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# Influence of Singed Viscose Yarn on knitted Grey Fabric Characteristics

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**Abstract:** Viscose Parent yarns of Ne 18/1, Ne 28/1 & Ne 38/1 were selected for the development of Single Jersey Knitted Parent Grey fabrics using Circular Knitting Machine. The parent yarns were singed to achieve the nominal linear densities of 'Singed' yarns of Ne 20/1, Ne 30/1 & Ne 40/1. These singed yarns were selected for the development of Single Jersey Knitted Singed Grey fabrics using Circular Knitting Machine. The six varieties of Knitted Parent & Singed Grey fabrics were properly coded. The quality characteristics of developed Knitted Parent & Singed Grey fabrics such as Pilling Resistance, Water Absorbency and Air Permeability were tested and critically analysed.

**Keywords:** Viscose, singed, linear density, Pilling Resistance, Absorbency, Air Permeability

## 1. INTRODUCTION

Knitted fabrics of normal Viscose yarns have hairiness on its surface. The hairiness present in the fabrics poses problems in the subsequent processes and in the final fabric appearances. An attempt is made to produce Knitted fabrics using singed Viscose yarns and the influence of singed Viscose yarns on Knitted fabric characteristics such as Pilling Resistance, Water Absorbency and Air Permeability were critically studied and compared with Knitted fabrics of its Parent Viscose yarns.

## 2. Materials and Methods

For this study, three different Viscose single yarns of nominal linear density of Ne 18/1, Ne 28/1 & Ne 38/1 were selected and singeing was carried out on Gas Yarn Singeing Machine to achieve the singed yarn nominal linear density of Ne 20/1, Ne 30/1 and Ne 40/1 respectively. Using both Parent & Singed Viscose yarns, six varieties of Knitted Parent & Singed Grey fabrics were produced. The nominal fabric weight (GSM) of both the Knitted Parent Grey fabrics & Knitted Singed Grey fabrics were kept similar for the respective linear densities. In order to maintain similarity in Knitted fabric GSM, the loop length was adjusted in knitting [2, 7]. The developed Knitted fabrics were coded and the details of knitting machine specifications and setting parameters for each coded fabrics are described in Table 1.

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Table 1- Fabric Code &amp; Knitting machine details

S.No	Fabric Code	Nominal Linear Density	Knitting Machine Details				Nominal Fabric Weight (g/m <sup>2</sup> )
			Cylinder Diameter (Inches)	Gauge	Speed (rev/min)	Stitch length, mm	
1	KCPG*	Ne 18/1	23	24	26	4.00	160
2	KCSG*	Ne 20/1	23	24	26	3.60	160
3	KMPG*	Ne 28/1	23	24	26	3.20	129
4	KMSG*	Ne 30/1	23	24	26	2.97	129
5	KFPG*	Ne 38/1	23	24	26	2.75	110
6	KFSG*	Ne 40/1	23	24	26	2.63	110

\* In the above fabric codes, 'K' stands for 'Knitted', 'C' stands for 'zCoarse', 'M' stands for 'Medium', 'F' stands for 'Fine', 'P' stands for 'Parent yarn', 'S' stands for 'Singed yarn' & 'G' stands for 'Grey fabrics'.

Above Coded six varieties of Knitted-Parent & Singed Grey fabrics were developed and tested for characteristics such as Pilling Resistance, Absorbency and Air Permeability and were critically analysed. ASTM D 4970-02 test method was used for Pilling Resistance and Martindale Abrasion and Pilling Tester, Model M 235 was used for conducting the Pilling tests. AATCC/ASTM Test method TS 018 was adopted for Water Absorbency and ASTM D 737-96 test methods were used for Air Permeability.

### 3. Results and Discussions

The six varieties of developed Knitted-Parent & Singed Grey fabrics were tested for characteristics such as Pilling Resistance, Water Absorbency & Air Permeability and their quality analysis are given below.

#### 3.1 Pilling Resistance

As per ASTM D 1776 standard for conditioning, all the six samples were conditioned before testing. As per ASTM D 4970-02 test method for Pilling Resistance, all the six varieties of Knitted Parent & Singed Grey fabric samples were tested using Martindale Abrasion and Pilling Tester, Model M 235. The samples were compared with the Standard ASTM Rating Scale and the Pilling qualities were evaluated and the samples were graded. The Standard ASTM Scale Rating is given in Table 2.

Table 2- Standard ASTM Scale Rating

Grade	Description
5	No Pilling
4	Slight Pilling
3	Moderate Pilling
2	Severe Pilling
1	Very Severe Pilling

The tested results of developed Knitted Grey fabrics of both Parent and Singed viscose yarns are shown in Fig 1. From the Fig 1, it was evident that all the Knitted Grey Fabrics of Singed yarns having fabric codes as 'KCSG', 'KMSG' & 'KFSG' have shown better Pilling Resistance than Knitted Grey Fabrics of Parent yarns having fabric codes as 'KCPG', 'KMPG' & 'KFPG' for different rubbing cycles.

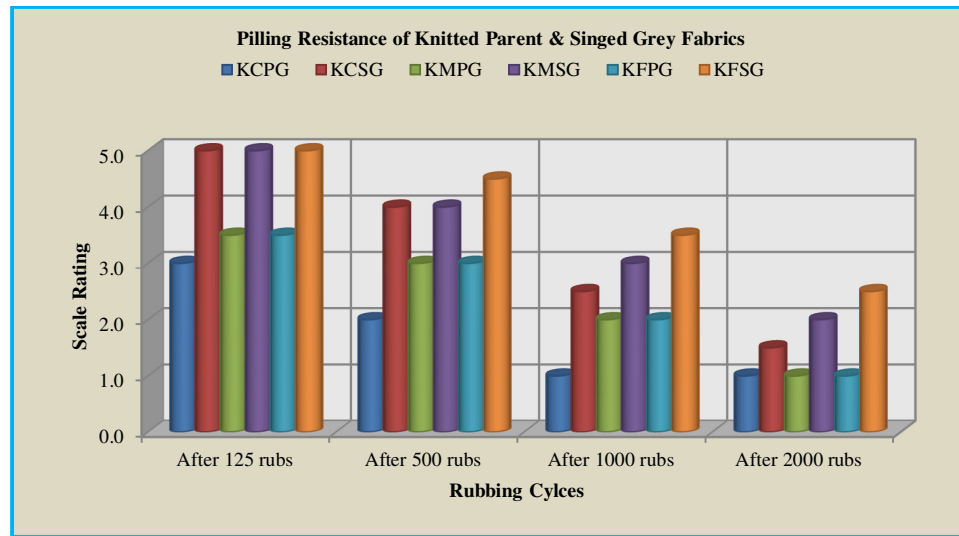


Fig 1- Pilling Resistance of Knitted-Parent and Singed Grey Fabrics

After 125 rubbing cycles, the Pilling grade was found 5 for all the Knitted Singed yarn Grey fabrics and the grade was gradually reduced to 4, 4 & 4.5 after 500 rubbing cycles, 2.5, 3 & 3.5 after 1000 rubbing cycles and 1.5, 2 & 2.5 after 2000 rubbing cycles respectively. Finer fabrics showed better grades for the same number of rubbing cycles than medium to coarser Knitted fabrics, due to lesser fibres in their yarn cross section and hence lesser pilling [1]. Lower pilling grades were found for Knitted Parent yarns Grey fabrics than Knitted Singed Yarn Grey Fabrics of the similar linear densities on all the rubbing cycles and worst Pilling was found after 2000 rubbing cycles. Knitted Singed yarn fabrics showed better scale values than Knitted Parent yarn fabrics due to reduction of yarn hairiness upto 86%.

### 3.2 Water Absorbency

As per AATCC/ASTM Test method TS 018, the absorbency tests were carried out for the six varieties of developed Knitted Grey fabric samples. Fig 2 shows the test results of Water Absorbency for all the developed Knitted-Parent & Singed yarns Grey fabric samples.

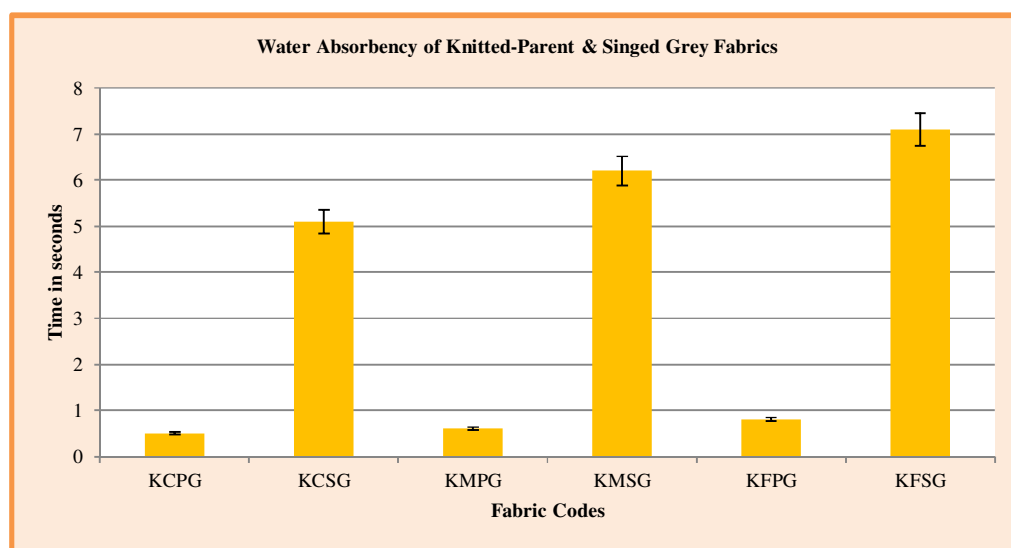


Fig 2- Water Absorbency of Knitted- Parent & Singed Grey Fabrics

There was general trend, showing good absorbency for the Knitted Parent yarn Grey fabrics than Knitted Singed yarn Grey fabrics. Knitted Singed yarn Grey fabrics took more time for Water Absorbency than Knitted Parent yarns Grey fabrics due to lesser hairs. The hairs presented in the Knitted-Parent yarn Grey fabric helped to absorb water very quick. There was also a trend which showed that finer yarns Knitted Grey fabrics took relatively more time for absorbency than coarser yarn Knitted Grey fabrics in both Parent and Singed viscose Knitted fabrics due to lesser fibres in their cross section. The water Absorbency values of all the Knitted Parent & Singed Grey fabrics were found to be statistically significant.

### 3.3 Air Permeability

As per ASTM D 737-96 test methods, Air Permeability test was carried out under ASTM D 1776 standard practice for conditioning and testing textiles, using Air Permeability Tester, SDL MO 21S. The test data of all the six varieties of developed Knitted Grey fabrics are shown in Fig 3.

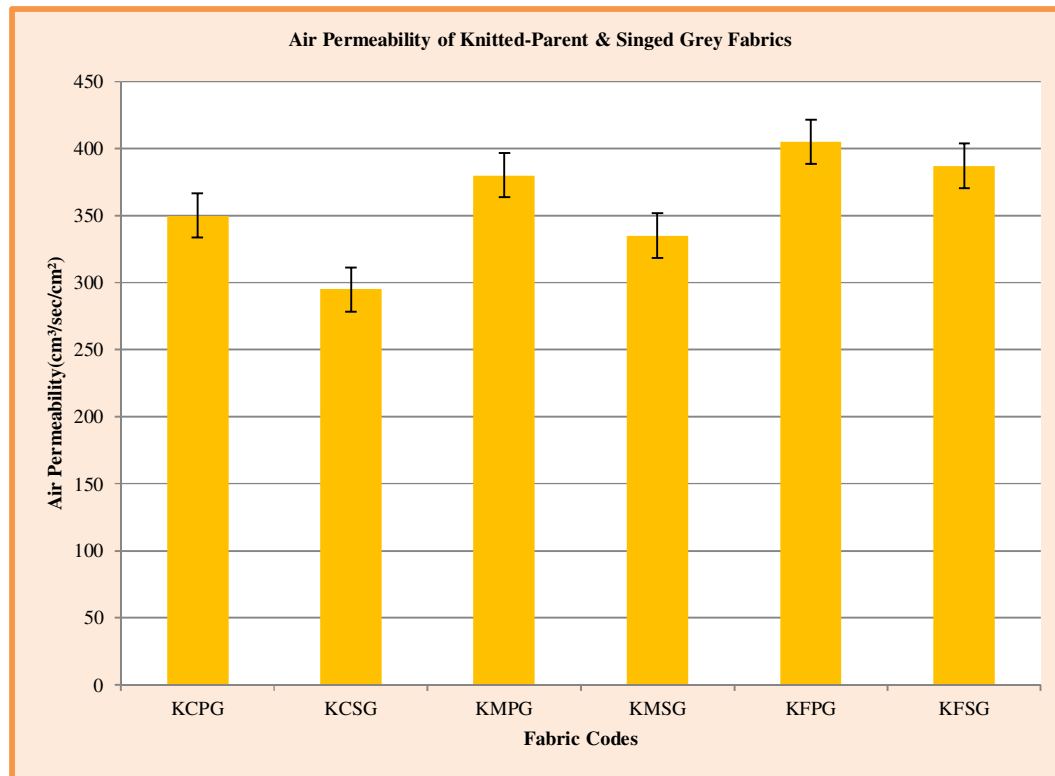


Fig 3- Air Permeability of Knitted- Parent & Singed Grey Fabrics

The Air Permeability, in general, was lower by 4.4% - 15.7% for Knitted- Singed yarn Grey fabrics than Knitted-Parent yarn Grey fabrics for the similar nominal fabric weight (GSM). This was due to lower stitch length used for Knitted- Singed yarn Grey fabrics, which resulted into less openness in fabric structure than Knitted- Parent yarn Grey fabrics, where the stitch length was comparatively higher. Due to more open structure of Knitted- Parent yarn Grey fabrics, the Air Permeability was found to be higher [5,8]. Further, the Air Permeability was found to be higher for finer fabrics than coarser fabrics in both Parent and Singed Grey Knitted fabrics [8]. The Air Permeability values of all the Knitted Parent & Singed Grey fabrics were statistically analysed using t-test. It clearly indicated that the values were more significant.

### 4. Conclusion

Six varieties of Single Jersey Knitted-Parent & Singed Grey fabrics were developed using circular knitting machine. The six varieties of Knitted developed Grey fabrics were tested for characteristics such as Pilling Resistance, Absorbency and Air Permeability and the results were critically analysed. It was observed that the Knitted Singed Grey fabrics showed better Pilling Resistance than Knitted Parent Grey fabrics due to reduction of yarn hairiness upto 86% on Knitted Singed yarn Grey fabrics. The Water Absorbency and Air Permeability were found to be significantly lower for Knitted -Singed Grey fabrics due to lesser hairs on fabric surface and relatively compact fabric structure.

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