Chattai, an acoustical material

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Introduction :

There is an increasing need for cheap and efficient sound absorbing materials, made from locally available materials. Also architects are looking for indegenous materials, for use in interiors of their buildings. Chattai a popular locally available material in the country has therefore been tested in a reverberation chamber for acoustical properties.

Different qualities of chattais are available in different sizes, with varying sizes of surface pores. Some of the chatais have fine pores where as some have quite large ones, depending upon the quality of the chatai and its use. The absorption of these chattais was calculated from the change in the reverberation time. These materials were further tested with air gap behind them and in combination with other sound absorbing materials. A good diffusion of sound in the chamber was ensured by employing 10% warble tone. Sound field of a particular frequency (warbled) was established by a trio of loudspeakers, excited by a beat frequency oscillator through an amplifier. The sound pressure picked up by a dynamic microphone suspended about the centre of the room was fed to a high speed sound level recorder through a microphone amplifier. The reverberation time was determined from the Sabine formula.

Test Results :

'Chattai' materials have the large surface pores, and are not good sound absorbers when tested with

Table I

Sound Absorption Coefficient Value of Different samples of 'Chattai'.

S. No.	Material	Absorption Coefficient (Hz)						Mounting	NRC
		125	250	500	1 K	2 K	4 K		
1	Sample No. 1	.02	.04	.05	.09	.18	.30	One layer with rigid backing	.09
2	Sample No. 2	.02	.04	.06	.08	.16	.25	One layer with rigid backing	.08
3	Sample No. 1	.04	.07	.08	.28	.40	.53	Two layers with rigid backing	.21
4	Sample No. 1	.04	.08	.16	.44	.49	.49	3 layers with rigid backing	.32
5	Sample No. 1	.04	.09	.12	.28	.32	.32	One layer with 1.25 cm air gap	.18
6	Sample No. 1	.08	.09	.12	.33	.49	.49	2 layers with 1.25 cm air gap	.26
7	Sample No. 1	.08	.13	.19	.44	.60	.70	3 layers with 1.25 cm air gap	.34
8	Sample No. 1	.08	.09	.12	.33	.40	.40	1 layer with 2.5 cm air gap	.23
9	Sample No. 1	.08	.10	.14	.36	.60	.70	2 layers with 2.5 cm air gap	.30
10	Sample No. 1	.10	.15	.28	.50	.60	.70	3 layers with 2.5 cm air gap	.38
11	Sample No. 1	.21	.38	.76	.80	.85	.90	Composed sample with 1 layer of Bartex 2.5 cm thick with rigid backing	.70
12	Sample No. 1	.21	.40	.80	.80	.81	.85	Some sample with 1.25 cm air gap	.70
13	Sample No. 1	.22	.45	.85	.82	.83	.76	Some sample with 2 5 cm air gap	.74
14	*Bartex 2.5 cm.	.15	.21	.69	.97	.96	.71	Rigid backing	.71

* The values of a bsorption coefficient of Bartex with rigid backing are given for comparison.

N. R. C.—Noise Reduction Coefficient.

rigid backing. The absorption coefficient of different qualities of this material was found to vary considerably, (Table I). These materials were also tested in combination with different layers, with rigid backing and with air gap behind them. As would be seen from table I, the material, when used with air gap behind and with multiple layers, have increased in its absorption coefficient. Two layers give absorption equivalent to one layer of the material with 1.25 cm air gap behind it. Also three layers of these materials give equivalent absorption to two layers of materials with 2.5 cm air gap. When this material is tested in combination with a good sound absorbing material like Bartex or fibreglass, it is seen that low frequency absorption is increased considerably specially when there is an air gap behind the composed sample. Hence this material works out to be a good facing material for highly sound absorbing materials mentioned above. This has the added advantage of increasing the absorption of the composed sample still higher at low frequencies. The texture of the sample as shown in two cases in Photos 1 and 2 may be acceptable.

The absorption coefficient values are shown in Table 1. The table shows that most of the combinations of material give an acceptable value of NRC as 0.3. The testing is still in progress and more local materials are to be tested.

Application- As these composed samples give a very good NRC values, therefore, they can be used for the control of excessive reverberation in rooms at very nominal cost. It is clear from Table I that the sound absorption coefficient increases at low frequencies when the chattai is used as a facing material for fibrous acoustical materials. These may be used on walls/ceilings etc. as follows :

Holes have to be drilled on the walls at certain distances between them. In case of ceiling wooden rafters are suspended where wooden battens are fixed. In the case of walls wooden gutties should be tightly fixed inside the holes and wooden battens should be screwed over the gutties. Such a frame work leaves a gap on the wall/ceiling in which the acoustical blanket like fibreglass, Bartex etc. may be placed. After putting the blanket in position, the chattais should be nailed or screwed with battens as shown in Photo I.

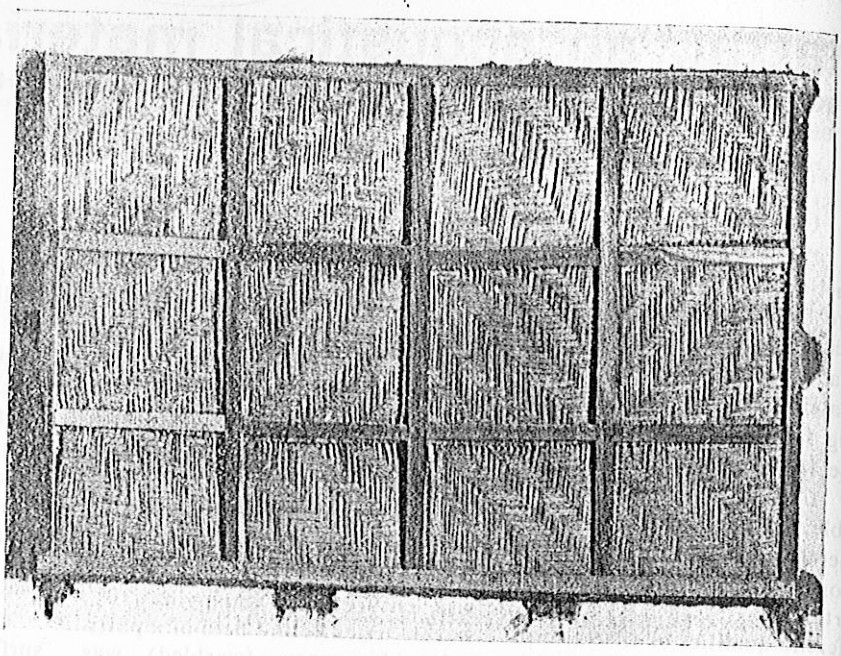

Photo 1. Texture of the sample when chatai is used as a facing material.

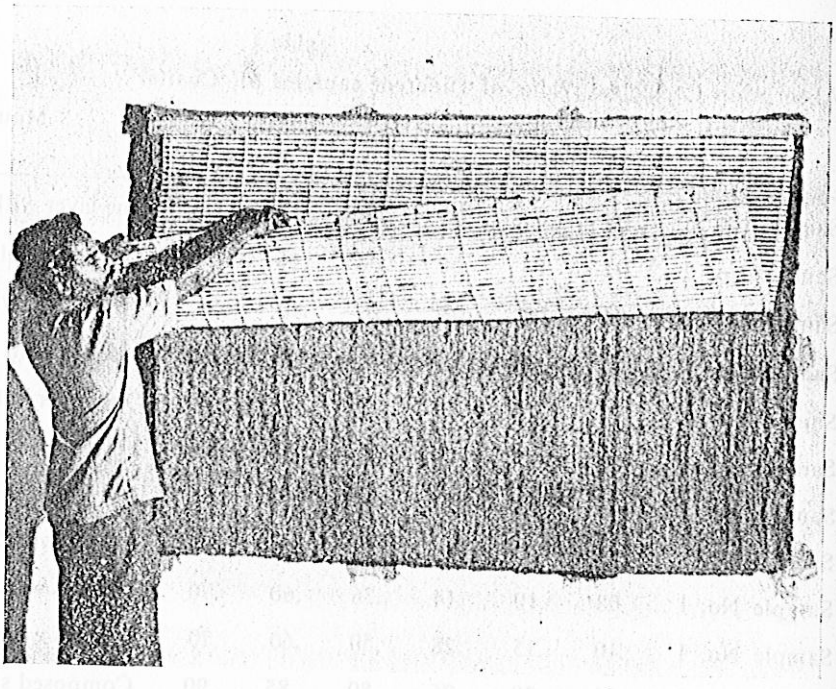

Photo 2. Texture of the sample when the 'CHICK' is used as a facing material.