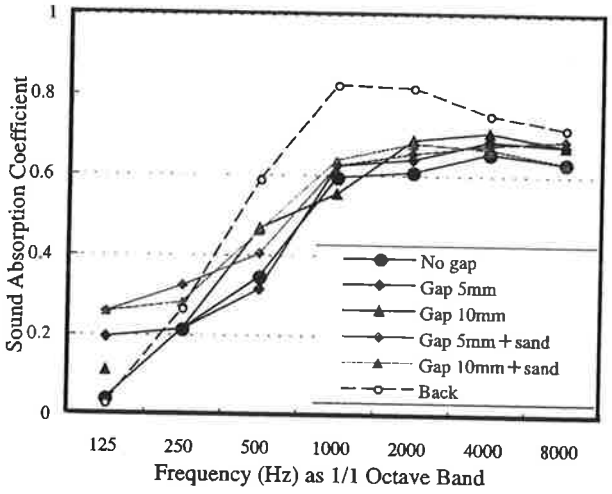
Fig.9 Sound absorption properties in case of nonabsorbent treatment on side surface



(a) 50mm



(b) 100mm



(c) 150mm

Fig.10 Comparison of sound absorption of specimens in different condition of installation

Table 3 Void ratio distribution of 150mm specimen

Layer Position	Void ratio
Upper (front side)	26.1%
Middle	30.2%
Lower (back side)	31.5%

(average:29.3%)

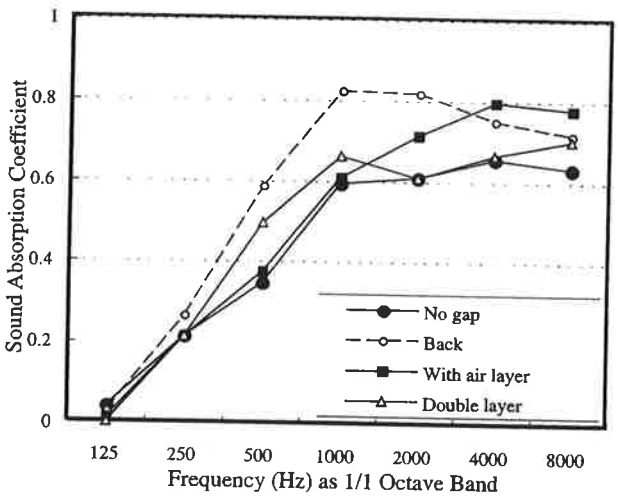


Fig.12 Comparison of sound absorption of 150mm specimen in different conditions