Physical Properties and characteristics of Fabrics

We need to make sure that the customer is aware of the properties and characteristics of the fabrics. It is the designer’s responsibility to select the appropriate fabrics for their intended applications, but it is the responsibility of the fabric producer to provide as much information as possible to help customers make appropriate fabric selections. Like physical properties, style characteristics, tactile characteristics, utility characteristics, durability and so on.

Fabrics classified by Patterns
Fabrics categorised by Fiber Types
1. Physical properties of Fabrics

Physical properties are the static physical dimensions of fabric. The following physical properties are used to define the static physical dimensions of strand fabrics:

- Fiber or filament: type, size, length
- Yarn: diameter, twist, weight or size, count, fiber content for mixed yarns, ply.
- Weight: ounces per squared or yards per pound.
- Thickness: vertical depth.
- Fabric structure
- Woven fabrics: weave type, warp and filling yarn count per linear inch
- Knitted fabric: knit type, wale and course count per inch
- Finishes: chemicals such as resins, starches, waxes and mechanical effects such as Calendaring and napping applied to the woven fabric to yield or enhance style, durability, and utility values.
- Fabric width: The length of the filling or course
- Colour: Hue, value, and intensity (degree of brilliance)
- Fabric density: weight per unit of volume.
- Surface contour: the geometric dimension of the surface plane.

2. Physical characteristics of fabrics

Physical characteristics are the dynamic physical parameters of fabric. They are physical changes in the fabric that result from applying outside forces on the fabric. Most of the durability and utility values of fabric are characteristics and not properties. There are four major categories of fabric characteristics that interest the apparel manufacturer. They are:
There are often correlations among the four types of characteristics. A utility characteristic such as fabric elongation will be correlated to a working characteristic such as sewing without stretching.

3. **Style characteristics of a fabric**

Style characteristics are those changes which affect the emotional appeal, the fabric imports to the consumer. This is exemplified when a consumer handles a fabric and refers to the fabric with adjectives such as stiff, soft, hand, etc. The three basic categories for style characteristics are:

- **Hand characteristic** – are the changes of the fabric plane with hand manipulations, which exert tensile compression, molding, or supporting forces on the fabric. The hand characteristics include some of the utility characteristics, such as elongation, elasticity, flexibility, etc.
- **Tactile characteristics** – refer to the changes in surface contour that result from a mechanical force exerted on or against the surface structure. These changes apply to the surface contour aspects of the fabric surface and not the fabric plane. The surface contour changes dimension under tactile pressure (no matter how small the pressure) this is a tactile characteristic. Pile, napped, and any fabric whose surface contour can be varied by tactile pressure, have obvious tactile characteristics. Designers specify tactile
characteristics with terms such as soft, coarse, rough, hard, smooth sticky, oily and greasy.

- Visual characteristics – are the changes in the color values when either the fabric or light is moved. End – to – end shading, side – to – side shading and mark – off are three color quality problems in addition to metamorphic fabrics.
  - End – to – end shading – refers to changes in shade throughout the length; the shade of one end of the bolt differs from the shade of another end.
  - Side – to – side shading – refers to changes in shade from selvage to selvage; the shade of the fabric along one selvage differs from the shade of the fabric along the other selvage.
  - Mark – off – in the fabric is the phenomena of changing the shade and/or the intensity of the fabric surface by rubbing it.
  - Metamorphic – fabrics exhibit color difference with the change in the spectral distribution(characteristics) of the illuminant

4. **Utility Characteristics**

Utility characteristics are changes in the fit, comfort, and wearing functions of the garment when the fabric engages a mechanical thermal, electrical, or chemical force during the utilization of the garment. The two major types of utility characteristics are transmission and transformation. A transmission characteristic transmitting mass or energy through the fabric.

Transmission characteristics include:

- Air permeability (includes all gases and vapor)
- Heat transmission (thermal conductivity)
- Light permeability
- Moisture transmission
- Radioactivity transmission (the degree with which radioactive energy such as x-ray and gamma rays can penetrate fabrics). Transformation characteristics charge a physical property of the fabric. The property dimension(s) is altered without destroying the fabric. Changes which disintegrate the fabric are durability characteristics. Transformation characteristics include:
  - Colorfastness
  - Crease resistance
  - Crock resistance
  - Dimensional stability
  - Pilling
  - Shrinkage
  - Static electricity etc

5. **Durability characteristics**

Durability characteristics are the capacities of fabric to maintain the style and utility characteristics during wear. It is the measure of stress which destroys the fabric or the fabrics ability to repeat a desired style or utility characteristic. The durability characteristics are:

- Abrasive strength (the measure of rubbing action)
- Bursting strength (the measure of vertical pressure)
- Launder-ability (the measure of washing)
- Tearing strength
- Moth resistance
- Tensile strength
- Radiation absorption strength (the rate at which radiation energy either disintegrate a fabric or
destroys utility characteristics).

- Fire resistance
- Corrosive strength (the measure of chemical action, acid or alkaline)
- Dry cleaning durability (the measure of dry cleaning performance)

6. **Product Production working characteristics**

Product production working characteristics are those characteristics which affect the quality of production with respect to quality values and the cost of production method. The working characteristics of a fabric include:

- The coefficient of friction (cutting, sewing, pressing and packing)
- Sewed seam strength
- Sewed seam slippage (yarn slippage)
- Sewing distortions
- Yarn severage
- Bondability strength (fused, cemented, and heat-sealed seams)
- Pressing moldability (to what degree a flat piece of fabric may be skewed during pressing with hand and press buck).
- Die moldability – how well a flat seamless piece of fabric may be molded with dies into a given from such as a bra cup or a hat.