ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 9, Issue 5 , May 2022

Analysis of Factors Affecting the Pile Strength of Terry Fabrics

Mamadalieva Dildora, Karimov Rahimjon, Alieva Dilbar, Izatillaev Muzaffarxon

Namangan engineering and technology instute, doctoral student
Namangan engineering and technology instute, associate professor
Namangan engineering and technology instute, associate professor
Namangan engineering and technology instute, assistant

ABSTRACT: In this paper, the linear densities of warp and weft yarns, their densities per unit of measurement, the effect of the fiber content of the yarns on the pile strength of terry fabrics were determined on the basis of calculations and the obtained values were analyzed.

KEYWORDS: strength, linear density, yarn, terry fabric, ground warp yarn, pile warp yarn, weft yarn, sample, density.

I. INTRODUCTION

Today, terry towels are one of the most exported textile products in our country.

It is known that the quality of terry fabrics and finished products made of them in the country must meet the requirements of the interstate standard (GOST 11027-2014). [1]

Paragraphs 3,3,7 of the standard specify the strength of the piles in connection with the fabric, the norm of which is at least 49.05 sN or 50 gr.k.

The strength of terry fabric piles is mainly influenced by the linear densities of the warp and weft yarns, their densities per unit of measurement, and the fiber content of the yarns. If the thicknesses of the yarns used for the manufactured fabrics and their densities per unit of measurement are not commensurate with each other, the normative conditions of strength in the separation of terry fabrics and the pile of the finished product from the fabric base may not be met.

The difference between terry fabrics and fabrics is in the use of a separate pile warp yarn to form piles in terry fabrics. Figure 1-2 shows a diagram of the cut of terry fabrics on the warp and weft yarns.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 9, Issue 5 , May 2022

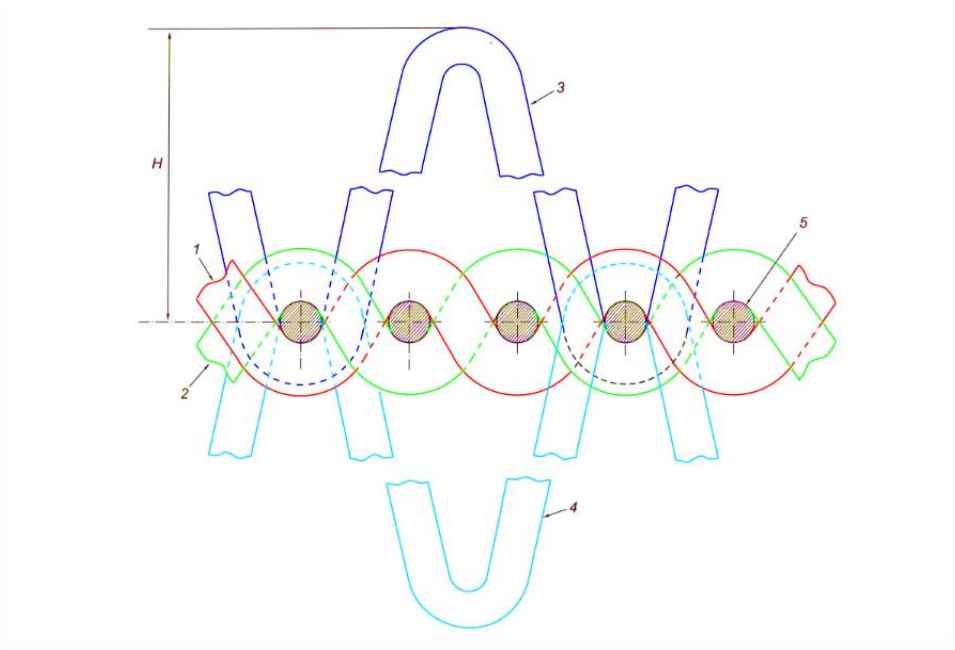

Figure 1, Scheme of formation of terry fabrics, section cut the weft yarn.

In Figure 1, the diameters of the 1,2-ground warp yarn, 3,4-piles warp yarn, 5-weft yarn, $d_i^{з.т}$,$d_i^{т.т}$, $d_i^{а}$ -ground warp and weft yarns. A-the distance between the weft yarns.

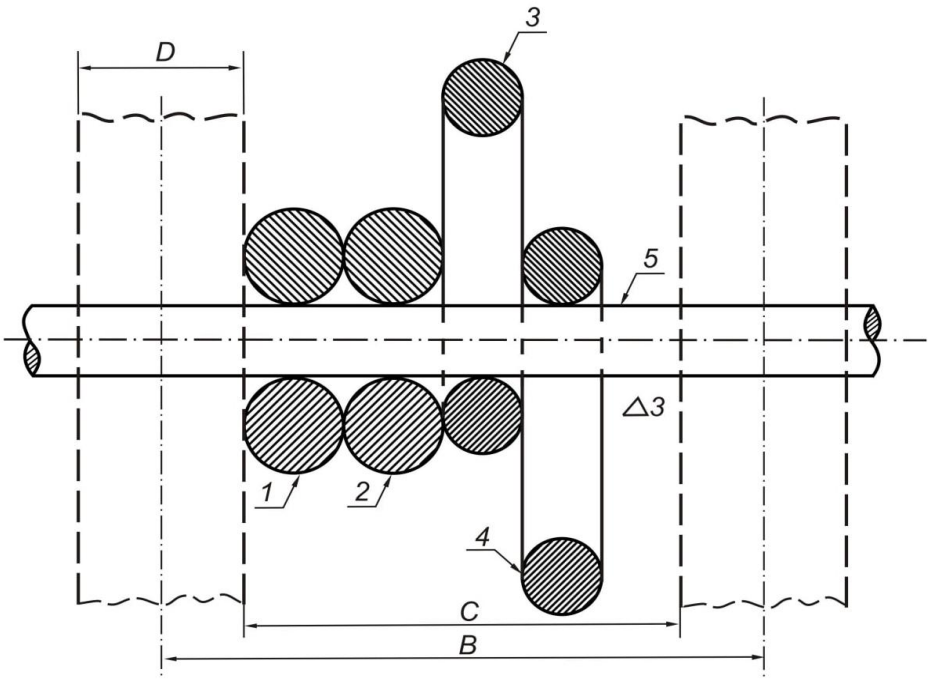

Figure 2, Schematic of the formation of terry fabrics, cross-section of pile and ground warp yarns.

In Fig. 2, the 1,2-ground warp yarn, the 3,4-pile warp yarn, the 5-weft yarn, D-the thickness of the reeds, B-the distance between the centers of the reeds, S-the distance between the of the reed.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 9, Issue 5 , May 2022

The parameters of weaving of terry fabrics for towels produced by Art Soft Tex LLC in Namangan are given in Table 1:

Table 1

№	Used yarns	Linear density of yarns		Reed number	The number of yarns in 1 cm
		Nm	Tex		
1	Ground warp	34/2	20/2	55.0	11.0
2	Pile warp	27/1	37.03	55.0	11.0
3	weft	27/1	37.03		16.0÷22.0

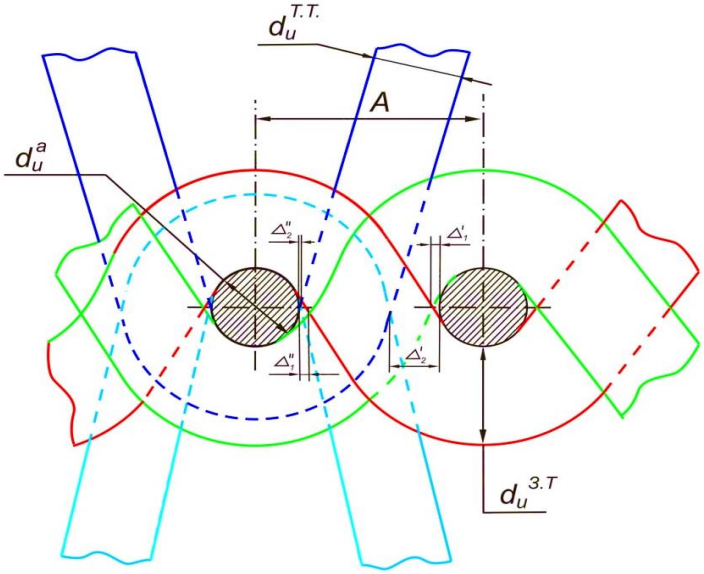

Figure 3 is a schematic of the magnification of the structure of the terry fabric.

In Fig. 3, the diameter of the $d_i^{3.m}$-ground warp yarns, the diameter of the $d_i^{m.m}$ -pile warp yarn, the diameter of the d_i^a -weft yarn, the distance between the centers of the A-two weft yarns.

$\Delta_1 = \Delta_1' , \Delta_1''$- the distances to the right and left between the ground warp and the weft yarns,

$\Delta_2 = \Delta_2' + \Delta_2''$- right and left distances between the pile and the weft yarns

Figure 3 shows an enlarged diagram of the structure of the terry fabric in units of scale along the weft. The diameters of the yarns shown in the diagram (their shapes are conventionally assumed to be round) can be determined by the following formula. [2];

$$d_{i=p}\frac{1.25}{\sqrt{Nm}}mm$$

Here: d_{ip} - thread diameter in mm,

Nm-Linear densities of yarns in the metric system,

1.25-100% constant coefficient for yarns spinning from cotton fiber.

The distance A between the centers of the weft yarns can be determined by the ratio of 10 mm to the number of weft yarns in 1 cm. The distances between the ground and the pile and the weft yarns can be determined as follows:

$$\Delta_1 = \Delta_1' + \Delta_1'' = [A-(d_i^{3.m} + d_i^a)] \text{ mm};$$

$$\Delta_2 = \Delta_2' + \Delta_2'' = [A-(d_i^{m.m} + d_i^a)] \text{ mm};$$

The indicators of the terry fabrics produced at the enterprise are shown in Figure 2, the results of which are recorded in Table 2, and the results of the proposed type of fabric are recorded in Table 3.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 9, Issue 5 , May 2022

Table 2

№	The number of weft yarns in 1 cm	Ground warp		Pile warp		Weft		A mm,	Δ_1 mm	Δ_2 mm
		Nm	$d_{и}^{з.т}$ mm.	*Nm*	$d_{и}^{т.т}$ mm.	*Nm*	$d_{и}^{а}$ mm			
1	16	34/2	0.3	27/1	0.24	27/1	0.24	0.625	0.085	0.145
2	18	34/2	0.3	27/1	0.24	27/1	0.24	0.555	0.015	0.075
3	20	34/2	0.3	27/1	0.24	27/1	0.24	0.5	-0.04	0.02
4	22	34/2	0.3	27/1	0.24	27/1	0.24	0.454	-0.086	-0.026

Table 3

№	The number of weft yarns in 1 cm	Ground warp		Pile warp		Weft		A mm,	Δ_1 mm	Δ_2 mm
		Nm	$d_{и}^{з.т}$ mm	*Nm*	$d_{и}^{т.т}$ mm.	*Nm*	$d_{и}^{а}$ mm			
1	16	34/2	0.3	15/1	0.328	27/1	0.24	0.625	0.085	0.057
2	18	34/2	0.3	15/1	0.328	27/1	0.24	0.555	0.015	-0.013
3	20	34/2	0.3	15/1	0.328	27/1	0.24	0.5	-0.04	-0.068
4	22	34/2	0.3	15/1	0.328	27/1	0.24	0.454	-0.086	-0.114

Using the proposed method, Figures 3-4 show the effect of the linear density of pile warp yarns and weft yarn densities used and proposed in the enterprise on the distance between the pile warp yarns and weft yarns:

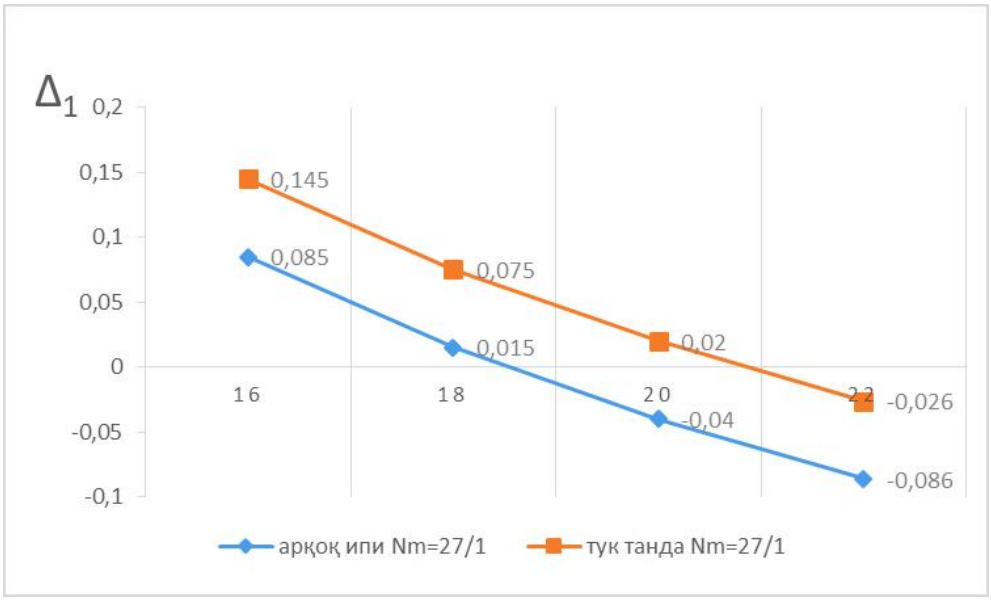

Figure 4. The distances between the ground warp and the weft yarns.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 9, Issue 5 , May 2022

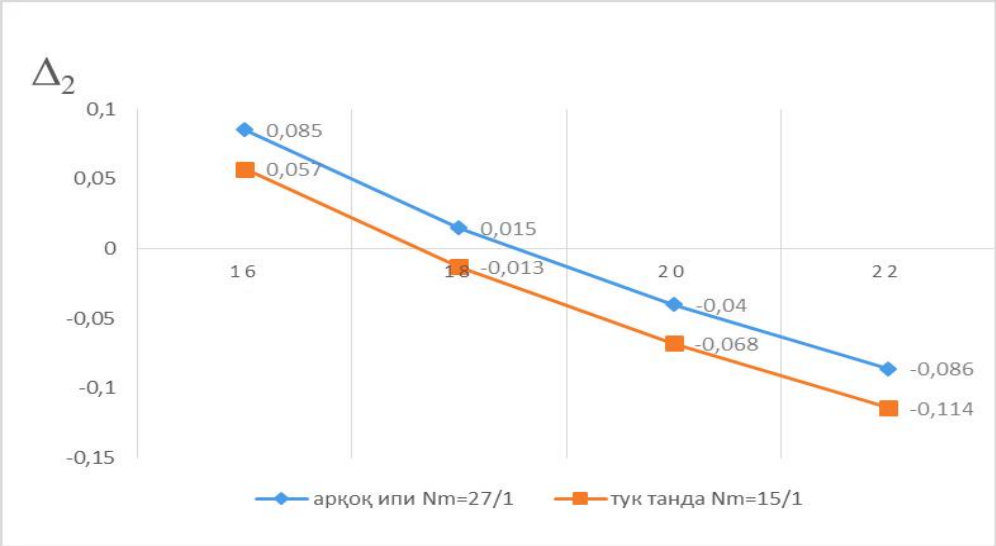

Figure 5. The distances between the pile warp and the weft yarns.

In Fig. 5 we can see that when using the weft yarn Nm-27/1 and the pile warp Nm-15/1 yarns, the spacing between the yarns in the fabric is reduced compared to the weft yarn Nm-27/1 and pile warp yarns Nm-27/1 in Figure 4.
Figure 2 shows an enlarged drawing of the structure of the terry fabric on the warp in units of scale.
Here: The B-dimension is determined by the distance between the reeds used and its ratio of 10 mm to the number in 1 cm.
In our example:

$$B=\frac{10}{5.5}=1.818 \text{ mm.}$$

- D is the thickness of the reed and is 0.5 mm in the sample (determined experimentally).
- The amount of size C is B -D

1,818-0,5=1,318 mm to equal.

- Δ_3-size is determined by the distance between the reed and the difference between the sum of the diameters of the ground and the pile warp yarns.

In our example: $\Delta_3=[C-(2d_и^{з.т}+2d_и^{т.т})]$-mm.
That is, $\Delta_3=[1,318-(2x0,3+2x0,24)]=0,238$ mm.
Δ_3-the distance between the reed is in mm
This distance can be "negative" (-) or "positive" (+) depending on the setting parameters of the fabric, ie the linear densities of the selected yarns and the type of reed selected.
In practice, in raw fabrics produced on looms, there are gaps in the distances between 4 pieces, which can be of different sizes. However, in the example we are considering, the most important thing is that the distances between them are hollow and the warp move freely relative to each other, and the densities in the example and the linear densities of the yarns do not affect the strength of the pile. The data on the effect of warp densities and their linear densities and reeds numbers on the strength of pile yarns, calculated theoretically, are recorded in Table 3.

ISSN: 2350-0328
International Journal of Advanced Research in Science, Engineering and Technology
Vol. 9, Issue 5 , May 2022

Table 4

№	Reed number	the linear densities of the yarns Nm			Reed size			
		Ground warp	Pile warp	weft	B mm	Д mm	C mm	Δ_1 mm
1	50	34/2	27/1	27/1	2	0,5	1,5	0.42
2	52,5	34/2	27/1	27/1	1,90	0,5	1.4	0.32
3	55,0	34/2	27/1	27/1	1.818	0,5	1,318	0,238
4	57,5	34/2	27/1	27/1	1,739	0,5	1.239	0,159
5	60,0	34/2	27/1	27/1	1.666	0,5	1.166	0,086

II. CONCLISION

1. The strength of the separation of pile of terry fabrics depends mainly on the linear densities of the warp and weft yarns and their number of yarns per 1 cm, ie densities.

2. In the samples of terry fabrics analyzed, it was found that the minimum distance between the yarns on the weft is equal to 22 back yarns per 1 cm.

3. All of the samples were located in the weft direction, and the distances between the yarnss in the warp were found to be positive.

REFERENCES

1. GOST 11027-2014 “Terry and wafer cotton fabrics and piece goods”. Moscow “Standartinform, 2015”.
2. E.A.Onikov Handbook of weaving M.: Light industry.
3. Kuzmin V.V. “Development of a method for designing looped fabrics according to given parameters”. Diss. cand. tech. Sciences. - M., 2000.
4. Romanov V.Yu. “Development of optimal technological parameters for the production of looped fabric”. Diss. cand. tech. Sciences. - M., 2009.
5. Installation instructions for the weaving machine for weaving woolen fabrics R 9500, ITEMA.
6. Mamadalieva, D., Karimov, R., & Alieva, D. (2021). ANALYSIS OF THE METHOD OF DETERMINING THE PILES STRENGTH OF TERRY TOWEL. SCIENTIA.