Reprinted from THE JOURNAL SOCIETY OF AMERICA, Vol. 31, No.5, 628-629,

Dependence of Sound Absorption Coefficient upon Area of Acoustic Materials

KOZI SATO AND MASARU KOYASU
Kobayashi Institute of Physical Research, Kokubunji, Tokyo, Japan
(Received December 23, 1958)

The dependence of the absorption coefficient on the area of the sample materials when the sound absorption is measured by the reverberation chamber was already reported in 1934 by V.L.Chrisler.[1] We investigated this relation by using our new

Table I. Dimensions of sample materials.

Length × width (m)	Area (m^2)	Perimeter / area ratio
0.91×0.60	0.54	5.60
1.21×0.91	1.10	3.85
1.82×0.91	1.65	3.31
1.82×1.82	3.31	2.20
2.73×1.82	4.97	1.83
3.64×1.82	6.61	1.65
5.46×1.82	9.96	1.46
5.46×2.42	13.2	1.19
5.46×3.03	16.5	1.03

reverberation chamber and also obtained a more extensive range of absorption coefficients than that of Chrisler.

The reverberation chamber used for this research has a volume of about 513m^3, surrounded by nonparallel walls.[2] The empty chamber absorption extends from 2.7 to 8.2 m^2 for the frequency range from 250 to 2000 cps. Sample materials were several kinds of mineral wool blankets with different thicknesses, placed on the center of the floor of this chamber. The dimensions of sample materials are shown in Table I.

In order to obtain the absorption coefficient for the sample area less than 3m^2, we followed the method that was adopted by

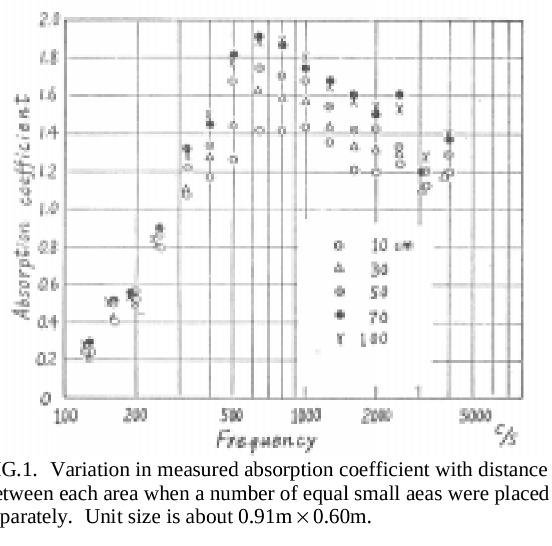

FIG.1. Variation in measured absorption coefficient with distance between each area when a number of equal small aeas were placed separately. Unit size is about 0.91m × 0.60m.

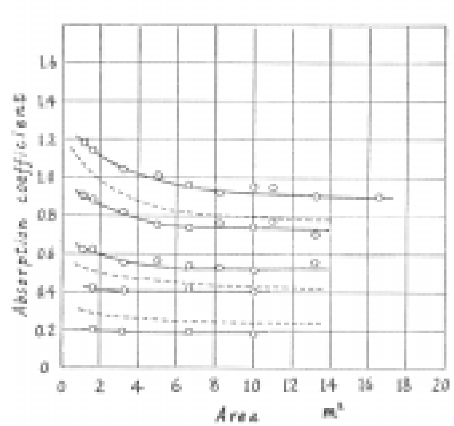

FIG.2. variation in measured absorption coefficient with area at 250 cps. Dotted lines show Chrisler's experiments.

Chrisler. That is, a number of equal small areas were placed in the reverberation chamber far enough apart from one another. As the preliminary study of this method, we investigated effect of the distance between each area on the absorption coefficient. The sides of sample materials were covered with materials which have a far lower absorption coefficient compared with the sample surface. Figure 1 shows an example of these results. For the sample area less than about 1 m^2, the measured absorption coefficient increases as the distance increases. But, when the distance becomes more than 1 m, the absorption coefficient approaches the limiting value. Thus, we took this value as the absorption coefficient corresponding to that area.

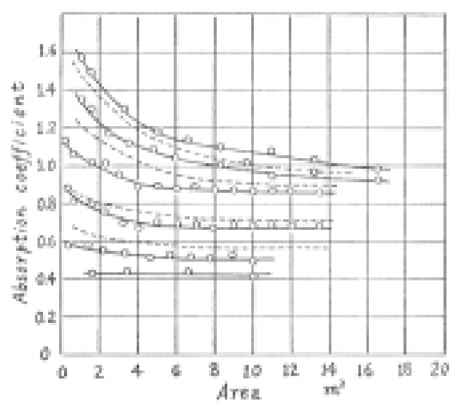

FIG.3. Variation in measured absorption coefficient with area at 500 cps.

sample area varying from 0.5 to 15 m^2 are shown in Figs.2 through 5. In these figures, the results reported in Chrisler's paper are also shown. Within the same range of absorption coefficients, these two measurements coincide fairly well with each other.

The results of measurements of the absorption coefficient with

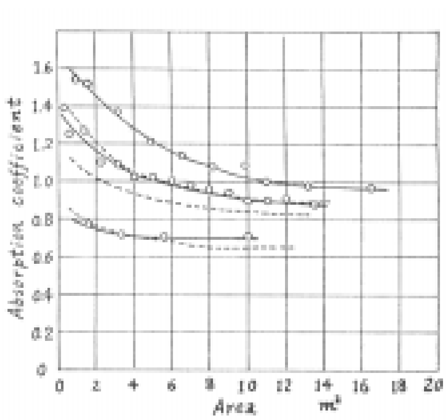

FIG.4. variation in measured absorption coefficient with area at 1000 cps.

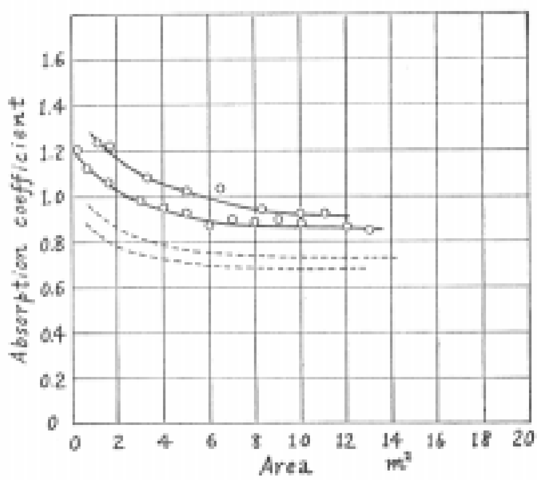

FIG.5. Variation in measured absorption coefficient with area at 2000 cps.

The details of this research will be published later in the *Bulletin of the Kobayashi Institute of Physical Research.*

1 V.L.Chrisler, J.Research Natl. Bur. Standards **13**, 169- 187 (1934).
2 K.Sato and M.Koyasu, J.Acoust.Soc.Japan **13**, 231-255 (1957).