INFLUENCE OF WATER VAPOUR TRANSMISSION ON POLYESTER FABRIC

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Abstract
Water vapour transmission rate defines the comfortness of the fabric. Water vapor permeability is defined as 'fabric's ability to transport water vapor from skin surface through fabric to external environment' and it's a measure of the passage of water vapour through a material which is basically the mass of water vapour that is transmitted through a measured area in a specific unit of time under specified conditions of temperature and humidity.Moisture adds weight to the garment and makes the skin cold. It can also cause irritation and skin diseases.Hence, it is very essential to have a moisture management fabric so as to make the wearer feel comfortable. The main aim of moisture management fabric is to make the skin feel dry.The test determines diffusion of water vapour into the fabric.ASTME 96 is the most comprehensive standard on cup method being compiled up till now.In ASTME 96, cup method includes desiccant method and water method. The two methods are based on the same testing principle. Test dish, test environment and weighing appliance are the main assemblies in cup method and not a single one can be omitted. The process of specimen attachment is complicate but has a direct influence on test result.

***Keywords*—Water vapour, comfortness, Skin**

INTRODUCTION

This is a test method to compare the ability of water vapour from a saturated clothing environment to the ambient atmosphere. Water vapour transmission to fabric is assumed to be controlled mostly by fiber, yarn and fabric variables that determine fabric thickness and porosity,diffusion of the water vapour through the layers,absorption, transmission and desorption of the water vapour transmission by the fibres. knitting is a method by which yarn is manipulated to create a textile or fabric. It is used to create many types of garments. Polyester is a category of polymers that contains the ester functional group in every repeat unit of their main chain. as a specific material, it mostly commonly refers to a type called polyethylene terephthalate (pet). Polyester is a very important manmade fiber. When it is produced with long chain synthetic polymer with ester, chiefly polyester is produced by the melt spinning process. Additionally, it is the most commonly used synthetic fibres. Knitted polyester is a strong, slightly heavier, weather resistant and fast drying knitted polyesters.Appearance is coarser due to the looser weave of the material. Knitted polyester's lower cost and faster production time make it ideal for quick and economical print runs. Moisture vapour transmission rate (mvtr), also water vapour transmission rate (wvtr), is a measure of the permeabitily for vapour barriers. There are various techniques to measure mvtr, ranging from gravimetric techniques that measure the gain or loss of moisture by mass, to highly sophisticated instrumental techniques that in some designs can measure extremely low transmission rates. The conditions under which the measurement is made has a considerable influence on the result. Moisture transmission through textiles has a great influence on the thermo – physiological comfort of the human body which is maintained by perspiration both in vapour and liquid form. The clothing to be worn should allow this perspiration to be transferred to the atmosphere in order to maintain the thermal balance of the body. It is underlined that the processes which play the major role in moisture transmission in a particular situation are dependent on the moisture content of the fabric, the type of material used, the perspiration rate and the atmospheric conditions, such as humidity, temperature and wind speed.

MATERIALS AND METHODS

A.TABLE 1

Sam-ple Code	**Your Refer-ence**	**Sample Code**	**Your Refer-ence**
K2001898-1	Knitted Fabric Sample Marke ple Marked 1	K2001898-2	Knitted Fab-ric Sam-ple Marked 2

K2001898-3	Knitted Fabric Sample Marke ple Marked 3	K2001898-4	Knitted Fabric Sample Marked 4
K2001898-5	Knitted Fabric Sample Marke ple Marked 5	K2001898-6	Knitted Fabric Sample Marked 6
K2001898-7	Knitted Fabric Sample Marke ple Marked 7	K2001898-8	Knitted Fabric Sample Marked 8
K2001898-9	Knitted Fabric Sample Marke ple Marked 9	K2001898-10	Knitted Fabric Sample Marked 10
K2001898-11	Knitted Fabric Sample Marke ple Marked 11	K2001898-12	Knitted Fabric Sample Marked 12

METHODOLOGY

The water vapour permeability of the fabric is generally expressed in terms of the amount of water vapour per unit time per unit area (mg/cm^2·h) under the condition that a certain relative humidity difference exists between the two sides of the fabric.

Under a humidity gradient, water vapour diffuses from the high humidity air through the fabric to the low humidity air. The movement of water vapour, depending on the porous properties of the textile material and the structural voids within the fabric, this porosity and voids are interconnected into channels that can transmit water vapour to escape from the surface of the fabric.

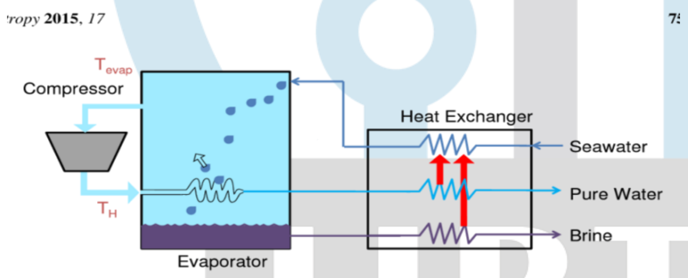

Fig:1- The process of water vapour transmission

The given fabric samples were tested for courses per inch, wales per inch, GSM and Thickness. The test results are given below:

TABLE 2

Sample No.	**GSM**	**Thickness Mm**	**Courses per inch Front/Back**	**Wales per inch Front/Back**
1	218.93	0.68	38/38	43/43
3	211.40	0.70	36/36	43/43
4	202.31	0.65	36/36	46/36
6	198.00	0.66	34/34	42/34
7	179.39	0.65	32/32	42/16
9	173.04	0.66	26/26	44/16

10	173.46	0.56	40/40	32/32
12	166.71	0.55	35/35	33/33
13	186.21	0.64	40/40	36/28
15	184.28	0.66	39/39	36/28
16	158.20	0.52	34/34	33/12
18	154.63	0.51	35/35	33/12

Based on the above described method we have tested water vapour transmission of the corresponding 7 samples.
TABLE 3

S. No	Sample id	Result (g/24h*m2)
1.	1	945.63
2.	4	1563.15
3.	6	1612.25
4.	9	1245.50
5.	12	996.53
6.	15	1362.12
7.	18	1550.15

RESULTS AND DISCUSSION

Various test methods are used here. The table-1 represents the markings made in samples to identify them easily. The table-2 represents course per inch, wales per inch, GSM, and thickness. Apparently, the fabric thickness and GSM is influenced by course per inch and wales per inch. However, the thickness and GSM might vary in different situations. Sample 1 has the highest GSM which has the second highest course per inch and wales per inch. Though sample 8 has decent number of wales per inch and course per inch it has the least GSM.

Table-3 represents the result to water vapour transmission test. This rate is the sample WVTR and is recorded in units of g/24h*m2.

CONCLUSION

Hence, all the samples are tested for its water vapour transmission properties. Each of them showed different results. This study focuses on the water vapour transmission behaviour of polyester under different properties from various samples.The liquid and water vapour permeability of a material plays an important role in determining clothing performance and in maintaining human body comfort. The evaluation method is of the utmost importance in determining the material properties accurately.

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