(REFEREED RESEARCH)

AN INVESTIGATION ON THE AVAILABILITY OF FACE TO FACE WARP KNITTED PILE FABRICS AS A DURABLE CARPET

ÇÖZGÜLÜ ÖRME YÜZ YÜZE HAVLI KUMAŞLARIN POLYESTER KEÇE TAKVİYESİ SONRASINDA DAYANIKLI HALI OLARAK KULLANILABİLİRLİĞİ ÜZERİNE BİR ARAŞTIRMA

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ABSTRACT

This study aims to investigate the availability of face to face warp knitted pile fabric as a durable carpet after reinforcing with needle punched polyester felt and natural latex. In the paper the effects of pile yarn count, silicone resin and tuft density on the performance of warp knitted carpets are tested and reported. For this reason, eight knitted carpets were carefully manufactured by Raschel type warp knitting machine and tested by static loading machine, dynamic loading machine and abrasion machine. Evaluations are made according to thickness loss values by testing under a pressure of 2.00 ±0.2 kpa. Hence, the overall test results are compared in graphic form and evaluated statistically using Design Expert 8.0 statistical package program kpa. The statistical analysis performed to determine the durable life of the carpets by examining the relationship between observed parameters and test period. At the end of the study, it is found that pile yarn count, tuft density and test application period are statistically important factors on static and dynamic loading test results while silicone resin is not. For abrasion resistance of the samples pile yarn count, silicone resin and test application period are found statistically significant while tuft density is not.

Keywords: Warp knitted carpets, pile fabrics, durability, tuft density, polyester felt.

ÖZET

Bu çalışma çözgülü örme havlı kumaşların polyester keçe takviyesi ve doğal latex uygulaması sonrasında dayanıklı halı olarak kullanılabilirliğini araştırmaktadır. Çalışmada hav iplik numarasının, hav yoğunluğunun ve silikon reçinenin çözgülü örme halıların performanslarına olan etkileri test edilmiş ve raporlanmıştır. Değerlendirmeler 2.00 ±0.2 kpa basınç altındaki kalınlık kaybı değerlerine göre yapılmıştır. Bu amaçla 8 adet numune Raşel tipi çözgülü örme makinesinde üretilmiş ve numunelere statik yükleme, dinamik yükleme ve aşınma direnci testleri uygulanmıştır. Tüm sonuçlar grafiksel ve istatistiksel olarak incelenmiştir. İstatistiksel analizler Design Expert istatistiksel paket programı ile yapılmıştır. İstatistiki olarak belirlenen parametrelerle uygulanan test süreleri arasında bağlantı kurularak halıların dayanım ömrü belirlenmeye çalışılmıştır. Çalışmanın sonucunda hav iplik numarası, hav yoğunluğu ve testin uygulama süresinin statik ve dinamik yükleme testlerine göre anlamlı değişkenler olduğu görülmüştür. Silikon reçine uygulaması, statik ve dinamik yükleme test sonuçlarında anlamlı bir farklılık yaratmamıştır. Aşınma direnci test sonuçları üzerinde ise hav iplik hammaddesi, silikon reçine ve testin uygulama süresi anlamlı parametrelerken hav yoğunluğu anlamlı bulunmamıştır.

Anahtar Kelimeler: Çözgülü örme halı, havlı kumaş, dayanıklılık, hav yoğunluğu, polyester keçe.

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Introduction

Carpet is a type of floor covering and its appearance is quite important parameter for preference. Appearance of the carpet is affected from abrasive wear, extension, friction, walking, loading, cleaning etc. By these effects, the piles become flat; the color and the attractiveness change and therefore the availability of the carpet is ended by the user while the lifetime of the carpet continues [1]. Hence, it means the lifetime of the carpet depends on the appearance retention as durability.

One of the important quality factors in carpets is the thickness loss (after the deformation in compress) by the effect of loadings. This loading is divided into two as static (brief moderate loading and/or prolonged heavy loading) and dynamic loading. Brief moderate static loading refers to the loading of light or medium weight furniture over the carpet for few hours. Prolonged heavy static loading refers to the loading of heavy weight furniture over the carpet for more than one day [2]. Dynamic loading refers to the loading that is repeatedly applied to the same area for a long time [3]. By all these loadings, the thickness of the carpet decreases and the carpet deforms temporarily or permanently. In other words by this loss, the carpet appearance on the face loses its original form and the carpet's resilience capability is also lost [4].

In the literature, the effects of carpet manufacturing parameters such as pile material, pile height, tuft density, ground density and weave on the carpet performance properties have been studied with a wide range [1]. Hearl et al and Cassidy et al studied on pile abrasion of the carpets [5, 6]. Koç et al, Dayiary et al, Çelik & Koç, Grover et al and Schwabe et al were researched on the pile thickness loss after loading [4, 7-10]. Javidpanah et al, Çelik & Koç, Radhakrishnaiah and Çelik et al investigated the thickness loss of wilton type carpets produced by different pile materials [11-14]. Önder and Berkalp investigated the effect of pile material, pile height and pile density to find out the appropriate construction parameters [15]. Clegg researched the compression during wear by using hexapod tester [16]. Clegg, Dunlog & Jie and Özdil et al studied on the performance of the carpets testing by dynamic loading tester [17-20].

In this study, it is aimed to find out the effect of pile yarn count, pile height, tuft density and silicone resin on the durability of the warp knitted carpets. According to the test result the availability of warp knitted pile fabrics as a carpet is proved. The importance of this study is filling the lack of the literature about the warp knitted carpets. Reinforcing the knitted carpet samples by polyester felt and application of silicone increased the originality of the study.

Generally, warp knitted carpets are the type of pile fabrics. Pile fabrics are produced by double needle bar Raschel warp knitting machine. In this machine, fabrics can be produced as double face fabric or single face fabric by changing the movements of guide bars. If one of the guide bars makes pillar stitch and other one makes tricot stich in needle bars, the fabric has two different faces on each side but if both of the guide bar make tricot stiches in needle bars, the fabric has two same faces on each side. To form face to face knitted pile fabric at least five guide bars are used [21]. In this pattern, two fabrics that are formed in each needle bar are combined together by inlaying of another guide bar between needle bars as seen in Figure 1.

In this structure shown in Figure 1, the distance between two needle bars can change from 1 to 65 mm according to the end use of the fabric [21]. Warp knitted carpets are produced like spacer fabric (Figure 2). Generally, to obtain a carpet structure, five guide bars are used. Two front guides swing over the front needle bar, two back guides over the back bar and the middle guide bar, which is threaded with pile yarn, swings over both needle bar. Then the two cut-pile fabrics are obtained by cutting the fabric down to the center as seen in Figure 3 by knives in another machine.

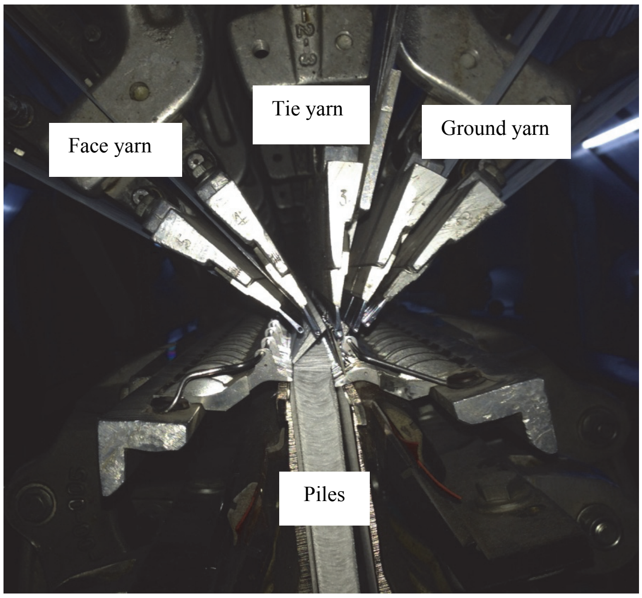


Figure 1. Knitting principle of face to face warp knitted carpet

Figure 2. Produced face to face knitted structure

Figure 3. Divided structure

Currently, warp knitted carpets are used as bath floor covering because the thickness and the durability of these carpets are low. In this study, it is aimed to increase the durability of the carpets by reinforcing polyester felt and latex application. In addition, silicone resin is applied to the piles before coating polyester felt and latex application to increase the soil resistance of them. At the end of the study, the availability of warp knitted carpets, which is suitable for daily life, is proved.

Experimental

Samples

The present study has been carried out on eight warp knitted carpets. The samples are produced on a KARL MAYER RD 6 N E24 double needle bar Raschel machine of gauge 24 and 5 guide bars. The samples are manufactured as pile fabric and then they were divided into two for obtaining two carpets according to the following notation.

Front Guide Bar: 1-1, 1-2/ 1-1, 1-0//

Rear Guide Bar: 1-0, 0-1/ 0-1, 1-0//

Divided single-face piled gray fabrics are colored by printing machines and then the fabrics are brought to fixation to make their color stable. In the washing unit, extra dyes and chemicals are removed from the fabrics and cationic softeners softened the fabrics. Then the fabrics are passed to the dryer. After drying the distance between piles are opened by brushers. The name of this process is pre-raising. The face of the carpets is raised and scissors equalized the length of the piles. Then the fabrics are printed. Then the samples are coated with polyester needle punched felt (130 gr/m^2). Finally, the fabrics are brought to the latex unit. In this unit at first natural latex and catalyzer were mixed with 125 rpm then ammonium acetate is added. The pH of the compound was adjusted to 9,5. The solution is passed under infrared heaters, which is coated gold at 120-140 °C for removing the ammonium acetate. During this process, the outer layer of the coating is heated and the pattern is formed. After this process, the latex coated carpet is heated by owen and finally cold fixation is applied. The carpet is relaxed for 16-24 hours before use. Finally, the three layered structure is obtained as shown in Figure 4.

All the samples used in this study are formed by three parts as seen from the Figure 4. The warp knitted structures of the samples varies by changing the tuft density, pile yarn count and used silicone resin. Tuft density means the number of tuft in 1cm^2 and calculated by the values of wpc X cpc. All the pile yarns warp yarns and tie yarns of the samples are made of polyester. Other properties of the samples are given in Table 1.

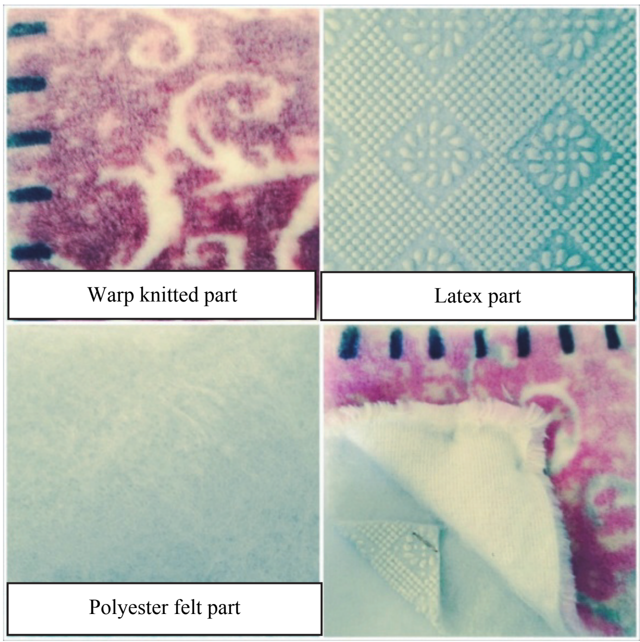


Figure 4. Floor felted warp knitted carpet schematic view

In this table the samples are coded according to the pile yarn count, course per cm, pile height and silicone resin. For example the code 300/7/12S means the sample is being 300 Denier pile yarn, 7 mm pile height, 12 cpc and silicone resin.

Methods

All the tests are reliably carried out in a conditioned laboratory according to the international standards. Before testing, the samples are conditioned for 24 hours [22].

Table 1. Properties of the samples

Carpets	Count of Warp Yarn	Count of Pile Yarn	Count of Tie yarn	Pile height, mm	Wale per cm	Course per cm	Weight, g/m^2	Thickness, mm
300/7/12S*	150 D/48F	300 D/192 F	150 D/48F	7	7	12	1279	9
300/7/12	150 D/48F	300 D/192 F	150 D/48F	7	7	12	1283	9
500/6/8S*	150 D/48F	500 D/192 F	150 D/48F	6	7	8	1294	8
500/6/8	150 D/48F	500 D/192 F	150 D/48F	6	7	8	1297	8
300/6/8S*	150 D/48F	300 D/192 F	150 D/48F	6	7	8	948	8
300/6/8	150 D/48F	300 D/192 F	150 D/48F	6	7	8	950	8
300/6/12S*	150 D/48F	300 D/192 F	150 D/48F	6	7	12	1253	8
300/6/12	150 D/48F	300 D/192 F	150 D/48F	6	7	12	1256	8

*The capital ”S” refers to the silicone application

Dynamic loading is the process of repeatedly applying a load to the same area of a textile floor covering to assess its resistance to crushing from interrupted continual loading such as walking traffic. The test method measures the cyclic loading effect similar to repeated stepping onto a given area of textile floor covering. Thickness loss of the textile floorcovering is measured after repeated loading and the thickness after recovery for predetermined periods. Dynamic loading machine is used to simulate the effect of walking on carpet, which causes bedding-down of piles [23]. In this study WIRA Carpet Dynamic loadinpog test machine is used to measure the durability of samples. Three specimens were used during the test. During this test, the specimen is settled on the specimen plate with the wale direction at right angles to the direction of movement of the plate. The specimen is held using the clamping screws. The thickness of the specimen is measured under a pressure of 2 kpa [24]. This thickness consists of the thickness of the ground fabric and its pile height. The test procedure is conducted according to ISO 3416. In this standard, the thickness of the carpet is initially measured under the standard pressure (2.00 ±0.2 kpa). And then the thickness is re- measured at intervals 100, 200, 400, 1000 and 2000 again under the pressure of 2.00 ±0.2 kpa to find out the life of the knitted carpet as recommended in the standard [3].

Abrasion resistance is the ability of a textile floor covering to resist the loss of the use surface material by abrasive or mechanical action. Abrasion test machine is used to see the resistance of the pile to the rotational frictional force of wool fabric [23]. In this study, WIRA Carpet Abrasion machine is used to measure the number of cycles required to wear the pile down to the backing substrate or may also be used to measure abrasion, but is more the mass loss of the pile fiber for a given number of cycles. Three specimens of for each carpet are tested and the mass loss ratio method is used for assessment. Abrasion resistance tester simulates the friction over carpets, which can be related to the vacuum cleaner and human traffic over the carpet. During this test the carpet is settled in the bottom apparatus of the machine and woolen woven abrasive fabric and non-woven polyester felt fabric are settled in the upper apparatus of the machine. During the test both apparatus are rotated at the same time. The test procedure is carried out according to BS EN 1813 [25]. In this standard, the mass and the thickness of the carpet are initially measured and then the thickness and mass of the carpets are re-measured at the cycles 5000, 10000, 15000 and 20000. Finally, the mass and thickness loss of the samples are calculated.

In this study, WIRA Carpet Static loading machine is used to test the thickness loss of the carpets after prolonged heavy static loading. Three specimens are used. This test is applied to the carpets to simulate the thickness and view change of the carpet after a heavy furnishing put over the carpet for 24 hours. In this test 700 kpa pressure is applied to the carpet for 24 hours. Then after taking off the load the thickness of the carpet is re-measured after 2 minutes, 1 hour and 24 hours.

Statistical Analyses

Design Expert 8.0 statistical package programmer does the statistical analyses of the study. Initially full factorial design is performed and design model is selected as mean. The experimental results have been statistically evaluated by using the Design Expert Analysis of Variance (ANOVA) software with F values of the significance level of _=0.05, with the intention of exploring whether there is any statistically significant difference between the variations obtained.

Results and Discussions

In this part of the study, the statistical test results are given as a table. We evaluated the results based on the F value and the probability of the F-value (prob>F). The lower the probability of the F-value, it is the stronger the contribution of the variation and the more significant the variable. Table 2 summarizes the statistical significance analysis for all the data obtained in the study. In this ANOVA analyses, dependent factors are pile yarn count, tightness, silicone application and tests application period.

Table 2. Statistical ANOVA table of test results

Fabric properties		Dynamic Loading, (thickness loss,%)	Abrasion Resistance, (mass loss,%)	Static Loading, (thickness loss, mm)
Tuft density, tuft/cm	F-value	0,025	0,17	0,00025
	P-value	2,11	0,43	0,0003
	Prob>F	0,1600	0,5180	0,9259
	% Contribution	0,85	10,69	0,001
Silicone resin	F-value	0,11	2,55	0,70
	P-value	9,01	6,33	25,05
	Prob>F	<0,0001	0,4509	<0,0001
	% Contribution	18,15	1,23	2,92
Pile yarn count	F-value	1,65	2,24	0,16
	P-value	138,71	5,57	5,76
	Prob>F	<0,0001	0,0201	0,0274
	% Contribution	15,40	36,80	0,042
Test application period	F-value	1,62	3,30	5,63
	P-value	135,88	8,18	200,33
	Prob>F	<0,0001	0,0094	<0,0001
	% Contribution	54,76	7,43	93,31

According to Table 2 the Model F-value implies the model is significant. There is only a 0.01% chance that a "Model F-Value" this large could occur due to noise. Values of "Prob > F" less than 0.0500 indicate the model terms are significant. Values greater than 0.1000 indicate the model terms are not significant. In this case; silicone resin, pile yarn count and test application period are significant model terms on dynamic loading test results of sample knitted fabrics. Any variables are not significant model terms on the abrasion resistance test results of sample knitted fabrics. Finally, on static loading test results of the sample knitted fabrics; silicone resin and test application period are the significant model terms.

Dynamic Loading Test Results

In the dynamic loading test, the thickness of the samples are measured under 2 kpa pressure initially. During the test thicknesses of the samples are re-measured at determined intervals as recommended in the ISO 3416 standard. Finally, the thickness loss of the samples are calculated and given as both mm and percentage in Table 3 according to the following equation.

$$TL\%=[(T_f-T_i)*100]/T_i \qquad 1$$

In this equation "T%" refers to the thickness loss as percentage; "T_f" refers to the final thickness of the carpet after determined impact value; "T_i" refers to the initial thickness of the carpet before any loading.

Table 3 shows the thickness loss values of the samples during the dynamic loading test as mm and percentage. If the value is low, it means the durability of the carpet is high. Therefore, it is clear that silicone resin increases the durability of the carpet. When the thickness loss of the samples 300/7/12 and 300/6/12 are compared, it is seen that pile height is significant factor on the thickness loss. More pile height means more durability for the carpets, which have same characteristics. When the thickness loss of the samples 500/6/8 and 300/6/8 are compared, it is seen that pile yarn count is quite important factor on the thickness loss of the samples. Therefore, it is said that to produce more durable carpets, producers should use fine pile yarn. In the literature, there are similar test results [11].

The statistical analysis given in Table 2 indicates that the test application period has a significant influence with % 54.76 contribution on the dynamic loading values of sample knitted fabrics. The contributions of pile yarn count and silicone resin on the dynamic loading values of sample knitted fabrics are similar. The effect of tuft density on the dynamic loading test is not significant. In accordance with the literature pile thickness loss is classified as 0-15% -5 points; 16-25% - 4 points; 25-35% - 3 points; 35-45% - 2 points. Any carpet with a pile thickness loss greater than 45% is not classified [23]. Then the samples 300/6/8, 300/6/8S, 300/7/12 and 300/7/12S take 5 point and the rest take 3 point according to the literature [23]. Then it is concluded that the resistance of the carpets 300/6/8, 300/6/8S 300/7/12 and 300/7/12S are quite high and the resistance of the rest is moderate. Finally, the durability of the samples are sufficient to use.

Abrasion Resistance Test Results

According to the standard [25] the carpet should be tested up to 5000 cycles. Since the aim of the study is finding out the life of the carpets, three specimen are tested up to 20000 abrasive cycles and the mass loss of the samples are measured at 5000, 10000, 15000 and 20000 cycles and the results are illustrated as percentage in Figure 5.

Table 3. Thickness loss percentage of knitted samples

Samples	Initial thickness (mm)*	Thickness loss after determined impacts									
		100 impact		200 impact		400 impact		1000 impact		2000 impact	
	Unit	mm	%	mm	%	mm	%	Mm	%	mm	%
300/7/12S	9	0,00	0	0,00	0	0,70	8	0,70	8	1,40	15,5
300/7/12	9	0,00	0	0,00	0	0,70	8	0,70	8	1,41	15,6
500/6/8S	8	0,00	0	0,00	0	0,70	7,8	0,70	7,8	2,09	26
500/6/8	8	0,00	0	0,00	0	0,70	7,8	0,70	7,8	2,11	26,3
300/6/8S	8	0,00	0	0,00	0	0,73	9	0,73	9	0,73	9
300/6/8	8	0,00	0	0,00	0	0,74	9	0,74	9	0,74	9
300/6/12S	8	0,00	0	0,00	0	0,71	8,9	1,42	17,8	2,10	26
300/6/12	8	0,00	0	0,00	0	0,71	8,9	1,43	17,9	2,14	26,7

*This is the thickness of carpet with piles, polyester felt and latex.

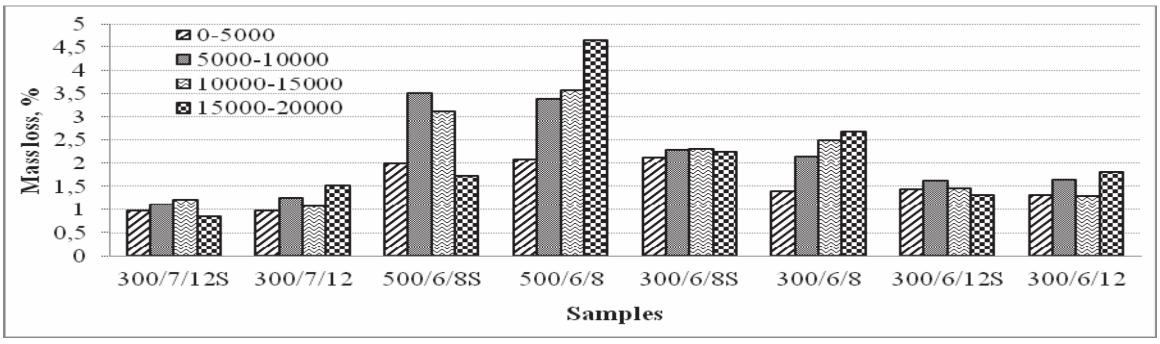
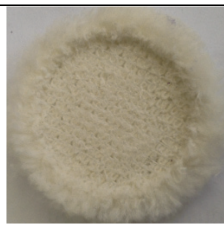
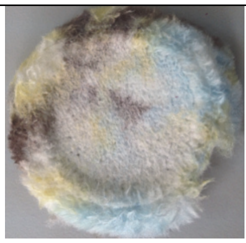


Figure 5. Mass loss percentage of samples after abrasion test at determined intervals

Figure 5 shows the mass loss values of the samples during abrasion test as percentage. If the value is low it means the resistance of the carpet to abrasion is high. Therefore, it is seen that the effect of silicone resin on abrasion resistance of the samples is not consistent. When the mass loss percentage of the samples 300/7/12 and 300/6/12 are compared, it is seen that the pile height is significant parameter on the abrasion resistance. If the pile height is long, the abrasion resistance is high for the carpets, which have same characteristics. When the mass loss of the samples 500/6/8 and 300/6/8 are compared, it is seen that the pile yarn count is the most important factor on the abrasion resistance. Carpets produced by finer pile yarn show more resistance to abrasion than those of coarser pile yarn. When the mass loss of the samples 300/6/8 and 300/6/12 are compared, it is seen that the tuft density is quite significant parameter on the abrasion resistance. It is obvious that the test application period is also very important factor and when the test application period increases; the resistance of the samples decrease. Because the mass loss percentages of the samples are under 5 %; it is concluded that all the samples are resistant to the abrasion. Therefore, it is said that abrasion resistant carpets can be produced by using fine pile yarn, high tuft density and long pile height. The results are identical to the literature different from the effect of pile height [15]. Different from the standard the thickness change and the view change of the samples before testing and after testing are added to study and shown in Table 4.

According to the thickness loss values given in Table 4; silicone resin deteriorated the resistance to abrasion because silicone resin changes (decreases) the friction coefficient of the samples and the surface of the carpet with silicone resin become flat quicker. Because of the fact that this treatment does not affect the migration of the fiber from the surface; the mass of the samples with or without silicone resin are closer. Other results depend on the thickness loss changing values are identical to the mass loss changing values of the samples. When the statistical test results are evaluated it is seen that no parameter has significant effect on the abrasion resistance of the samples. Contribution test results show that among the parameters pile yarn count is the most important one.

Table 4. Photographic views and thickness loss percentage of samples after 20000 cycles of abrasion test

Samples	Photographic view	Thickness Loss, %	Samples	Photographic view	Thickness Loss, %
300/7/12		33,33	300/7/12S		55,56
500/6/8		42,86	500/6/8S		57,14
300/6/8		33,33	300/6/8S		44,44
300/6/12		28,57	300/6/12S		42,86

Prolonged Heavy Static Loading Test Results

The durability of the samples is related with the thickness loss after the static loading application. In the prolonged heavy static loading test the initial thickness of the samples are measured and then 700 kpa weight is put over the samples for 24 hour and then the load is lifted from the samples. During the test, the thicknesses of the samples are re-measured after 2 minutes, 1 hour and 24 hours. The thickness losses of the samples are evaluated and the results in mm are presented as a graph in Figure 6.

Figure 6 illustrates the thickness loss values of the samples during prolonged heavy static loading test as mm. Accordingly this figure the following equations show the static loading procedure and measuring periods of the thickness after unloading the pressure [12].

$$\delta S = t0 - t1 \quad (2)$$

$$\delta P = t0 - t3 \quad (3)$$

$$\delta E = t3 - t1 \quad (4)$$

In the above equations, t is the original mean thickness of a carpet sample at the standard pressure before applying the static load. In this equation, t1 is the mean thickness is measured after recovery for 2 minutes, t0 is the mean thickness is measured after recovery for 24 hours. δS is the difference between the original thickness and the thickness measured after recovery for 2 minutes, δP is the difference between the original thickness and the thickness is measured after recovery for 24 hours. δE is the recovered thickness difference between the thickness after recovery for 24 hours and the thickness after recovery for 2 minutes, all the values are measured in mm [12]. To calculate the static force FS (in N) equations 4 and 5 are used in order to applied and evaluate the rigidity coefficient k respectively resembling a spring [12].

$$FS = PS \times A \quad (4)$$

$$k = FS/\delta = FS/(t0 - t) \quad (5)$$

In these equations: PS is the static applied pressure on a test specimen of a carpet sample, in kpa, which is a constant value of 700 kpa. A is the test specimen surface area of a carpet sample in m^2, which is a constant value of 0.01 m^2. FS is the static force applied on the test specimen of a carpet sample, which is a constant value of 7000 N calculated by Equation 4, k is the rigidity coefficient of a carpet defined in general through the recovery periods after releasing static force applied. With respect to the above equations, k values of the knitted carpets are calculated and listed in Table 5.

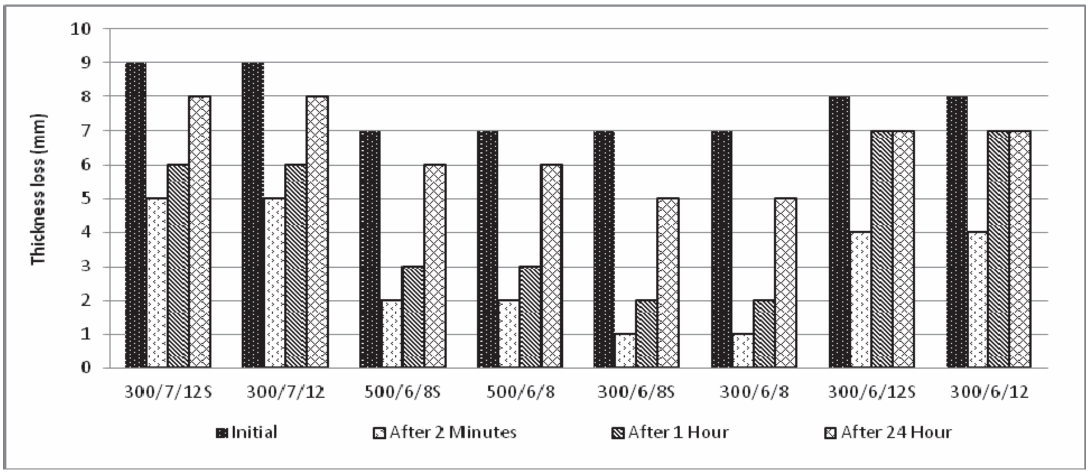


Figure 6. Thickness loss test results of sample knitted fabrics during heavy static loading

Table 5. The coefficient k and deformation δ with recovery time

Samples	**Recovery period**					
	2 minutes later		1 hour later		24 hours later	
	δ, mm	k, N/mm	δ, mm	k, N/mm	δ, mm	k, N/mm
300/7/12S	4	1750	3	2333	1	7000
300/7/12	4	1750	3	2333	1	7000
500/6/8S	5	1400	4	1750	1	7000
500/6/8	5	1400	4	1750	1	7000
300/6/8S	6	1166	5	1400	2	3500
300/6/8	6	1166	5	1400	2	3500
300/6/12S	4	1750	1	7000	1	7000
300/6/12	4	1750	1	7000	1	7000

Normally, resembling the interpretation of a spring for carpets, the higher the *k* value, the worse is the carpet's resilience capability [12]. Examining the data in Table 5 it is clear that silicone resin does not affect the resistance of the samples to static loading. Except from the sample 300/6/8, the thickness of all samples decrease 1 mm after loading 24 hour. Hence, the longer the pile height and the higher the tuft density, the higher the recovery to the original position after the static pressure is released. Both the pile height and tuft density of this sample are low so this sample deforms more. Pile yarn count does not change the resistance effectively. Generally, warp knitted samples have similar resistances to prolonged heavy static loading and it is thought that polyester felt increases the resistance. If a carpet has a higher resilience to static loading, it resists more against bending or damping and absorbs the lesser total energy [12]. According to statistical test results given in Table 2; both the silicone resin and the test application period are significant model terms but the test application period is the most effective parameter with the 93,31 % contribution value. Similar test results are found in the literature [12].

CONCLUSION

In this study, warp knitted face to face knitted fabrics are manufactured as carpet. Since the aim of the study is to increase the durability of this type of fabrics, produced samples are reinforced by needle punched polyester felt and then coated by natural latex. The effect of pile yarn count, pile height, tuft density and silicone resin on the durability of the warp knitted carpets are investigated by dynamic and static loading and abrasion resistance tests. According to the test results, the following conclusions were obtained.

-According to the thickness loss values, after dynamic loading test silicone resin increases the durability of the carpet. The reason of this increasing is related with the changed friction coefficient value. More pile height means more durability for the carpets, which have same characteristics. Actually, the pile height increases the resilience of the carpets. The main effect of pile yarn count accounted for 36.80 % of total variation in the thickness loss variation as a major effect; then to produce more durable knitted carpets producers should use fine pile yarn.

- According to the mass loss values after abrasion resistance test; the effect of silicone resin on the abrasion resistance of the samples are not consistent, the pile height is significant parameter on abrasion resistance. If the pile height is long, the abrasion resistance is high for the carpets, which have same characteristics. Pile yarn count is the most important factor on abrasion resistance. Carpets produced by finer pile yarn show more resistance to abrasion than those of coarser pile yarn. Therefore, it is said that abrasion resistant carpets can be produced. by using fine pile yarn, high tuft density and long pile height.

-According to the thickness loss values after prolonged heavy static loading test, silicone resin does not affect the resistance of the samples to static loading. Pile yarn count does not change the resistance effectively. Generally, warp knitted samples are resistant to prolonged heavy static loading and it is thought that polyester felt increases the resistance.

- The statistical analysis indicates that test application period is quite important factor according to the dynamic loading values of sample knitted fabrics while tuft density is not significant. The pile yarn count and silicone resin on the dynamic loading values of sample knitted fabrics are statistically important. On the abrasion resistance test, most effective parameter is statistically pile yarn count. Tuft density is also effective factor on the abrasion resistance. According to the static loading test, test application period is the most effective parameter statistically.

From the point of view of the end use, the knitted carpets with fine and long piles and high tuft density may be preferred where heavier, massive and stationary goods are used, due to the better resilience capability against static and dynamic loading.

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