



washing
and
stretching
marquisette
curtains

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The Story in Brief . . .

Stretching marquisette or lace curtains after they have been washed has long been a problem to the housewife. General directions say, "Reshape the curtain to its original dimensions." However, these instructions do not take into consideration such things as shrinkage of material and strength of the fabric.

Results of a study at this Experiment Station show that very often, "reshaping to original dimensions," leads to tearing the curtain. In arriving at this conclusion, the researchers uniformly washed and dried curtains of cotton and rayon fabric and then shaped the curtains on stretchers at two different tensions.

In finding the results on how curtains should be stretched, the observers also noted the quickest way to pin curtains on stretchers, whether or not machine washing damages curtains, how much curtains will shrink when washed, and how curtain shrinkage influences curtain dimensions during stretching.

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Some Pointers on Laundering Curtains

The laundering of cotton and rayon marquisette panel curtains can be relatively simple, and a careful handling of the curtains can prolong their use. Unfortunately, information on laundering of a specific curtain material is rarely given to the consumer. Because of this lack of information, differences in the fabrics and the effect of conditions of use, one must rely largely upon judgment as a guide for the procedure to follow. Here are some suggestions which may prove of interest and help to homemakers, especially those inexperienced in laundering curtains.

The strength of the fabric (the extent of deterioration) should be considered in deciding whether to hand wash or machine wash curtains. It is possible to hand wash curtains with less agitation and strain on the fabric, but hand washing requires good procedures the same as machine washing.

When curtains are machine washed, regardless of the type machine used, containers for curtains, such as the mesh bags used in commercial laundering, will help to protect the fabric in the washing and also eliminate the handling of individual curtains.

An ample supply of water in hand or machine washing is desirable for best soil removal.

The wash period for curtains should be as short as possible and still get

the fabric clean. Unless the curtains have become water stained or are extremely soiled, the soil is largely a surface soil that is quickly removed in washing.

Over-stretching should be avoided. The dimension to which a curtain should be stretched will be influenced by shrinkage and the characteristics of the particular fabric. In any case, the dimensions may need to be reduced as the curtain becomes weakened from use. While a better appearance might be had along the sides and ends by stretching the curtain to a larger dimension, it may be necessary to sacrifice something in appearance in order to have longer service from the curtains.

When a short curtain or sash curtain is dried on stretchers, attaching it at the corners first may be sufficient; but for long panels pinning them down at one or several points between corners will help to distribute the strain on the fabric as well as to space the fullness more evenly.

Although it is usually desirable to obtain a maximum length in a panel curtain, reducing width will likely not overcome the loss of length due to shrinkage. For a smooth pin-line along the ends as well as the sides, a certain balance in tension crosswise and lengthwise is necessary.

Washing and S-t-r-e-t-c-h-i-n-g Marquisette Curtains

By DOROTHY SAVILLE
Home Economist

The directions for laundering marquisette or lace curtains frequently state, "Wash by hand in lukewarm water and mild soap. Take measurements of the curtain before washing and reshape it to the original dimensions."

The first point "wash by hand," is a general direction. It provides for maximum safety of all materials under the widest possible variety of washing conditions. But it is more work, and not always necessary.

Whether washing is done by hand or machine depends upon the type of fabric, its degree of deterioration, and the washing facilities available. Spun glass curtains are generally washed by hand, but machine washing may be possible for curtains of any of the other fibers that are now used for curtain fabrics.

Curtains of nylon, Orlon and Fiberglas do not require shaping in drying; but shaping on stretchers is usually desirable if not always essential for marquisettes of cotton, rayon and cellulose acetate. However, the directions "Take measurements of the curtain before washing and reshape it to the original dimensions" cannot be followed with safety. This was shown by the results of a study recently completed at this Experiment Station and reported in this bulletin. To obtain the information, curtains were washed by hand and by machine and were shaped on curtain stretchers at two different tensions.

Fabrics Tested

Curtains were made from two cotton and two rayon permanent finish marquisettes which were considered typical of such fabrics available at the time. For convenience, they are referred to as C-1, C-2, R-1 and R-2. They were all 63 inches long. The cottons were 37 inches wide. The rayons designated as R-1 were 41½ inches and the others, R-2, were 42 inches wide.

Washing Procedure

Two panels of each fabric were hand washed, and two were machine washed. One panel washed by each procedure was shaped to a dimension obtained by high stretching, referred to in this discussion as high tension, and the other was shaped to a dimension which would give an acceptable appearance without excessive stretching (medium tension).

The curtains washed by machine were placed in net laundry bags (Figure 1), four panels to a bag, and washed in an agitator-type machine. Two bags of curtains made up a load. A synthetic detergent was used. The temperature of the suds and rinses was 100 degrees F., which is a lukewarm temperature.

The curtains were washed 10 minutes in both hand and machine washing, and were put through two rinses of 1 minute each. This wash period was longer than would ordinarily be necessary, but was used for the purpose of getting more wear due to laundering. The



Fig. 1.—Standard laundry bags were used in washing the curtains. The open mesh permits free movement of water through the curtains and reduces the “wear and tear” on the fabric. Mesh bags that are made for home laundering or other loosely woven bags are suitable containers for curtains to be washed by machine.

curtains were laundered 10 times before strength tests were made on the fabrics.

After the last rinse, all of the curtains were put through a spin-drier for the same length of time to try to have uniform moisture remaining in the curtains. The panels were shaped and dried on pin-type curtain stretchers.

Drying Procedure

The curtains were put on stretchers by first attaching the four corners in the order: Left top, right bottom, right top, and left bottom (Figure 2). Then the left end, right end, bottom and top. This order was followed principally because of the positions at which measurements of tension were made.

To get a measure of the pull exerted on the fabric in the shaping

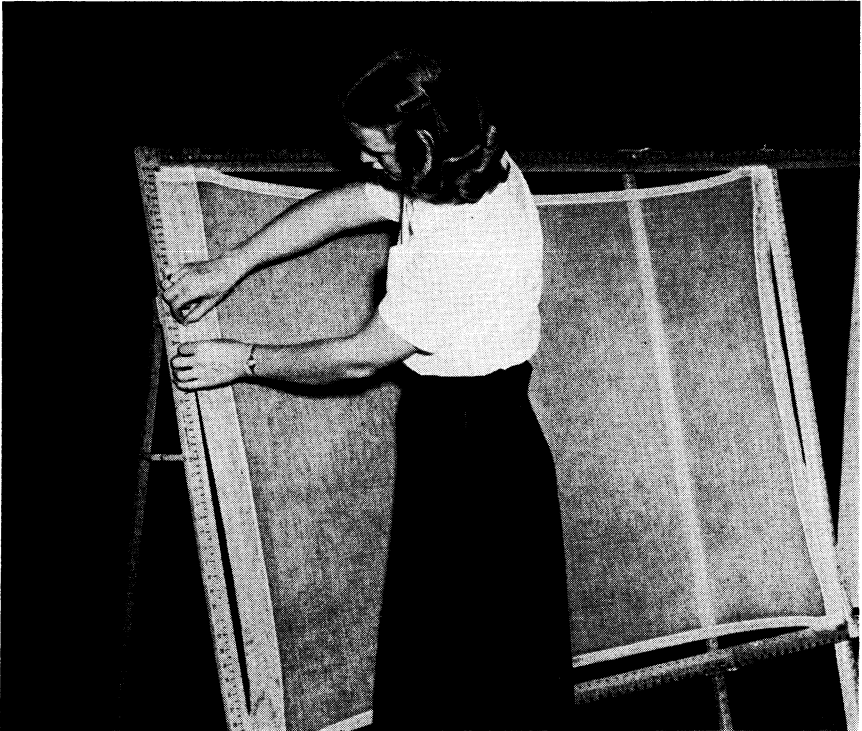


Fig. 2.—The curtains were fastened at the four corners first. The left end was pinned down next as shown in the picture, then the right end, bottom and top.

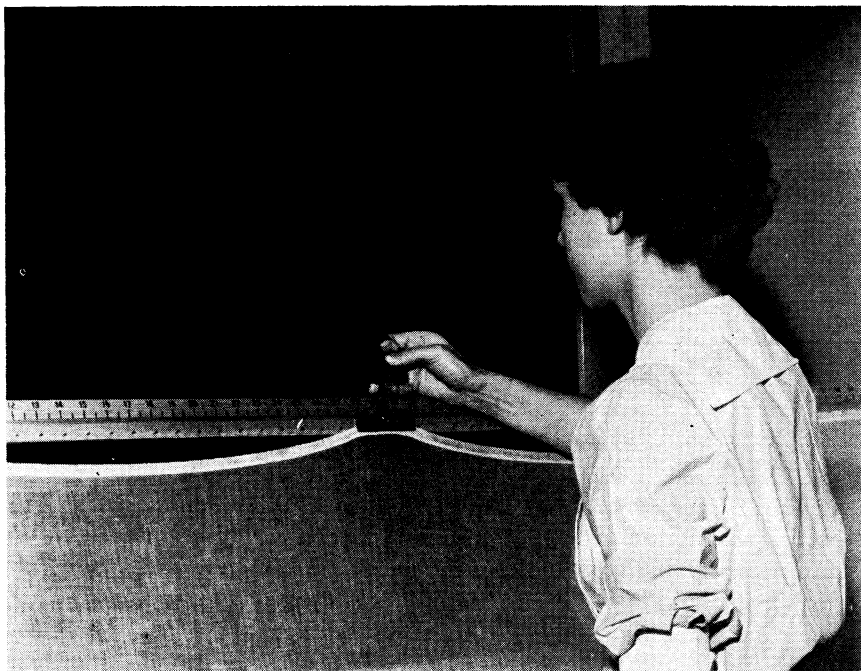


Fig. 3.—To get a measure of the pull at certain positions on the curtain in shaping it to the desired dimensions, a 3-inch clamp was fastened to the edge of a hem. A spring scale of 8-lb. capacity was fastened to the clamp to measure the pull necessary to bring the edge of the curtain to the pin line on the stretcher.

of the panels, a special clamp 3 inches long was fastened to the edge of the curtain at specific positions. Then the pull necessary to bring the curtain edge to the pin line was measured by a spring scale of 8-pound capacity (Figure 3).

Although the greater part of the work of laundering curtains is in the shaping, washing by machine may save work if not time. When washing by machine, only a little more work is required to wash six or eight panels than to wash two; but the work of washing by hand increases with each additional curtain handled.

The shaping of curtains for drying is the major work of laundering. In view of this fact, the time and work of putting a curtain on a stretcher was given special study. What is referred to here as the

Table I.—Time Required for Putting A Panel Curtain on Stretcher by Different Methods.

| Person | Method | Time | |
|---------------|--|------|------|
| | | Min. | Sec. |
| Experienced | 1-pin, working clockwise | 4 | 10 |
| Experienced | 1-pin, working counterclockwise | 3 | 58 |
| Experienced | 2-pin, working clockwise | 3 | 14 |
| Experienced | 2-pin, working counterclockwise | 2 | 55 |
| Inexperienced | No direction (used unsystematic 1-pin method) | 6 | 52 |
| Inexperienced | 2-pin, systematic procedure working counterclockwise | 3 | 23 |

2-pin method was developed in a previous project, but it was improved upon through a motion study of the procedure.*

The order of procedure in putting panels on stretchers in the improved method was as follows: Right top corner, left bottom corner, left top corner, and right bottom corner. Starting at the right bottom corner, work up the right end, across the top, down the left end and across the bottom.

There would be fewer motions if the two corners were fastened at one end before moving to the other end; but a larger bulk of material has to be held in the hands than when one corner at each end is attached first.

One side rather than one end was pinned down last. Because of the weave in marquisette, any tears from the pins on the stretcher are more likely to occur along the ends (breaking of filling yarns) than along the sides.

The time required to put a panel on a stretcher by different methods is shown in Table I. It will be noted that the 2-pin method is faster for both the experienced and inexperienced person. Figures 4 and 5 show how the curtain is held in both the 1-pin and 2-pin methods. A left-handed person probably would find it faster to work from left to right or clockwise, since it was easier and faster for a right-handed person to work from right to left, holding the loose edge of the curtain in the left hand.

The 2-pin method was not only faster, but it required less work than the 1-pin method. No attempt was made to check the individual

* Acknowledgment is made to Mrs. Ruth C. Whitehouse, Assistant Professor, Department of Home Life, Oklahoma A. & M. College, for direction of the motion study.

movements of the workers' hands, but as soon as the corners were fastened down, the number of motions in the 2-pin method were about half as many but slightly longer than those used in the 1-pin method. The 2-pin method is as easily learned as the 1-pin method, and involves a very simple technique of holding the fabric and pressing it over the pins.

Dimension of Panels

The dimensions of the curtains in drying were determined on the basis of a common tension for the curtains of all fabrics. Some of the fabrics might have been shaped to a greater dimension than others because they could be stretched more without tearing. The tensions readings varied considerably throughout the launderings and especially through the first ones, but no changes were made in the dimensions after the fifth washing regardless of change in tension readings. The tension at the center of the panels lengthwise and crosswise is shown in Table II as an average of the eighth and tenth washings.

The attempt to have the panels of all fabrics under the same tension for drying at each washing was unsuccessful, as the results in Table II show. Change in dimensions through successive washings and difference in the rate of drying as the curtains were being put on stretchers undoubtedly affected the tension of the curtains as they were being shaped on the stretchers at different washings.

The sizes of the panels when put on stretchers at high and medium tensions are given in Table III. The size of a panel when shaped under the two tensions differed no more than 1 inch either lengthwise or crosswise, yet the difference in tension was about 3 pounds. This difference in tension is significant in view of the low crosswise strength of many marquisettes.

Table II.—Maximum Tension on Panels Shaped and Dried Under High and Medium Tensions.

(Average of 8th and 10th launderings)

| Fabric No. | Tension in pounds | | | |
|------------|-------------------|--------|-----------|--------|
| | Lengthwise | | Crosswise | |
| | High | Medium | High | Medium |
| C-1 | 5.00 | 1.75 | 6.25 | 3.00 |
| C-2 | 4.50 | 1.50 | 5.75 | 2.50 |
| R-1 | 4.25 | 2.00 | 5.00 | 2.50 |
| R-2 | 4.50 | 2.00 | 6.00 | 3.00 |

Table III.—Dimension of Panels Shaped and Dried Under High and Medium Tensions.

| Fabric No. | Length in inches | | | | Width in inches | |
|------------|------------------|--------------------------|----------------|----------------|--------------------------|----------------|
| | Before washing | After washing and drying | | Before washing | After washing and drying | |
| | | High tension | Medium tension | | High tension | Medium tension |
| C-1 | 63 | 62 | 61 | 37 | 35 | 34 |
| C-2 | 63 | 61½ | 60½ | 37 | 36½ | 36 |
| R-1 | 63 | 59½ | 58½ | 41½ | 38 | 37½ |
| R-2 | 63 | 62½ | 61½ | 42 | 39½ | 38½ |

Strength of Fabrics

In these marquisettes, which of course were not weakened from exposure, machine washing was found to reduce strength no more than hand washing. In a previous study of marquisette curtains, cotton fabrics having a filling (crosswise) dry strength as low as 5 pounds and rayons with 6.5 pounds showed no apparent damage from machine washing.* The crosswise tension on the fabrics in shaping them on stretchers in this study was 5 pounds or more at the high tension, therefore over-stretching curtains in shaping them on stretchers may be greater cause of damage than machine washing.

The wet strength of the cotton fabrics was as good or better than dry strength, but the rayon marquisettes were only about half as strong when wet as when dry. Since the filling strength of the dry rayons was double that of the cottons, the wet strength of the two was much the same.

The filling strength of the marquisettes was much lower than warp strength (Appendix Tables I and II). It is the filling strength which is of most importance in determining how much a marquisette curtain can be stretched in length as well as in width. It influences the length, for the pull over the pin points at the ends of the curtain is on the filling yarns. In laundering these curtains, no pin point tears occurred along the sides, but in a few cases there were small tears at the ends as shown in Figure 6. The pull over the pin points at the sides is on the warp yarns which appear in pairs in marquisettes, and therefore pin point tears do not occur at the sides as they do at the ends of a curtain. A look at fabric C-1 will show that at the high tension the

* D. Saville. OAES Manuscript Report No. MR-3. *Curtain Marquisettes: A Test of the Serviceability of Different Fibers and Finishes.* 1950, p. 22. Oklahoma A. & M. College Library.



Fig. 4.—A close-up view of the way in which the curtain was held in putting it on a stretcher by the I-pin method. Note that the loose material was held in the worker's left hand; the right hand was used only in fastening the edge over the pins. If one is left handed, the procedure will probably be the reverse.



Fig. 5.—In the 2-pin method the curtain was held in the same way as in the 1-pin method, except that the hands were farther apart. By holding the edge of the curtain in this manner, it can be slipped over two pins at one time, thus reducing the number of movements of the hands and the time necessary to put the curtain on the stretcher.

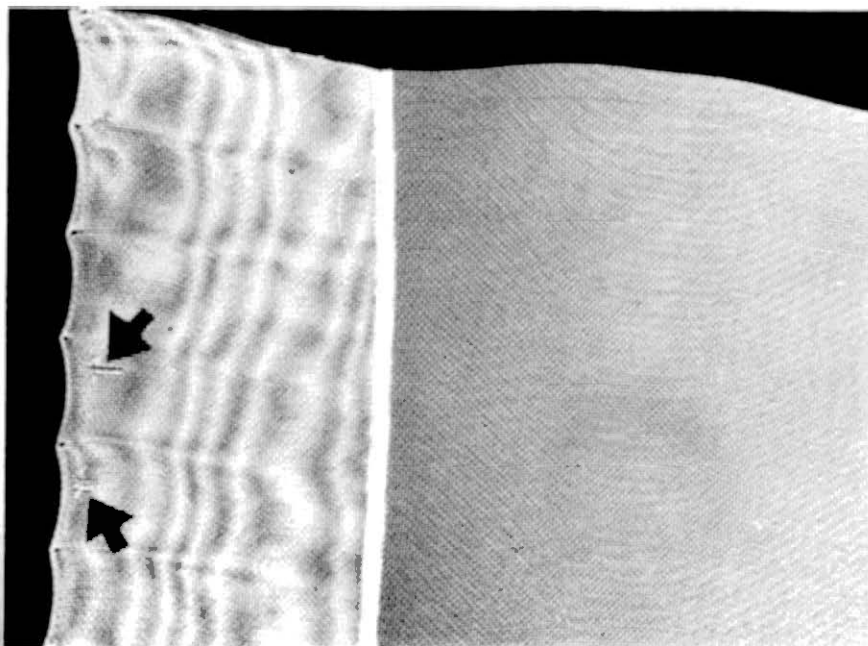


Fig. 6.—The bottom hem of this curtain shows two small tears (arrows). These tears were the result of too much tension on the fabric where it was fastened over the pins of the stretcher in a previous washing. Over-stretching is likely to cause such damage, especially at the top and bottom hems, even in new marquisettes.

pull lengthwise was 5 pounds as compared with a warp strength of 25 pounds, but the pull crosswise was over 6 pounds with a filling strength of only $9\frac{1}{2}$ pounds.

Shaping and drying curtains under high tension did not reduce their strength any more than did shaping and drying under lower tensions. It appears from the results that a curtain may be stretched to some point below that at which there will be actual breakage of yarns over the pin points or elsewhere. The extent to which the curtains could be stretched under similar tensions varied as shown in Table III.

Shrinkage

Since marquisette curtains would rarely be washed even as long as 10 minutes at one washing, the total shrinkage of a cotton or rayon curtain might not be expected to occur until after several washings. Later washings might necessitate a reduction in dimension to which the curtain should be stretched, due to additional shrinkage.

To find the shrinkage of the fabrics without tension, samples of the fabrics were prepared as for standard tests and washed along with the curtains for five washings. The pieces were pressed flat without tension. Cotton and rayon marquisettes generally have high shrinkage as compared with other fabrics, even when they are treated in the finishing to reduce shrinkage. All of the fabrics had high shrinkage in at least one direction, as shown in Table IV.

Neither the cottons nor the rayons were alike in both warp and filling shrinkage. Both cottons had the same warp shrinkage, but one had nearly twice as much filling shrinkage as the other. The rayons had the same filling shrinkage but differed in warp shrinkage. There was no indication of the amount of shrinkage to expect in any of the marquisettes, nor any indication that they would be so different in shrinkage. Most of the shrinkage occurred in the first washing, but shrinkage continued through successive washings.

When pieces 18 x 18 inches of each of the four marquisettes were hemmed, laundered and shaped out to original size, only R-2 withstood the strain without tearing, and it required extremely careful handling. None of the curtains could be put on a stretcher the dimensions of the unlaundered curtain, but R-2 could be shaped to a larger dimension than any of the other marquisettes, although the tension on it was very high.

Since none of the panels could be shaped to their original measurements without damage, directions for laundering marquisette curtains such as these should not state, "Shape the curtain to its original dimension." In fact, since none of the marquisettes had the same shrinkage in both warp and filling and could not be shaped to the same dimensions when under similar tension, the same directions regarding dimensions could not apply equally well to all four fabrics.

Table IV.—Shrinkage of Marquisette Fabrics When Washed and Dried Without Tension.

(Measurement given in percent of original length)

| Fabric No. | WARPSWISE | | | | | FILLINGWISE | | | | |
|------------|-----------|----------|----------|----------|----------|-------------|----------|----------|----------|----------|
| | 1st wash | 2nd wash | 3rd wash | 4th wash | 5th wash | 1st wash | 2nd wash | 3rd wash | 4th wash | 5th wash |
| C-1 | 3.5 | 4.2 | 4.2 | 4.2 | 4.5 | 12.9 | 13.9 | 14.6 | 15.6 | 16.0 |
| C-2 | 3.1 | 4.2 | 3.8 | 4.2 | 4.5 | 6.6 | 7.3 | 8.0 | 8.0 | 8.7 |
| R-1 | 9.7 | 11.5 | 11.8 | 11.8 | 11.5 | 11.1 | 11.1 | 12.5 | 12.5 | 12.2 |
| R-2 | 3.8 | 4.5 | 5.2 | 5.6 | 5.6 | 10.4 | 10.4 | 11.1 | 12.5 | 12.2 |

Summary

Panel curtains were made from two cotton and two rayon marquisettes. Half of the curtains were washed by machine; half by hand. The curtains were shaped on pin-type stretchers at two tensions, one as high as was considered safe without tearing the fabric and the other high enough to give a satisfactory appearance.

The conclusions in brief are:

1. Machine washing caused no more damage to the fabrics and reduced strength no more than hand washing.

2. Stretching under high tension in drying did not reduce the strength of the fabrics but did cause some breakage of crosswise yarns at the pin points along the ends of the curtains.

3. A systematic procedure for placing curtains on stretchers resulted in a saving of both time and motion.

4. Shrinkage varied greatly and was not alike for any two fabrics.

5. The difference in length and width of the curtains at the two tensions was no more than 1 inch for any fabric, but the difference in tension was 3 pounds or more. This difference in tension is sufficient to cause damage to a marquisette curtain low in strength.

6. None of the curtains could be shaped to their original measurements after being washed.

APPENDIX: Breaking Strength Data

Tables I and II give breaking strength of the fabrics but not of yarn. Since all of the laundered fabrics had more yarns per inch than the unlaundred, due to shrinkage, their strength was higher than it would have been otherwise. A calculated yarn strength may be obtained by dividing the fabric strength by the corresponding figure for yarns per inch as given in the tables.

Appendix Table 1.—The Breaking Strength of Marquisette Curtains Before Laundering, and After Washing by Machine and by Hand.

| Fabric No. | Method of washing | No. of yarns per inch | | Breaking strength in pounds (strip method) | | | |
|------------|-------------------|-----------------------|---------|--|---------|------|---------|
| | | | | Standard conditions | | Wet | |
| | | Warp | Filling | Warp | Filling | Warp | Filling |
| C-1 | Unlaundred | 46.1 | 27.5 | 24.8 | 9.4 | 28.1 | 9.9 |
| C-1 | Machine | 50.0 | 28.2 | 24.8 | 9.6 | 27.0 | 9.6 |
| C-1 | Hand | 50.4 | 28.4 | 24.3 | 9.5 | 27.9 | 10.2 |
| C-2 | Unlaundred | 50.4 | 27.0 | 26.3 | 8.8 | 30.1 | 9.1 |
| C-2 | Machine | 54.3 | 28.0 | 25.9 | 8.9 | 25.6 | 9.4 |
| C-2 | Hand | 53.7 | 28.0 | 26.1 | 9.0 | 26.3 | 8.6 |
| R-1 | Unlaundred | 44.0 | 28.0 | 29.0 | 17.1 | 14.4 | 8.2 |
| R-1 | Machine | 49.1 | 30.2 | 29.4 | 18.1 | 14.8 | 8.4 |
| R-1 | Hand | 49.0 | 30.3 | 28.0 | 17.7 | 14.6 | 8.4 |
| R-2 | Unlaundred | 53.7 | 31.0 | 33.7 | 19.1 | 17.2 | 10.5 |
| R-2 | Machine | 57.3 | 31.8 | 32.5 | 18.7 | 17.7 | 11.0 |
| R-2 | Hand | 57.3 | 31.7 | 31.8 | 18.6 | 16.4 | 11.0 |

Appendix Table II.— The Breaking Strength of Marquisette Curtains Before Laundering and After Washing and Drying at Two Tensions.

| Fabric No. | Tension in drying | No. of yarns per inch | | Breaking strength in pounds (strip method) | | | |
|------------|-------------------|-----------------------|---------|--|---------|------|---------|
| | | | | Standard conditions | | Wet | |
| | | Warp | Filling | Warp | Filling | Warp | Filling |
| C-1 | Unlaundred | 46.1 | 27.5 | 24.8 | 9.4 | 28.1 | 9.9 |
| C-1 | High | 49.9 | 28.1 | 24.4 | 9.3 | 28.0 | 9.8 |
| C-1 | Medium | 50.5 | 28.5 | 24.7 | 9.8 | 27.0 | 10.0 |
| C-2 | Unlaundred | 50.4 | 27.0 | 26.3 | 8.8 | 30.1 | 9.1 |
| C-2 | High | 53.8 | 27.9 | 26.2 | 8.7 | 25.9 | 8.8 |
| C-2 | Medium | 54.1 | 28.0 | 25.8 | 9.2 | 25.9 | 9.2 |
| R-1 | Unlaundred | 44.0 | 28.0 | 29.0 | 17.1 | 14.4 | 8.2 |
| R-1 | High | 48.2 | 30.0 | 28.4 | 17.8 | 14.4 | 8.3 |
| R-1 | Medium | 49.9 | 30.5 | 29.0 | 17.9 | 15.0 | 8.5 |
| R-2 | Unlaundred | 53.7 | 31.0 | 33.7 | 19.1 | 17.2 | 10.5 |
| R-2 | High | 56.7 | 31.5 | 31.7 | 18.5 | 17.1 | 10.9 |
| R-2 | Medium | 58.0 | 32.0 | 32.7 | 18.7 | 17.0 | 11.1 |