

January 23, 1943.

SOUND ABSORPTION COEFFICIENTS OF THE
MORE COMMON ACOUSTIC MATERIALS.

The following figures have been obtained at the National Bureau of Standards for the sound absorption coefficients of a number of acoustic materials which are on the market. The bulk of the measurements are on materials submitted by the makers. The measurements on some of these materials were made several years ago. Technologic changes in manufacture, some induced by the war, may have caused differences between the coefficients of materials now on the market and those of materials originally tested. However, an attempt has been made to reduce the effect of variations in manufacture by including the coefficients only for those materials which the makers state are essentially the same as when the tests were made.

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 besides sound absorption which must be considered, 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 on samples having an area of approximately 72 square feet.

The sound absorption coefficient of a material is defined as the fractional part of the energy of a sound wave that is absorbed at each reflection. Experimental figures such as are given here must be regarded as approximate only. This branch of applied science is new and in a state of development. The methods and formulas used in obtaining these figures are those which, while not entirely satisfactory, are open to the least objection. The uncertainty involved is such that all the coefficients are probably somewhat too large.

The "noise coefficient" given in the table is the average, to the nearest multiple of 0.05, of the coefficients for 256, 512, 1024, and 2048 cycles. It has been recommended by many consultants that such a coefficient be used when the problem is one of reducing the noise level, as in offices, restaurants, etc.

Many of the acoustic materials exhibit large variations in their sound absorption properties when the method of mounting is changed. In many cases the most important feature is the amount of air space

back of the material. The figures given in this letter circular apply only when the materials are mounted in the same manner as when tested. For this reason the exact method of mounting is given for each test.

Acoustic plasters require special skill in their application, as improper manipulation may reduce the coefficient. Particular attention is called to the fact that a dry base coat is used for most applications. Also, the sound absorption coefficients are affected quite materially by the time between the application of the first and second coats of acoustic plaster, the amount of moisture in the surface of the plaster when it is finally floated, or finished with a trowel or by other means; and other factors of this nature.

A number of materials have been painted and retested to determine the effect of painting. In every case the paint was applied so as to decrease the sound absorption as little as possible and still obtain a reasonably good paint job. Details of the manner in which the paint was applied on any particular material will be supplied upon application.

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. Also, in comparing different materials it should be borne in mind that there is some variation in manufacture; hence, the sample which was measured may have more or less absorption than the material delivered on the job. Minor differences in coefficients, therefore, should be disregarded in choosing between materials.

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 National Bureau of Standards Circular C418 entitled "Architectural Acoustics," which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents per copy. Supplementary data on any of the materials mentioned in this letter circular will be furnished on application.

Additional information regarding the absorption coefficients of acoustical materials may be obtained from the Acoustical Materials Association, 120 South LaSalle Street, Chicago, Illinois.

CORRECTION SHEET

LC-714

1. p. 5, Item 10 under "Types of Mounting" should read "Nailed on 2 x 8's, 12" o. c., unless otherwise indicated."
2. p. 6, Cushiontone A-3, weight should be "1.27" and not ".95" as indicated.
3. p. 6, Temlok De Luxe 1/2", weight "1.18" should be deleted.

TRADE NAME OF ACOUSTIC MATERIALS.

| Trade Name | Manufacturer | Address | Page |
|---|--|---|--------|
| Absorbstone | Iuse Stevenson Company | 873 Blackhawk Street, Chicago, Illinois..... | 14 |
| Absorbex | The Celotex Corporation | 120 South LaSalle Street, Chicago, Illinois ... | 7 |
| Acoustex | National Gypsum Company | Buffalo, New York | 14 |
| Acoustical Cork "B" | United Cork Companies | Kearny, New Jersey | 16 |
| Acoustic Plaster | Hollywood Stucco Products, Inc. | 5244 Vineland Avenue, North Hollywood, Calif. . | 20 |
| Acoustic Plaster | The Kelley Island Lime and Transport Company | Leader Building, Cleveland, Ohio | 21 |
| Acousti-Celotex | The Celotex Corporation | 120 South LaSalle Street, Chicago, Illinois ..7, 8, 9, 10 | |
| Acoustilite | The Insulite Company | 500 Baker Arcade Bldg., Minneapolis, Minn. ... | 12 |
| Acousti-Metal | National Gypsum Company | Buffalo, New York | 14, 15 |
| Acoustone | United States Gypsum Company | 300 West Adams Street, Chicago, Illinois | 16 |
| Air-Acoustic Sheets | Johns-Manville Sales Corp. | 22 East 40th Street, New York, N. Y. | 12 |
| Alkoustolith Tile | R. Guastavino Company | 660 Main Street, Woburn, Mass. | 10-11 |
| Audience (Seated in different types of seats) | - | - | 25 |
| Balsam Wool | Wood Conversion Company | First National Bank Bldg., St. Paul, Minn. . . | 17 |
| Basalt Rock | Basalt Rock Company | Mapa, California | 7 |
| Cabots Quilt | Samuel Cabot, Inc. | 141 Milk Street, Boston, Mass. | 7 |
| Calacoustic Plaster | Pacific Portland Cement Co. | 111 Sutter Street, San Francisco, Calif. | 22 |
| Cork Acoustical | United Cork Companies | Kearny, New Jersey | 16 |
| Cushiontone | Armstrong Cork Company | Lancaster, Pennsylvania | 6 |
| Dodson Acoustic Plaster | Dodson Manufacturing Co. | 1463 Barwise, Wichita, Kansas | 19 |
| Econacoustic | National Gypsum Company | Buffalo, New York | 15 |
| Felt | The Felters Company, Inc. | 214 South Street, Boston, Mass. | 10 |
| Fiberglas Acoustical | Owens Corning Fiberglas Corp. | Toledo, Ohio. | 15 |
| Blankets | | | |
| Fiberglas OC-9 Board | Owens Corning Fiberglas Corp. | Toledo, Ohio | 15 |
| Fiberlite | The Insulite Company | 500 Baker Arcade Bldg., Minneapolis, Minn. ... | 12 |
| Fibracoustic | Johns-Manville Sales Corp. | 22 East 40th Street, New York, N. Y. | 12 |

| Trade Name | Manufacturer | Address | Page |
|-----------------------------|--|--|-------|
| Hushkote Acoustic Plaster | Cleveland Gypsum Supply Company | 1276 West Third Street, Cleveland, Ohio. | 19 |
| Kencoustic | David E. Kennedy, Inc. | 58 Second Avenue, Brooklyn, New York | 13 |
| Kentex | " " " | " " " " | 13 |
| Koustex | " " " | " " " " | 13 |
| Limpet | Keasbey & Mattison Company | Ambler, Pennsylvania | 20,21 |
| Macoustic Plaster | National Gypsum Company | Buffalo, New York | 22 |
| Muffletone | The Celotex Corporation | 120 South LaSalle Street, Chicago, Illinois | 10 |
| Nashkote | Johns-Manville Sales Corp. | 22 East 40th Street, New York, N. Y. | 12 |
| Nuwood Bevel Lap Tile | Wood Conversion Company | First National Bank Bldg., St. Paul, Minn. | 17 |
| Old Newark Acoustic Plaster | Newark Plaster Company | 50 Church Street, New York, N. Y. | 22 |
| Perfatone | United States Gypsum Company | 300 West Adams Street, Chicago, Illinois | 16 |
| Permacoustic | Johns-Manville Sales Corp. | 22 East 40th Street, New York, N. Y. | 12 |
| Plastacoustic | R. Guastavino Company | 660 Main Street, Woburn, Mass. | 19 |
| Pyrocoustic | Mitchell & Smith | 9501 Copeland Avenue, Detroit, Michigan | 14 |
| Quietone | United States Gypsum Company | 300 West Adams Street, Chicago, Illinois | 16 |
| Reverbolite Plaster | The Celotex Corporation | 120 South LaSalle Street, Chicago, Illinois | 18 |
| Sabinite Plaster | United States Gypsum Company | 300 West Adams Street, Chicago, Illinois | 23,24 |
| Sanacoustic | Johns-Manville Sales Corp. | 22 East 40th Street, New York, N. Y. | 12,13 |
| Seats (See Audience) | | | 25 |
| Softone | Industrials Inc. of Wisconsin | 333 N. Michigan Avenue, Chicago, Illinois | 11 |
| Sphinxstone | The Sphinx Acoustical Co. | c/o Wm. J. Davey, 1916 Locust Grove Road, Silver Spring, Maryland | 16 |
| Sound Isolation Blanket | Johns-Manville Sales Corp. | 22 East 40th Street, New York, N. Y. | 13 |
| Spray-Acoustic, Type X | Sprayo-Flake Company | 2715 Irving Park Road, Chicago, Illinois | 23 |
| Stucoustic | California Stucco Products of New England, Inc. | 169 Waverly Street, Cambridge, Mass. | 18 |
| Studio Element | Johns-Manville Sales Corp. | 22 East 40th Street, New York, N. Y. | 13 |
| Super-Acoustic Plaster | Gypsum Insulation & Mfg. Co. | 1252 Lawrence Street, Los Angeles, Calif. | 20 |
| Temlok Deluxe | Armstrong Cork Company | Lancaster, Pennsylvania | 6 |
| Transite Acoustical Units | Johns-Manville Sales Corp. | 22 East 40th Street, New York, N. Y. | 13 |
| Travacoustic | National Gypsum Company | Buffalo, New York | 15 |
| Trutone | Acoustone Company, Ltd. | 121 C.C.Chapman Bldg., Los Angeles, Calif. | 6 |

TYPES OF MOUNTING

1. Cemented to gypsum wall board. This is considered equivalent to cementing to plaster or masonry.
2. Nailed on 13/16" x 2" furring, 12" o.c., unless otherwise indicated.
3. Metal supports attached to 13/16" x 2" wood furring.
4. Laid directly on laboratory floor.
5. Nailed on 2 x 4's, 12" o.c., unless otherwise indicated.
6. Cemented to the floor of the reverberation chamber.
7. Back of sample covered with concrete.
8. Attached to metal suspension system. 4" air space back of tile, unless otherwise indicated.
9. Acoustic tile nailed to 13/16" x 2" furring, 18" o.c., space between furring filled with Rockwool.
10. Nailed on 2 x 8's, 12" o.c.
11. Laid on 24 gauge sheet iron, nailed to 13/16" x 2" furring, 24" o.c.

Sound Absorption Coefficients and Description of Test Samples

TABLE I
Prefabricated Acoustic Units.

ACOUSTONE COMPANY, LTD.

| Material | Thick-ness | Mounting (See Page 5) | Coefficients | | | | Noise Coef. | Size of Unit Tested | Wt. (lb) sq ft | Surface | Date | | |
|--|------------|--------------------------|--------------|-----|-----|------|----------------|---------------------------|----------------------|-----------|------|----------------------------------|------|
| | | | 128 | 256 | 512 | 1024 | | | | | | | |
| Trutone Tile, cast on 1/4" gypsum wall board | 7/8" | 4 | .16 | .17 | .48 | .82 | .65 | .74 | .55 | 12" x 24" | - | Spray painted by manufacturer | 1932 |

ARMSTRONG CORK CO.

| | | | | | | | | | | | | | |
|----------------------|------|---|-----|-----|-----|-----|-----|-----|-----|-----------|------|--|------|
| Cushiontone Type A-1 | 1/2" | 1 | .06 | .18 | .56 | .71 | .65 | .57 | .55 | 12" x 12" | .79 | Painted by manufacturer, perforated 484 holes per sq ft 3/16" dia. 3/8" deep. | 1941 |
| Cushiontone Type A-1 | 1/2" | 2 | .07 | .46 | .59 | .67 | .74 | .68 | .60 | 12" x 12" | .79 | Painted by manufacturer, perforated as above. | 1941 |
| Cushiontone Type A-2 | 5/8" | 1 | .08 | .19 | .63 | .82 | .74 | .81 | .60 | 12" x 12" | .91 | Painted by manufacturer, perforated as above, holes 1/2" deep. | 1941 |
| Cushiontone Type A-2 | 5/8" | 2 | .06 | .49 | .68 | .83 | .76 | .74 | .70 | 12" x 12" | .91 | Painted by manufacturer, perforated as above. | 1942 |
| Cushiontone Type A-3 | 7/8" | 1 | .10 | .30 | .78 | .78 | .68 | .50 | .65 | 12" x 12" | .95 | Painted by manufacturer, perforated as above, holes 3/4" deep. | 1942 |
| Cushiontone Type A-3 | 7/8" | 2 | .15 | .65 | .66 | .78 | .67 | .53 | .70 | 12" x 12" | .95 | Painted by manufacturer, perforated as above. | 1942 |
| Temlok DeLuxe | 1/2" | 4 | .12 | .24 | .39 | .31 | .31 | .32 | .30 | 48" x 54" | 1.18 | Painted by manufacturer, | 1937 |
| Temlok DeLuxe | 7/8" | 4 | .22 | .46 | .35 | .32 | .39 | .57 | .40 | 48" x 54" | 1.19 | Painted by manufacturer, | 1937 |

BASALT ROCK COMPANY

| Material | Thickness | Mounting (See Page 5) | Coefficients | | | | Noise Coef. | Size of Unit Tested. | Wt. (lb) sq ft | Surface | Date |
|--------------------|-----------|--------------------------|--------------|-----|-----|------|----------------|----------------------------|----------------------|-----------|------|
| | | | 128 | 256 | 512 | 1024 | | | | | |
| Basalt Rock Type A | 5" | 4 | .32 | .81 | .75 | .73 | .74 | .73 | 25.2 | Unpainted | 1938 |

SAMUEL CABOT, INC.

| | | | | | | | | | | | | |
|--------------|---|---|-----|-----|-----|-----|-----|-----|-----|---|--------------------|------|
| Cabots Quilt | - | 4 | .12 | .30 | .69 | .82 | .41 | .31 | .55 | - | Covered with paper | 1938 |
|--------------|---|---|-----|-----|-----|-----|-----|-----|-----|---|--------------------|------|

THE CELOTEX CORPORATION

| | | | | | | | | | | | | |
|--|------|---|-----|-----|-----|-----|-----|-----|-----|---------------------------------------|--|------|
| Absorbex Type A on 1" Absorbex Type F (10 gauge) | 2" | 4 | - | .39 | .80 | .96 | .92 | - | .75 | 9"x9" tile on 20"x64" sheets | Spray painted by manu- facturer. | 1932 |
| Absorbex Type A | 1" | 1 | .09 | .24 | .62 | .89 | .73 | .73 | .60 | 12"x12" | Unpainted | 1939 |
| Absorbex Type A | 1" | 1 | .14 | .49 | .83 | .61 | .30 | .22 | .55 | 12"x12" | Same as above, brush painted 5 coats at NBS | 1939 |
| Absorbex Type A | 1" | 9 | .19 | .63 | .95 | .86 | .78 | .77 | .80 | 18"x18" | Unpainted | 1936 |
| Absorbex Type A | 1" | 2 | .19 | .33 | .80 | .86 | .80 | .83 | .70 | 18"x18" | Kerfed, spray painted 4 coats at NBS | 1936 |
| Absorbex Type C | 1" | 4 | .14 | .19 | .34 | .73 | .62 | .62 | .45 | 20"x64" | Unpainted | 1932 |
| Absorbex Type C | 1" | 2 | .14 | .21 | .67 | .69 | .59 | .62 | .55 | 20"x64" | Unpainted | 1932 |
| Absorbex Type F (14 gauge) | 1" | 2 | .06 | .17 | .47 | .66 | .53 | - | .45 | 20"x64" | Spray painted by manu- facturer. | 1934 |
| Absorbex Type F (10 gauge) | 1" | 2 | .13 | .47 | .98 | .70 | .78 | .70 | .75 | 20"x64" | Spray painted 4 coats at NBS | 1934 |
| Absorbex Type F (8 gauge) | 2" | 7 | .12 | .26 | .48 | .50 | .46 | .56 | .45 | 12"x12" | R.I. finish perforated 4 1/4" holes per sq ft, 3/16" dia., 3/8" deep | 1936 |
| Acousti-Celotex Type C1 | 1/2" | 1 | .17 | .24 | .40 | .45 | .43 | .51 | .40 | 12"x12" | Unpainted, perforated as above. | 1936 |

THE CELOTEX CORPORATION (CONTINUED)

| Material | Thickness | Mounting (See Page 5) | Coefficients | | | | | | Noise Coef. | Size of Unit Tested. | Wt. (lb) sq ft | Surface | Date |
|--|-----------|--------------------------|--------------|-----|-----|------|------|------|----------------|----------------------------|----------------------|---|------|
| | | | 128 | 256 | 512 | 1024 | 2048 | 4096 | | | | | |
| Acousti-Celotex Type C2 | 5/8" | 1 | .11 | .31 | .71 | .80 | .67 | .57 | .60 | 12"x12" | .88 | R.I. finish, perforated as above, holes 1/2" deep. | 1936 |
| Acousti-Celotex Type C2 | 5/8" | 2 | .14 | .65 | .63 | .73 | .67 | .55 | .65 | 12"x12" | .88 | Same as above | 1936 |
| Acousti-Celotex Type C2, Slow burning. | 5/8" | 1 | .09 | .25 | .68 | .79 | .69 | .66 | .60 | 12"x12" | .89 | Unpainted, perforated as above. | 1937 |
| Acousti-Celotex Type C2, Slow burning. | 5/8" | 2 | .12 | .48 | .64 | .70 | .62 | .49 | .60 | 12"x12" | 1.07 | Painted by manufacturer, perforated as above. | 1939 |
| Acousti-Celotex Type C3 | 13/16" | 1 | .10 | .30 | .78 | .85 | .59 | .42 | .65 | 12"x12" | 0.94 | R.I. finish, perforated as above, holes 5/8" deep. | 1939 |
| Acousti-Celotex Type C3 | 13/16" | 1 | .08 | .33 | .83 | .86 | .53 | .37 | .65 | 12"x12" | - | Same as above, except brush painted 4 coats MRS. | 1939 |
| Acousti-Celotex Type C3 | 13/16" | 8 | .55 | .66 | .66 | .80 | .69 | .52 | .70 | 12"x24" | 1.09 | R.I. finish, perforated as above. | 1936 |
| Acousti-Celotex Type C3 Slow burning | 13/16" | 1 | .18 | .36 | .67 | .74 | .67 | .66 | .60 | 12"x12" | 1.35 | Unpainted, perforated as above. | 1936 |
| Acousti-Celotex Type C3 Slow burning | 13/16" | 8 | .45 | .58 | .67 | .91 | .71 | .66 | .70 | 12"x24" | 1.06 | Unpainted, perforated as above. | 1937 |
| Acousti-Celotex Type C4 | 1 1/4" | 1 | .17 | .48 | .97 | .72 | .50 | .41 | .65 | 12"x12" | 1.58 | R.I. finish, perforated as above, holes 1 1/16" deep. | 1936 |
| Acousti-Celotex Type C4 Slow burning | 1 1/4" | 8 | .53 | .68 | .96 | .78 | .60 | .50 | .75 | 12"x24" | 1.44 | Same as above | 1936 |
| Acousti-Celotex Type C4 Slow burning | 1 1/4" | 1 | .13 | .51 | .94 | .84 | .58 | .52 | .70 | 12"x12" | 1.80 | Unpainted, perforated as above. | 1936 |

THE CELOTEX CORPORATION (CONTINUED)

| Material | Thick- ness | Mounting (See Page 5) | Coefficients | | | | | | Noise Coef. | Size of Unit Tested. | WT. (lb) sq ft | Surface | Date |
|--|----------------|--------------------------|--------------|-----|-----|------|------|------|----------------|----------------------------|--|---------|------|
| | | | 128 | 256 | 512 | 1024 | 2048 | 4096 | | | | | |
| Acousti-Celotex Type C4 Slow burning | 1 1/4" | 8 | .43 | .62 | .78 | .81 | .61 | .40 | .70 | 1.93 | Painted by manufacturer, perforated as above. | 1939 | |
| Acousti-Celotex Type C5 | 13/16" | 1 | .15 | .24 | .62 | .73 | .70 | .71 | .55 | - | Unpainted, perforated 441 holes per sq ft, 1/4" dia., 5/8" deep. | 1931 | |
| Acousti-Celotex Type C5 | 13/16" | 1 | .13 | .26 | .62 | .78 | .86 | .77 | .65 | - | Same as above, brush painted 1 coat glue size, 4 coats lead and oil at NBS. | 1931 | |
| Acousti-Celotex Type C5 | 13/16" | 2 | .09 | .56 | .77 | .90 | .78 | .62 | .75 | .86 | Unpainted, perforated as above, holes 5/8" deep. | 1933 | |
| Acousti-Celotex Type C5 Slow burning | 13/16" | 8 | .57 | .70 | .63 | .84 | .78 | .68 | .70 | 1.12 | Painted by mfr., perfor- ated as above, holes 5/8" deep. | 1939 | |
| Acousti-Celotex Type C6 | 1 1/4" | 4 | .12 | .41 | .90 | .92 | .66 | .64 | .70 | 1.44 | Unpainted, perforated as above, holes 1" deep. | 1932 | |
| Acousti-Celotex Type C6 Slow burning | 1 1/4" | 8 | .56 | .72 | .77 | .92 | .63 | .53 | .75 | 1.65 | Painted by mfr. perfor- ated as above, holes 1" deep. | 1939 | |
| Acousti-Celotex Type C8 | 1" | 2 | .20 | .62 | .66 | .75 | .73 | .48 | .70 | 1.44 | R.I. finish, perforated 462 holes per sq ft, 3/16" dia., 7/8" deep. | 1940 | |
| Acousti-Celotex Type C9 | 3/4" | 1 | .11 | .32 | .74 | .81 | .54 | .45 | .60 | 1.06 | Painted by mfr., perfor- ated 441 holes per sq ft, 3/16" dia., 11/16" deep. | 1941 | |
| Acousti-Celotex Type C9 | 3/4" | 2 | .14 | .62 | .72 | .76 | .58 | .48 | .65 | 1.06 | Painted by mfr., perfor- ated as above. | 1941 | |
| Acousti-Celotex Type C9 | 3/4" | 8 | .43 | .66 | .73 | .77 | .62 | .48 | .70 | 1.00 | Painted by mfr., perfor- ated as above. | 1941 | |

THE CELOTEX CORPORATION (CONTINUED)

| Material | Thickness | Mounting (See Page 5) | Coefficients | | | | | | Noise Coef. | Size of Unit Tested | Wt (lb) sq ft | Surface | Date |
|---------------------------------|-----------|--------------------------|--------------|-----|-----|------|------|------|----------------|---------------------------|---------------------|---|------|
| | | | 128 | 256 | 512 | 1024 | 2048 | 4096 | | | | | |
| Acousti-Celotex Type M1 | 9/16" | 1 | .11 | .29 | .68 | .74 | .82 | .74 | .65 | 12"x12" | 1.23 | Painted by mfr., perforated 676 holes per sq ft, 5/32" dia., 1/2" deep. | 1936 |
| Acousti-Celotex Type M2 | 1" | 8 | .38 | .54 | .66 | .95 | .73 | .68 | .70 | 12"x24" | 2.32 | Painted by mfr., perforated as above, holes 7/8" deep. | 1939 |
| Mufflestone, Standard finish | 3/4" | 1 | .13 | .36 | .65 | .62 | .70 | .69 | .60 | 12"x12" | 1.62 | Unpainted | 1938 |
| Mufflestone, Standard finish | 1" | 1 | .19 | .45 | .84 | .87 | .83 | .88 | .75 | 12"x12" | 1.83 | Painted by manufacturer. | 1938 |
| Mufflestone, Standard finish | 1" | 1 | .15 | .46 | .75 | .80 | .72 | .68 | .70 | 12"x12" | 1.84 | Unpainted | 1938 |
| Mufflestone, Standard finish | 1" | 1 | .13 | .44 | .78 | .80 | .75 | .82 | .70 | 12"x12" | - | Same as above, spray painted 3 coats at NBS. | 1938 |
| Mufflestone, Fissured finish | 1" | 1 | .16 | .45 | .71 | .69 | .71 | .70 | .65 | 12"x12" | 1.96 | Unpainted | 1938 |
| Mufflestone, Fissured finish | 1" | 1 | .16 | .44 | .68 | .69 | .69 | .71 | .65 | 12"x12" | - | Same as above, spray painted 3 coats at NBS. | 1938 |
| Mufflestone, Fissured finish | 1" | 1 | .14 | .41 | .82 | .77 | .75 | .78 | .70 | 12"x12" | 1.94 | Unpainted | 1942 |

THE FELTERS COMPANY, INC.

| Felt | 1" | 4 | .11 | .40 | .50 | .84 | .78 | .98 | .70 | - | .96 | No surface covering. | 1938 |
|------|----|---|-----|-----|-----|-----|-----|-----|-----|---|-----|----------------------|------|
|------|----|---|-----|-----|-----|-----|-----|-----|-----|---|-----|----------------------|------|

R. GUASTAVINO COMPANY

| | | | | | | | | | | | | | |
|-------------------------------|--------|--------------------------------|-----|-----|-----|-----|-----|-----|-----|--------|-----|-----------|------|
| Akoustolith Tile Grade B-1 | 1 1/4" | 5 (12" o.c., not nailed) | .41 | .83 | .78 | .72 | .78 | .82 | .80 | 6"x12" | 5.8 | Unpainted | 1936 |
| Akoustolith Tile Grade B-2 | 1" | 4 | .09 | .17 | .46 | .77 | .77 | .58 | .55 | 6"x12" | 4.6 | Unpainted | 1932 |
| Akoustolith Tile Grade B-2 | 1 1/2" | 4 | .14 | .30 | .67 | .87 | .82 | .57 | .65 | 6"x12" | 6.1 | Unpainted | 1932 |

THE INSULITE COMPANY

| Material | Thickness | Mounting (See Page 5) | Coefficients | | | | | | Noise Coef. | Size of Unit Tested. | Wt (lb) sq ft | Surface | Date |
|-------------|-----------|--------------------------|--------------|-----|-----|------|------|------|----------------|----------------------------|---------------------|----------------------------------|------|
| | | | 128 | 256 | 512 | 1024 | 2048 | 4096 | | | | | |
| Acoustilite | 3/4" | 1 | .16 | .34 | .79 | .72 | .69 | .64 | .65 | 12"x12" | .59 | Painted by manufacturer | 1939 |
| Acoustilite | 3/4" | 2 | .12 | .49 | .80 | .85 | .80 | .83 | .75 | 12"x12" | .57 | Painted by manufacturer | 1940 |
| Acoustilite | 3/4" | 2 | .11 | .53 | .82 | .82 | .72 | .68 | .70 | 12"x12" | - | Spray painted 2 coats at NBS. | 1940 |
| Acoustilite | 3/4" | 2 | .19 | .73 | .67 | .55 | .39 | .32 | .60 | 12"x12" | - | Spray painted 4 coats at NBS. | 1940 |
| Fiberlite | 1/2" | 1 | .07 | .20 | .53 | .77 | .74 | .74 | .55 | 12"x12" | .41 | Painted by manufacturer | 1939 |
| Fiberlite | 1/2" | 2 | .07 | .40 | .72 | .75 | .80 | .78 | .65 | 12"x12" | .44 | Painted by manufacturer | 1940 |

JOHNS-MANVILLE SALES CORPORATION

| | | | | | | | | | | | | | |
|--|------------------|----|-----|-----|-----|-----|-----|-----|-----|---------|------|--|------|
| Air-Acoustic Sheets | 1/2" | 11 | .14 | .45 | .53 | .70 | .67 | .70 | .60 | 18"x24" | .80 | Unpainted | 1938 |
| Air-Acoustic Sheets | 1" | 11 | .31 | .55 | .70 | .74 | .76 | .76 | .70 | 18"x24" | 1.51 | Unpainted | 1938 |
| Fibracoustic | 1" | 1 | .17 | .45 | .79 | .73 | .74 | .73 | .70 | 12"x12" | .54 | Painted by manufacturer | 1942 |
| Fibracoustic | 1" | 2 | .17 | .77 | .74 | .71 | .71 | .81 | .75 | 12"x12" | .54 | Painted by manufacturer | 1942 |
| Nashkote A | 3/4" | 1 | .09 | .16 | .27 | .30 | .23 | .23 | .25 | 36"x48" | - | Painted 2 coats oil. | 1929 |
| Nashkote A | 3/4" | 1 | .11 | .21 | .51 | .68 | .71 | .68 | .55 | 36"x48" | - | Same as above except membrane perforated with fine holes after painting. | 1929 |
| Nashkote A | 1" | 1 | .12 | .20 | .33 | .33 | .28 | .28 | .30 | 36"x48" | - | Painted 2 coats oil | 1929 |
| Nashkote A | 1" | 1 | .13 | .26 | .58 | .73 | .77 | .71 | .60 | 36"x48" | - | Same as above except membrane perforated with fine holes after painting. | 1929 |
| Permacoustic | 3/4" | 1 | .12 | .35 | .74 | .74 | .72 | .75 | .65 | 12"x12" | 1.69 | Unpainted | 1942 |
| Permacoustic | 1" | 5 | .27 | .74 | .66 | .82 | .70 | .70 | .75 | 12"x12" | 2.33 | Unpainted | 1938 |
| Permacoustic | 1" | 1 | .20 | .62 | .83 | .74 | .77 | .80 | .75 | 12"x12" | 2.33 | Unpainted | 1938 |
| Sanacoustic, Rock- wool pad plus Metal facing & pad sup- ports, plus furring = | 1 5/8" 2 1/2" | 3 | .18 | .58 | .96 | .91 | .82 | .74 | .80 | 12"x24" | 1.2 | Perforated enameled metal surface, 4608 holes per sq ft., .068" diameter. | 1940 |

JOHNS-MANVILLE SALES CORPORATION (Cont'd)

| Material | Thick-ness | Mounting (See Page 5) | Coefficients | | | | | Noise Coef. | Size of Unit Tested. | Wt (lb) sq ft | Surface | Date |
|--|------------------|--------------------------|--------------|-----|-----|------|------|----------------|----------------------------|---------------------|--|------|
| | | | 128 | 256 | 512 | 1024 | 2048 | | | | | |
| Sanacoustic, same as above except every other tile was not perforated and contained no pad. | As above. | 3 | .15 | .86 | .66 | .66 | .49 | .44 | 12"x24" | Pad 1.2 | Enameled metal surface. Perforated pans had 4608 holes per sq ft, .068" diameter. | 1940 |
| | | | .43 | .94 | .77 | .82 | .78 | .72 | | | | |
| Sanacoustic, pad plus metal facing and pad supports, plus furring = | 1 5/8" 5 1/4" | 8 | .54 | .72 | .57 | .62 | .50 | .43 | 12"x24" | Pad 1.2 | Perforated enameled metal surface, 4608 holes per sq ft, .068" diameter. | 1940 |
| | | | .60 | .72 | .57 | .62 | .50 | .43 | | | | |
| Sanacoustic, same as above, except every other tile was not perforated and contained no pad. | As above | 8 | .11 | .58 | .85 | .83 | .81 | .83 | - | 1.5 | Metal lath. | 1932 |
| Sound Isolation Blanket (Rockwool) | - | 4 | .16 | .54 | .72 | .74 | .71 | .81 | 22"x36" | 1.47 | No covering. | 1937 |
| Studio Element | 1" | 4 | .19 | .39 | .77 | .74 | .70 | .55 | 12"x12" | 3.0 | Transite, perforated 576 holes per sq ft, diameter 5/32" | 1931 |

DAVID E. KENNEDY, INC.

| | | | | | | | | | | | | | |
|-------------------|------|---|-----|-----|-----|-----|-----|-----|-----|-----------------|---------|--------------------------|--------------------------|
| Kencoustic (cork) | 1" | 1 | .05 | .12 | .48 | .65 | .38 | .47 | .40 | 12"x12" | .79 | Painted by manufacturer. | 1939 |
| | | | .09 | .16 | .66 | .64 | .50 | .62 | .50 | .50 | 12"x18" | .88 | Painted by manufacturer. |
| Kentex | 1" | 1 | .18 | .36 | .53 | .48 | .45 | .35 | .45 | 11 1/2"x11 1/2" | .78 | Unpainted. | 1942 |
| Koustex | 3/4" | 1 | .08 | .21 | .62 | .85 | .70 | .70 | .60 | 12"x12" | 1.48 | Painted by manufacturer. | 1942 |
| | | | .66 | .82 | .52 | .58 | .64 | .66 | .65 | .65 | 12"x12" | 1.43 | Painted by manufacturer. |
| Koustex | 1" | 1 | .12 | .29 | .75 | .87 | .71 | .76 | .65 | 12"x12" | 2.24 | Unpainted. | 1939 |
| | | | .13 | .33 | .72 | .95 | .77 | .86 | .70 | .70 | 12"x12" | 2.2 | Painted by manufacturer. |

LUSE STEVENSON COMPANY

| Material | Thick-ness | Mounting (See Page 5) | Coefficients | | | | Noise Coef. | Size of Unit Tested. | Wt (lb) sq ft | Surface | Date |
|-------------|------------|--------------------------|--------------|-----|-----|------|----------------|----------------------------|---------------------|-----------|------|
| | | | 128 | 256 | 512 | 1024 | | | | | |
| Absorbatone | 1" | 10 | .40 | .91 | .82 | .80 | .78 | .86 | 2.2 | Unpainted | 1940 |
| Absorbatone | 1" | 2 | .10 | .31 | .71 | .93 | .78 | .84 | 2.4 | Unpainted | 1941 |

MITCHELL & SMITH

| | | | | | | | | | | | | |
|------------|--------|---|-----|-----|-----|-----|-----|-----|-----|-----|----------------------------------|------|
| Pyrocustic | 13/16" | 1 | .10 | .30 | .79 | .84 | .86 | .80 | .70 | 1.1 | Unpainted | 1940 |
| Pyrocustic | 13/16" | 1 | .11 | .42 | .78 | .82 | .70 | .65 | .70 | - | Spray painted 2 coats at NBS. | 1940 |

NATIONAL GYPSUM COMPANY

| | | | | | | | | | | | | |
|--|------------------|---|-----|-----|-----|-----|-----|-----|-----|---------------|--|------|
| Acoustex Type 30R | 5/8" | 2 | .11 | .20 | .59 | .91 | .85 | .72 | .65 | 1.34 | Unpainted | 1938 |
| Acoustex Type 40R | 3/4" | 1 | .06 | .17 | .37 | .68 | .82 | .74 | .50 | 1.75 | Unpainted | 1938 |
| Acoustex Type 40R | 3/4" | 2 | .15 | .22 | .61 | .93 | .79 | .69 | .65 | 1.54 | Unpainted | 1938 |
| Acoustex Type 50R | 7/8" | 2 | .13 | .28 | .70 | .98 | .85 | .87 | .70 | 1.79 | Unpainted | 1938 |
| Acoustex Type 60R | 1" | 1 | .07 | .24 | .55 | .87 | .86 | .88 | .65 | - | Unpainted | 1937 |
| Acoustex Type 60R | 1" | 2 | .11 | .33 | .77 | .92 | .70 | .96 | .70 | 2.07 | Unpainted | 1936 |
| Acoustex Type 60R | 1" | 1 | .07 | .22 | .54 | .87 | .78 | .77 | .60 | 2.31 | Painted by manufacturer. | 1939 |
| Acoustex Type 60R | 1" | 1 | .09 | .27 | .71 | .92 | .62 | .62 | .65 | - | Same as above, brush painted 5 coats at NBS. | 1939 |
| Acoustex Type 70R | 1 1/8" | 1 | .12 | .28 | .70 | .96 | .84 | .88 | .70 | 2.5 | Unpainted | 1940 |
| Acoustex Type 70R | 1 1/8" | 2 | .15 | .37 | .84 | .92 | .78 | .80 | .75 | 2.5 | Unpainted | 1940 |
| Acousti-Metal, Rockwool pad plus metal facing and pad supports, plus furring | 1 1/8" | 8 | .40 | .84 | .87 | .93 | .82 | .70 | .85 | 0.98 (Pad) | Perforated enameled metal, 4608 holes per sq ft, .068" diameter. | 1939 |
| Acousti-Metal, same as above, except every other tile was not perforated and contained no pad. Fastened to 13/16" furring in- stead of 3 5/8" | 1 5/8" 5 1/4" | 8 | .22 | .75 | .65 | .64 | .49 | .34 | .65 | 0.98 (Pad) | Enameled metal surface. Perforated pans had 4608 holes per sq ft, 0.68" diameter. | 1941 |

NATIONAL GYPSUM COMPANY (Continued)

| Material | Thickness | Mounting (See Page 5) | Coefficients | | | | Noise Coef. | Size of Unit Tested | Wt (lb) sq ft | Surface | Date |
|--|-----------|--------------------------|--------------|-----|-----|------|----------------|---------------------------|---------------------|---|------|
| | | | 128 | 256 | 512 | 1024 | | | | | |
| Acousti-Metal-B, perforated metal on each face and filled with 4 lb density glass min- eral wool. | 3 1/2" | 4 | 128 | 256 | 512 | 1024 | 2048 | 4096 | 4.44 | Enameled metal surface, 4608 holes per sq ft, .068" diameter. | 1942 |
| | | | .46 | .94 | .98 | .89 | .83 | .79 | | | |
| Acousti-Metal-B, perforated metal on each face and filled with 6 lb density glass min- eral wool. | 3 1/2" | 4 | .49 | .99 | .98 | .91 | .86 | .78 | 5.25 | Same as above. | 1942 |
| | | | .09 | .21 | .66 | .73 | .72 | .86 | | | |
| Econacoustic | 1/2" | 1 | .08 | .45 | .67 | .62 | .78 | .60 | 0.48 | Unpainted. | 1940 |
| Econacoustic | 1/2" | 2 | .14 | .51 | .78 | .78 | .82 | .70 | 0.48 | Unpainted. | 1940 |
| Econacoustic | 1" | 1 | .19 | .48 | .78 | .74 | .80 | .70 | 0.71 | Unpainted. | 1939 |
| Econacoustic | 1" | 1 | .18 | .50 | .79 | .74 | .67 | .70 | - | Same as above, except spray painted 3 coats. | 1939 |
| Econacoustic | 1" | 1 | .11 | .44 | .82 | .83 | .77 | .70 | - | Same as above, except spray painted 7 coats. | 1939 |
| Travacoustic | 1" | 1 | .11 | .44 | .82 | .83 | .77 | .70 | 2.04 | Unpainted. | 1940 |

OWENS-CORNING FIBERGLAS CORPORATION

| | | | | | | | | | | | | |
|------------------------------------|------|---|-----|-----|-----|-----|-----|-----|-----|------|--------------------------------|------|
| Fiberglas Acousti- cal Blankets | 1" | 4 | .27 | .63 | .75 | .75 | .78 | .75 | .75 | .44 | Covered with thin mus- lin. | 1938 |
| Fiberglas Acousti- cal Blankets | 2" | 4 | .34 | .72 | .87 | .87 | .75 | .70 | .80 | .72 | Same as above. | 1938 |
| Fiberglas Acousti- cal Blankets | 3" | 4 | .39 | .91 | .97 | .91 | .82 | .85 | .90 | 1.07 | Same as above. | 1938 |
| Fiberglas OC-9 Board | 3/4" | 5 | .21 | .72 | .93 | .93 | .89 | .91 | .85 | .60 | Unpainted | 1942 |

THE SPHINX ACOUSTICAL COMPANY

| Material | Thickness | Mounting (See Page 5) | Coefficients | | | | Noise Coef. | Size of Unit Tested | Wt (lb) sq ft | Surface | Date |
|-------------|-----------|--------------------------|--------------|-----|-----|------|----------------|---------------------------|---------------------|---------|------|
| | | | 128 | 256 | 512 | 1024 | | | | | |
| Sphinxstone | 2" | 4 | .10 | .33 | .78 | .87 | .70 | .65 | 18"x24" | - | 1932 |

UNITED CORK COMPANIES

| | | | | | | | | | | | | | |
|------------------------|--------|---|-----|-----|-----|-----|-----|-----|-----|---------|-----|-----------|------|
| Acoustical Cork "B" | 1 1/2" | 2 | .09 | .57 | .37 | .33 | .29 | .41 | .40 | 12"x12" | .94 | Unpainted | 1939 |
|------------------------|--------|---|-----|-----|-----|-----|-----|-----|-----|---------|-----|-----------|------|

UNITED STATES GYPSUM COMPANY

| | | | | | | | | | | | | | |
|---|------------------------------|---|-----|-----|-----|-----|-----|-----|-----|---------|--------------|---|------|
| Acoustone Type D | 9/16" | 1 | .09 | .19 | .62 | .80 | .78 | .74 | .60 | 12"x12" | 1.09 | Unpainted | 1939 |
| Acoustone Type D | 1 1/16" | 1 | .07 | .24 | .68 | .82 | .76 | .73 | .65 | 12"x12" | 1.30 | Unpainted | 1939 |
| Acoustone Type D | 1 3/16" | 1 | .11 | .38 | .79 | .81 | .77 | .82 | .70 | 12"x12" | 1.40 | Unpainted | 1939 |
| Acoustone Type D | 1 5/16" | 1 | .11 | .46 | .85 | .85 | .92 | .87 | .75 | 12"x12" | 1.48 | Unpainted | 1940 |
| Acoustone Type F | 9/16" | 1 | .07 | .17 | .56 | .88 | .82 | .83 | .60 | 12"x12" | .88 | Unpainted | 1940 |
| Acoustone Type F | 1 1/16" | 1 | .09 | .22 | .67 | .84 | .78 | .80 | .65 | 12"x12" | 1.15 | Unpainted | 1940 |
| Acoustone Type F | 1 3/16" | 1 | .09 | .34 | .82 | .91 | .81 | .86 | .70 | 12"x12" | 1.24 | Unpainted | 1940 |
| Acoustone Type F | 1 5/16" | 1 | .10 | .39 | .83 | .88 | .81 | .82 | .75 | 12"x12" | 1.46 | Unpainted | 1940 |
| Acoustone Type F | 9/16" | 1 | .07 | .19 | .60 | .85 | .84 | .78 | .60 | 12"x12" | .97 | Mill painted | 1940 |
| Acoustone Type F | 1 1/16" | 1 | .07 | .22 | .75 | .92 | .82 | .81 | .70 | 12"x12" | 1.13 | Mill painted | 1940 |
| Acoustone Type F | 1 3/16" | 1 | .14 | .31 | .86 | .87 | .78 | .77 | .80 | 12"x12" | 1.33 | Mill painted | 1940 |
| Acoustone Type F | 1 5/16" | 1 | .20 | .48 | .92 | .87 | .84 | .78 | .80 | 12"x12" | 1.54 | Mill painted | 1940 |
| Acoustone Type F | 1 3/16" | 8 | .34 | .75 | .71 | .72 | .79 | .77 | .75 | 12"x12" | 1.31 | Mill painted | 1940 |
| Perfatone, Rockwool pad, plus metal facing and pad supports, plus furring = | 1 5/8" 8" 1 1/2" 1" | 8 | .43 | .79 | .80 | .90 | .87 | .71 | .85 | 12"x24" | .93 (Pad) | Perforated enameled metal, 4608 holes per sq ft, .073" diameter. | 1939 |
| Quietone | | 1 | .10 | .22 | .56 | .69 | .66 | .69 | .55 | 12"x12" | 0.47 | Unpainted, sand finish | 1939 |
| Quietone | | 4 | .06 | .47 | .76 | .74 | .72 | .76 | .65 | 12"x12" | 0.81 | Unpainted, brush finish | 1932 |

WOOD CONVERSION COMPANY

| Material | Thickness | Mounting (See Page 5) | Coefficients | | | | | | Noise Coef. | Size of Unit Tested | Wt (lb) sq ft | Surface | Date |
|--------------------------|-----------|--------------------------|--------------|-----|-----|------|------|------|----------------|---------------------------|---------------------|-----------------------------|------|
| | | | 128 | 256 | 512 | 1024 | 2048 | 4096 | | | | | |
| Balsam Wool | 1" | 4 | .18 | .36 | .55 | .65 | .67 | - | .55 | - | | | 1928 |
| Nuwood Bevel Lap Tile | 1/2" | 6 | .12 | .19 | .30 | .40 | .40 | .51 | .30 | 12"x12" | | Scrim facing. Unpainted. | 1931 |
| Nuwood Bevel Lap Tile | 1" | 6 | .14 | .19 | .37 | .37 | .41 | .56 | .35 | 12"x12" | 1.41 | Unpainted. | 1931 |

CABLE 2

Acoustic Materials for Plastic Application

Unless otherwise stated, each sample of acoustical plaster was mixed according to the specifications furnished by the manufacturers and applied by a skilled plasterer on a false ceiling at the National Bureau of Standards. All samples of material applied with an air gun or blower were constructed at NBS unless otherwise stated. The panels were laid on the floor of the Reverberation Chamber for test.

CALIFORNIA STUCCO PRODUCTS OF NEW ENGLAND, INC.

| Material | Thickness | Coefficients | | | | | Noise Coef. | No. of Coats | Base Coat | Application | Surface Treatment | Date |
|-----------------------|-----------|--------------|-----|-----|------|------|-------------|----------------------------------|---------------------|--|-----------------------------|------|
| | | 128 | 256 | 512 | 1024 | 2048 | | | | | | |
| Stuacoustic Type A.D. | 3/4" | .18 | .36 | .65 | .62 | .62 | .55 | 1st coat 7/16" 2nd coat 5/16" | 3/4" Gypsum plaster | 1st coat applied to half green base coat. 2nd coat applied 3 hours after 1st coat. | Finished with steel trowel. | 1935 |
| | | .12 | .29 | .52 | .78 | .74 | .60 | 1st coat 1/4" 2nd coat 1/4" | 3/4" Gypsum plaster | 1st coat applied to dry base coat. 2nd coat applied 24 hours after 1st coat. | | |

THE CELOTEX CORPORATION

| | | | | | | | | | | | | | |
|-----------------------|------|-----|-----|-----|-----|-----|-----|-----|--------------------------------|------------------------------------|--|-----------------------------|------|
| Reverbolite (Regular) | 1/2" | .19 | .29 | .51 | .70 | .69 | .78 | .55 | 1st coat 1/4" 2nd coat 1/4" | 3/4" Gypsum plaster on metal lath. | 1st coat applied on dry base coat. 2nd coat applied as soon as first coat had set. | Finished with steel trowel. | 1938 |
| | | .18 | .29 | .41 | .51 | .55 | .65 | .45 | 1st coat 1/4" 2nd coat 1/4" | 3/4" Gypsum plaster on metal lath. | 1st coat applied on dry base coat. 2nd coat applied 24 hours after 1st coat. | | |

CLEVELAND GYPSUM SUPPLY COMPANY

| Material | Thick-ness | Coefficients | | | | Noise Coef. | No. of Coats. | Base Coat | Application | Surface Treatment | Date |
|---------------------------|------------|--------------|-----|-----|------|-------------|---------------|-----------|---|-----------------------------|------|
| | | 128 | 256 | 512 | 1024 | | | | | | |
| Hushkote Acoustic Plaster | 1/2" | .13 | .24 | .45 | .71 | .56 | .49 | .50 | 1st coat 1/4" Gypsum plaster on metal lath. 2nd coat 1/4" Gypsum plaster on metal lath. | Finished with steel trowel. | 1935 |
| | | .16 | .34 | .50 | .53 | .43 | .37 | .45 | 1st coat 3/4" Gypsum plaster on metal lath. 2nd coat 1/4" Gypsum plaster on metal lath. | Finished with steel trowel. | 1937 |
| | | .28 | .36 | .45 | .50 | .53 | .57 | .45 | 1st coat 3/4" Gypsum plaster on metal lath. 2nd coat 1/4" Gypsum plaster on metal lath. 3rd coat 1/4" Gypsum plaster on metal lath. | Finished with steel trowel. | 1938 |

THE DODSON MANUFACTURING COMPANY

| | | | | | | | | | | | |
|-------------------------|------|-----|-----|-----|-----|-----|-----|-----|--|---|-----------------------------|
| Dodson Acoustic Plaster | 3/4" | .15 | .25 | .30 | .35 | .34 | .26 | .40 | 1st coat 1/2" Gypsum plaster on metal lath. 2nd coat 1/4" Gypsum plaster on metal lath. | Finished with cork float and stippled to break surface film. | 1939 |
| | | .17 | .22 | .24 | .28 | .27 | .22 | .28 | .35 | 1st coat applied to half green base coat. 2nd coat applied as soon as 1st coat had taken initial set. | Finished with steel trowel. |

U. GUASTAVINO COMPANY

| | | | | | | | | | | | |
|---------------|------|-----|-----|-----|-----|-----|-----|-----|--|--|-----------------------------|
| Plastacoustic | 1/2" | .17 | .22 | .24 | .28 | .27 | .22 | .28 | 1st coat 3/4" Gypsum plaster 2nd coat 1/4" Gypsum plaster | Finished with steel trowel. | 1941 |
| | | .16 | .21 | .23 | .27 | .26 | .21 | .27 | .34 | 1st coat applied on dry base coat. 2nd coat applied 24 hours after 1st coat. | Finished with steel trowel. |

GYPSON INSULATION AND MANUFACTURING COMPANY

| Material | Thick-ness | Coefficients | | | | | | | | Noise Coef. | No. of Coats. | Base Coat | Application | Surface Treatment | Date |
|------------------------|------------|--------------|-----|-----|------|------|------|--|-----|--------------------------------|-------------------------------|---|---------------------------|-------------------|------|
| | | 128 | 256 | 512 | 1024 | 2048 | 4096 | | | | | | | | |
| Super-Acoustic Plaster | 1/2" | .12 | .24 | .45 | .71 | .62 | .63 | | .50 | 1st coat 1/4" 2nd coat 1/4" | Gypsum plaster on metal lath. | 1st coat applied to dry base coat. 2nd coat applied 24 hours after 1st coat. | Finished with cork float. | 1938 | |

HOLLYWOOD STUCCO PRODUCTS

| | | | | | | | | | | | | | | |
|------------------|------|-----|-----|-----|-----|-----|-----|--|-----|--------------------------------|-------------------------------|---|---------------------------|------|
| Acoustic Plaster | 1/2" | .10 | .22 | .42 | .78 | .78 | .70 | | .55 | 1st coat 1/4" 2nd coat 1/4" | Gypsum plaster on metal lath. | 1st coat applied to dry base coat. 2nd coat applied 24 hours after 1st coat. | Finished with cork float. | 1939 |
|------------------|------|-----|-----|-----|-----|-----|-----|--|-----|--------------------------------|-------------------------------|---|---------------------------|------|

KEASBEY AND MATTISON COMPANY

| | | | | | | | | | | | | | | |
|---------------------------|------|-----|-----|-----|-----|-----|-----|--|-----|---|---|--|---|------|
| Limpet (Sprayed Asbestos) | 3/8" | .36 | .92 | .85 | .81 | .87 | .91 | | .85 | - | - | Applied with air gun on metal lath, 5 7/8" air space back of Limpet. Same as above. | Finished with roller unpainted. | 1942 |
| Limpet (Sprayed Asbestos) | 3/8" | .43 | .91 | .82 | .67 | .62 | .61 | | .75 | - | - | Same as above. | Same as above, except spray painted 5 coats at NBS. | 1942 |
| Limpet (Sprayed Asbestos) | 1/2" | .25 | .78 | .97 | .81 | .82 | .85 | | .85 | - | - | Same as above. | Finished with roller, unpainted. | 1941 |
| Limpet (Sprayed Asbestos) | 1/2" | .27 | .75 | .90 | .75 | .80 | .88 | | .80 | - | - | Same as above. | Same as above, except spray painted 2 coats at NBS. | 1941 |
| Limpet (Sprayed Asbestos) | 3/4" | .41 | .88 | .90 | .88 | .91 | .81 | | .90 | - | - | Same as above. | Finished with roller, unpainted. | 1941 |

KEASREY AND MATTISON COMPANY (Continued)

| Material | Thickness | Coefficients | | | | | | | | Noise Coef. | Application | Surface Treatment | Date |
|---------------------------|-----------|--------------|-----|-----|------|------|------|------|-------|-------------|--|--|------|
| | | 128 | 256 | 512 | 1024 | 2048 | 4096 | 8192 | 16384 | | | | |
| Limpet (Sprayed Asbestos) | 3/4" | .49 | .90 | .93 | .86 | .81 | .82 | | | .90 | Same as above. | Same as above, except spray painted 2 coats at NBS. | 1941 |
| Limpet (Sprayed Asbestos) | 3/4" | .48 | .91 | .91 | .86 | .87 | .87 | | | .90 | Same as above. | Same as above, except spray painted 10 coats at NBS. | 1941 |
| Limpet (Sprayed Asbestos) | 5/8" | .32 | .28 | .50 | .84 | .85 | .87 | | | .60 | Applied with air gun on gypsum wall board nailed on 2x4's, 16" on centers. | Finished with roller, unpainted. | 1942 |
| Limpet (Sprayed Asbestos) | 5/8" | .38 | .26 | .67 | .77 | .72 | .61 | | | .60 | Same as above. | Same as above, except spray painted 5 coats at NBS. | 1942 |
| Limpet (Sprayed Asbestos) | 3/4" | .08 | .19 | .70 | .89 | .95 | .85 | | | .70 | Applied with air gun on gypsum wall board. | Finished with roller, unpainted. | 1941 |
| Limpet (Sprayed Asbestos) | 3/4" | .09 | .23 | .67 | .90 | .93 | .87 | | | .70 | Same as above. | Same as above, except spray painted 2 coats at NBS. | 1941 |
| Limpet (Sprayed Asbestos) | 1 1/2" | .16 | .59 | .98 | .98 | .97 | .90 | | | .90 | Same as above. | Finished with roller, unpainted. | 1941 |
| Limpet (Sprayed Asbestos) | 1 1/2" | .16 | .62 | .94 | .98 | .94 | .91 | | | .85 | Same as above. | Same as above, except spray painted 2 coats at NBS. | 1941 |

KELLEY ISLAND LIME AND TRANSPORT COMPANY

| Material | Thickness | Coefficients | | | | | | | | Noise Coef. | Base Coat | Application | Surface Treatment | Date |
|------------------|-----------|--------------|-----|-----|------|------|------|------|-------|-------------|---|------------------------------|---|------|
| | | 128 | 256 | 512 | 1024 | 2048 | 4096 | 8192 | 16384 | | | | | |
| Acoustic Plaster | 1/2" | .17 | .26 | .52 | .86 | .71 | .62 | | | 1 | Thin scratch coat gypsum plaster on metal lath. | Applied to dry scratch coat. | Stippled after plaster was partly dry. | 1942 |
| Acoustic Plaster | 1/2" | .20 | .26 | .54 | .84 | .62 | .45 | | | 1 | Same sample as above. | Same as above. | Spray painted 5 coats cold water paint. | 1942 |

NATIONAL GYPSUM COMPANY

| Material | Thickness | Coefficients | | | | | | Noise Coef. | No. of Coats | Base Coat | Application | Surface Treatment | Date |
|-------------------------------------|-----------|--------------|-----|-----|------|------|------|-------------|--------------------------------------|--|--|--------------------------------|------|
| | | 128 | 256 | 512 | 1024 | 2048 | 4096 | | | | | | |
| Acoustic Plaster (Trowel Finish) | 1/2" | .15 | .27 | .42 | .45 | .36 | .29 | .40 | 1st coat 1/4" 2nd coat 1/4" | 3/4" Gypsum plaster on metal lath. 3/4" | 1st coat applied to half green base coat. 2nd coat applied 2 hrs after 1st coat. | Finished with steel trowel. | 1936 |
| | | .17 | .27 | .52 | .76 | .66 | .55 | .55 | 1st coat 1/4" 2nd coat 1/4" | Gypsum plaster on metal lath. | 1st coat applied to dry base coat. 2nd coat applied 24 hours after 1st coat. | | |
| Acoustic Plaster (Trowel Finish) | 3/4" | .25 | .41 | .67 | .63 | .52 | .47 | .55 | 1st coat 3/8" 2nd coat 3/8" | 3/4" Gypsum plaster on metal lath. | 1st coat applied to dry base coat. 2nd coat applied 24 hrs after 1st coat. | Finished with steel trowel. | 1937 |

NEWARK PLASTER COMPANY

| | | | | | | | | | | | | | |
|--------------------------------|------|-----|-----|-----|-----|-----|-----|-----|--------------------------------------|--|--|--------------------------------|------|
| Old Newark Acoustic Plaster | 1/2" | .09 | .23 | .47 | .77 | .71 | .75 | .55 | 1st coat 1/4" 2nd coat 1/4" | 3/4" Gypsum plaster on metal lath. | 1st coat applied to dry base coat. 2nd coat applied 24 hours after 1st coat. | Finished with steel trowel. | 1938 |
|--------------------------------|------|-----|-----|-----|-----|-----|-----|-----|--------------------------------------|--|--|--------------------------------|------|

PACIFIC PORTLAND CEMENT COMPANY

| | | | | | | | | | | | | | |
|------------------------|------|-----|-----|-----|-----|-----|-----|-----|--------------------------------------|--|--|------------------------------|------|
| Calacoustic Plaster | 1/2" | .15 | .28 | .44 | .67 | .66 | .66 | .50 | 1st coat 1/4" 2nd coat 1/4" | 3/4" Gypsum plaster on metal lath. | 1st coat applied to dry base coat. 2nd coat applied 72 hours after 1st coat. | Finished with cork float. | 1936 |
|------------------------|------|-----|-----|-----|-----|-----|-----|-----|--------------------------------------|--|--|------------------------------|------|

SPRAYO-FLAKE COMPANY

| Material | Thickness | Coefficients | | | | | | | | Noise Coef. | Application | Surface Treatment | Date |
|-----------------------|-----------|--------------|-----|-----|------|------|------|------|-------|---|--|-------------------|------|
| | | 128 | 256 | 512 | 1024 | 2048 | 4096 | 8192 | 16384 | | | | |
| Spray-Acoustic Type X | 5/8" | .59 | .87 | .85 | .88 | .94 | .83 | | .90 | Applied with an air gun on metal lath. 3 5/8" air space back of material. Same as above. | Finished with a roller. Surface sprayed with coat of binder. | 1940 | |
| Spray-Acoustic Type X | 5/8" | .65 | .79 | .80 | .70 | .83 | .60 | | .80 | Same as above. | Same as above, except brush painted 4 coats at NBS. | 1940 | |
| Spray-Acoustic Type X | 1 1/8" | .18 | .52 | .95 | .93 | .91 | .87 | | .85 | Applied with an air gun on gypsum wall board. | Finished with a roller. Surface sprayed with coat of binder. | 1940 | |
| Spray-Acoustic Type X | 1 1/8" | .15 | .47 | .88 | .92 | .87 | .88 | | .80 | Same as above. | Same as above, except spray painted 3 coats at NBS. | 1940 | |

UNITED STATES GYPSUM COMPANY

| Material | Thickness | Coefficients | | | | | | | | Noise Coef. | Base Coat | Application | Surface Treatment | Date |
|-------------------|-----------|--------------|-----|-----|------|------|------|------|-------|-----------------------------|-----------------|--|--------------------------|------|
| | | 128 | 256 | 512 | 1024 | 2048 | 4096 | 8192 | 16384 | | | | | |
| Sabnite Hydraulic | 1/2" | .14 | .24 | .27 | .38 | .48 | .64 | | .35 | 1st coat 1/4" 2nd coat 1/4" | Gypsum plaster. | 1st coat applied to dry base coat. 2nd coat applied after 1st coat had set and partly dried. | Floated with cork float. | 1931 |
| Sabnite Plaster A | 1/2" | .16 | .24 | .38 | .78 | .75 | .77 | | .55 | 1st coat 1/4" 2nd coat 1/4" | Gypsum plaster. | 1st coat applied to dry base coat. 2nd coat applied 24 hours after 1st coat. | Floated with cork float. | 1935 |

UNITED STATES GYPSUM COMPANY

| Material | Thick-ness | Coefficients | | | | | | Noise Coef. | No. of Coats. | Base Coat | Application | Surface Treatment | Date |
|--------------------|------------|--------------|-----|-----|------|------|------|-------------|---|------------------------------------|--|-----------------------------|------|
| | | 128 | 256 | 512 | 1024 | 2048 | 4096 | | | | | | |
| Sabinite Plaster A | 3/4" | .13 | .27 | .59 | .81 | .74 | .85 | .60 | 1st coat 1/4" 2nd coat 1/4" 3rd coat 1/4" | 3/4" Gypsum plaster on metal lath. | 1st coat applied on dry base coat. 2nd coat applied 48 hours after 1st coat. 3rd coat applied 72 hours after 2nd coat. | Floated with cork float. | 1935 |
| | | .19 | .22 | .43 | .80 | .75 | .75 | .55 | 1st coat 1/4" 2nd coat 1/4" | 3/4" Gypsum plaster on metal lath. | 1st coat applied on dry base coat. 2nd coat applied 48 hours after 1st coat. | Floated with cork float. | 1936 |
| | | .16 | .26 | .48 | .77 | .83 | .85 | .60 | 1st coat 1/4" 2nd coat 1/4" | 3/4" Gypsum plaster on metal lath. | 1st coat applied on dry base coat. 2nd coat applied 24 hours after 1st coat. | Finished with steel trowel. | 1940 |
| Sabinite Plaster M | 3/4" | .20 | .32 | .62 | .79 | .74 | .85 | .60 | 1st coat 3/8" 2nd coat 3/8" | 3/4" Gypsum plaster on metal lath. | 1st coat applied on dry base coat. 2nd coat applied 24 hours after 1st coat. | Finished with steel trowel. | 1940 |

Table 3

Absorption per person for an audience seated in chairs of various types.

| *Seating | | 128 | 256 | 512 | 1024 | 2048 | Date |
|----------|---------------------------------|-----|-----|-----|------|------|------|
| A | Women without coats | 0.7 | 1.3 | 2.3 | 3.6 | 4.6 | 1930 |
| A | Women with coats | 1.3 | 2.4 | 4.0 | 5.8 | 6.7 | 1930 |
| A | Men without overcoats | 1.3 | 2.1 | 4.1 | 5.5 | 7.4 | 1930 |
| A | Men with overcoats | 2.3 | 3.2 | 4.8 | 6.2 | 7.6 | 1930 |
| B | Mixed audience | - | - | 3.9 | 4.7 | - | 1929 |
| B | Empty seat | - | 3.4 | 3.0 | 3.3 | 3.6 | 1929 |
| C | Mixed audience | - | 3.5 | 4.1 | 4.9 | 4.2 | 1930 |
| C | Empty seat | - | 3.0 | 2.5 | 2.9 | 3.1 | 1929 |
| D | Mixed audience | - | 2.7 | 3.3 | 3.8 | 3.6 | 1930 |
| | Plywood chair | - | 0.2 | 0.3 | 0.5 | 0.5 | 1930 |

The above absorption figures are numerically equal to the number of square feet of a material having an absorption coefficient of 1.00, which would absorb the same amount of sound energy.

- *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.

Suggestions Concerning the Proper Use
of Acoustical Material.

As there has been considerable misconception concerning the proper use of acoustical material it is considered desirable to call attention to two of the fundamental principles underlying the formulas which are used in acoustical design. It is assumed in all of the formulas that (1) the absorption is proportional to the area of the absorbing material, and that (2) there is a uniform distribution of sound energy. As a rule neither one of these assumptions is true.

It has been found from experiment when very small areas are used, such as the panels in a coffered ceiling having areas of from 1 to 4 square feet and separated from each other by a foot or more, that the effective absorption of the material in these panels is greater than when the material is installed in one large area. In fact, for materials having large coefficients, this effective absorption may be as much as 50 percent more than one would expect from the coefficient.

It has also been found when all of the acoustical material is applied on one surface of a relatively small room, say 50,000 cubic feet or under, that this creates a non-uniform distribution of sound energy in the following manner. Let us assume that the ceiling of a room is covered with a highly absorbent material. Under these conditions the sound energy which is traveling between the floor and ceiling is absorbed quite rapidly, while that traveling between the untreated wall surfaces, having very little to absorb it, may continue for some considerable time. This persistence of sound energy between the untreated surfaces may cause the measured reverberation time to be considerably longer than would be computed using the ordinary reverberation formula and the coefficient usually given. For this reason, it is essential in small rooms that the acoustical material be distributed on the side walls as well as on the ceiling, if the effective absorption of the material is to be anywhere near that which one would expect from the coefficient of the material. For further discussion of this problem see Circular C418.

We also wish to call attention to the fact that a proper distribution of the acoustical material should be worked out in the initial plans of a building, as it is frequently impossible to obtain a satisfactory distribution after the interior design has been completed without taking into account the acoustical treatment.