



## Performance Analysis of Handloom Fabrics for Home Furnishings Evaluation of Handle, Tensile Strength, And Color Fastness

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### Abstract

Home furnishing applications require the systematic evaluation of the performance of handloom fabrics which is well described in this study. Selection of the samples a range was chosen was made from traditional weaving clusters. This prevention was focused on the investigation of main features such as the handle features, tensile strength, color fastness, etc. Data were collected using standardized testing methods to ensure consistency and reliability. Significant differences among various fabric constructions were observed in subjective and objective evaluations of the handle of the fabrics. Mechanical tensile strength tests were performed to assess the stress-induced mechanical performance durability of the fabrics, with noticeable variation in strength retention based on fiber material and weave density found. Fastness to washing, rubbing and light was also assessed, with ratings recorded according to standard textile testing methods. Most of the fabrics showed moderate to high levels of light fastness, while those dyed naturally showed some discrepancies. Statistical analysis has been performed on all data gathered through the tests, determining correlations between structure of the fabric to the performance properties. These findings can be a resource for designers, manufacturers and researchers to promote the use of handloom textiles in contemporary home interiors. It has also elevated the durability, aesthetic and functional appropriateness of handloom fabrics.

**Keywords:** Handloom Fabrics, Home Furnishings, Handle Properties, Tensile Strength, Color Fastness

### 1. Introduction

Because of their distinctive textures and cultural significance, handloom fabrics have long been used in home furnishings. A thorough assessment of their performance characteristics is necessary to guarantee their appropriateness for modern applications. This chapter offers designers, manufacturers, and researchers' insights into the evaluation of handloom fabrics' handle qualities, tensile strength, and color fastness. Handloom based home furnishing fabrics represent a harmonious blend of tradition and modernity, bringing a unique aesthetic and tactile quality to interior spaces. Handloom fabrics have attracted a lot of attention due to their cultural significance and environmental advantages as consumers look for products that are produced ethically and sustainably. The use of cotton, flax, hemp, and blend fabrics all of which provide a wide range of textures, durability, and environmentally beneficial qualities is the main focus of this investigation into the world of handloomed home

furniture fabrics [1-2]. Cotton is still a mainstay in the textile industry because of its long-standing reputation for being soft and breathable. Cotton fabric becomes a work of unmatched craftsmanship when it is woven by hand, showcasing the talent and commitment of craftspeople. From comfortable armchairs to sophisticated draperies, its adaptability and comfort make it the perfect option for a wide range of furniture applications. The flax plant is used to make linen, a fabric known for its strength, absorbency, and inherent sheen. Because of their unique texture and organic appeal, handloom linen fabrics add a touch of rustic elegance to home décor [3-5]. They are especially popular for cushion covers and upholstery, where strength and beauty are crucial. A robust and biodegradable fabric is produced from hemp, a crop that is extremely sustainable. Because of their reputation for resilience to deterioration, handloom hemp textiles are appropriate for high-traffic areas of the house. Their



distinct texture and earthy hues give any interior space a natural, environmentally friendly feel. The best of both worlds is provided by blend fabrics, which combine various fibers. These textiles strike a balance between softness, durability, and visual appeal by combining the properties of cotton, flax, hemp, and other materials [6-8]. Handloom blends can be customized to meet particular requirements, improving the look and feel of furniture for the home. In this exploration, we will delve into the specific properties and benefits of each fabric type, highlighting their contributions to sustainable living and interior design [9-12]. We can appreciate the artistry and environmental benefits of handloom-made fabrics by learning about their distinctive qualities, which encourages a more thoughtful and beautiful approach to home décor.

## 2. Handle Properties

The tactile qualities of fabrics, known as handle properties, were evaluated using both subjective assessments and objective measurements. Key parameters included:

## 3. Crease Recovery

Crease recovery is a critical property in textile science, reflecting a fabric's ability to regain its original form after being folded, creased, or compressed. This characteristic is especially important for garments and home textiles, as it significantly impacts aesthetic appeal, durability, and ease of care. In simple terms, crease recovery measures how well a fabric can "bounce back" after it has been subjected to mechanical deformation. When a fabric is folded or crushed, the fibers within it are displaced from their original positions. If the fabric possesses high crease recovery, it can return to its initial state with minimal visible marks or lines. Conversely, fabrics with low crease recovery tend to retain creases, which can make garments look wrinkled or untidy. This property is quantified through various standardized tests, such as the Crease Recovery Angle (CRA) test, where the angle through which a folded fabric specimen recovers is measured. Higher recovery angles indicate better performance, signifying that the fabric resists permanent deformation more efficiently. Several factors influence the crease recovery of a fabric. The type of

fiber is one of the most significant determinants. For example, synthetic fibers like polyester and nylon generally exhibit superior crease recovery compared to natural fibers such as cotton and linen. This is because synthetic fibers are more resilient and have an inherent elasticity that allows them to revert to their original shape more readily [13]. However, technological advancements have enabled the development of finishes and treatments for natural fibers, such as resin finishes for cotton, which enhance their crease recovery properties. The fabric's construction also plays an integral role. Woven fabrics tend to have lower crease recovery than knitted fabrics because the interlaced structure of woven materials restricts fiber movement, making it harder for the fabric to recover after deformation. On the other hand, knitted fabrics have loops that can move and adjust, facilitating better recovery. Finishing processes further impact crease recovery. Chemical treatments, such as the application of cross-linking agents, can improve the resilience of cellulose fibers and help the fabric retain its shape after folding. Mechanical processes, including calendaring and heat setting, are also used to enhance fabric performance in this regard. In the context of everyday use, crease recovery is an essential consideration for both manufacturers and consumers. For manufacturers, producing high crease recovery fabrics reduces the need for intensive ironing and improves the marketability of their products. For consumers, garments and household textiles made from high crease recovery materials offer convenience and a polished appearance, making them preferable choices for busy lifestyles.

## 4. Flexural Rigidity

Flexural rigidity is a fundamental property that describes the stiffness of a fabric. It is measured in both the warp (lengthwise) and weft (crosswise) directions, providing valuable insights into how a textile will behave under bending or folding stress. Essentially, flexural rigidity quantifies the amount of force needed to bend a fabric to a certain degree, and higher values indicate a stiffer, less flexible material. The assessment of flexural rigidity is crucial for both manufacturers and consumers. For manufacturers, understanding this property helps in selecting



appropriate materials for specific applications, such as garments, upholstery, or industrial textiles. For consumers, flexural rigidity affects the “handle” or feel of a fabric fabrics with higher rigidity tend to feel stiffer, while those with lower rigidity feel softer and more pliable. Flexural rigidity is typically tested using standard methods such as the Cantilever Test or the Heart Loop Test. These tests involve measuring the force required to bend a fabric sample, and the results are often reported separately for the warp and weft directions. This distinction is important because the structure and composition of fabrics can cause significant differences in stiffness depending on direction [14-15]. A notable study found that handloom cotton fabric exhibits higher flexural rigidity compared to other fabric samples. This finding suggests that handloom cotton has a stiffer handle, which could be attributed to factors like yarn thickness, weave density, or the finishing process. Such information is valuable for designers and consumers who may prefer a crisper fabric for certain garments or applications, such as tailored shirts or structured home textiles. In conclusion, flexural rigidity is a key indicator of how stiff or flexible a fabric will feel and perform. By assessing this parameter in both warp and weft directions, textile professionals can better match fabrics to their intended use, ensuring the right balance between comfort, durability, and appearance.

### 5. Drape Coefficient

The drape coefficient is a significant parameter in textile science, reflecting how a fabric hangs or falls under its own weight. This property is particularly important in determining the aesthetic and functional suitability of a fabric for different applications, especially in home furnishings and apparel. In essence, the drape coefficient quantifies the fabric’s ability to conform to shapes or contours when suspended, providing a numerical value that describes its flexibility and fluidity. A lower drape coefficient indicates that the fabric is softer and flows more freely, creating elegant folds and curves. Conversely, a higher drape coefficient signifies a stiffer fabric that retains a more structured, less flowing shape. The measurement is typically obtained through standardized tests, where a circular

piece of fabric is draped over a pedestal and the extent of its hanging is analyzed. This numerical value helps designers and manufacturers predict how a fabric will behave in practical use. Studies examining handloom fabrics have revealed significant variations in their drape coefficients. These differences arise from factors such as fiber type, yarn thickness, weave pattern, and finishing techniques. For example, a handloom fabric with a lower drape coefficient may be better suited for applications where a soft, flowing effect is desired, such as curtains or decorative throws. On the other hand, fabrics with higher drape coefficients are more appropriate for structured items like tablecloths or cushion covers, where a crisp and neat appearance is preferred [16-17]. Understanding the drape coefficient enables both producers and consumers to make informed choices about fabric selection. For home furnishings, the right drape can enhance the overall look and feel of a space, contributing to both comfort and style. By paying attention to the drape coefficient, textile professionals ensure that each fabric is matched to its most suitable application, optimizing both performance and aesthetics. In summary, the drape coefficient is a crucial indicator of how a fabric will hang and behave in real-world settings. Variations among handloom fabrics influence their appropriateness for specific home furnishing uses, making this property an essential consideration in textile selection and design.

### 6. Tensile Strength

Tensile strength is a fundamental property used to evaluate the durability and performance of fabrics under tension. These characteristic measures the maximum force a fabric can withstand before breaking, providing valuable insight into how well a textile will hold up during use, especially in demanding applications. Tensile strength tests are typically conducted by pulling a fabric sample in a controlled manner until it snaps. These tests reveal significant variations in the strength of fabrics, depending on factors such as fiber content and weave density. For instance, fabrics made from or blended with strong natural fibers like hemp and flax generally exhibit superior tensile strength compared to those composed solely of weaker fibers. The robust structure of these fibers enables the fabric to endure



greater stress without tearing, thus enhancing its overall durability. Weave density also plays a crucial role in determining tensile strength. Fabrics with a tighter weave, where yarns are closely packed together, tend to be stronger because the force applied is distributed more evenly across the fabric. This makes tightly woven textiles less prone to stretching or breaking under load, improving their resistance to wear and tear. The results of tensile strength testing are essential for both manufacturers and consumers. For manufacturers, understanding how different fiber blends and weave structures impact strength allows them to design more durable products tailored to specific uses. For consumers, fabrics with higher tensile strength are ideal for items that experience frequent use or require extra durability, such as upholstery, workwear, or outdoor textiles. In summary, tensile strength is a key indicator of fabric durability. Variations in fiber content and weave density significantly affect this property, with blends of strong fibers like hemp and flax leading to enhanced resistance to wear and longer-lasting textiles.

## 7. Color Fastness

Color fastness is an essential quality parameter in textiles, referring to a fabric's ability to retain its original color when exposed to various external factors such as washing, rubbing, and sunlight. This property is crucial for maintaining a garment or textile's aesthetic appeal and overall value over time. To evaluate color fastness, fabrics undergo standardized tests that simulate real-life conditions. These tests include washing fastness (how well the color holds up to repeated laundering), rubbing or crocking fastness (resistance to color transfer through friction), and light fastness (durability of color when exposed to sunlight). The results of these tests provide a comprehensive understanding of how a fabric will perform during everyday use. Most fabrics in the study exhibited moderate to high levels of light fastness, meaning they retained their color well when exposed to sunlight. This is particularly important for textiles used in environments where they are likely to encounter direct or prolonged light, such as curtains, upholstery, or outdoor fabrics. However, the assessment also revealed discrepancies in the color

fastness of naturally dyed fabrics [15-16]. These materials showed lower levels of resistance, particularly to washing and light exposure, compared to those dyed with synthetic dyes. Such findings highlight potential challenges in maintaining color stability in naturally dyed textiles. While natural dyes are valued for their eco-friendly qualities and unique hues, they often require special care to prevent fading and discoloration. In summary, color fastness is a vital consideration for both manufacturers and consumers, influencing the longevity and appearance of textiles. While most modern fabrics perform well, naturally dyed textiles may need additional attention to preserve their color and ensure long-lasting beauty.

## Conclusion

The performance characteristics of handloom fabrics for home furnishings have been thoroughly evaluated. It has been demonstrated that a variety of fibers, including cotton, flax, hemp, and blends, contribute unique tactile and functional properties to handloom textiles. Through standardized testing, the handle properties such as crease recovery, flexural rigidity, and drape coefficient have been quantitatively assessed, revealing that each fabric type offers distinct advantages for different applications. The superior tensile strength exhibited by hemp and flax fabrics has been highlighted, suggesting their suitability for high-durability applications, while the comfort and versatility of handloomed cotton have been recognized as beneficial for a wide range of home furnishing uses. The assessment of color fastness has shown that most fabrics maintain their color well under exposure to light and washing; however, naturally dyed fabrics have been found to require extra care to preserve color integrity. It has been established that the traditional craftsmanship and sustainable qualities of handloom fabrics provide significant value in modern interior design, aligning with the increasing demand for ethically produced and environmentally friendly materials. The importance of careful fiber selection, weave structure, and finishing techniques in determining fabric performance has been underscored. By understanding these properties, designers and manufacturers are enabled to make informed choices, ensuring that handloom fabrics



continue to offer both aesthetic appeal and functional reliability in contemporary home environments. The insights presented here are expected to guide future innovation and appreciation of handloom textiles in the home furnishing sector.

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