

## **QUALITY TESTING OF TERRY TOWEL AND ITS ASSURANCE**

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### **Abstract**

Under the preview of quality, the word Quality means the best quality performance for customer's utmost satisfaction within a competitive price structure. Textile Testing & Quality Control (TTQC) is very important work or process in each department of export oriented industry. The study of the quality of terry towel fabrics will reveal new approaches. The terry-structured fabrics, used in bathroom, pool, sea, sauna and Turkish bath, hold an important place in people's personal lives as end-products. The methods of quality testing of the terry-woven fabric structure are discussed in this study. In the process of sample production, the towels were made on a loom and standard finishing techniques were applied. The comfort parameters of the gray and finished fabrics such as air-permeability, velocity of water absorption, and vapor permeability were measured under standard laboratory conditions and the obtained data were evaluated statistically.

### **INTRODUCTION**

The testing of quality of textile products is an expensive business. A laboratory has to be set up and furnished with a range of test equipment not just when results are required. Moreover all these costs are non productive and therefore add to the final cost of the product. Therefore it is important that testing is not undertaken without adding some benefit to the final product. There are a number of points in the production cycle where quality testing may be carried out to improve the product or to prevent sub-standard merchandise progressing further in the cycle.

Reasons for Textile Testing

- Checking Raw Materials
- Monitoring Production
- Assessing the Final Product
- Investigation of Faulty Material

### **Checking Raw Materials**

The production cycle as far as quality testing is concerned starts with the delivery of raw material. If the material is incorrect or sub-standard then it is impossible to produce the required quality of final product. These processes are very often carried out in separate establishments; therefore what is considered to be a raw material depends on the stage in processing at which the testing takes place. It can be either the raw fibre for a spinner, the yarn for a weaver or the finished fabric for a garment maker. The incoming material is checked for the required properties so that unsuitable material can be rejected or appropriate adjustments made to the production conditions. The standards that the raw material has to meet must be set at a realistic level. If the standards are set too high then material will be rejected that is good enough for the end use, and if they are set too low then large amounts of inferior material will go forward into production.

### **Monitoring Production**

Production monitoring, which involves testing samples taken from the production line, is known as quality control. Its aim is to maintain, within known tolerances, certain specified properties of the product at the level at which they have been set. A quality product for these purposes is defined as one whose properties meets or exceeds the set specifications. Besides the need to carry out the tests correctly, successful monitoring of production also requires the careful design of appropriate sampling procedures and the use of statistical analysis to make sense of the results.

### **Assessing the Final Product**

In this process the bulk production is examined before delivery to the customer to see if it meets the specifications. By its nature this takes place after the material has been produced. It is therefore too late to alter the production conditions. In some cases selected samples are tested and in other cases all the material is checked and steps taken to rectify faults. For instance some qualities of fabric are inspected for faulty places which are then mended by skilled operatives; this is a normal part of the process and the material would be dispatched as first quality.

### **Investigation of Faulty Material**

If faulty material is discovered either at final inspection or through a customer complaint it is important that the cause is isolated. This enables steps to be taken to eliminate faulty production in future and so provide a better quality product. Investigations of faults can also involve the determination of which party is responsible for faulty material in the case of a dispute between a supplier and a user, especially where processes such as finishing have been undertaken by outside companies. Work of this nature is often contracted out to independent laboratories that are then able to give an unbiased opinion.

### **Product Development and Research**

In the textile industry technology is changing all the time, bringing modified materials or different methods of production. Before any modified product reaches the market place it is necessary to test the material to check that the properties have been improved or have not been degraded by faster production methods. In this way an improved product or a lower-cost product with the same properties can be provided for the customer. A large organisation will often have a separate department to carry out research and development; otherwise it is part of the normal duties of the testing department.

### **Basic Parameters of Quality Terry Towel**

- **Weight & GSM:** Weight and GSM should be same as required by customer. Every manufacturer has some template or software (ERPs) where towel manufacturers calculate everything likes pile's height, density of picks and ends to meet requirement. This database or any software has been developed through some basic calculation.
- **Softness/ Hand feel:** It depends on properties of the yarn used in pile, finishing chemicals and too some extent on pile orientation.

- Pile Orientation: Totally depends on process line.
- Lint: Lint is basically protruding fibers present in a finished towel. It is measured by weight of accumulated fiber collected from washing machine and tumble drying machine during testing.
- Absorbency: Terry towel should be highly water absorbent.
- Dimensional Stability: How a towel is behaving after washing is fall under dimensional stability properties. Dimensional stability is measured by the residual shrinkage % in a finished towel.
- Other Parameters are strength, color fastness etc.

## **METHODS**

The conditioning and testing of textiles instances where such conditioning is specified in a test method. Because prior exposure of textiles to high or low humidity (65 +/- 2 %.) may affect the equilibrium moisture pick-up, a procedure also is given for preconditioning the material when specified. The equipment to be used in the conditioning and testing of textiles shall include conditioning room or chamber, preconditioning cabinet, room, or suitable container, balance, and multiple shelf conditioning rack. The conditioning room or chamber shall consist of equipment for maintaining the standard atmosphere for testing textiles throughout the room or chamber within the tolerances given and including facilities for circulating air over all surfaces of the exposed sample or specimen and equipment for recording the temperature and relative humidity of the air in the conditioning room or chamber. Samples or specimens requiring preconditioning shall be brought to relatively low moisture content in a specified atmosphere. Samples or specimens requiring conditioning shall be brought to moisture equilibrium for testing in the standard atmosphere for testing textiles, or when required.

### **Water Absorption Test:**

This is most important test carried out for terry towel. Main use of terry towel is to absorb the water after bathing. So to check the water absorbency is necessary. This test method determines the ability of a terry fabric to rapidly absorb and retain liquid water from surfaces such as human skin. The sample to be tested is mounted on an embroidery ring with just sufficient tension for removing the wrinkles in the fabric. It is placed below burette with the tip of the burette not more than 2.5cm above the fabric. The fabric is placed horizontally. The burette is filled with distilled water up to the zero mark. A drop of water is then allowed to fall on the fabric and the same time a stop watch is started. The drop is viewed at a low angle and as soon as the light from the drop vanishes, the stop watch is stopped and the time in seconds is noted. The test is repeated in other portions of the same towel ten times and average is calculated. The time so calculated is recorded as the absorbency of fabric.

### **Dimensional Stability Test:**

To determine dimensional change of the towel comparing the distances between length and width direction benchmarks before and after when subjected to an

appropriate combination of specified washing & drying procedure. ECE (European Colorfastness Establishment) detergent (without BOA), sodium per borate tetra hydrate used. Lay the towel to relax for 4 hours on a bench in ambient conditions so that it is smooth & tension free. Select the correct programmed for the wash required depending on the type of machine being used, set temperature, water levels. Dissolve the powder with a small quantity of warm water in a beaker and start the machine. Tumble dryer used to dry the towel.

### **Fastness Properties of Terry Towel:**

Fastness there is resistance of dyeing and prints to external influences, is having importance for the practical use of any dyestuff. Fastness property tests are consequently very extensive and widely standardized. Technical committee 38, sub-committee of the International Standards organisation (ISO) has to date defined 45 different methods. The purpose for which for which a dyed material is to be used must always be born in mind when dyestuffs are selected. The evaluation of its results, effected with the grey scale used to determine changes of shade and staining.

### **Fastness to washing**

- A 10 x 4 cm swatch of the dyed fabric is taken and is sandwiched between two adjacent (grey cotton) fabrics and stitched. The sample and the adjacent fabric were washed together. Five different types of washing are specified as different washing methods.
- The solution should be preheated to the required temperature of washing. The liquor ratio should be 1: 50. After soaping treatment, the specimen is removed, rinse twice in cold water and then in cold running tap water. Squeezed and dried in air at a temperature not exceeding 60°C. Place the tested sample next to a sample of the same material which has not been tested, and compare the change with the help of grey scale under good lighting conditions and give the grades. If the dyeing being tested shows equal or less change than the satisfactory sample, then it is as good as the satisfactory sample. Place the adjacent fabric next to samples of the same material which have not been tested and compare them. Equal or less staining shows equal or better fastness.

### **Fastness to Light:**

It is an off line quality assurance system. Generally in India towels kept outside of the home for drying purpose. In day; sun light fall on the towel surface. So it needs to know how much protection ability have a fabric to sun light. It is determined by an experiment called color fastness to light.

### **Principle of Color Fastness to Light:**

This test measures the resistance to fading of dyed textile when exposed to day light. The test sample is exposed to light for a certain time which is about 24 hours to 72 hours or by customer/buyer demand and compare the change with original unexposed sample the changes are assessed by Blue Scales.

### **Light Fastness Grades:**

Grade	Degree of Fading	Light Fastness Type
8	No fading	Outstanding
7	Very slight fading	Excellent
6	Slight fading	Very good
5	Moderate fading	Good
4	Appreciable fading	Moderate
3	Significant fading	Fair
2	Extensive fading	Poor
1	Very extensive fading	Very poor

### **Fastness to Rubbing:**

A fastness is a place, such as a castle, which is considered safe because it is difficult to reach or easy to defend against attack. This test is designed to determine the degree of color which may be transferred from the surface of a colored fabric to a specify test cloth for rubbing (which could be dry and Wet).

### **There are two test methods for rubbing fastness**

1.ISO-105-X12

2.AATCC-08

In ISO-105-X12 the wet pickup of the rubbing cloth is 100% .While in AATCC-08 the wet Pickup of the rubbing cloth is 65%.We check rubbing by Dry and Wet methods. In wet rubbing we wet the rubbing cloth according to test method and give rating by comparing the Staining with the gray scale. Similarly for dry rubbing we check the rubbing with dry rubbing cloth and compare the staining with gray scale for ratings. Color Fastness to rubbing is a main test which is always required for every colored fabric either it is Printed or dyed. So if the fixation is good it's washing properties will be good.

### **Rubbing Fastness depends on:**

- Nature of the Color
- Depth of the Shade

There are some colors like black, Red, Burgundy, Navy blue which have poor Color fastness properties because of their chemical structure. Like Black color is a carbon base color and the particle size of carbon is large than the other colors that's why its rubbing properties are poor. Similarly red and blue are in the same case. So to improve the color fastness we add more binder to improve the fastness properties of these colors. It doesn't mean that we cannot achieve the best results with these colors. The required results can achieve but production cost will be increase. On the other hand the construction of the fabric also affects the fastness properties.

### **Always Check**

- Quality construction
- Color
- Depth of the Color
- End Use of the product

Results which we can achieve in Normal Conditions are

	<b>Dark Shade</b>	<b>Medium shades</b>	<b>Light Shades</b>
Dry	3-4	4	4-5
Wet	2-2.5	3	3.5-4

## **CONCLUSION**

Above mentioned methods used in terry towel industries for controlling quality. The quality of the towel depends on the different weaving structures, different pile heights, yarns made of different fibers and some of the fabrics finished. It can be seen from this study that, in the towel weaving field, taking comfort into consideration and identifying the variation of the parameters that effect quality. Selected methods like number of washes, time for drying are based on buyer requirement. Buyers want quality but not quantity. In every department of textile industry, quality will maintained for each material. Because quality of previous material can affect the quality of next process. For example, if qualified fiber is inputted then output will be good yarn.

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