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CHARACTERISTICS OF PAKISTANI TUFTED CARPETS AND FLOOR COVERING

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The objective of the present study is to investigate and assess the quality of the Pakistani tufted carpets. Carpets manufacturing was the first branch of textile industry to recognise the tufting technology. This study deals with the important physical characteristics of the tufted carpets and floor covering. The relationship between physical properties of carpet and floor covering has been determined for the quality evaluation. The primary backing plays key role in tufted carpet manufacturing. The construction and the type of yarns used for primary backing has also been investigated regarding its physical characteristics and its relationship with the carpet quality.

Key words: Quality, Tufted carpets.

Introduction

Besides oriental carpet which are hand knotted carpets, modern times has introduced another class of carpets which are machine made. These carpets are known as tufted carpets. The manufacturing principle of the tufting technique comprises of three successive but independent production stages. (i) Manufacturing of primary backing, (ii) the actual tufting, (Formation pile) and (iii) the scuring of the pile in the primary backing by coating of latex secondary backing.

Materials and Methods

Ten representative samples A to J each 2 sqft. of different brand of tufted carpets were collected from the market and the following parameters have been studied for its quality evaluation. It has been found from the study of these carpets samples that tufted carpets consist of two major parts (i) Primary backing (ii) Surface making material.

(i) Primary backing. The Primary backing is a pre-woven fabric consisting of two types of yarns (1) Cotton Yarn and (2) Jute yarn.

(ii) Surface making material. This part consists of double ply wollen yarns. The analysis of woollen yarn was carried out according to ASTM[6].

Count test. The count of yarn is a numerical expression which define its fineness. The count of the yarn was determined according tot the direct (metric) system (Tex).

$$\text{General formula} = \frac{W \times 1}{L}$$

W =Weight in gms, 1 = Unit of length in meter,

L = Length of the sample.

The value of the count determined of an average of 50 readings for jute, cotton and woollen yarn as in Table 1.

Twist test. The twist of cotton, jute and woollen yarn was determined by means of twist testing machine, (Mod. type FY-16). The average of twenty readings were recorded for each sample as given in Table 1.

TABLE 1.

	Primary backing			Pile yarn					
	Jute yarn (2 ply)			Cotton yarn (6 ply)			Woollen yarn (2 ply)		
S. No.	Count (Tex)	Z Twist/ inch	Tensile strength gramme weight	Count (Tex)	Z Twist/ inch	Tensile strength gramme weight	Count (Tex)	Z Twist/ inch	Tensile strength gramme weight
A	348	17	3000	269	8	3200	415	3	1300
B	325	17	3050	270	7	2440	415	4	1310
C	301	18	3000	262	8	3210	415	4	1345
D	385	18	2010	278	7	2680	415	3	1300
E	366	17	3000	298	7	2980	415	4	1300
F	350	17	3000	260	8	2300	415	3	1300
G	300	18	3010	260	7	2270	415	3	1300
H	325	17	3025	245	7	2240	415	3	1300
I	321	17	3115	262	8	2420	415	4	1300
J	311	17	3000	250	7	2210	415	3	1300

Tensile strength test. The breaking weight was determined by tensile strength testing machine, "made Frank Type 653 No. 482." The average of twenty readings were taken for each sample of cotton, jute and woollen yarn as given in Table 1.

Abrasion test. The abrasion test for durability was carried out on wira (Matedle) abrasion machine. For the rubbing surface smaller circular sample was used. Assessment is made by cutting the piles of the base square and weighing them.

Resilence, appearance, texture retension. The desirable property of the carpet is theability to recover from the compression of walking trafic and furniture feet etc. For the assessment of the resilence of the carpet dimensional changes are studied. These carpet samples subjected to heavy trafic in a corridor of the laboratories for a period of above one year.

Pile length and pile density. The density of the pile may be derived from the knowledge of the pile height and the number of tuft/inch. The number of tufts were determined for each sample ABCDEFGHIJ, wrap wise and weft wise of the carpet. The pile height [5] was also determined (difference between total thickness and backing thickness). Pile density or the length of pile/sq. yard has been determined according to the formula [5].

No. of tufts/sq inch x pile height x 36 x 36 =yards (length of pile/sq. yard).

The value of the above tests are given in Table 2.

COLOUR FASTNESS

(a). Sun light and day light colour fastness. The samples of the each brand have been exposed to sun light, according to the ISO (ASTM) method 105-1959 No. 15.

(b). Colour fastness to crocking. The ISO recommended 105-1959 No. 18 were applied to each sample [6]. The term crocking is used to denote the transfer of colour by rubbing.

(c). Wash fastness. The sample were heated in 5% soap solution for a period of 1/2 hour at 50° ASTM [6,8] method D-1778-60 T. According to the above the colour fastness is-from average to good.

Results and Discussion

These carpets possess strong backing consist of jute yarn and cotton yarn and warp way and weft way. The use of cotton and jute yarn in constructions has displayed the following qualities [7].

(1). Dimentional stability; (2). Resistant to ratting; (3). Pile anchoring capability; (4). Workability during pile insertion; 5. Resistance to temperature.

The woollen yarn used as surface making material is of the same quality as indicated from its count (Tex) and its tpi.

The pile height and pile density of these carpets are also according to the international standard and the quality of these carpets have been determined by studying these properties. These carpets are durable and having fast colour, good appearance and texture. The quality order as indicated from its characteristics are in the order as shown in Table 2. These tufted carpets belong to plush type having level cut pile surface using balanced low twist woollen yarn.

The quality assessment of the Pakistani tufted carpets of representative samples has been carried out. Table 1 shows the count in direct metric system (Tex) expressing the finess in numerical values for cottons, jute and woollen yarn.As there is a direct relationship between the count and finess. The greater the numerical values of count, the fine will be the quality of yarn. The Table 1 also indicates the average values of twist per inch expressed in tpi (turns per inch). The average values of tensile strength of each type of yarn e. g. jute yarn cotton yarn and woollen yarn is also given in the Table1 The breaking load or the tensile strength is expressed in term of gramme weight.

TABLE 2.

S.No.	No. of tufts warp way	No. of tufts weft way	No. of tuft/inch^2	Tuft height (pile in inch)	Pile density (yards)	Quality order
A	8	7	56	0.42	921	C
B	7	8	56	0.50	1008	B
C	8	8	64	0.50	1152	A
D	7	7	49	0.41	531	E
E	7	8	56	0.33	665	I
F	6	7	42	0.33	525	D
G	6	7	42	0.33	525	F
H	6	6	36	0.31	500	G
I	7	7	49	0.41	536	H
J	6	7	42	0.40	531	J

It is evident from the Table 1 that the yarn used in carpet backing is jute yarn and cotton yarn in warp way and weft way respectively. The degree of finess or count of cotton yarn and jute yarn is representing the quality order of the respective carpet samples as C B A E I D F G H and J (10 samples).These values are also in accordance with the standard values [7] for carpet packing with a count (Tex) range of 1550-250. For floor covering strong backing is required in order to with-stand heavy trafic load. The cotton yarns of six ply and jute yarn of 2 ply are used in carpet backing, with sufficient tensile strength and standard tpi as indicated from Table.1resulted in strong backing and good quality of carpet. The woollen yarn used as surface making material having a tex value of 415 agrees with the standard [3,4] values ranging from 350-1500. The twist per inch of the woollen yarn consumed in the representative samples of the carpet is 3-4 tpi. These values also agree with the standard [3,4] tpi for double ply woollen yarn ranging from 0.2-6.0 tpi. This low twist has created good carpet surface coverage spinning twist in Z direction and ply twist in S direction. The pile density of representative sample indicates that these tufted carpets possess good surface coverage. The pile height is also according to the standard tufted carpet and the tufts per inch is also agrees with the standard carpets with a range 49 tufts per inch to 64 tufts/inch. The quality number of these representative samples will be C B A I D F G J and H. It is now evident from the study of the pile density and pile height that the greater the number of the tufts/inch and pile height the better the quality of the carpet. The abrasion test and the resilience property of these carpets also indicates the quality. It is evident from the above discussion that the primary backing constitutes merely the foundation material for the pile inserted in it, as the qualities in use of the finished products are determined primarily by the pile and its appearance.

The backing is not apparent on the used side. As the primary backing of these tufted carpet under study consists of cotton and jute yarn in weft way and warp way respectively, so the backing has difinetly the best dimentional [7] stability and also afford sufficient pile solidity through coating without further support and above all it can be manufactured cheaply. It is evident that it is the fibre material, that determined the quality of the primary backing.

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