Quality Parameters of Woven, Knitted and Non-woven Fabrics

Understand the Quality of Fabric

Quality of Fabric:

Quality is very important for all types of fabric and textiles. There are some important topics given blow about quality of fabric.

Quality Parameters of Woven, Knitted and Non-woven Fabrics:

Generally to test the quality parameters of woven, knitted and non-woven fabric, the fabric must be conditioning at 24 hours in the **standard testing** atmosphere. It is very important for all types of fabric.

Fig: Woven, knitted and non-woven fabric

Quality Parameters of Woven Fabrics:

There are some quality parameters of woven fabric.....

1. Dimensional characteristics:

- Length
- Width
- Thickness.

2. Weight of fabric:

- Weight per unit area.
- Weight per unit length.

3. Fabric strength and extensibility:

- Tensile strength.
- Tearing strength.

4. Threads per inch of fabric:

- Ends per inch.
- Picks per inch.

5. Yarn count:

- Warp **count**
- Weft count.

6. Crimp:

- Warp crimp
- Weft crimp.

7. Handle:.

- Stiffness
- Drape.

8. Crease resistance and crease recovery.

9. Air permeability.

10. Abrasion resistance.

11. Water resistance.

12. Shrinkages.

13.Different fastness properties:

- Fastness to light.
- Fastness to wash.
- Fastness to perspiration.
- Fastness to Rubbing.

Quality Parameters of Knitted Fabrics:

There are some quality parameters of **knitted fabric**.....

1. Strength and extensibility.
2. Course density.
3. Wales density.
4. Lop length.
5. Elasticity.
6. Deformation.
7. **Grams per square meter (G.S.M)**
8. **Yarn count**.
9. Design.

Quality Parameters of Non-woven Fabrics:

There are some quality parameters of non-woven fabric.....

1. Strength and extensibility of fabric.
2. Weight.
3. Thickness.
4. **Air permeability**.
5. Crease resistance.
6. Stability of washing.

7. Stability of dry cleaning.
8. Dimensional stability.
9. Elasticity.

Yarn Quality Parameters:

For the best knitting we have to choose the best yarn or ideal yarn for knitting to fault free fabric or quality full fabric. So we have to careful about the **yarn properties** or for ideal yarn. The following yarn properties should have to be said textile yarn as a ideal yarn-

1. The yarn in circular in cross-section and is uniform along its length.
2. Yarn is composed of concentric layers of different radial.
3. Each fiber follows a uniform helical path around one of the concentric cylinder so that its distance from yarn axis remains constant.
4. A fiber at the centre will follow a straight line of the axis.
5. The axis of circular cylinders coir sides with yarn axis.
6. The number of filaments or fibers crossing the unit area is constant; that is the density of packing. Fibers in the yarn are constant throughout the model.
7. Every filament in the yarn will have the same amount of twist per unit length.
8. The yarn consists of very large number of filaments.

If the above mentioned yarn properties is absent on any yarn than the yarn should not be allowed on knitting to make fabric. Because it will not be able to give you perfect knitting where the **yarn's parameter** is mandatory to be maintained.

Yarn quality requirements for knitting such as

- Evenness,
- **Yarn Count**
- Breaking strength,
- Elongation,
- Twist,
- Moisture contents,
- Yarn winding,
- Yarn lubrication,
- **Yarn hairiness.**

Yarn evenness:

Yarn evenness is a measure of the level of variation in yarn linear density or mass per unit length of yarn. In other words, it refers to the variation in yarn count along its length. It is the evenness of staple spun yarn that is of concern here. Continuously filament yarns have virtually no variation in linear density so evenness is not an issue for those yarns. A yarn with poor evenness will have thick and thin places along yarn length, while an even yarn will have little variation in mass or thickness along length. While a yarn may vary in many properties, evenness is the most important quality aspect of a yarn, because variations in other yarn properties are often a direct result of yarn count irregularity. We already know that twist tends to accumulate in the thin places in yarn, so irregularity in yarn linear density will cause variations in twist along yarn length. This preferential concentration of twist in thin places along a yarn also exacerbates the variations in yarn diameter or thickness, which often adversely affects the

appearance of the resultant fabrics. An irregular yarn will also vary in strength along the yarn.

Yarn counts (tex) and twist (turns/cm):

The responsibility for the accuracy of the yarn count and the tolerance levels for variation in yarn count and twist (turns/cm), as well as the type and level of lubricant/finish, lie with the spinner and are normally declared in the terms and conditions of sale. For highly critical end-uses such as military items and technical textiles, special yarn quality specifications and variability limits will be required and must be negotiated with the spinner.

Selection of suitable yarn count should be based on:

1. Machine gauge, Yarn Tex = {100/G}2
2. Machine types which are having varied needle strength hook sizes and dial and cylinder distances.
3. Knitted structures which are produced with from one feeder (Plain, rib etc.,) to 3 or 4 feeders (blister and multicolor jacquards). More number of needles/inch necessitates the use of finer counts.

Breaking Strength & Elongation of Yarn:

Tensile property of textile yarns is a prime important parameter in determining the suitability for any particular application. It is therefore of utmost importance to determine this characteristic accurately. There are three basic principles for measuring yarn tensile strength. But for measuring single yarn tensile strength mainly constant rate of extension (CRE) and constant rate of loading (CRL) principles are used. A single yarn shows two different results of breaking load and elongation value in these two methods due to the difference in measuring system.

Table: Showing the quality parameter of yarn

Parameters	30/1 cotton combed		30/1 cotton carded		30/1 poly cotton	
	Best	Acceptable limit	Best	Acceptable limit	Best	Acceptable limit
Uniformity %	9-9.5	9.7-10.2	11.5-12.1	12.8-13.5	9.5-9.8	10.4-10.7
Thin (-50%)	0	3-5	16-22	50-60	2-3	7-10
Thick (+50%)	7-12	32-43	75-90	250-300	15-20	34-42
Neps (+200%)	38-47	73-88	140-175	300-380	30-45	48-58
Hairiness	4.0-4.4	4.6-4.9	4.75-5.1	5.5-5.81	4-4.44	4.45-4.8
Tenacity(CN/tex)	21.8-22.6	18.4-18.9	16.7-17.6	16.2-15.4	25.5-24	23.4-22.1
elongation	6.7-6.9	6.2-6.4	7.3-7.08	6.6-6.4	14.7-13.7	11.8-11.2

Winding:

Winding, which is the transfer of the yarn from the primary or 'spinners' package to a secondary conical package (cone) more suitable for weft knitting, provides an opportunity to monitor the yarn electronically for a number of faults, including:

- Knots
- Thin places
- Slubs or thick places
- Weak places

The tension employed in winding causes weak places to break and results in knots. Slubs and thin places are cut out by the electronic clearer and also replaced by knots. All knots, including those generated by the clearing process, are placed on the nose of the cone where they may be counted prior to packing. An agreed maximum limit of knots per cone will be set and any cone that exceeds this limit will be rejected.

Yarn lubrication:

The type and level of yarn lubrication determine the coefficient of friction of the yarn. In weft knitting in particular, the coefficient of friction is a key factor in determining the quality of the knitted product as it has a direct influence on the peak yarn tension in the knitting zone and thus on the number of yarn breakages, as well as the extent to which dropped stitches will ladder.

Objectives of yarn lubrication

The main aim of yarn lubrication is to reduce yarn friction. Added advantages include:

1. Reduced abrasion effects on guide surfaces and needles - this is important with hard synthetics (PA, PE)
2. Dissipation of static charges - this is important with 100% synthetic yarns
3. Better cohesion of the filaments
4. Improved yarn pliability. Due to lubrication, yarn becomes softer and more pliable offering less resistance to the loop formation

Yarn Hairiness:

Fibres protruding out from the main body of the yarn are called hairiness. The number of hairs exceeding 3mm in length as a percentage of the total number of hairs is found to be linearly related to the count of the yarn, i.e. there are more hairs in a fine yarn than a coarse one of the same type.

Impact of Shrinkage

Shrinkage of textile and apparel products has always had a profound effect on design and production planning in all areas of textile and apparel manufacturing. In today's competitive markets, where high quality is expected at a low price, apparel companies are demanding products with low levels of shrinkage from their suppliers.

Shrinkage Defined

"Dimensional change" means any change in dimensions of a fabric or garment, whether positive or negative. A positive change in dimensions is "growth," and a negative change in dimensions is "shrinkage." In garments, shrinkage characteristics relate not only to dimensional changes, but also to changes such as seam puckering and skew, changed relationships between the body cloth and trim components, and changes in fit. For the purposes of this course, shrinkage is defined as "a dimensional change in a fabric or garment caused by an application of a force, energy, or a change in environment that either allows the goods to relax or forces the fabric to move in a given direction."

Types of Shrinkage

Shrinkage and its causes can be broken down into two types: construction shrinkage and processing shrinkage. This means that shrinkage is affected both by the fabric's construction parameters and by the forces applied during dyeing and finishing. Sewing and finishing processes during apparel manufacturing also can affect shrinkage. Shrinkage of a product is affected by both application and removal of stresses.

Physics of Shrinkage

Science tells us that the lowest energy state for a flexible rod is that of a straight rod. From a physics perspective, yarn is a flexible rod. The yarn is bent to form the loops in knits and the warp and filling yarns in weaving. The bending of the yarn and the amount of open space in the fabric determine the amount of shrinkage resulting from removal of stress on the yarns and reduction in the openness of the fabric.

Conclusion:

There are many quality parameters in different types of fabric. And there are also many different faults in different types of fabric, which are effect in quality of fabric. If we control those faults and effects ,we can get the good quality of fabric. So quality control is very important for all types of fabric and textiles.