

# Performance of Linen and its Mixture with Cotton and Polyester Knitted Fabrics

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**Abstract**—Knitwear industry is emerging as the fastest growing segment of Indian garment exports compared to all other segments, including woven garments and the mill-made garments. Within the textile industry, the role of hosiery or knitwear sector is increasing by the day. Knitting is the second most frequently used method of fabric construction. Knitted fabrics may be constructed with a single yarn that is formed into interlocking loops by the use of hooked needles. There are several reasons for the growth of knitting industry – low capital investment for starting a new knitting unit, high productivity of machine, faster and simpler operation, possibility to manufacture more flexible styles and designs. Knitted fabrics are the most comfortable one and are in tune with time. Today knitting is a complex industry, which has two main areas. One area produces knitted goods for apparel manufacturers, for the sewing centers for consumers and for others. The other area produces completed apparel such as hosiery, sweaters and underwear. A study on Performance of linen and its mixture with cotton and polyester knitted fabrics and its utility for the same had been presented in this work. Firstly, linen, cotton and polyester yarns were procured from the market and fabric was manufactured by using flat bed knitting machine of 100% linen, linen: cotton and linen: polyester in the plain and rib knits. After that scouring was done and different physical parameters were tested which includes courses and wales, thickness, weight per unit area, pilling, dimensional stability, stiffness, crease recovery, bursting strength and drape coefficient and then comparison was done in between the different fabrics of the same knit and results were calculated on the basis of different parameters calculated.

## 1. INTRODUCTION

Textiles have always a central role in the evolution of human culture by being at the forefront of both technological and artistic development. Knitted fabrics may be constructed with a single yarn that is formed into interlocking loops by the use of hooked needles. Knitting is a method by which thread or yarn is turned into cloth or other fine crafts.

In this research an attempt has been made for producing linen and its mixture (linen: cotton and linen: polyester) by using flatbed machine and then testing was done.

## 2. OBJECTIVES

1. To prepare knitted fabric from pure linen and mixture of linen with polyester and cotton.
2. To find physical parameters of knitted fabrics.

## 3. DELIMITATIONS

1. Study was confined to the yarn of 7.5 yarn count i.e. 24 nm.
2. Study was confined to the linen knitted fabrics with the mixture of cotton and polyester only.
3. Study was confined only to the flat bed knitting.

## 4. METHODOLOGY

The study was undertaken to evaluate the physical parameters of linen fabrics and its bends. The details pertaining to material used and the methods adopted during the course of investigation are presented in this chapter under following sub sections.

## MATERIALS USED

**Yarn:**-Yarns were procured from Atul textiles and Bhawna textiles, Muradnagar Ghaziabad.

## INSTRUMENT USED:-

Table- Instruments used for study

S. No.	INSTRUMENT	PURPOSE
1	Sasmira launder o meter	For washing
2	Eureka stiffness tester	Stiffness
3	Eureka crease recovery tester	Crease recovery test
4	Pick glass	Use to count wales and course
5	Thickness tester	To determine the thickness of fabrics
6	ICI Pilling tester	For pilling test
7	Drape o meter	To determine drape of fabrics

8	Digital bursting strength tester	Determine bursting strength of the fabric
9	Electronic weighing balance	To determine weight

### MANUFACTURING OF THE FABRIC: -

After procuring the yarn, fabrics were prepared by using 100% linen, linen: cotton mixture yarns (50:50%) and linen: polyester mixture yarns (50:50%) on computerized flatbed knitting machine. Fabrics were manufactured by using weft knitting technique in plain and rib knit.

### PRE TREATMENT:-

Experiment design was used for the study and the study was conducted under following steps:

### Scouring of the linen fabric:

Non fibrous constituents such as dirt, dust, oil, waxes, mineral etc. were removed by the scouring of linen fabric.

### Recipe used for scouring treatment:

S. No.	Chemical	Amount
1	Sodium Carbonate	2 g/l
2	Ezee	5 g/l
3	Material liquor ratio	1:30
4	Temperature	60 <sup>o</sup> C
5	Time	30minutes

### PROCEDURE

The fabric get dip in the container containing scouring solution 2g/l of sodium carbonate and 5 g/l of Ezee and treated for duration of 30 minutes at 60<sup>o</sup>C temperature. The fabric was taken out from the bowl, rinsed thoroughly and squeezed gently. The scoured fabric was dried at room temperature. (Trotman, 1970)

### DETERMINATION OF PHYSICAL PROPERTIES: -

Fabric thickness, weight per unit area, wales per inch and courses per inch, bursting strength, pilling, stiffness, drapeability, fabric shrinkage and crease resistance.

### RESULTS AND DISCUSSION

#### Physical properties of knitted fabrics

##### Courses and wales per inch

FABRIC	Plain knit		Rib knit	
	Courses	Wales	Courses	Wales
100% Linen	22	18	22	26
Linen : Cotton	20	18	24	26
Linen : Polyester	20	18	24	24

### Thickness (mm)

FABRIC	PLAIN KNIT	RIB KNIT
100% Linen	1.03	1.68
Linen : Cotton	.90	1.71
Linen : Polyester	1.05	1.55

### Fabric weight (gm/m<sup>2</sup>)

FABRIC	PLAIN KNIT	RIB KNIT
100% Linen	6.89	11.10
Linen : Cotton	6.52	9.67
Linen : Polyester	9.21	12.47

### Pilling

FABRIC	PLAIN KNIT	RIB KNIT
100% Linen	5	5
Linen : Cotton	4	4
Linen : Polyester	2	2

### Dimensional stability (in percent)

FABRIC	PLAIN KNIT		RIB KNIT	
	Course wise	Wales wise	Course wise	Wales wise
100% Linen	6.25	2.5	7.5	5
Linen : Cotton	12.5	0	0	5
Linen : Polyester	2.5	1.25	2.5	3.75

### Stiffness

FABRIC	PLAIN KNIT	RIB KNIT
100% Linen	.39	.35
Linen : Cotton	.40	.77
Linen : Polyester	.47	.64

### Crease recovery

FABRIC	Plain knit		Rib knit	
	Course wise	Wales wise	Course wise	Wales wise
100% Linen	96.1	93.7	94.1	91.8
Linen : Cotton	92.8	102.2	102.2	94.4
Linen : Polyester	94.7	94	95.3	90.8

### Bursting strength (kg/cm<sup>2</sup>)

FABRIC	PLAIN KNIT	RIB KNIT
100% Linen	7.53	9.40
Linen : Cotton	5.43	9.83
Linen : Polyester	15.46	11.33

**Drape coefficient (in percent)**

FABRIC	PLAIN KNIT	RIB KNIT
100% Linen	30	34.27
Linen : Cotton	32.55	38.54
Linen : Polyester	33.41	32.55

**5. CONCLUSION**

Present study is a step towards product innovation. It explores the possibility of developing linen, linen: polyester and linen: cotton knitted fabrics for organized sector. The knitwear industry in India is poised for major take-off in the world of fashion as designers find a lucrative outlet for their creative ideas. This study is eminently suited to make small but important contribution in accomplishing the gigantic task of finding gainful employment in urban areas. This study will help to add new varieties in knitted fabrics. The result will be useful to knitted cottage industry. Consumer will be benefited and get fine and good quality of knitted fabrics.

**BIBLIOGRAPHY**

- [1] Ajgaonkar D.B., 1998 "Knitting Technology", Universal publishing corporation, Mumbai
- [2] Booth, J.E. 1968, "Principles of Textile Testing" 3<sup>rd</sup> edition, Heywood books, London
- [3] Cellulose Fibers: Bio- and Nano-Polymer Composites, 2011, pp 61-95
- [4] Corbman, B.P. 1985, "Textile Fiber to Fabric", 6<sup>th</sup> edition, Grey Decision/ McGraw Hill Book Company, New Delhi
- [5] Fibers and Polymers, June 2002, Volume 3, Issue 2, pp 80-84  
Textile research journal volume 79 issue 5 march 2009
- [6] Gohl and Vilensky, 1983, "Textile Science", CBS Publisher and Distributors
- [7] Johnson Henry, 2012 "Introduction To Knitting Technology", Abhishek publications, Chandigarh
- [8] Journal of Polymers and the Environment, July 2000, Volume 8, Issue 3, pp 103-109
- [9] Spencer David J., 1989 "Knitting Technology", 2<sup>nd</sup> edition, Pergamon press, Newyork
- [10] *Textile Research Journal* November 2013 vol. 83 no. 18 1961-1973
- [11] Tortora Phyllis G., 1978 "Understanding Textiles", Macmillan Publishing Co.Inc, Newyork

**WEBLIOGRAPHY**

- [1] <http://www.textileschool.com/School/Fabrics/KnittedFabrics>
- [2] <http://textilelearner.blogspot.com/2012/01/linen-fiber-characteristics-of-linen.html#ixzz2e01IIIBo>
- [3] <http://www.examiner.com/article/different-types-of-fibers-that-are-made-into-yarns>
- [4] <http://cottonaustralia.com.au/cotton-library/fact-sheets/cotton-fact-file-cotton-properties-and-products>