CHAPTER 7

INFLUENCE OF MOISTURE MANAGEMENT FINISH ON COMFORT CHARACTERISTICS OF KNITTED FABRICS MADE FROM DIFFERENT YARNS

7.1 INTRODUCTION

Based on the findings from the previous chapters it is well established that moisture management finished (MMF) microdenier polyester knitted fabrics have shown superior performance in comfort characteristics. To know the level of performance of microdenier polyester when compared to other commercially available yarns it become necessary to analyze the comfort characteristics of fabrics made from different yarns.

Wicking behaviour and drying rate are critical aspects for the performance of fabrics and have a practical significance in clothing comfort. For comfort, the rate of evaporation should be as close to the wicking rate as possible. Liquid transfer mechanisms include water diffusion and capillary wicking, which are determined mainly by effective capillary pore distribution, pathways and surface characteristics, whereas the drying rate of a material is related to the macromolecular structure of the fiber, surface finish on fabrics and the amount of water absorbed.

In its unfinished state, polyester fiber is hydrophobic and has a much lower water absorption capacity than cotton fiber, but its wicking rate, although slow compared with some other synthetic fibers, is faster than that of
cotton. Cotton fibres have perceived limitations with regard to what is called performance apparel, since it is not considered ‘high-tech’, while polyester has high potential for ‘scientific creation’. When polyester is intended to make contact with the skin in a garment, it is usually chemically treated by hydrophilic polymer to improve its wicking ability. The hydrophilic polymer forms a durable polymer film that interacts readily with water imparting a hydrophilic finish. The resulting hydrophobic core and hydrophilic surface allow moisture to migrate along the outer surface of fibre without being absorbed into the core (Olga Troynikov and Wiah Wardiningsih 2011).

Knitted fabrics with smaller number of fabric contact points on the skin warranted by the uneven surface, results in reduced clinging sensation when the skin is sweat-wetted. The lesser the direct contact with skin, the greater the wicking action. Fibre selection and chemical finishing are used to modify the performance characteristics of apparel fabrics to attain efficient moisture management. Fabrics are often chemically treated for applications such as active wear, sportswear, outdoor clothing, work wear and intimate apparel in which the concept of moisture management is utilized to prevent or minimize the collection of liquid on the skin of the wearer due to perspiration.

7.2 METHODOLOGY

The influence of moisture management finish on comfort characteristics of knitted fabrics made from different yarns have been studied, to know the level of performance of microdenier polyester knitted fabrics among the selected fabrics. The comfort characteristics such as wetting vertical wicking, transverse wicking, moisture vapour transfer, air permeability and drying rate were tested. All the test results have been analyzed using statistical tool at 95% confidence level and standard error has also been evaluated and represented in each figure.
Five types of yarns namely Microdenier polyester (M1), spun polyester (M2), polyester/cotton blend yarn (M3), filament polyester (M4) and 100% cotton (M5) was taken for the study. All the yarns were of the same count or denier (i.e.) spun polyester, polyester/cotton and cotton were 35° count, whereas Microdenier polyester (containing 108 filaments) and filament polyester (containing 34 filaments) were of 150 denier average fineness.

The selected yarns were knitted on the circular knitting machine of 28 gauge to produce five different fabrics of single jersey plain structure containing 2.9 mm stitch length.

7.2.1 Finishing Treatment

Microdenier polyester, spun polyester and filament polyester fabric samples were first hot washed and then bleached. Cotton and polyester/cotton fabrics were first scoured and then bleached. All the five fabric samples were then coated with wetting agent (1gpl) and acetic acid (0.2gpl) for 15 minutes at 60°C - 70°C temperature at material is to liquor ratio of 1:10. After this wetting process, the five varieties of fabrics were treated for moisture management finish. That is, the fabric samples were treated with a dispersion containing a chemical combination of hydrophilic polysiloxane and hydrophilic polyester nonionic. The fabric samples were treated in the finishing bath with pH value of 5.5 at 60°C – 70 °C temperature for 10 minutes. The fabric samples were then dried and cured in a stenter at 150°C temperature and subjected to relaxation for 48 hours.
Development of five knitted fabrics
Single jersey structures with 2.9mm stitch length

Preparatory wet processing for the above fabrics
(Scouring/ Hot wash / Bleaching)

Application of wetting agent to the fabrics
Application of Moisture Management Finish

Dispersion containing Hydrophilic Polysiloxane and Hydrophilic Polyester with pH=5.5 and Temp=60-70°C

Fabrics subjected to testing for:
› Geometrical characteristics › Wetting › Vertical Wicking › Transverse wicking
› Moisture vapour transfer › Air permeability › Drying rate

Figure 7.1 Process Flow Chart for Application of Moisture Management Finish on Knitted Fabrics
7.3 RESULTS AND DISCUSSION

The influence of moisture management finish on comfort characteristics were tested.

7.3.1 Geometrical Characteristics

The geometrical characteristics of five different knitted fabrics were measured and the average value of ten samples was given in Table 7.1.

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Wales per cm</th>
<th>Courses per cm</th>
<th>Stitch density (Loops/cm²)</th>
<th>Areal density (grams/m²)</th>
<th>Stitch length (mm)</th>
<th>Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microdenier Polyester</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Un Treated</td>
<td>16.93</td>
<td>16.81</td>
<td>284.59</td>
<td>126</td>
<td>2.9</td>
<td>0.51</td>
</tr>
<tr>
<td>Treated</td>
<td>17.85</td>
<td>17.71</td>
<td>316.12</td>
<td>135.5</td>
<td>2.7</td>
<td>0.56</td>
</tr>
<tr>
<td>Spun Polyester</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Un Treated</td>
<td>16.53</td>
<td>14.96</td>
<td>247.28</td>
<td>106</td>
<td>2.9</td>
<td>0.44</td>
</tr>
<tr>
<td>Treated</td>
<td>17.32</td>
<td>15.74</td>
<td>272.61</td>
<td>113</td>
<td>2.8</td>
<td>0.45</td>
</tr>
<tr>
<td>Polyester/Cotton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Un Treated</td>
<td>16.28</td>
<td>15.02</td>
<td>244.52</td>
<td>100</td>
<td>2.9</td>
<td>0.41</td>
</tr>
<tr>
<td>Treated</td>
<td>17.13</td>
<td>15.56</td>
<td>266.54</td>
<td>110.5</td>
<td>2.8</td>
<td>0.43</td>
</tr>
<tr>
<td>Filament Polyester</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Un Treated</td>
<td>16.91</td>
<td>16.53</td>
<td>279.52</td>
<td>121</td>
<td>2.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Treated</td>
<td>17.82</td>
<td>17.36</td>
<td>309.35</td>
<td>130.5</td>
<td>2.7</td>
<td>0.55</td>
</tr>
<tr>
<td>100% cotton</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Un Treated</td>
<td>16.89</td>
<td>16.45</td>
<td>277.84</td>
<td>122</td>
<td>2.9</td>
<td>0.44</td>
</tr>
<tr>
<td>Treated</td>
<td>17.66</td>
<td>17.28</td>
<td>305.16</td>
<td>126</td>
<td>2.8</td>
<td>0.45</td>
</tr>
</tbody>
</table>

The wale and course density of the fabrics were increased after MMF was applied. This area shrinkage due to finishing treatment affects the areal density of the fabrics. Microdenier polyester and filament polyester fabrics exhibits higher areal density and thickness than the other three fabrics. After MMF there is an increase of 7% in areal density and 9% in thickness for both fabrics. Spun polyester and polyester/cotton show 6% and 9% increase in areal density while the increase in thickness is 2% and 4% respectively. Cotton exhibits a marginal 3% increase in areal density and 2% increase in thickness values. The application of MMF has reduced the loop length for all five fabrics thereby showing an increase of 8.5% in stitch density.

7.3.2 Water Transmission characteristics

The water transmission characteristics of MMF knitted fabrics made from five different yarns were analysed and the average values were given in Table 7.2.
Table 7.2 Water Transmission Characteristics

<table>
<thead>
<tr>
<th>Samples</th>
<th>Sinking time (s)</th>
<th>Vertical wicking</th>
<th>Transverse wicking</th>
<th>Moisture vapor transmission (percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Wicking height after 30 minutes (cm)</td>
<td>Water spreading area for 1ml of water (cm²)</td>
<td>Area covered to reach saturation (cm²)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wales wise</td>
<td>Course wise</td>
<td>UnTreated</td>
</tr>
<tr>
<td>Microdenier Polyester</td>
<td>7.3</td>
<td>6.3</td>
<td>15.6</td>
<td>16.8</td>
</tr>
<tr>
<td>Spun Polyester</td>
<td>16.6</td>
<td>10.6</td>
<td>4.5</td>
<td>12.9</td>
</tr>
<tr>
<td>Polyester/Cotton</td>
<td>20.21</td>
<td>12.9</td>
<td>3.4</td>
<td>10.1</td>
</tr>
<tr>
<td>Filament Polyester</td>
<td>14.6</td>
<td>10.3</td>
<td>13.5</td>
<td>14.6</td>
</tr>
<tr>
<td>100% cotton</td>
<td>16.0</td>
<td>9.8</td>
<td>11.9</td>
<td>14.2</td>
</tr>
</tbody>
</table>

s- seconds, cm - centimeters
From Table 7.2 it is seen that fabrics treated with moisture management finish exhibited better results in wetting, wicking and moisture vapor transfer when compared to untreated fabrics. All the fabrics showed higher wicking length in wale wise direction than course wise direction. Fabrics made from filament yarns showed superior results than fabrics made from spun yarns.

7.3.3 Analysis of Wetting Characteristics

The ability of the fabric to sink completely in water were tested and included in Table 7.2.

![Figure 7.2 Wetting Characteristics of the Fabrics](image)

From Table 7.2 and Figure 7.2, it is seen that microdenier polyester fabrics shows the quickest wetting time followed by cotton and filament polyester fabrics. These fabrics takes 36% more time to sink in water than microdenier polyester. Spun polyester takes 40% more time to sink in water whereas polyester/cotton takes double the time to sink when compared to microdenier polyester fabrics. Compared with treated fabrics the untreated
spun polyester, filament polyester and cotton fabrics take 50% more time to sink in water. The untreated polyester/cotton fabrics take an unduly long time to sink in water but for Microdenier polyester fabric it takes only 13% more time than treated fabrics. This is due to the finer filaments in its yarn cross sections.

7.3.4 Analysis of Wicking Characteristics

The rate of water spreading by capillary action was tested for wale wise and course wise direction and given in Figures 7.3 and 7.4. The wicking height of all five fabrics in wale wise and course wise directions were analyzed with respect to wicking time from 5 seconds to 5 minutes and upto 30 minutes.

From the Figure 7.3 it is seen that the wicking length increases with time for all fabrics. The rate of increase is gradual for microdenier polyester, filament polyester and cotton fabrics while it is very slow for spun polyester and polyester/cotton fabrics. Microdenier treated fabrics show 13% higher values than filament polyester and cotton fabrics. Except polyester/cotton the other four fabrics show similar results after 1 minute. The wicking rate increases by 68 to 75% from 1st minute to 5 minutes for microdenier polyester and filament polyester fabrics, while it is 60% for spun polyester and cotton fabrics. It is interesting to note that the wicking length attained in 5 seconds is 19 % to 22% of total wicking length obtained in 30 minutes for microdenier polyester, spun polyester, filament polyester and cotton fabrics while it is only 15% for polyester/cotton.
Figure 7.3 Vertical Wicking of the Fabrics–Wale Wise Direction
But in untreated fabrics microdenier polyester shows highest value followed by filament polyester and cotton. Spun polyester and polyester/cotton fabrics exhibit very low values. The wicking rate shapely dropped for polyester/cotton and spun polyester fabrics, and they exhibited very low values. Comparing treated and untreated fabrics it is clear that spun polyester and polyester/cotton fabrics show a very significant 3 times increase in wicking length. This is due to the application of MMF on the fabrics. The effect of MMF is very significant for spun polyester and polyester/cotton fabrics.

Compared with untreated fabrics the treated microdenier polyester and filament polyester fabrics show 7% increase in wicking length while it is 16% for cotton fabrics. Filament fabrics exhibit higher wicking rates due to its inherent channeled fibre structures. Channeled structures form a transport system that pulls moisture away from the skin to the outer layer of the fabric. These channels enhances water attraction into it because of hydrophilic surface treatment given by MMF. Additionally microdenier polyester has a larger surface area due to the increase in inter fibre space in the yarn. This is due to more number of filaments in its yarn cross section. Also the gap between the filaments inside the core of yarn is very less. This leads to higher wicking rate.

Comparing spun fabrics, cotton with its good absorbency characteristics obtains higher wicking length. Cotton is easily wettable and does-wick only when its capillaries are full. The initial wicking rate from 5 sec to 1 minute is higher in microdenier polyester and filament polyester fabrics which helps pulls the moisture away from skin to the outer surface of fabric.

Spun polyester shows 22% higher wicking than polyester/cotton fabrics. This behaviour can be explained by absorption and wicking phenomena. Cotton is a highly hydrophilic fibre; it has good absorbency but
due to its high affinity to water when water molecules reaches in the capillary, it forms a bond with absorbing group of fibre molecules, which inhibits the capillary flow along the channel formed by fibre surfaces. When blended with polyester the movement of water is partly governed by the absorption of water by the fibre and its movement along the fibre, which results in very less movement of water along the fabric. In spun polyester the liquid surface is dragged very smoothly due to its positive contact angle (75°) which exhibits higher wicking than polyester/cotton. The same trend was observed by Brojeswari et al (2009)

Between polyester fabrics filament polyesters show higher wicking than spun polyester due to continuous filaments in its yarn which allows the capillary to rise unhindered.

From Figure 7.4 it is seen that the wicking rate for coursewise follows a similar trend as in walewise direction. Compared with walewise, the total wicking length after 30 minutes is less by 9 to 10% for filament fabrics, 25% for spun polyester and 15% for cotton. For polyester/cotton fabrics the reduction is 9%, Similarly the wicking length is lesser at all time intervals. The reason for this is water moves longitudinally faster in vertical direction because knit loops lie one above the other and the loop leg orientation of the yarn is in walewise direction, while in coursewise direction the loops are set side by side where the movement of water follows the loop (ie) first in horizontal direction and then in vertical direction intermittently. So capillaries are easily formed in walewise direction but along the courses there is a hindrance to water movement. The same trend was observed by Patil et al (2009) on different materials under different conditions.
Figure 7.4 Vertical Wicking of the Fabrics – Course wise Direction
Interestingly compared with untreated fabrics the treated fabrics show 4 to 7% higher wicking for filament fabrics while it 2.5 times higher in spun polyester and 3 times higher in polyester/cotton fabrics. These results follow a similar trend as in walewise direction.

7.3.5 Analysis of Transverse Wicking characteristics

The area covered by the spreading action of water for one drop and saturation method are given below.

7.3.5.1 Area of Water Spread for One Drop of Water

The area covered by the spreading action of one drop (1ml) of water were tested and included in Table 7.2.

![Figure 7.5 Area of Water Spread on the Fabrics](image)

From Table 7.2 and Figure 7.5 it is seen that microdenier polyester fabrics shows higher spreading area followed by filament polyester and cotton fabrics. But the difference is only marginal. Spun polyester and polyester/cotton fabrics show lower spreading area. Transfer wicking is a unique phenomenon with respect to water transfer behaviour of fabrics, since
it has no directional effect. When the area spread is more the evaporation of the fabric was also more. In filament fabrics, the spaces between the fibres create more capillaries with larger area spread and quicker the moisture evaporation. Compared to treated fabrics the untreated fabrics show 32 to 44% lower area spread for spun polyester and polyester cotton respectively. Filament fabrics show 5% lower area while it is 9% for cotton. The application of MMF has increased the area spread for spun polyester and polyester cotton fabrics.

### 7.3.5.2 Area of Water Spread and Time Taken to Reach Saturation

The area covered and time taken to reach saturation point were tested and included in Table 7.2.

![Area of Water Spread to Reach Saturation](image)

**Figure 7.6 Area of Water Spread to Reach Saturation**

From Figure 7.6 and Table 7.2 it is seen that the water spreading area (to reach saturation) shows larger area for microdenier polyester and filament polyester fabrics followed by cotton. Spun polyester and polyester/cotton exhibit 30% lesser area spread to reach saturation point. The
MMF treatment of spun polyester and polyester/cotton fabrics noticeably increases the rate of liquid water absorption (wicking), but does not affect the total amount of water absorbed by the fabric or its water vapor absorption, since MMF alters only the hydrophilicity of the fabric surface. The absorption of water by fibre molecules as well as the moisture fill up in the inter-fiber and inter yarn pores of the fabric decides the area spread. Spreading of the water reduces troughs of low thermal resistance areas in the fabric. This is decided by the number of hydrophilic groups in the fabric. On the other hand the amount of water taken up by the pores will be dependent on the porosity of the material. Here the stitch density of the fabrics are nearly similar, so all materials are having same porosity. Hence absorption and spreading are due to the hydrophilic group in the fabric.

The MMF has provided the hydrophilic capacity. Additionally filament fabrics have higher surface tension which helps to hold the water droplet and transfer it in the lateral direction against gravitational force. More interfibre space in the fabric ensures that the water spreads well in parallel along the fabric plane. The advantage of these assessments is that since transverse wicking being multi-dimensional it eliminates the directional effect.

![Five Different Fabrics](image)

**Figure 7.7 Time Taken for the Fabrics to Reach Saturation**
From Figure 7.7 and Table 7.2 it was seen that the time taken to reach saturation point was similar for both filament fabrics. For untreated fabrics of Microdenier polyester, filament polyester, spun polyester and polyester/cotton the time taken to reach saturation point by the lateral spreading action of water is nearly 2 times than that of treated fabrics. The time taken for untreated cotton fabrics to reach saturation is 2.5 times more. The area spread for untreated fabrics is lower by 15 to 26% for microdenier polyester, polyester/cotton, filament polyester and cotton fabrics. As for spun polyester it is 2.5 times lower than that of treated fabrics. The effect of MMF is very significant with respect to area spread and time taken.

### 7.3.6 Analysis of Moisture Vapour Transfer Behaviour

The rate at which moisture vapor moves through a fabric were tested and shown in Table 7.2.

From Figure 7.8 and Table 7.2 it is seen that microdenier polyester exhibits higher Moisture Vapour Transfer (MVT) rates than the other four fabrics. Filament polyester and cotton fabrics shows 20% lower MVT than microdenier polyester fabrics. Spun polyester and polyester/cotton fabrics shows 30% and 40% lower MVT than microdenier polyester fabrics. Microdenier polyester consisting of finer filaments in its yarn transfers more moisture through the fabric within the given time. Filament polyester fabrics have similar thickness and stitch density values of microdenier polyester but gives 20% lower MVT. This is due to the coarser filaments in its yarn cross section for the same diameter. The lower MVT rates of spun polyester and polyester/cotton fabrics may be due to the fabric surface hairiness which partly hinders moisture transmission.
Figure 7.8 MVT for Height Reduction of Water

Compared with untreated fabrics the treated fabrics show 17% to 20% higher MVT. The application of MMF has increased the MVT rates for all given fabrics.

From Table 7.2 and Figure 7.9 it is observed that microdenier polyester fabrics give higher weight reduction than the other four fabrics. Filament polyester and cotton fabrics give 20% lower weight reduction than microdenier polyester. Spun polyester and polyester/cotton fabrics give 30% and 40% lower weight reduction than microdenier polyester fabrics. A similar trend was seen in the MVT test for height reduction.
Five Different Fabrics

**Figure 7.9 MVT for Weight Reduction of Water**

Compared with untreated fabrics the treated fabrics show 13% to 20% higher weight reduction. The application of MMF has shown increased weight reduction and hence higher MVT rates.

### 7.3.7 Air Permeability Characteristics

The rate of air flow through the fabric under a differential pressure between the two faces of a fabric were tested and given in Figure 7.10.

From Figure 7.10 it was seen that spun polyester and polyester/cotton fabrics show 18% higher values than the filament fabrics of microdenier polyester and filament polyester. This may due to the 20% lower fabric thickness of spun polyester and polyester/cotton fabrics. Also the stitch density of these fabrics are 15% lesser than filament fabrics. Cotton fabric shows 7% increase in values which is mainly due to its 19% lower fabric...
thickness. Microdenier polyester and filament polyester exhibit similar air permeability values.

![Air Permeability of the Fabrics](image)

**Figure 7.10 Air Permeability of the Fabrics**

Interestingly when compared with untreated fabrics all the five treated fabrics show a marginal reduction in air permeability values. The same trend was observed by Tyagi and Dhirendra Sharma (2005). The effect of MMF on air permeability is insignificant.

### 7.3.8 Drying Characteristics

The quick drying capability of the five different fabrics were evaluated by its drying rate. It indicates the ability of the fabric to evaporate the moisture present.
Figure 7.11 Drying Rate for Untreated Fabrics

Figure 7.12 Drying Rate for Treated Fabrics
From Figures 7.11 and 7.12, it is seen that wicking ability and MMF play an important role in the drying capability of the fabrics. Microdenier polyester fabrics show the quickest drying time followed by filament polyester. This is due to the finer filaments in the yarn which gives greater exposed surface area thus facilitating faster drying of the fabrics. A similar trend was noticed by Srinivasan et al (2007).

Spun polyester, polyester/cotton and cotton fabrics take 14% longer time to dry completely than microdenier polyester. From the figure it was seen that filament fabrics exhibit quicker drying time than the spun fabrics. This is because filament fabrics have inherent channeled fibre structures due to the stiffness of its yarns. Also the channels are continuous thus facilitating effective water transport and subsequent evaporation. This increases the drying rate of filament fabrics. The same trend was observed by Miller et al (2006). It appears that the drying capability of the fabrics were related to the macromolecular structure of its fibres.

Compared with untreated fabrics the treated fabrics shows quicker drying rates. Microdenier polyester and filament polyester exhibited 20% faster drying rates while for spun polyester it was 12%. Polyester / cotton and cotton fabrics exhibited 26% and 30% faster drying rates respectively. The untreated polyester/cotton and cotton fabrics took a longer time to dry than the other three fabrics. This is due to the fact that cotton fibre swells when absorbing water and subsequently takes a longer time to dry. The application of MMF is significant with respect to drying rate.

7.4 CONCLUSION

One of the objectives of this research work is to study the influence of MMF on comfort characteristics of knitted fabrics made from different
yarns. The comfort characteristics were compared between MMF treated and untreated fabrics.

In the geometrical characteristics of MMF knitted fabrics, there is an increase of 7% in areal density and 9% in thickness for microdenier polyester and filament polyester fabrics. In the case of spun polyester there is 6% increase in areal density and 2% increase in thickness values. Polyester/cotton shows 9% increase in areal density and 4% increase in thickness values. Cotton exhibits a marginal 3% increase in areal density and 2% increase in thickness values. There is an increase of 8.5% in stitch density for all five fabrics. It is due to the reduction in loop length when compared to untreated fabrics for all five fabrics.

In the wetting test, microdenier polyester fabrics showed the quickest sinking time. Cotton and filament polyester fabrics took 36% more time to sink in water than microdenier polyester. Spun polyester took 40% more time to sink in water whereas polyester/cotton had taken double the time to sink when compared to microdenier polyester fabrics. Compared with treated fabrics the untreated spun polyester, filament polyester and cotton fabrics took 50% more time to sink in water.

In the wicking test, the wicking rate increases in the range of 68 to 75% during the first minute to five minutes for microdenier polyester and filament polyester fabrics, while it is 60% for spun polyester and cotton fabrics. The wicking length attained in 5 seconds is 19% to 22% of total wicking length obtained in 30 minutes for microdenier polyester, spun polyester, filament polyester and cotton fabrics, while it is only 15% for polyester/cotton fabrics. Comparing with untreated fabrics it was clear that the treated spun polyester and polyester/cotton fabrics show a very significant 3 times increase in wicking length. The treated microdenier polyester and
filament polyester fabrics show 7% increase in wicking length while it is 16% for cotton fabrics.

Compared with walewise direction, the total wicking length after 30 minutes for coursewise direction fabrics was less by 9 to 10% for filament fabrics, 25% for spun polyester and 15% for cotton fabrics. For polyester/cotton fabrics the reduction was 9%. Compared with untreated fabrics the treated fabrics show 4 to 7% higher wicking for filament fabrics while it 2.5 times higher in spun polyester and 3 times higher in polyester/cotton fabrics.

In the transverse wicking test for one drop of water, microdenier polyester fabrics shows higher water spreading area followed by filament polyester and cotton fabrics. Spun polyester and polyester/cotton fabrics show lower spreading area. Compared to treated fabrics the untreated fabrics show 32 to 44% lower area spread for spun polyester and polyester cotton respectively. Filament fabrics show 5% lower area spread while it is 9% for cotton fabrics.

In the saturation test, the water spreading area was larger for microdenier polyester and filament polyester fabrics followed by cotton. Spun polyester and polyester/cotton exhibit 30% lesser area spread to reach saturation point. The time taken to reach saturation point for untreated fabrics of microdenier polyester, filament polyester, spun polyester and polyester/cotton was nearly 2 times than that of treated fabrics. The time taken for untreated cotton fabrics to reach saturation is 2.5 times more than microdenier polyester.

In the MVT test for reduction in height of water, filament polyester and cotton fabrics showed 20% lower moisture vapour transfer than microdenier polyester fabrics. Spun polyester and polyester/cotton fabrics
shows 30% and 40% lower MVT than microdenier polyester fabrics. Compared with untreated fabrics the treated fabrics show 17% to 20% higher MVT.

In the MVT test for reduction in weight of water, filament polyester and cotton fabrics showed 20% lower weight reduction than microdenier polyester. Spun polyester and polyester/cotton fabrics showed 30% and 40% lower weight reduction than microdenier polyester fabrics. Compared with untreated fabrics the treated fabrics show 13% to 20% higher weight reduction.

In the air permeability test, spun polyester and polyester/cotton fabrics showed 18% higher values than the filament fabrics of microdenier polyester and filament polyester while cotton fabric showed 7% increase in values.

In the drying rate test, microdenier polyester fabrics showed the quickest drying time of 24 minutes followed by filament polyester with 26 minutes. Spun polyester, polyester/cotton and cotton fabrics took 14% longer time to dry completely than microdenier polyester. Compared with untreated fabrics the treated microdenier polyester and filament polyester fabrics exhibited 20% faster drying rates while for spun polyester it was 12%. Polyester / cotton and cotton fabrics exhibited 26% and 30% faster drying rates respectively.

Comparing all selected fabrics, it was concluded that microdenier polyester fabrics with its high wicking action and quicker moisture evaporation had given a superior performance in comfort characteristics.