PRH:HMR
V1-2

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON
April 22, 1932.

Letter
Circular LC 326

(superseding #308)

SOUND ABSORPTION COEFFICIENTS OF THE MORE COMMON MATERIALS.

The following figures have been obtained at the Bureau of Standards for the sound absorption coefficients of a number of materials now on the market as acoustic correctives. The inclusion of a material in this letter circular is not to be construed as a general approval. Each material should be judged on its merits in any particular case as there are other requirements such as fire resisting qualities, light reflection, appearance, etc. Figures are also given for the absorption of an audience seated in chairs of different kinds. All the results have been obtained by the reverberation method.

Acoustic correctives may be classified in general as fibrous materials, tiles, and acoustic plasters. Materials of the first two classes are usually supplied in a form which needs no special experience for its application. With acoustic plasters the case is different. If improperly applied the coefficient of absorption may be considerably less than the values here given.

It is not necessarily the case that the materials of highest coefficient are the most advantageous. When there is room enough to apply the requisite quantity, a material of low coefficient will give better results than one of higher absorption, because of the more uniform distribution of material.

For the foregoing reasons it is advisable in drawing up specifications for auditoriums to lay emphasis upon the reverberation time desired rather than upon coefficients of material. See Bureau of Standards Circular No. 396 entitled, Architectural Acoustics, which may be obtained of the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5¢ per copy.

Additional details regarding any of the materials mentioned in this letter circular will be furnished on application.

Material	Absorption coefficients for 128	256	512	1024	2048	Date
ACOUSTEX 1" thick #60	.11	.21	.53	.81	.81	1931
1½" " #70	.16	.34	.75	.85	.84	1931
ditto, 6 coats spray paint	.14	.30	.74	.90	.85	1931
ACOUSTIC LIME PLASTER, Finishing Lime Assoc. of Ohio 3/4" thick	.17	.23	.28	.36	.64	1930
ACOUSTOLIC (Maftex) nailed on 2x4's, spaced 2 ft. on centers; Without surface treatment	.44	.24	.31	.44	.48	1930
Tinted with water soluble aniline color		.29	.28	.41		1930
Tinted with water color paint	.40	.33	.31	.38	.37	1930
ACOUSTONE 1/2" thick	.09	.20	.48	.64	.66	1931
3/4" "	.13	.28	.61	.73	.73	1930
1" "	.18	.38	.64	.73	.73	1930
AKOUSTOLITH TILE, Grade D, 1"	.08	.13	.25	.54	.67	1930
" " " D, 2"	.15	.26	.59	.74	.52	1930
" " " B, 1"	.10	.14	.28	.65	.73	1929
" " " C, 1½"	.12	.19	.44	.61	.66	1930
" " " C, 2"	.19	.26	.53	.64	.70	1930
" " " B, 2"	.21	.50	.90	.86	.72	1931
AKOUSTOLITH PLASTER, ¾" thick	.13	.21	.19	.23	.33	1931
ARBORITE, on 13/16" x 2" furring strips, spaced 12" on centers Low density material, sanded surface	.21	.48	.34	.31	.41	1930
ARBORITE, Regular material, sanded surface, same furring strips	.16	.40	.27	.29	.39	1930
BALSAM WOOL, 1" thick, scrim facing	.18	.36	.55	.65	.67	1928
BALSAM WOOL QUIETILE, 1" thick	.12	.24	.63	.76	.76	1931
CALICEL ACOUSTIC TILE, 1" " cemented to plaster board	.26	.38	.74	.91	.78	1932
CELOTEX Single B, 5/8" thick	.08	.18	.48	.63	.75	1931
" " 4 coats brush painted	.07	.20	.46	.72	.87	1931
CELOTEX Double B, 13/16" thick	.15	.24	.62	.76	.73	1931
" " 4 coats brush painted	.13	.26	.62	.82	.91	1931
CELOTEX Triple B, 1¼" thick	.18	.33	.84	.97	.76	1931
CELOTEX MINERAL FIBER, 1¼" thick Unpainted	.22	.32	.84	.80	.87	1931
CELOTEX MINERAL FIBER, 1¼" " brush painted, 2 coats	.19	.45	.92	.81	.63	1931
CORKOUSTIC, Type C, 1½" thick	.08	.14	.61	.56	.64	1931
EK-O-LESS TILE, 3/4" thick on 1" backing	.22	.31	.67	.87	.78	1932
FLAXLINUM, 1" thick	.09	.31	.62	.77	.69	1930
FLAXLINUM in TMB Tile, on 13/16" x 2" furring strips, spaced 16" on centers, thicknesses as below:						

Material	Absorption Coefficients for Frequencies 128	256	512	1024	2048	Date
1/2" Flaxlinum	.11	.19	.58	.68	.69	1930
1" "	.17	.34	.61	.72	.68	1930
1/2" and 1" "	.32	.46	.67	.69	.71	1930
2 1" layers Flaxlinum	.41	.59	.70	.72	.74	1930
HACHMEISTER-LIND ACOUSTIC PLASTER stippled with pins 1/2" deep	.16	.19	.25	.36	.44	1930
INSULITE ACOUSTILE TYPE 44, 1 1/2" thick	.26	.42	.50	.57	.61	1931
KALITE ACOUSTIC CEMENT, 3/4" thick, on metal lath with wood studs, no base coat	.34	.46	.49	.52	.73	1931
KALITE TILE, 1 1/2" thick, 1" backing	.15	.32	.50	.52	.40	1931
MACOUSTIC PLASTER, 1/2" thick, stippled with large pins, perforations 1/2" deep	.06	.17	.33	.56	.58	1931
MACOUSTIC PLASTER 47W, 1/2" thick stippled with small nails, perforations 1/2" deep	.41	.34	.43	.54	.58	1932
NASHKOTE A, 1/2" thick	.05	.13	.25	.26	.20	1929
" A, 3/4" "	.09	.16	.27	.30	.23	1929
" A, 1" "	.12	.20	.33	.33	.28	1929
" B-332, 1/2" "	.09	.15	.31	.52	.74	1929
" B-332, 3/4" "	.12	.21	.40	.63	.81	1929
" B-332, 1" "	.19	.26	.51	.73	.89	1929
" A, 1/2" thick, perforated	.08	.15	.43	.62	.65	1929
" A, 3/4" " "	.11	.21	.51	.68	.71	1929
" A, 1" " "	.13	.26	.58	.73	.77	1929
NUWOOD BEVEL LAP TILE, 1/2" thick	.12	.19	.30	.40	.40	1931
" " " " 1" "	.14	.19	.37	.37	.41	1931
POROLITH	.10	.23	.56	.84	.87	1931
REVERBOLITH PLASTER, Stippled with large pins, 1/2" thick	.07	.15	.34	.47	.65	1930
ROCKOUSTILE 1" thick	.18	.38	.57	.65	.72	1931
SABINITE PLASTER, Hydraulic, 1/2" thick	.14	.24	.27	.38	.49	1931
SANACOUSTIC TILE, Rock Wool filler, 1 1/4" thick	.17	.41	.82	.94	.85	1930
Ditto, on furring strips 13/16" thick, unpainted	.19	.64	.87	.87	.80	1931
Ditto, 3 coats paint	.17	.49	.84	.79	.86	1931
STUCCOUSTIC PLASTER, formula XB, 3/4" thick	.29	.53	.59	.73	.72	1932
STUCCOUSTIC " " " spray painted, 3 coats Cousti-lac			.59			1932
STUCCOUSTIC PLASTER, formula XB 11/16" thick		.36	.56			1932
STUCCOUSTIC PLASTER, " BB 1/2" thick			.51			1932
DITTO, formula BB, 1/2" thick, spray painted 5 coats cold water paint	.14	.16	.49	.59	.61	1932

Material	Absorption coefficients for Frequencies 128	256	512	1024	2048	Date
TEMLOCK, 1/2" thick nailed on 2x4's spaced 16" on centers	.24	.31	.27	.27	.36	1931
THERMATEX, on 13/16" x 2" furring strips, spaced 12" on centers	.30	.39	.34	.43	.53	1930
THERMAX, 14 Gauge, 1", no furring	.14	.19	.34	.76	.63	1932
" " 1" spray painted, 3 coats	.13	.17	.36	.80	.70	1931
THERMAX, 14 gauge, 1", on 13/16" by 2" furring strips, spaced 20" on centers	.14	.21	.69	.71	.59	1932
THERMAX, 10 Gauge, 2" no furring	.		.61			1932
THOS. MOULDING COMPANY All samples mounted on 13/16" x 2" furring strips, spaced 16" on centers, unless otherwise specified.						
TMB LAMINATED ACOUSTIC TILE spray painted with lacquer						
1" thick	.17	.41	.63	.69	.74	1931
1½" thick	.27	.58	.72	.77	.81	1931
TMB FIBRE TILE						
½" thick unpainted	.07	.15	.28	.51	.71	1931
11/16" thick unpainted cemented to gypsum wall board	.11	.22	.39	.60	.86	1931
Ditto, spray painted 6 coats lacquer	.11	.19	.42	.58	.78	1931
1" thick unpainted	.12	.22	.56	.79	.80	1931
1½" " "	.17	.36	.78	.85	.85	1931
1" " spray painted with lacquer, by manufacturer	.11	.25	.62	.81	.73	1931
TMB METAL TILE filled with Gimco Rock Wood pad, weight 1/6 lb.per sq.ft.	39	.50	.86	.90	.81	1931
DITTO, filled with 1½" TMB fiber tile	.16	.47	.79	.81	.75	1931
TMB SOUNDEX TILE, 3/4" thick mounted on plaster board with semi plastic cement	.04	.22	.45	.72	.75	1931
TMB SOUNDEX same as above, brush painted 3 coats lacquer	.14	.21	.43	.68	.77	1932
TMB SOUNDEX same as above, brush painted 6 coats lacquer	.19	-	.46	-	-	1932
TMB SOUNDEX 1½" thick, spray painted with 2 shop coats lacquer by manufacturer	.19	.35	.67	.72	.74	1932
TRANSITE ACOUSTICAL TILE	.19	.39	.81	.77	.72	1931

The coefficients given in the above table represent the fractional part of the energy of a sound wave which is absorbed at each reflection.

Audience seated in chairs of various types.

A = cane seat chairs, open back
B = theatre chairs, box spring seat, heavily padded back
C = same as B, but single layer of padding on back
D = Church pews, seating five.

Absorption per person[1]	Frequencies 128	256	512	1024	2048
Women without coats, A	0.7	1.3	2.3	3.6	4.6
Women with coats, A	1.3	2.4	4.0	5.8	6.7
Men without overcoats, A	1.3	2.1	4.1	5.5	7.4
Men with overcoats, A	2.3	3.2	4.8	6.2	7.6
Mixed audience, B			3.9	4.7	
Empty seat, B		3.4	3.0	3.3	3.6
Mixed audience, C		3.5	4.1	4.9	4.2
Empty seat, C		3.0	2.5	2.9	3.1
Mixed audience, D		2.7	3.3	3.8	3.6

(1) These figures are numerically equal to the number of square feet of a material having unit absorption, which would absorb the same amount of sound energy.