# STUDY ON HIGH TWIST YARN AND ITS WOVEN FABRIC PROPERTIES

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## ABSTRACT

*Yarn structure influences the configuration of the constituent fibers in the yarn and the comfort properties of the fabrics to a great extent. The fiber arrangement in the yarn has a major influence on the comfort-related properties such as thermal conductivity, air permeability, wickability, and moisture vapor permeability. The amount of twist plays vital role for finished consumers' good which determines appearance, durability and serviceability of fabric. This project aims to study on high twist yarn and its its influence on fabric comfort and behavior and to find its suitable application in kurtis . In this study, yarn samples of VSF compact spun yarn of different counts and different twists are sourced. Plain weaved fabric is produced with the desired warp and weft yarns and the parameters are studied by subjecting both the samples of yarn and fabric into a series of testing like Evenness, Hairiness, Strength in Yarn stage and Stiffness, Flexural rigidity, Bursting strength in Fabric stage. These tests help us to understand and study the properties of yarn and fabric (Mechanical and Low stress mechanical properties) and to analyze the effect of yarn linear density and TPI on fabric properties.*

**Keyword :** *High twist yarn, , wickability, fabric comfort, Flexural rigidity,, Bursting strength*

## 1. INTRODUCTION

High twist yarn plays an important and significant role on the yarn quality and its production. It provides cohesion between the fibres and gives strength to the yarn particularly when the yarn is subjected to any external force. Yarn twist has always been an integral part in textile design for its marked influence on the different aspects of those fabrics such as, appearance, handle and functional properties. Therefore, twisting mechanism including twist distribution and propagation has attracted the increasing interest of researchers in textiles and apparel. Highly twisted yarn is widely used in the textile industry in order to produce a primarily clothing (mostly kurtis and blouse materials) and upholstery fabric. In the weaving industry it is always emphasized to increase production and maintain quality of woven fabric so the mill can meet the demands of both national and international quality familiar consumers and markets. Also Competitiveness is the main feature of the textile industry in future. So alternative solutions from yarn and fabric is required in order to meet the demand and also up gradation to withstand the national and international standards. By twisting the yarn the applications will find global market. From literature review it is visible that various researchers have focused on the characteristics of high twist yarn. In this research, a range of twist level has been analyzed. By taking different counts (30, 40 COUNT ) in order to find out the most appropriate twist level for producing a yarn having acceptable properties.Its important parameters can only lead to the betterment or improvement in the fabric behavior and properties. The main aim of our project to study the properties of yarn and fabric (Mechanical and low stress mechanical properties) and to analyse the effect of yarn linear density, TPI on fabric properties by conducting series of tests in both the stages (in both yarn and fabric stages) and to find the suitable application (Kurtis). Besides this, optimization tools are also being used as it helps to find variation between samples and it helps to understand the influence of yarn parameters on fabric strength.

## 2. BACK GROUND OF THE WORK

Textile fabrics have been serving the human race for many centuries. They not only provide strength but also provide flexibility (easy to bend, shear, and twist), permeability, and drape-ability. Such unique attributes are essential to obtain considerable protection, esthetics, and comfort during their use as apparels or garments. In this 21st century, they are now being used in various technical applications where the product requirements are altogether different from normal garment properties. The most commonly used fabric structure for garments and even for technical applications is the woven fabrics where two sets of perpendicular yarns are crossed and interweave with each other to create a coherent and stable structure. In this chapter, we focus on the details on the woven fabric construction to describe the basic principles used in establishing structure-property relationship of a textile structure and illustrate the underlying assumptions and their implications. This will help in analysis and interpretation of the structural-property relationship of such fabrics, and set a platform to select/engineer optimum structure with suitable properties of the fabric for various technical applications (1). A process for forming crepe fabrics on a shuttleless loom is provided which includes temporary stabilization of highly twisted (e.g., 40-70 TPI) filament yarn. To this end, hot melt size is applied at a predetermined temperature in predetermined amounts (e.g., add-on of about 10.5-13.5%) immediately after twisting so as to reduce the liveliness of the yarn and to thereby permit it to be woven. After weaving, the yarn stabilization is reversed by a desizing operation. The fabric is subsequently heat treated to develop crepe characteristics (2). The yarn structure and fabric interlacing pattern are determining parameters for fabric properties. The current study focusses on the multi-response optimization of certain fabric properties like shrinkage, areal density, thickness, flexural rigidity, and bending modulus using principal component analysis for optimum properties. Yarn twist (four different levels), fabric weave design (plain and twill), and yarn type (carded and combed) were the variables of the study. The Taguchi approach of the orthogonal array was sued for designing the experiments, and eight different samples were produced. The yarn twist and fabric weave design were found to have significant effect on these properties of the fabric. Furthermore, using analysis of the variance method, contribution% of parameters to these properties was determined (3). Flexural rigidity of a fabric is among the important properties, especially for industrial applications of high performance fabrics. The relationships between various fabric properties and fabric stiffness were analyzed. Several monofilament fabrics were tested in the warp direction for this purpose. It was found that there were close relationships between fabric stiffness and warp diameter, filling diameter, fabric modulus and fabric density. As yarn diameters and fabric modulus increase, the stiffness of fabric also increases. It was evident that fabric design has also an effect on fabric stiffness for the tested fabrics. The measured fabric stiffness values were compared with theoretical calculations that showed good agreement (4). When fabrics are bent or creased in other than the warp or fill directions, the de formation of the individual yarns has a torsional component. The interaction of this component with the twist of the yarn should result in anisotropic creasing behavior in the fabric.Crease recovery as a function of test direction was measured for a number of fabrics. Anisotropy attributable to torsion-twist interaction was found in cellulosic fabrics when strong directional effects due to such factors as twill ribs were not introduced by the fabric construction. The effect could be qualitatively related to the yarn twists. With fibers of greater intrinsic resilience, such as wool, nylon, or acetate, the crease recovery was essentially isotropic.When cellulosic fabrics were treated with dimethylol urea, their crease recovery not only became greater but also was more nearly isotropic (5). Investigating the effect of weft yarn twist level on sensorial comfort of 100% woven cotton fabrics. Five cotton fabrics were woven with incremental weft yarn twist levels and their tensile and shear strength, pure bending, compression, surface friction and roughness were evaluated using Kawabata Evaluation System and compared. The study reveals that at higher level of twist, lower surface friction, less compressibility, less slipperiness (0.264 warp and 0.199 weft direction), rougher surface (0.026 warp and 0.020 weft) and less even surface (2.643 warp and 1.998) were observed. The wicking ability also reduced with the increase in twist level while there was an improvement in water permeability (6). study of the effect of high twist factor yarns of crepe fabrics on vertical and horizontal wicking rates.For this aim, three 100% PET woven samples varying in their twists/m values (1000, 1600, 2400 TPM) for their pick yarns were produced, taking into account that the other production parameters were constant. Results showed that the increase in twist factor increased vertical wicking rates due to the progressive decrease in intra thread spaces. On the other hand, horizontal wicking rate was increased until a specific twist factor, after which the horizontal wicking rate decreased. This can be attributed to the deformation of yarns alignment which directly affects the inter yarn spaces (7). The main advantages of using twisted fibrous structures are for their strength, weight, flexibility, and elastic behavior, it exhibits maximum axial stiffness and minimum bending stiffness (8). the tensile properties of high stretch yarns are dependent on the configuration of the constituent filaments and on the complexity of assembly of these filaments, and that the fundamental shape of crimps of the yarn consists of a series of rings which develop the high extension properties(9). Developed the woven fabric using the combination of vortex yarn spun by using cotton, viscose and modal fibres. Different combinations in warp and weft directions are used to produce the woven fabric. The bursting strength of the woven fabric made air vortex spun yarn shows a terrible increase in the tensile strength of fabric. There is a 1.5 time increase in the tensile strength of fabric due to the yarn strength increase and the good cohesion property of air vortex yarn (10).

## 3. MATERIALS AND METHODOLOGY

**Table 1** Yarn used

| | |
|---|---|
| 1. | 30's Ne VSF Compact spun yarn ( Normal Twist) Z twist |
| 2. | 30's Ne VSF Compact spun yarn ( High twist) Z twist |
| 3. | 30's Ne VSF Compact spun yarn ( High twist) S twist |
| 4. | 40's Ne VSF Compact spun yarn ( Normal Twist) Z twist |
| 5. | 40's Ne VSF Compact spun yarn ( High twist) Z twist |
| 6. | 40's Ne VSF Compact spun yarn ( High twist) S twist |

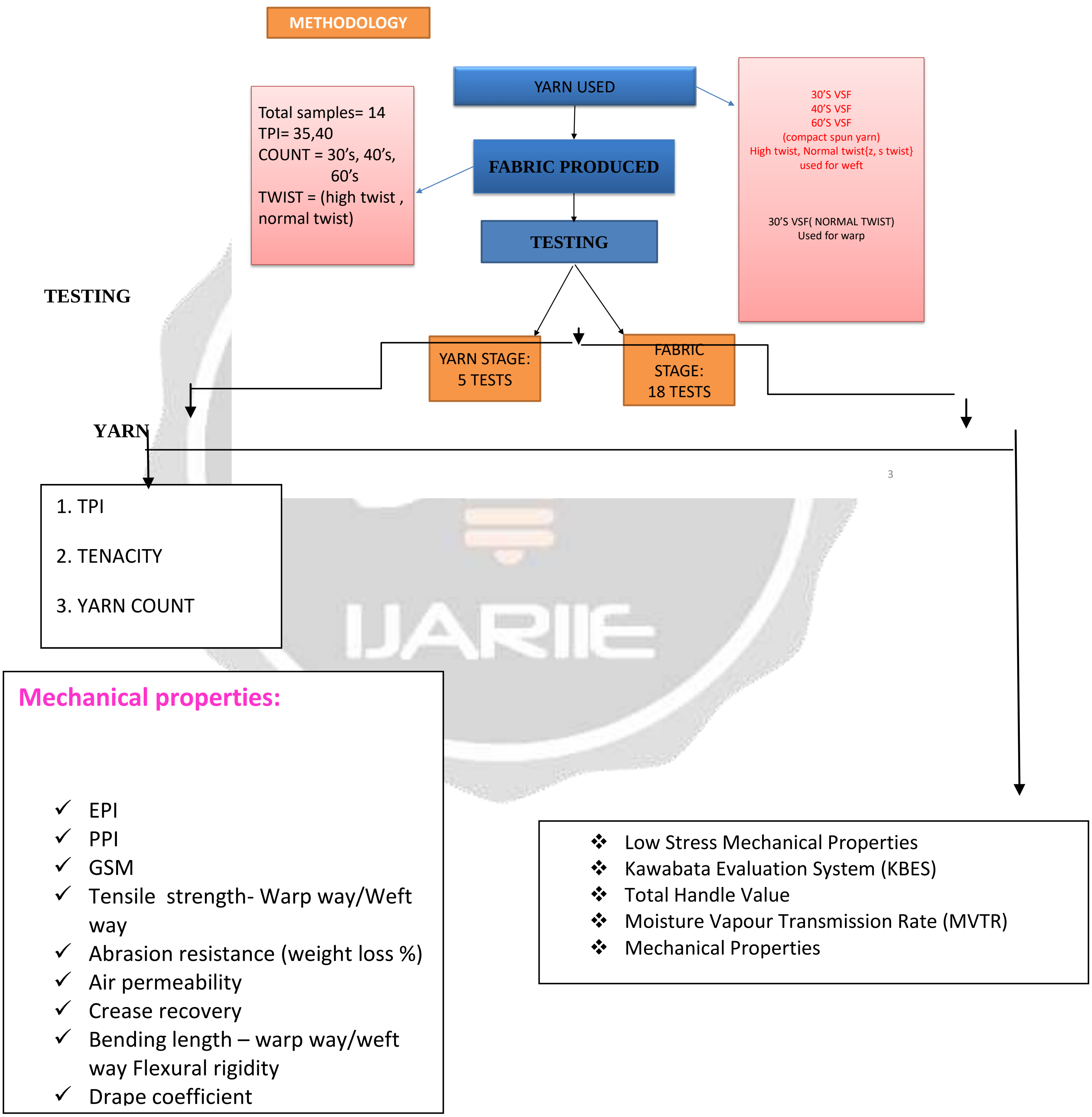
**Table 2** Fabric produced pattern

| S,NO | WARP | WEFT | STRUCTURE |
|---|---|---|---|
| 1 | 30's Ne VSF Compact spun yarn ( Normal Twist) Z twist | 30's Ne VSF Compact spun yarn ( Normal Twist) Z twist | Plain |
| 2 | 30's Ne VSF Compact spun yarn ( Normal Twist) Z twist | 30's Ne VSF Compact spun yarn ( High twist) Z twist | `plain |
| 3 | 30's Ne VSF Compact spun yarn ( High twist) Z twist | 30's Ne VSF Compact spun yarn ( High twist) Z twist | Plain |
| 4 | 30's Ne VSF Compact spun yarn ( High twist) Z twist | 30's Ne VSF Compact spun yarn ( High twist) Z twist | Plain |
| 5 | 30's Ne VSF Compact spun yarn ( High twist) Z twist | 30's Ne VSF Compact spun yarn ( High twist) Z twist | Plain |
| 7 | 30's Ne VSF Compact spun yarn ( High twist) Z twist | 40's Ne VSF Compact spun yarn ( Normal Twist) Z twist | Plain |
| 8 | 30's Ne VSF Compact spun yarn ( High twist) Z twist | 30's Ne VSF Compact spun yarn ( High twist) Z twist (40TPI) | Plain |
| 9 | 30's Ne VSF Compact spun yarn ( High twist) Z twist | 30's Ne VSF Compact spun yarn ( High twist) S twist (40TPI) | Plain |
| 10 | 30's Ne VSF Compact spun yarn ( High twist) Z twist | 40's Ne VSF Compact spun yarn ( High Twist) Z twist ( 40 TPI) | Plain |
| 11 | 30's Ne VSF Compact spun yarn ( High twist) Z twist | 40's Ne VSF Compact spun yarn ( High Twist) S twist ( 40 TPI) | Plain |
| 12 | 30's Ne VSF Compact spun yarn ( High twist) Z | 40's Ne VSF Compact spun yarn ( High Twist) | Plain |

| | | | |
|---|---|---|---|
| | twist | Z twist ( 35 TPI) | |

### 3.1 METHODOLOGY

Initially, VSF Compact spun yarn of different counts and various twist of yarns has been sourced.Fabric samples with the desired warp and weft have been produced in the Projectile loom.After that we are going to do series of tests in both yarn stage and fabric Stage.Tests are done to study the parameters (Mechanical and low stress Mechanical properties).



### 3.2 YARN TEST RESULTS

| | YARN SAMPLES | U% | Thin | Thick | Neps | Total | S3 | H index | Tenacity RKM | Elongation % | Avg count | Count CV | Strength (Lbs) | CSP | TPI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 30'S VSF | 14.12 | 192 | 575 | 302 | 1069 | 895 | 27 | 21.32 | 12.58 | 19.69 | 2.7 | 107 | 3210 | 23 |
| 2 | 30'S VSF (HIGH TWIST) | 13.76 | 185 | 564 | 275 | 1024 | 873 | 26 | 19.63 | 13,10 | 30.12 | 1.9 | 80.7 | 2400 | 27 |
| 3 | 40'S VSF (COMPACT) | 10.5 | 160 | 302 | 215 | 677 | 510 | 20 | 15.94 | 11.58 | 40.88 | 1.56 | 67 | 2680 | 24 |
| 4 | 40'S VSF (HIGH TWIST Z TWIST) | 11.01 | 179 | 469 | 245 | 893 | 643 | 13 | 16.77 | 12.09 | 39.42 | 2.41 | 63.11 | 2520 | 32 |
| 5 | 40'S VSF (HIGH TWIST S TWIST) | 15.17 | 224 | 587 | 275 | 1086 | 820 | 25 | 20.32 | 13.25 | 19.58 | 2.32 | 65 | 2600 | 32 |
| 6 | 30'S LENZING VISCOSE | 12.68 | 198 | 465 | 247 | 910 | 670 | 16 | 19.62 | 13.75 | 19.73 | 2.13 | 102 | 3060 | 24 |
| 7 | 60'S MODAL | 13.82 | 210 | 395 | 263 | 868 | 579 | 14 | 18.08 | 11.08 | 30.62 | 1.98 | 48 | 2880 | 34 |
| 8 | 30'S VSF S twist | 12.76 | 193 | 367 | 235 | 795 | 515 | 18 | 18.9 | 12.46 | 30.13 | 1.53 | 103 | 3090 | 27 |

### 3.3 FABRIC PARTICULARS and TEST results

| SL.NO | SAMPLES | EPI | PPI | REED WIDTH (in inches) | AIR PERMEABILITY | STIFFNESS (cm) / Bending length | | GSM |
|---|---|---|---|---|---|---|---|---|
| | | | | | | warp | weft | |
| 1 | 30'S VSF * 30'S VSF (HIGH TWIST) | 66 | 48 | 63 | 2560 (1.4) | 3 | 2.7 | 288 |
| 2 | 30'S VSF * 40'S VSF (COMPACT) | 66 | 48 | 63 | 2560 (1.1) | 2.6 | 2.5 | 312 |
| 3 | 30'S VSF * 30'S VSF (HIGH TWIST Z TWIST) | 66 | 48 | 63 | 2960(2.1) | 2.3 | 2.1 | 356 |
| 4 | 30'S VSF * 40'S VSF (HIGH TWIST Z TWIST) | 66 | 48 | 63 | 2460 (1.4) | 2.5 | 2.4 | 230 |
| 5 | 30'S VSF * 40'S VSF (HIGH TWIST S TWIST) | 66 | 48 | 63 | 2660 (1.4) | 3.4 | 3.1 | 236 |
| 6 | 30'S VSF * 30'S LENZING VISCOSE | 66 | 48 | 63 | 2360 (2.4) | 2.8 | 2.5 | 292 |
| 7 | 30' S VSF * 30'S VSF (HIGH TWIST) | 56 | 48 | 55 | 2360 (0.9) | 2.3 | 2 | 248 |
| 8 | 60'S MODAL *30'S VSF (HIGH TWIST) | 92 | 52 | 63 | 2360 (1.2) | 2.6 | 2.4 | 222 |
| 9 | 30' S VSF * 30'S VSF (HIGH TWIST) | 68 | 44 | 63 | 2360 (1.3) | 2.8 | 2.6 | 198 |
| 10 | 60'S MODAL *30'S VSF (HIGH TWIST) | 68 | 56 | 63 | 2360 (1.1) | 2.8 | 2.5 | 268 |
| 11 | 30' S VSF (HIGH TWIST) * 30'S VSF (HIGH TWIST) (S + Z twist) | 64 | 60 | 63 | 2360 (1.4) | 2.6 | 2.2 | 268 |
| 12 | 30'S VSF * 30'S VSF (HIGH TWIST) | 68 | 48 | 63 | 2360 (1.6) | 2.3 | 1.9 | 388 |
| 13 | 30'S VSF * 30'S VSF (HIGH TWIST) | 56 | 44 | 63 | 2360 (1.4) | 3 | 2.7 | 186 |
| 14 | 30'S VSF * 30'S VSF (NORMAL TWIST) | 66 | 48 | 63 | 2960 (5.4) | 5.6 | 5.2 | 228 |

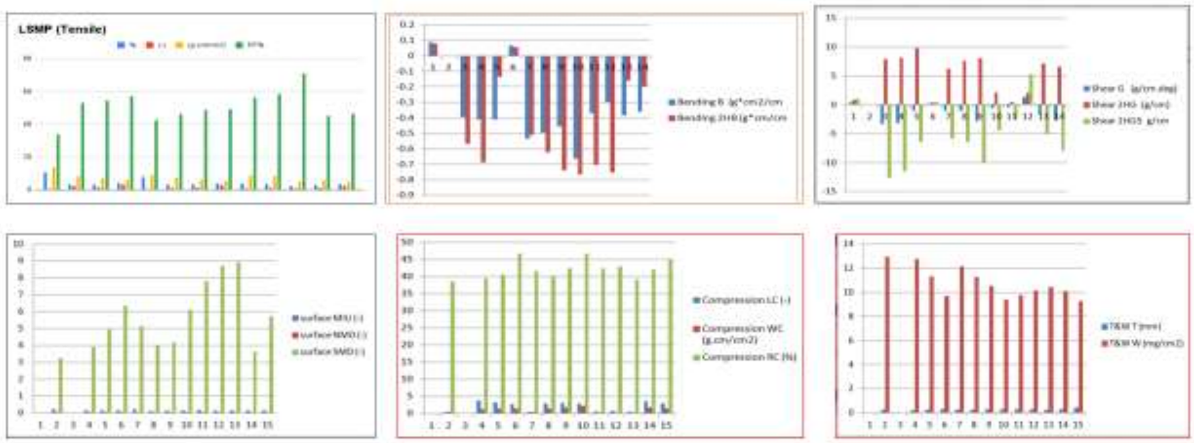
| Sl.NO | SAMPLES | FLEXURAL RIGIDITY [G] UNIT: milligram centimeter [mm cm] | THICKNESS [mm] | BENDING MODULUS UNIT : kg/cm$^2$ | Abrasion resistance | TENSILE STRENGTH WARP WAY | TENSILE STRENGTH WEFT WAY | Drape coeeicient |
|---|---|---|---|---|---|---|---|---|
| 1 | 30'S VSF * 30'S VSF [HIGH TWIST] | 663.9 | 0.25 | 509.9 | 43.3 | 43.2 | 38.3 | 57.35 |
| 2 | 30'S VSF * 40'S VSF [COMPACT] | 517.05 | 0.22 | 582.7 | 46.17 | 37.3 | 32.1 | 61.01 |
| 3 | 30'S VSF * 30'S VSF [HIGH TWIST Z TWIST] | 377.9 | 0.23 | 372.7 | 45.58 | 35.6 | 31.3 | 62.8 |
| 4 | 30'S VSF * 40'S VSF [HIGH TWIST Z TWIST] | 338.2 | 0.3 | 150.3 | 42.22 | 34.8 | 30.7 | 54.21 |
| 5 | 30'S VSF * 40'S VSF [HIGH TWIST S TWIST] | 807.6 | 0.23 | 796.5 | 41 | 37.3 | 30.1 | 57.21 |
| 6 | 30'S VSF * 30'S LENZING VISCOSE | 540.8 | 0.26 | 369.23 | 42.2 | 36.8 | 32.3 | 56.41 |
| 7 | 30' S VSF * 30'S VSF (HIGH TWIST) | 244.7 | 0.27 | 149.2 | 45.7 | 35.5 | 31.9 | 34.21 |
| 8 | 60'S MODAL *30'S VSF [HIGH TWIST] | 346.04 | 0.29 | 170.26 | 35.24 | 44.6 | 44.3 | 31.32 |
| 9 | 30' S VSF * 30'S VSF (HIGH TWIST) | 388.9 | 0.3 | 172.84 | 32.13 | 47.2 | 43.1 | 28.45 |
| 10 | 60'S MODAL *30'S VSF [HIGH TWIST] | 496.3 | 0.31 | 199.9 | 30.35 | 48.3 | 44.7 | 39.45 |
| 11 | 30' S VSF (HIGH TWIST) * 30'S VSF (HIGH TWIST) [S + Z twist] | 366.6 | 0.28 | 200.4 | 34.12 | 39.2 | 36.6 | 43.32 |
| 12 | 30'S VSF * 30'S VSF [HIGH TWIST] | 354.5 | 0.25 | 272.26 | 33.05 | 41.7 | 37.1 | 44.12 |
| 13 | 30'S VSF * 30'S VSF [HIGH TWIST] | 428.8 | 0.28 | 234.4 | 33.12 | 43.2 | 38.3 | 44.3 |
| 14 | 30'S VSF * 30'S VSF [NORMAL TWIST] | 3582.8 | 0.41 | 623.81 | 33.72 | 36.8 | 32.3 | 43.7 |

### 3.4 LOW STRESS MECHANICAL PROPERTIES

Low Stress Mechanical Properties

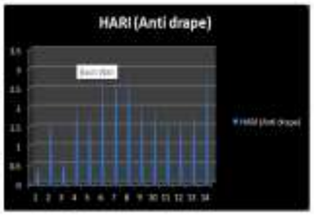
| S.no | Structure | Sample | Tensile EMT % | Tensile LT (-) | Tensile WT [g.cm/cm2] | RT% | Bending B [g*cm2/cm | Bending 2HB [g*cm/cm | Shear G [g/cm.deg] | Shear 2HG [g/cm] | Shear 2HGS g/cm | Surface MIU (-) | Surface NMD (-) | Surface SMD (-) | Compression LC (-) | Compression WC [g.cm/cm | Compression RC (%) | T&W T (mm) | T&W W (mg/cm2) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Plain | 1 | | | | | | | | | | | | | | | | | |
| 2 | Plain | 2 | 10.65 | 0.541 | 14.13 | 33.86 | 0.089 | 0.0794 | 0.36 | 0.82 | 1.01 | 0.201 | 0.0148 | 3.25 | 0.318 | 0.327 | 38.53 | 0.25 | 12.933 |
| 3 | Plain | 3 | 3.11 | 2.2 | 8.2 | 53.11 | -0.3936 | -0.5682 | -3.34 | 7.92 | -12.61 | 0.139 | 0.0262 | 3.92 | 3.763 | 1.27 | 39.63 | 0.22 | 12.76 |
| 4 | Plain | 4 | 3.34 | 1.43 | 7.6 | 54.61 | -0.4102 | -0.6862 | -3.2 | 8.2 | -11.53 | 0.149 | 0.0284 | 4.95 | 3.228 | 1.38 | 40.58 | 0.23 | 11.31 |
| 5 | Plain | 5 | 4.31 | 3.17 | 6.05 | 57.14 | -0.4102 | -0.1364 | -1.01 | 9.8 | -6.43 | 0.156 | 0.0332 | 6.35 | 2.634 | 1.35 | 46.67 | 0.3 | 9.67 |
| 6 | Plain | 6 | 7.99 | 0.465 | 9.07 | 42.32 | 0.066 | 0.0562 | 0.29 | 0.41 | 0.47 | 0.192 | 0.0154 | 5.13 | 0.331 | 0.315 | 41.59 | 0.23 | 12.166 |
| 7 | Plain | 7 | 3.11 | 1.18 | 7.2 | 46.3 | -0.5324 | -0.5109 | -1.02 | 6.2 | -5.86 | 0.11 | 0.0216 | 3.981 | 2.91 | 1.42 | 40.32 | 0.26 | 11.26 |
| 8 | Plain | 8 | 3.21 | 1.23 | 6.4 | 48.52 | -0.4966 | -0.6229 | -1.01 | 7.6 | -6.43 | 0.14 | 0.0274 | 4.165 | 3.07 | 1.65 | 42.42 | 0.27 | 10.51 |
| 9 | Plain | 9 | 3.83 | 2.92 | 5.38 | 49.21 | -0.4551 | -0.7377 | -2.91 | 8.05 | -10.15 | 0.147 | 0.031 | 6.11 | 2.855 | 2.27 | 46.67 | 0.29 | 9.41 |
| 10 | Plain | 10 | 3.95 | 0.886 | 8.75 | 56.57 | -0.6645 | -0.7642 | -0.53 | 2.13 | -4.47 | 0.164 | 0.0187 | 7.815 | 0.512 | 0.146 | 42.47 | 0.3 | 9.759 |
| 11 | Plain | 11 | 3.49 | 0.968 | 8.45 | 58.58 | -0.3697 | -0.7036 | -0.43 | 0.46 | -2.53 | 0.141 | 0.0238 | 8.7 | 0.702 | 0.107 | 42.99 | 0.31 | 10.166 |
| 12 | Plain | 12 | 2.44 | 0.852 | 5.2 | 71.15 | -0.3004 | -0.7508 | 1.28 | 2.08 | 5.28 | 0.134 | 0.0174 | 8.905 | 0.512 | 0.11 | 39.09 | 0.25 | 10.409 |
| 13 | Plain | 13 | 3.01 | 1.18 | 5.7 | 45.35 | -0.3841 | -0.1604 | -1.58 | 7.15 | -5.13 | 0.141 | 0.0229 | 3.65 | 3.473 | 1.78 | 42.14 | 0.28 | 10.11 |
| 14 | Plain | 14 | 3.61 | 2.63 | 5.21 | 46.57 | -0.3602 | -0.1983 | -2.68 | 6.58 | -7.85 | 0.135 | 0.0295 | 5.71 | 2.817 | 1.31 | 45.04 | 0.41 | 9.25 |

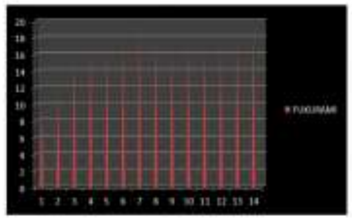
| | |
|---|---|
| T | Thickness |
| W | Weight |

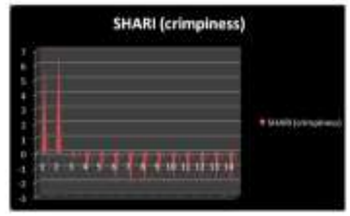


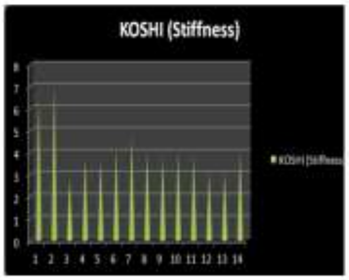

### 3.5 TOTAL HANDLE VALUE (THV)

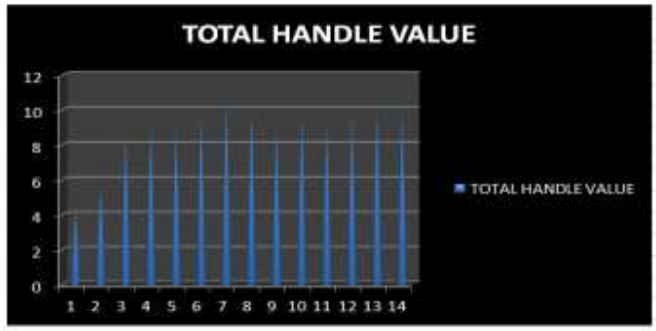
| | Total handle Value | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample code | | | | | | | | | | | | | |
| Details | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| KOSHI (Stiffness) | 6.47 | 7.1 | 2.87 | 3.76 | 3.67 | 4.12 | 4.68 | 3.98 | 3.76 | 4.01 | 3.81 | 3.05 | 3.12 | 3.98 |
| SHARI (crimpiness) | 5.89 | 6.9 | -0.65 | -1.56 | -1.35 | -2.11 | -2.32 | -2.17 | -1.56 | -1.76 | -1.62 | -1.82 | -1.78 | -2.17 |
| FUKURAMI (fullness & softness) | 9.8 | 11.2 | 16.17 | 17.13 | 16.83 | 17.56 | 19.23 | 18.63 | 17.13 | 17.23 | 16.56 | 17.67 | 18.01 | 18.63 |
| HARI (Anti drape) | 0.4 | 1.81 | 0.5 | 2.08 | 1.87 | 2.83 | 3.14 | 2.98 | 2.08 | 1.98 | 1.64 | 1.84 | 1.93 | 2.98 |
| TOTAL HANDLE VALUE | 4.23 | 5.61 | 8.49 | 9.1 | 8.88 | 9.67 | 10.51 | 9.89 | 9.1 | 9.6 | 9.22 | 9.71 | 10.01 | 9.89 |





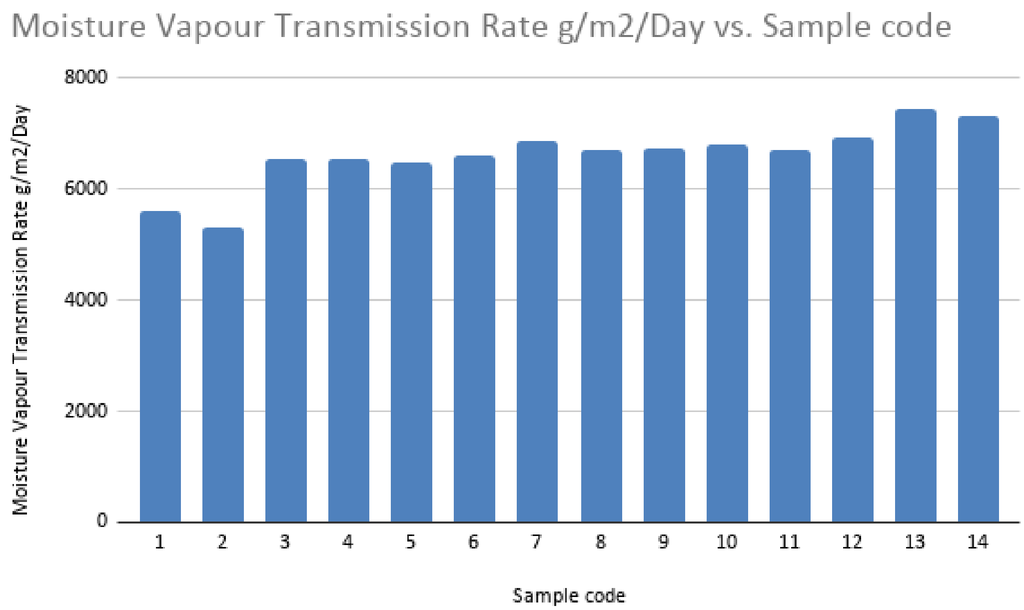




The total handle value of the fabric sample is determined by analysing the results obtained using the KWBES method which gives the behaviour of the fabric on low stress mechanical properties. The total handle value obtained by considering the Stiffness, crimpiness, Fullness & softness, Anti drape properties.

**3.6 MOISTURE VAPOUR TRANSMISSION RATE- ( MVTR)**

| Sample code | Transmission Rate g/m2/Day |
|---|---|
| 1 | 5621.78 |
| 2 | 5328.12 |
| 3 | 6531.34 |
| 4 | 6542.97 |
| 5 | 6467.31 |
| 6 | 6623.11 |
| 7 | 6876.75 |
| 8 | 6713.17 |
| 9 | 6737.89 |
| 10 | 6810.18 |
| 11 | 6713.45 |
| 12 | 6921.55 |
| 13 | 7432.1 |
| 14 | 7321.56 |




**CONCLUSION:**

1. The strength of the high twisted yarn is less compared to normal yarn.
2. The tensile strength of the fabric is reduced in case of fabric made by using high twisted yarn
3. The drape of the fabric is improved when high twisted yarn is used for making fabric because of yarn become more elastic.
4. The abrasion resistance of high twisted yarn fabric is drastically reduced when compared to normal fabric because the yarn surface become more rough.
5. The low stress mechanical properties of High twisted yarn fabric found to be equivalent high when compared with normal fabric.
6. The total handle value of the fabric made by using high twisted yarn has got good results.
7. MVTR rate has been improved in case of fabric made by using high twisted yarn.

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