

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON

October 10, 1929

RUBBER FLOOR TILE

This circular presents the conclusions reached as a result of various tests made on samples of rubber floor tile, together with general observations of floor tile in actual use. About 15 makes of tile, each consisting of one or more different styles or colors, were obtained from manufacturers for the purpose of determining the general properties of this type of floor covering.

In considering floor covering for any particular location several matters should be taken into consideration. One question is whether a hard type of floor such as concrete or ceramic tile would be satisfactory or whether a soft type such as rubber tile, linoleum, mastic flooring, or cork is desired. In this discussion it is assumed that the latter type is desired because of its ease on the feet, its comparative noiselessness or other properties. The general appearance of a floor is, of course, a matter of importance, but in this work that point was not given particular consideration as each of the products examined is made in a variety of color combinations to suit almost any taste. Certain properties, however, are common to all tile and the following were studied:

General characteristics such as appearance, dimensions, uniformity, type of back, hardness, and flexibility.

Resistance to abrasion.

Tendency to become permanently indented such as might be caused by furniture.

Ease of cleaning or, conversely, the tendency to retain a dirty or stained appearance.

Deterioration with age, that is, changes which take place in the appearance and physical properties due to aging and the action of light.

Methods of laying.

[Faint, illegible text, possibly a title or header]

[Faint, illegible text, possibly a signature or date]

Rubber tiling material is available in a variety of different forms. Some manufacturers make it in continuous rolls, some in the form of interlocking strips, but the majority make it in units similar to ceramic tile. Practically any shape can be produced but squares from 5 to 18 inches on a side are the most common. The usual thicknesses are 1/8, 3/16 and 1/4 inch, although in some cases it runs as high as 3/8 inch thick. Some tiles are homogeneous throughout while others have what is called a cushion back, that is, the top or wearing portion extends about half way through and the remainder consists of a backing of presumably cheaper material. In all cases noted the cushion back tiles appear to warp out of shape more than the homogeneous type, probably due to unequal expansion of the two materials. For this reason, there seems to be a general tendency among manufacturers to discontinue the production of cushion back tiling.

An examination of the samples with respect to hardness and flexibility showed that they were far from uniform; for instance, some tiles could be bent double without breaking or cracking while others of the same thickness were so firm and hard they would break if bent around a 3/4 inch diameter rod. General observation leads to the conclusion that the firm, relatively hard tiles are superior to the softer ones from the standpoint of staying in place when laid. The difference in hardness of different floor tiles is apparently not sufficient to affect the "feel" to the feet greatly.

The resistance to abrasion or wearing quality is naturally of interest to persons contemplating the purchase of rubber tile. This is a property which will vary with different makes; and tests show that some tiles are two or three times as good as others in this respect. However, for most uses it is not believed that the purchaser need concern himself particularly with abrasive wear as soft types of flooring in general and rubber tile in particular seldom actually wear out from this cause. In locations subject to very heavy traffic, of course, abrasive wear might be a feature of considerable importance. The actual relation between rubber tile and other flooring materials under such conditions naturally depends upon the specific products compared, but generally speaking, the life of rubber tile should be equal to or greater than other types of soft floors.

In addition to the actual wearing off of the surface due to an abrasive action, it has been observed that the surface of tile which is exposed to the weather or which is frequently washed gradually becomes uneven due to the wearing away of the different colored compounds at different rates. This condition is not limited to rubber tile but is often noted in stone and other hard floors. A partial remedy, at least, consists in avoiding the use of strong cleansing solutions.

The tendency of a floor covering to retain permanently depressions caused by furniture, etc., is of importance. Tests were made by pressing balls of different sizes into the surface of samples, maintaining this condition for long periods and noting the permanent deformation. It was found to vary several hundred per cent among the different brands of tile and almost this much among different colors of the same make. No samples were entirely free from permanent indentations under the test conditions. It may be said that rubber tile, in general, compares favorably with other types of soft floor coverings in its resistance to permanent indentation.

The ease of cleaning or, conversely, the tendency to retain a dirty or soiled appearance is an important consideration with most floors. This involves the resistance of the material to staining agents and also the character of the surface. For instance, some rubber tiles and other flooring materials as well are treated to give a very smooth and relatively hard glossy surface. Such a surface has little tendency to collect dirt, is apt to be non-absorbent, and is easily cleaned. Some rubber tiles were found to contain waxes which formed a thin coating on the surface. One of the purposes of compounding wax in rubber compounds is to make them resistant to sunlight checking and the absence of checking in sunlight was found to be characteristic of those tiles having a waxy deposit on the surface. However, some of the waxy surfaces are not satisfactory from the standpoint of soiling as dirt sticks badly and can not easily be cleaned off. Rubber itself is noted for its nonabsorbing characteristics and when used in the manufacture of tile this property is retained to a large extent. In general, rubber tile is resistant to acids and alkalis but not to most oils. The necessary filling materials and colors incorporated in the tile usually affect the staining characteristics so that specific statements as to staining are not possible. All the rubber tiles tested, however, would be classed as very resistant to acids and alkalis and to staining in general although in many cases prolonged contact with them caused stains, color changes, or swelling.

One criticism of rubber tile which has been brought to the attention of the bureau is that it sometimes has an offensive odor. This is a feature which may easily be avoided in manufacture as it is not characteristic of rubber itself, but is due to some ingredient used in compounding. Most rubber tile is practically odorless.

Deterioration of some rubber articles with age has been observed by most persons and rubber tile being a rubber product may have this characteristic if not properly made. However, due to the fact that rubber tile is not subject to stretching or distortion when once in place the result is not as serious as with rubber articles such as tires, gloves, or rubber bands.

The action of sunlight on rubber tile is illustrated by the results of tests of 60 samples which were exposed near an east window for six months. An examination at the end of this period showed that every sample had lost its gloss and in most cases the surface had "chalked" as is often observed on painted surfaces exposed to sunlight. In addition most of the colors had faded to a greater or less degree and in several cases there was surface checking. It has been observed in this and in other cases that surface checking is much more apt to take place with light shades of tile such as white, yellow and light blue than with darker shades. Black tile or the black portions of mottled tile seldom show any indication of checking. Similar samples of tile protected from the light showed no visual sign of deterioration. The glossy surfaces were not impaired and there was no indication of checking. Doubtless there is a slow deterioration of the tile as a whole with age whether in sunlight or not. This would lower the abrasive resistance but the factor of safety in this respect is evidently large so that rapid surface wear due to aging is infrequent.

Inasmuch as it appears that surface checking may occur to a greater or less extent with even the best grades of tile, it is well to choose colors which resist checking and also color combinations which make any checking which does occur inconspicuous. This means the selection of the darker shades and, wherever permissible, mottled combinations rather than plain colors.

Methods of laying rubber tile are difficult to study by laboratory means. An observation of tile in use and the experience of manufacturers and users leads to the conclusion that the laying is a very important part of any rubber tile installation. Aside from ordinary irregularities such as poor joints, the most frequent cause of trouble with rubber floor tile is its tendency to come loose from the floor. The cure for this trouble would appear to be the development of a better adhesive than is used at the present time and until this has been accomplished, it is recommended that consideration be given to the following points:

Use relatively hard, firm tile.

Use homogenous rather than cushion back tile unless it is shown that the expansion of the tile will not cause warping.

Make sure that the sub-floor is free from irregularities and dry, and that it will remain dry.

See that there are no open joints between the tiles.

Follow the manufacturer's instructions in regard to cleaning and care.

Conclusions reached as a result of this investigation may be summarized as follows:

Relatively hard, firm types are recommended rather than soft flexible ones and homogeneous tiles rather than those with a cushion back. From the standpoint of permanence of color and general appearance, use dark mottled colors. For ease of maintenance, a smooth glossy surface is desirable. Particular note should be made of any tendency for wax to come to the surface. Rubber tile in general compares very favorably with other types of soft floors in its resistance to wear and to permanent indentation. In any floor tile installation details in regard to laying should be given careful consideration.

