UGC Approved Journal

IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

ISO 3297:2007 Certified

Vol. 4, Issue 7, July 2017

A Comparative Study of Woven and Knitted Fabric used for Seat Covers

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Abstract: This paper gives an outline of the basic use of textile in the automobile industry for manufacturing seat covers in conjunction with its description, types and performance. Test on the properties like durability, comfort, appearance, Fabric abrasion resistance, Fabric breaking strength, Fabric tearing strength, Fabric crease recovery angle, Fabric water repellence, Fabric moisture content, Fabric colour fastness will be carried out. This will provide the comparative study of the types of fabrics used namely, Woven fabric and Knitted Fabric.

Keywords: Abrasion, Woven Fabric, Knitted Fabric.

I. INTRODUCTION

Technical textile plays an important role in Automobile industry. Every mobile vehicle consumes large amount of fabric for the interiors of the vehicle. Over 4 lakh tonnes of textile is utilized expectedly in automobile industry, worldwide.

Fabric, which is mostly used for the car seats, is polyester with high abrasion resistance, UV light resistance and improves the comfort (compressibility, resilience) and indicates the stitches of the sewing lines with an adequate depth.

The available technology for the weaving of the external fabric is a part of the the textile technology. These are:
- Woven fabric jacquard
- Woven fabric with loom of dobby woven (velvets).
- Weft needle fabric done in circular knitting machine (generally with pile).
- Weft needle fabric for warp knitting machine

II. LITERATURE SURVEY

History of Seat covers:
This survey includes the amplification of the use of textile in the automobile industry. In the 1940's, simple fabrics were used to manufacture car seat covers. Those were fibre spun from copolymer of vinyl and vinylidene chloride.
Just after World War II, nylon with the blend of other fabrics like cotton was used.

In 1950's, wide use of PVC coated fabrics was started.
In 1970's, knitted PVC fabric came into used in car seat covers.

Modern seat covers:
The seat constitutes the most important part of the interior decoration. Its security and comfort are studied by automobile manufacturers, seat makers, fabric producers, and textile research centers and universities. Polyester is the most widely used material in car seat coverings. Woven, weft knitted (circular machine), and warp knitted fabrics (tricot and double needle bar machine) are the most used fabric structures High abrasion resistance is needed in seat covers nowadays. The study in abrasion properties of fabrics discussed by [1], here behaviour of seat covers after 10,000 rubs of abrasion is determined. Various samples have been judged to find out the change in thickness and other properties of fabric after abrasion.

An experimental study of the abrasion resistance properties of a various warp-knitted constructions which are specially developed for automotive application as car seat covers is discussed in [2].

Predominant role of knitting in technical textile is discussed in [3].

General fibre survey, fabric structures, processing and testing of automotive textiles is discussed in [4].

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The seat can be divided into two main parts, a frame and a covering. The covering of the frame is divided into two parts, usually a polyurethane foam cushioning and a cap. The three layers composing the "complex" are a surface polyester fabric (weaving or knitting, etc.), thin polyurethane foam and a polyamide knitting or nonwoven that improve cap slip on the cushioning [5].

Abrasion is the physical destruction of fibres, yarns, and fabrics, resulting from the rubbing of a textile surface over another surface [6].

Abrasion ultimately results in the loss of performance characteristics, such as strength, but it also affects the appearance of the fabric [7].
Abrasion resistance of the textile materials is very complex phenomenon and affected by many factors, mainly classified as follows: Fiber, yarn, fabric properties and finishing processes [8].

Textile materials can be unserviceable because of several different factors and one of the most important causes is abrasion. Abrasion occurs during wearing, using, cleaning or washing process and this may distort the fabric, cause fibers or yarns to be pulled out or remove fiber ends from the surface [9].

III.PROPERTY COMPARISON BETWEEN KNITTED AND WOVEN FABRIC

A comparative study of different properties of fabric:
1) Fabric abrasion resistance
2) Fabric water repellency
3) Fabric moisture content
4) Fabric color fastness
5) Fabric breaking strength
6) Fabric tearing strength
7) Fabric crease recovery angle

1 Abrasion resistance test:

The abrasion resistance of fabric samples can be determined as per source no. **ISO-12947** on **Martindale abrasion tester.** Specimen is kept along with circular temple disc and abraded fabric along with a force between 9 kpa to 12 kpa.

2 Water Repellency

The water repellency can be determined by source **ISO-4920** with the help of **WATER REPELLENCY SPRAY TESTER .** Spray test requires a board which is inclined at an angle of 45. The fabric is kept on the board and distilled water is sprayed on the fabric with the help of 19 holes having the diameter of holes 9 mm each .

3 Moisture Content

The moisture content can be determined by source **IS:199** depends on principle of **oven dry method.** This method requires a saw,a scale, an oven, hot plate, field stove or the like suitable for drying moisture samples at a uniform temperature not exceeding 105º C. Select a representative quantity of the moist sample based on the maximum particle size of the sample. Sample should be 2-3 gm in weight and put it on oven for 15-20 min.

4 Color Fastness-

The colour fastness is determined by source number ISO-105 & IS:766 with the help of **colour fastness to washing and colour fastness to rubbing** tester.

5 Breaking strength

The breaking strength is determined as per source **IS:1969** on the **INSTRON** tensile strength tester by using 100 kgf load cell, 300 mm/min of sample size 300*60 mm .

6 Tearing Strength

The tearing strength is determined by as per source **ISO-13937-I** , on Elemendorf tearing strength tester by using 6400 gm tester capacity.

7 Crease Recovery-

The crease recovery is determined as per source no. IS:4681 on **CREASE RECOVERY TESTER.** Specimen size of 4 cm in length and 1.5 in width and a load of 500 gm is applied on the specimen for 5 min., hung on the jaws of crease recovery tester.

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IV. EXPERIMENTAL RESULTS & CONCLUSION

A. Resistance to Abrasion, water repellence, and colour fastness are same in both types of fabric.
B. Tearing strength and Breaking strength are higher in case of woven fabric.
C. Moisture content and Crease recovery angle are higher in knitted fabric.

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