INVESTIGATION ON COMFORT PROPERTIES OF VARIOUS THREE THREAD FLEECE KNITTED FABRIC QUALITIES

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ABSTRACT

The term comfort is defined as "the absence of unpleasantness or discomfort" or "a neutral state compared to the more active state of pleasure". There is general agreement that the movement of heat and water vapour through a garment is probably the most important factor in clothing comfort. The sportswear sector in textile industry has expanded on the worldwide and the producers and wearers want to indicate their comfort performance in addition to the aesthetic demands. Sportswear should possess good moisture transmission property. Moisture flow through various materials is a complex phenomenon as in three-thread fleece knitted fabric produced with different face and fleecy yarn material. So, in this study, nine three-thread fleece fabrics of different composition materials have been studied, where these knitted fabrics are produced in a special circular knitted machine.

Keyword: - Thermal conductivity, Air permeability, Water vapour permeability, Moisture management test

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INTRODUCTION:

Clothing comfort is a subjective matter as it depends on the wearers' perception. It is usually measured with the interaction between human body with its surrounding microclimate and also the clothing. Knitted fabrics are widely used due to their easy-care properties and possessed high degree of clothing comfort. Comfort is being reinforced as key parameter in clothing. Comfort is a pleasant state of psychological, physiological and physical harmony between the human being and the environment. The processes involved in human comfort are physical, thermo - physiological, neuro - physiological and psychological.

An approach to improve the pilling resistance properties of three thread polyester cotton blended fleece fabric

Pilling is a common surface defect in fleece fabrics made of chief value cotton (CVC) and polyester cotton (PC). The term "Chief Value Cotton" refers to fabrics produced by mixing cotton and synthetic fiber such as polyester where cotton typically makes up more than half of the overall combination of polyester. Customers nowadays want polyester cotton blended fleece fabric with excellent pilling

resistance, but it is difficult to improve pilling properties in polyester cotton blended fleece fabric. A variety of studies have been conducted to improve the pilling properties of single jersey CVC knit fabric. The primary goal of this study is to eliminate pilling in fleece fabrics made of three-thread polyester cotton blends. In this analysis, singeing with a heat setting was used to increase pilling resistance. According to this experimental study, the pilling resistance properties improve from grade 1 to grade 4, which is extraordinary. This method can be used to successfully solve the pilling problem in three thread polyester cotton blended fleece fabrics in the textile knitting industry.The main goal of this research is to improve the pilling behavior of three-thread polyester cotton fleece fabric. All of the study's objectives were met, and it can be concluded that singeing and heat setting are the most effective methods for reducing pilling in polyester cotton blended three thread fleece cloth. Excellent pilling resistance grade (4) is achieved after applying both singeing and heat setting. Without singeing and heat setting, the pilling grade is found to be very low. In the knitting industry, this method may be used to reduce the pilling tendency of CVC knit fabric.

Analysis on thermal comfortability of different three thread fleece fabric

This research work was carried out to study the thermal comfort characteristics of three thread fleece fabrics. Polyester filament, spun polyester, polyester/cotton and 100% cotton yarn was used to produce different fifteen samples with different fiber composition having same GSM (280) and thermal characteristics such as thermal conductivity, thermal resistance, relative water vapor permeability and their impact were analyzed. 90% cotton/10% polyester was observed with lowest thermal conductivity and with increasing the polyester percentage thermal conductivity increasing up to 65% cotton/ 35% Polyester. In case of thermal resistance higher resistance was observed for 90% cotton/10% polyester and with the increasing of polyester percentage thermal resistance decreases. The sample containing 90% cotton/10% polyester to 80% cotton/20% polyester showed the lowest and 65% cotton/35% polyester was found highest water vapor permeability. After total analysis of the samples 90% cotton/10% polyester containing three thread fleece fabric are recommended as best winter item

It is confirmed that presence of polyester in three thread fleece fabric can affect the thermal comfortability. A range of 25% to 35% presence of polyester with cotton raises the thermal conductivity and water vapor permeability which increases the coolness where as 10% to 20% of polyester with cotton gives better warmness for lower thermal conductivity and air permeability.

Effect of Blend Ratio, Loop Length on Thermal Comfort Properties of Single Jersey Knitted Fabrics:

The effect of the linear density, loop length, and blend proportion on thermal comfort properties (air permeability, thermal conductivity, thermal resistance, and water-vapor permeability) have been studied.

The thermal conductivity of the fabrics was generally found to decrease with an increase in the proportion of bamboo fiber. The water-vapor permeability and air permeability of the fabrics were observed to increase with an increase in bamboo fiber content. An increasing presence of bamboo fiber in the fabric causes a reduction in the fabric thickness and mass per unit area for all linear densities of yarn. As the constituent yarn gets finer, both the fabric air and water-vapor permeability increase while the thermal conductivity decreases.

As the loop length increases, the thermal conductivity also increases independent of the fabric packing density. As far as the water-vapor permeability is concerned, the increase in loop length decreases the flow rate of water vapor because of the hindrance of air layers.
As the linear density of the yarn increases, the thermal conductivity decreases as more air is caught by fibers, and vice versa. In the case of a higher water-vapor permeability, the linear density of yarn and the thickness of the fabric increase and the flow rate will be less.

Thermal Contact Properties of 2-Yarn Fleece Knitted Fabrics

In this paper, the warm-cool feeling of 2-yarn fleece knitted fabrics, which are widely used for outdoor garments, have been investigated, and to the best of our knowledge this has not been studied before. Four different fleecy fabrics were selected with varying ground and loop yarn combination, which is 100% cotton or PET/cotton blend in accordance with the most common, commercially available fleece-knitted fabric types. The thermal contact feelings of fleecy fabrics in four different compositions were investigated in this study. The structural parameters studied in this investigation are the fibre type of ground & loop yarn, and the raising treatment. It is well known that the warm-cool feeling of a fabric depends on the chosen fibres, so here we observed the effect of the fabric construction process. We found that the thermal contact feeling of fleecy fabrics are strongly affected by the raising treatment which is the final process of an usual fleecy fabric. The influence of yarn type after raising seems to be insignificant. The role of fabric thickness is also ignored, since all the raised samples have a similar thickness. The feeling of fleecy fabrics wetted is much cooler; wetted raised fleecy fabrics exhibit a warmer (more pleasant) feeling than fabrics without raising.

The dimensional properties of double-knit fabrics:

Double-knit structures are made from a combination of loops such as plain, rib, tuck, and Heat. having unequal lengths and knitted on different feeds, such as a cylinder-only or dial-only feed or a dial-and-cylinder feed. This results in individual feeders giving rise to unequal numbers of courses appearing at any one side of the fabric and to differing numbers of wales per unit length. Determination of Dimensions The dimensions of double-knit structures are governed by many parameters, such as the type of loop, method of loop combination, run-in ratio, average loop length, and course length associated with individual feeds. To determine the manner in which each of the above factors affects the fabric dimensions and appearance, it was found necessary to determine the practical limits within which, for a given yarn and machine, knitting could take place. this was done by determining the maximum and minimum lengths for the main types of loop used in knitting double-knit structures, such as interlock, rib, plain half-gauge, and plain full-gauge fabrics.

An unconventional way to incorporate comfort in knitted fabric:

The comfort and absorbing power of the cotton knitted fabric have been improved significantly by using bicomponent yarn, made up of 90% cotton fibres and 10% water-soluble compound, in place of 100% cotton yam. After knitting, the fabric is subjected to washing treatment where water-soluble compound is di5solved, making the yam in the fabric lighter, bulkier and softer. This results in the improvement of air permeability, absorbing power and feel of the fabric over that of 100% cotton knitted fabric.

It has already been reported 7 that after the washing treatment, the fabric made out of the bicomponent yam has better softness and feel than that made out of 100% cotton yam.

The Influence of Double Layer Knit Fabric Structures on Air and Water Vapor Permeability:

The face and back surfaces of the fabrics are connected by a) Loop and b) Tuck. The developed fabrics are taken to measure the water vapor permeability and air permeability properties. The test results were discussed statistically with single factor ANOVA. The results in the analysis of variance were based on conclusions from Tukey's Least Significant Difference test. They showed that the differences among the double layer structures were highly significant in the WVP and air permeability properties of the knit fabrics. The stitch densities in the fabric were found to influence more on the permeability property of the fabrics.

There are many factors influences the air permeability through textile structure such as Fiber – Orientation, morphological structure, volume of fiber fraction. Yarn – twist, linear density, type of material, yarn flattening, yarn structure. Fabric – Surface Porosity, fabric thickness, specific energy of the fabric, loop length, tightness factor, type of structure, types of stitch the barrier ability of the plain double-layered cotton/polyester knitted fabric to the air is based on surface porosity, fabric thickness & type of stitch. The air permeability of the fabrics made from natural yarns is higher than textured polyamide, highest than elastane knitted socks. There is no correlation between water vapor permeability and the air permeability of the double-layered knitted fabrics. The structure of the fabric is important factor that influence the permeability properties of the textile fabrics.

The influence of moisture content on the thermal conductivity of a knitted structure:

A theoretical model has been created to predict the thermal conductivity of knitted structures in terms of porosity, thickness and moisture content. The validity of the model was examined by the results of experiments conducted using different knitted fabrics, in which the porosity, thickness, fibre and water content are different. The thermal conductivity of a dry plain knitted fabric decreases with the increase of porosity; however, with increased water content, the increase of porosity contributes to an increase in thermal conductivity.

The thermal conductivity increases when the thermal conductivity of the fibres increases and also increases as the porosity decreases.

The effect of fiber cross-sectional shape and texturing temperature on knitted fabric air permeability:

Texturized yarns are often preferred especially in home textiles and sportswear. To improve polyester filament properties, mechanical, thermal, chemical and combinations of texturing processes are applied. With these processes, filament yarns take on a curved and voluminous structure and gain a permanent form. Properties of the texturized yarn can be varied as raw materials properties, machine type and process factors. This study covers the investigation of the effect of cross-sectional shape of fiber (round and trilobal) and texturing process temperature (150, 175 and 200 0C) on air permeability of false twist textured polyester single jersey knitted fabrics. Results showed that the highest air permeability value was obtained from knitted fabric with round fiber cross-sectional shape polyester filament textured at 150 0C. According to the statistical analysis, both the fiber cross-sectional shape and process temperature were found to have a significant effect on air permeability property.

Thermal properties of knitted fabrics made from cotton and regenerated bamboo cellulosic fibres:

The thermal properties of different knitted fabric structures made from cotton, regenerated bamboo and cotton-bamboo blended yarns. Three blends of fibres (100% cotton, 50:50 cotton: bamboo and 100% bamboo) were used to produce three yarn counts (30 tex, 24 tex and 20 tex).It was found that the thermal conductivity of knitted fabrics generally reduces as the proportion of bamboo fibre increases. For the same fibre blend proportion, the thermal conductivity was lower for fabrics made from finer yarns. The thermal conductivity and thermal resistance values of interlock fabric was the maximum followed by the rib and plain fabrics. The water vapour permeability and air permeability of knitted fabrics increase as the proportion of bamboo fibre increases. The air permeability and water vapour permeability values were higher for plain fabric as compared to those values of rib and interlock fabrics.

The effect of some fabric parameters on the thermal comfort properties of flat knitted acrylic fabrics for winter wear:

The thermal comfort properties of flat knitted acrylic fabrics differing in terms of knit structure, tightness, thickness and porosity were investigated within the perspective of its usage in winter wear products. Measured and calculated using the data from Permetest and Alambeta devices, the thermal comfort properties were handled in three aspects, namely thermoregulation characteristics, breathability and thermo-physiological characteristics, and their relationship with fabric structural parameters were investigated statistically. The results indicated that rib 2 2 structures provide the optimum condition in terms of thermoregulation, breathability and thermo-physiological comfort, whose thickness and porosity values should be adjusted accordingly, since the thickness improves thermal insulation and porosity improves breathability.

The parameters of thermal comfort are significantly affected by the knit structure. Furthermore, it was found that tightness of the knitted structures has an influence on thermal conductivity, thermal absorptivity and air permeability, while it had no significant impact on water vapor resistance and the water vapor permeability index. Thickness was also found to have a statistically significant influence on providing thermoregulation properties and water vapor resistance, whereas air permeability as an indicator of porosity is influential on thermal conductivity and thermal absorptivity, in terms of thermoregulation characteristics, and influential on the water vapor permeability index, in terms of thermo-physiological characteristics.

The Influence of Knitted Fabrics' Structure on the Thermal and Moisture Management Properties:

The influence of fabric's structure on the thermal and moisture management properties of knitted fabrics made of two types of yarns with thermo-regulating effect: Coolmax® and Outlast®. The main purpose of this study was the selection of the most adequate fabric, to be used in summer and winter sportswear. The results demonstrated that some properties, such as, thermal properties, diffusion ability, air and water vapor permeability are influenced by both raw material type and knitted structure parameters. Wicking ability is influenced to a greater extent by the knitted structure, while the drying ability is primarily determined by raw material and to a lesser extent by the knitted structure parameters. Outlast® fabrics are preferred candidates for warmer climate sportswear, particularly due to their lower thermal resistance, higher thermal conductivity and absorptivity, air and water vapor permeability. When considering sportswear for colder weather, Coolmax® based structures seem to be the best choice. These findings are an important tool in the design of a

sportswear product tailored to the different body areas thermal and moisture management requirements.

Thermal resistance of knitted fabrics:

The investigation is to draw out conclusions about significant fabric parameters affecting the heat transfer through a porous structure. A series of samples of single jersey fabrics was knitted and treated according to the same recipe. Essential primary and secondary parameters were determined to characterize the manufactured fabrics. Comparing the measured results for the thermal resistance of the knitted fabric, one can observe a strong correlation between the thermal resistance of the knitted fabric and thickness, mass per unit area, cover factor and porosity. The results of the statistic test showed that the correlation of fibre conductivity and the resistance of the knitted fabric to heat transfer is small (R = 0.32). It is to conclude that the air entrapped in the knitted fabric structure plays a prevalent role for thermal resistance of this kind of products. Performed investigations, presented results and findings have expanded previous findings on the basis of which parameters of similar knitted products in moderate environmental conditions can be predicted. Therefore, the value and performance characteristics of the product for the specific purpose can be evaluated to a certain extent.

The optimal thermophysiological comfort of a knitted structure can be achieved if all parameters of the manufacturing and finishing methods are selected studiously and optimized in conformity with the requirements set by the purpose of the product.

Thermal Comfort Properties of a Bi-layer Knitted Fabric Structure:

The thermal comfort properties of different knitted fabric structures made from modal, polypropylene and micro denier polyester were studied for volleyball sportswear. Eleven knitted fabrics were produced, in which three samples were single jersey, two plated and six bi-layer knitted structures. The air permeability, water vapour permeability, thermal conductivity, wicking and drying ability of bi-layer knitted fabric made up of polypropylene as the inner layer and modal as the outer layer with one tuck point of repeat were found to be higher as compared to other bi-layer, plated and single jersey structures. Both the objective and subjective results show that bi-layer knitted fabric with polypropylene as the inner layer and modal as the outer layer with one tuck point of repeat is mostly suitable for sportswear. The results are discussed together with multivariate ANOVA test results at a 95% significance level.

Moisture properties of raised 3-thread fleece fabric knitted with different face and fleecy yarns

In this study, nine three-thread fleece fabrics of different composition materials have been studied, where these knitted fabrics are produced in a special circular knitted machine. The developed fabrics are taken to measure, water vapor permeability ‘‘WVP”, gain%, air permeability, drying time, color difference, immersion time and bursting strength. The test results were discussed statistically with single factor ANOVA. From the experimental results, it has been observed that the difference between face and fleecy yarns material was highly significant for the whole fabric in the water vapor permeability, gain%, color difference and immersion time. Three-thread Fleece fabric knitted with

Egyptian cotton for the face and fleecy yarns has the maximum bursting strength compared to other samples having Bamboo and Tencel yarns.

To get no sweat accumulation and more comfortable feelings for sport wears, underwears and medical wears, 3-Thread fleece fabric having regenerated yarns for the face and fleecy is recommended. Three-thread fleece fabric having Tencel yarn for the face and back of the fabric has the least gain%. The more amorphous region constitutes of their fibers material attract water molecules. Therefore, their yarns have the ability to absorb water and get rid of it very fast. This is a very important property for the sportswear garments. To improve the durability of the weak Bamboo yarn inside the knitted fabric, 3-thread fleece structure is recommended. 3- Thread Fleece Structure improves the durability of the weak Bamboo yarn inside the fabric

The influence of pile weft knitted structures on the functional properties of winter outerwear fabrics

This study focuses on the selection of the most adequate structures to be used to represent typical winter outerwear, two groups of weft-knitted structures, fleece and plush knits, were selected. An experimental work is presented to determine the effects of different knit structures on; bursting strength, air permeability, absorption and thermal insulation properties of knitted fabrics. From the analyses of variance, it is seen that the effects of pile knit structure on the functional properties of knitted fabrics are highly significant. These findings are an important tool in the design of typical winter outerwear fabrics.

In this paper, the design of typical winter outerwear fabrics were discussed. All results indicate that, these fabrics are used to provide insulation / protection against loss of body temperature, according to the requirements imposed by climate / temperature conditions.
The insulation capacity of winter outerwear fabrics depends on two factors;
1. The thermal resistance of garments (Tog), where the higher the Tog rating, the better the insulation
2. The air permeability of the material, where low air permeability will ensure protection from draughts, while inherent breathe ability allows evacuation of body perspiration
It has been proven that different pile knitting structures have different functional and mechanical properties. Therefore, in order to achieve the ideal winter outerwear clothing, it is necessary to consider the end use of the garment while selecting the fabrics. According to the results plush structures, due to their high thermal insulation values and bursting strength properties, could be preferred for winter garments in order to protect from cold.

Shrinkage Control of Fleece Knit Fabrics by Some Yarn and Knitting Variables

The fibre pile or fleece knit can be made on circular knit machines with different types of construction. The machines may be complex, utilizing either spring or latch needles employing sinker-top, dial, cylinder, or dial / cylinder mechanisms. With this equipment, various effects can be produced. This paper describes the influence of some varibles like count and twists of backing yarn and stitch length upon shrinkage of two and three-yarn fleece fabrics. The results shows that by suitable combination of these variables the lengthwise and shrinkage can be controlled.

In comparison of 2-yarn fleece and 3-yarn fleece knitted fabric ity was reveals that width wise shrinkage is higher for 2 yarn fleece, however its length wise shrinkage is lower in competition than 3-yarn fleece, width wise shrinkage is inversely proportional to stitch length while length wise shrinkage is directly proportional to the stitch length.

Investigation of air permeability of new generation fleece fabrics in dry and wet state

In recent time fleece fabrics are being increasingly used for insulating layer in three-layer system of thermoactive clothing. Air permeability is the one of the feature which influence on thermal comfort of garments. Clothing often is getting wet (sweat, humid environment) which can significantly affect the thermal properties, while most of the testing methods performs measurements only in the dry state. Therefore, in the paper were presented the investigation of air permeability in dry, normal and wet state of the different kinds of fleece fabrics. Furthermore, the water absorption of the tested fleeces has been also determined. The presented researches proved that wet clothing significant loses thermal comfort. This phenomenon is exacerbated with increasing moisture content of material and depends on the structure and the filling of test materials.

From the presented researches follows, that with increasing moisture content in fleece fabrics significantly worsen their air permeability, which can cause drastic changes in the thermal comfort of the user. These changes are in the range of 20% to even 60%, depending on the kind of fleeces, their structure, weight as well as density of fabrics. Also deserve attention results of water absorption test. Fleeces, which are treated as a dry garments, due to their hydrophobic raw material, in fact, after dipping absorb a very large amount of water.

Study on the Effect of Dyeing and Finishing Parameters on Cotton Knitted Two Thread Fleece Fabric and 1x1 Rib Fabric

Dyeing and finishing parameters are important factors which have various impacts on cotton knitted two thread fleece and 1x1 rib fabrics respectively. Various technical properties like physical, dimensional and dyeing properties of 1x1 rib and two thread fleece knitted fabric after different wet processing stages and sequences have been influenced by dyeing and finishing parameters. For this purpose, it was taken two types of knitted fabrics such as 32(S), 1×1 Rib and 13(S), 28(S) two thread fleece. The grey fabric was subjected to pretreatment process involving scouring, bleaching and enzyme wash. The pretreated fabrics were then dyed and finished to ready to stitch fabrics. At the end of each process stage, samples were collected and analyzed for various physical properties. In every state except dyeing, weight has successively decreased. Total weight loss found for 1x1 rib is 9.59% and for two thread fleece is found 11.49%.g. The finishing process whether the dyed fabric is padded with softener and dried in a dryer alters fabric properties to a considerable extent. It improves fabric handle and imparts a soft feel to fabric. This study exposed that the fabrics found from the enzymatic scouring bleaching process show more softer handle and much less weight loss% than conventional process. We have found both length wise and width wise shrinkage for these types of fabric. For two thread fleece fabric, length wise shrinkage found -3.26% and in width wise -2.70%. For 1x1 rib fabric, length wise shrinkage found 3.35% and in width wise -3.50%. It can be said that, enzymatic process will play a vital role in future textile processing. However, the study will be helpful for industrial wet processing for an actual assessment among these particular knitted structures. It will be also helpful for those who are willing to do further experiment relevant to it.

Effect of backed yarn characteristics on two thread fleece knitted fabric properties.

The influence of backed yarn linear density and its twist factor on two-thread fleece knitted fabric properties has been studied. Experiments are conducted on both finished and raised fabrics. Four levels of linear density and two levels of twist factor are used for backed yarn. Knitted fabrics weight per square meter, shrinkage, spirality, thermal comfort characteristics, bursting strength and abrasion resistance are tested. Results show that by increasing yarn linear density, the fabric weight per square meter and thickness increase, while shrinkage and spirality improve. Raising process enhances fabric

thermal comfort characteristics, while the yarn twist factor exhibits insignificant effect on many fabric characteristics.

Characterization of Elastic Properties Accountable to Three Thread Fleece Fabrics

The aim of this paper is to investigate the elastic properties of three thread fleece fabrics. Investigation was carried out on the physical properties on weft knitted single jersey fabrics where the influence of washing cycle and fabric type on stretching (%) and unrecovered elongation (%) properties of the elastane knitted fabrics were shown. Here five different types of plain weft knitted fabrics were used to investigate the result. Extensibility and strength of the knitted fabrics are con-cerned with knitting structure. This research opens possible ways for the scholars to further study in this field. It is seen from the research that the Characterization of elastic properties accountable to three thread fleece fabrics were investigated. Knitted fabrics and products are exposed to a variety of stresses and loads/deformation during their usage. The loads are unlike by value, by direction, and by duration. The alternations of loading and unloading or resting processes affect the knitted structure and could bring about changes in the linear dimensions of the fabric or result in the distortion of the knitted items and finally the loss of product appearance or its useful properties. The Influence of Knitting Structure on Mechanical Properties of Weft Knitted Fabrics is investigated. Hence an investigation carried out on different types of rib knitted fabrics to establish that elasticity and strength of the knitted fabrics are immediately concerned with knitting structure.

Properties of Three-Thread Fleece Fabrics

This study investigates the effect of course length and washing processes on the physical characteristics and shrinkage behavior of three-thread fleece fabrics. Three groups of fabrics in five different course length ranges are produced, and their areal density, fabric thickness, pilling, and abrasion resistance are measured in accordance with the relevant ISO and British Standards. The dimensional changes of the samples in both width- and length-wise directions, together with skewness (%), are also measured after washing and tumble-drying cycles. The experimental results are evaluated with the SPSS statistical program.

Our findings thus far show the need for investigating different course lengths, fibre types, yarn counts, and dying processes on three-thread fleece fabric properties. Therefore, we have made a detailed systematic study by controlling knitting variables as well as laundering conditions (temperature, different washing regimes, use of detergent, etc.) in order to investigate the dimensional behavior of three-thread fleece fabrics.

CONCLUSION:

1. The water vapour permeability and air permeability shows concomitant increase as the proportion of bamboo fibre increases. If the blend proportion is the same, then the thermal conductivity reduces, but the air and water vapour permeability increase as the yarn becomes the finer one
2. To get no sweat accumulation and more comfortable feelings for sport wears, underwears and medical wears, 3-Thread fleece fabric having regenerated yarns for the face and fleecy is recommended. Three-thread fleece fabric having Tencel yarn for the face and back of the fabric has the least gain%. The more amorphous region constitutes of their fibers material attract water molecules. Therefore, their yarns have the ability to absorb water and get rid of it very fast. This is a very important property for the sportswear garments. To improve the

durability of the weak Bamboo yarn inside the knitted fabric, 3-thread fleece structure is recommended. 3- Thread Fleece Structure improves the durability of the weak Bamboo yarn inside the fabric

3. All results indicate that, these fabrics are used to provide insulation / protection against loss of body temperature, according to the requirements imposed by climate / temperature conditions.
4. The results shows that by suitable combination of these variables the lengthwise and shrinkage can be controlled. In comparison of 2-yarn fleece and 3-yarn fleece knitted fabric ity was reveals that width wise shrinkage is higher for 2 yarn fleece, however its length wise shrinkage is lower in competition than 3-yarn fleece, width wise shrinkage is inversely proportional to stitch length while length wise shrinkage is directly proportional to the stitch length.
5. The structural parameters studied in this investigation are the fibre type of ground & loop yarn, and the raising treatment. It is well known that the warm-cool feeling of a fabric depends on the chosen fibres, so here we observed the effect of the fabric construction process. We found that the thermal contact feeling of fleecy fabrics are strongly affected by the raising treatment which is the final process of an usual fleecy fabric.
6. It is observed that the parameters of air permeability thermal resistance, water vapour permeability and thermal conductivity are significantly affected by the fibre blend ratios

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