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Saraquest

Exclusive Insight

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**CHEMISTRY BEHIND
GOOD FEELINGS**

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Textile Chemical Manufacturing

“Customer Delight” is the key strategy of **Sarex Chemicals** as its main motto is to provide solutions to the customers rather than selling products.

Sarex Chemicals is a bluesign® system partner. Most of the products offered by Sarex are REACH Pre-Registered and more than 100 products are GOTS certified. Moreover, Sarex also has been accredited by :

- **ISO 17025 : 2017** (NABL Certified Laboratory)
- **ISO 45001 : 2018**
- **ISO 14001 : 2015**
- **ISO 9001 : 2015**

BLEACH-811



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BLEACH-811

Combined Scouring & Bleaching Of Cellulosic's

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Cotton is the most important natural fibre whose consumption is constantly increasing day by day. Natural cotton is hydrophobic and colored. Fabric obtained after weaving, known as grey or greige fabric, also contains both natural as well as added impurities. At any stage during textile manufacturing, from loose fibre to greige fabric, fibres may contain a variety of hydrophobic chemicals that interfere with uniform wetting. These impurities may be of natural origin, such as fats and waxes, or synthetic chemicals deliberately applied to the fibres to facilitate processes such as carding, spinning or knitting. The term 'impurity' is used to describe material other than fibre which is found in raw or processed stock. In order to make the fabric suitable for dyeing and printing, it is essential to remove the impurities present in greige fabric. The process involved in the removal of these impurities is called fabric pre-treatment.

Scouring and bleaching are the pre-treatment processes of removing impurities and color from the grey textile material as efficiently as possible, with minimum or no damage to the fibre and leaving the textile material in a perfectly white state. Scouring is a purifying treatment of textiles. The objective of scouring is to reduce the amount of impurities sufficiently to obtain level and reproducible results in dyeing and finishing operations. Scouring of cotton textiles is an essential treatment in textile wet processing in order to get high absorbency. The impurities present in grey cotton fabric are sizing ingredients, fats, waxes, pectin's and natural coloring matter. During scouring, waxes and other hydrophobic materials are removed from the cotton fibres. Conventionally, scouring is done with hot aqueous solution of caustic (NaOH) to remove hydrophobic components from the primary wall (e.g. pectin, protein and organic acids) and the cuticle (waxes and fats). Though alkaline scouring is effective and cost effective process, it is inefficient because it consumes large quantities of water and energy. Also, Hydrogen peroxide (H_2O_2) is most popular oxidant used to remove natural colorant of cotton fibres. Efficient removal of these impurities during grey preparation is essential to guarantee proper dyeing, printing and finishing processes.

Traditionally, scouring and bleaching processes are conducted at the temperatures up to $120^{\circ}C$ in a high alkaline medium at a pH of 10-12. Scouring process uses alkalis, such as sodium hydroxide, and is a multi-step process. The use of alkalis and the multi-step processing of the fabric, attack the cellulose and solubilizes it which results in the reduction in strength and loss of fabric weight. Also the strong alkali imparts harshness on the textiles. Furthermore, their salting wastewater has a high COD (Chemical Oxygen Demand), BOD (Biological Oxygen Demand), and salt content. In these treatments, large amounts of auxiliaries agents are added. Due to the high working temperatures, lot of energy is consumed. Large amount of water is used to rinse and neutralize the alkaline scoured and bleached fabrics. Consequently, the textile industry is considered to be one of the biggest water, energy and chemical consumers.

BLEACH-811

Till today, the most commonly accepted sequence of operations of cotton grey preparation is acid or enzyme desizing, alkali scouring and hypochlorite or hydrogen peroxide bleaching at high temperatures, requiring the use of large amount of thermal energy. This sequence of operation is time consuming and needs a large quantity of water, energy and a variety of chemicals. To minimize energy consumption, it has become necessary to combine several pre-treatment stages by reducing number of operations or by shortening the reaction time. The increasing demand for the conservation of natural resources and environmental protection has forced the researchers to look for different approaches which will simplify cotton grey preparation. One such approach is to carry out all the three processes simultaneously (combined process).In the present work, an attempt has been made to combine all the three grey preparatory processes, such as desizing, scouring and bleaching. Sarex has introduced a new concept for cotton yarn processing to get better productivity on looms with good end use performance. **Bleach-811** is an all in one bleaching aid which provides required alkalinity during bleaching to achieve absorbency just sufficient for dyeing. Bleach-811 substitutes caustic, stabilizer, sequestering agent and 40-50% wetting agent in the bleach bath. Following are the points highlighting the key features of the product.

➡ UNIQUE FEATURES

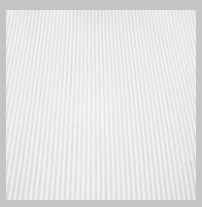
- All-in-one bleaching aid for combined scouring and bleaching of cotton and its blends.
- Bleaching requires only three ingredients, Bleach-811, Hydrogen peroxide and Wetting agent (40-50% of the existing dosage).
- Bleach-811 substitutes caustic, stabilizer, sequestering agent and 40-50% wetting agent in the bleach bath.
- Bleaching process with Bleach-811 is milder compare to conventional bleaching process.
- Reduces weight loss of cotton by 1-2%. More kilogram of material is achieved after bleaching.
- As no caustic is added in Bleach-811 process, the treated yarn is softer with less hairiness.
- The process requires 30% less acetic acid dosage in neutralizing bath compare to the conventional recipe.
- It is suitable for Continuous process.
- It is Ideal for knits, yarns and towels. It is also suitable for Polyester/Cotton blends and all regenerated cellulose viz., Viscose, Modal, Tencel etc.
- Very low COD of the drain bath hence minimizing the pollution potential.

➡ MECHANISM

Bleach-811 contains multiple ingredients which gives desired pH for scouring at the start of bleaching process and then reduces pH which is suitable for controlled decomposition of Hydrogen peroxide. This imparts gentle bleaching action which retains cotton strength and feel unlike conventional bleaching which keeps pH very high throughout the bleaching process making cotton harsh with reduced strength.

➡ RECOMMENDED APPLICATION PROCESS

Recipe for “Ready for Dyeing” Fabric

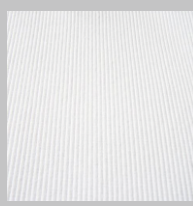
Conventional process		Bleach-811 process			
Caustic flakes	2%		Bleach-811	1.5 - 1.7%	
Celldet-R	0.5%		H ₂ O ₂ (50%)	2.5%	
Sarastabil-MRS	0.25%		Celldet-R	0.2 - 0.3%	
Saraquest-AO	0.5%		98°C, 30-45 min.		
H ₂ O ₂ (50%)	2.5%		62 / Instant		
98°C, 30-45 min.		65+ / Instant		Whiteness Index /Absorbency	
Whiteness Index /Absorbency					

BLEACH-811

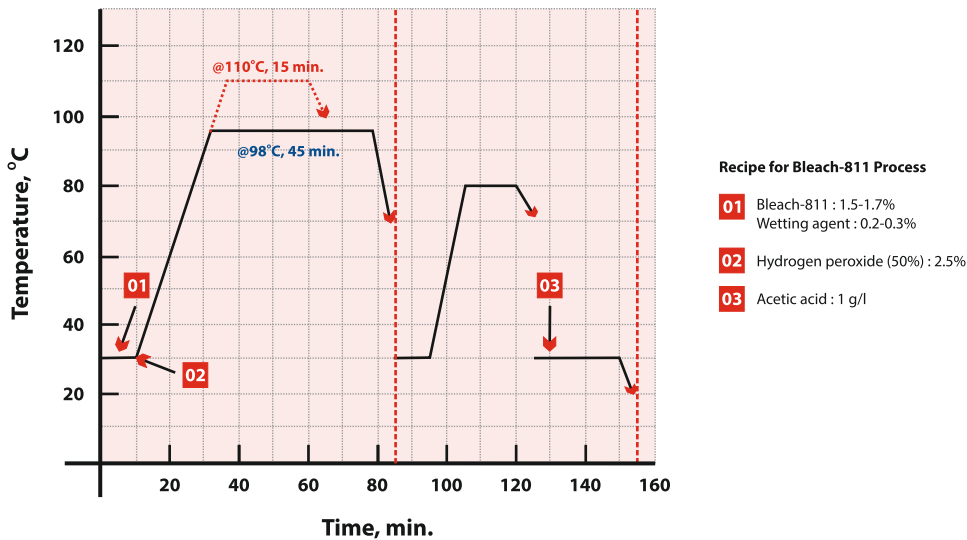
Recipe for “Full White” fabric

Demineralization step: 0.3% Celldet-R + 0.5% Saraquest-AO, 85°C, 20 min. Followed by bleaching with following recipes:

* *Demineralization is an Optional step*

Conventional process		Bleach-811 process		
Celldet-R	0.5%		Bleach-811	1.8 - 2%
Sarastabil-MRS	0.6%		H ₂ O ₂ (50%)	6.0%
Saraquest-AO	0.5%		Celldet-R	0.3%
Caustic flakes	2.5%		98°C, 60-75 min.	
H ₂ O ₂ (50%)	6%			
98°C, 60-75 min.				
Whiteness Index /Absorbency		78+ / Instant	73 / Instant	Whiteness Index /Absorbency

Application process



CONCLUSION

The advantage of Bleach-811 process is increased production with reduction in labor cost, reduction in treatment time, lower consumption of water, steam and electricity with minimum loss in weight and strength of material.

CELLBIND-FF & CELLBIND-7838

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CELLBIND-FF & CELLBIND-7838

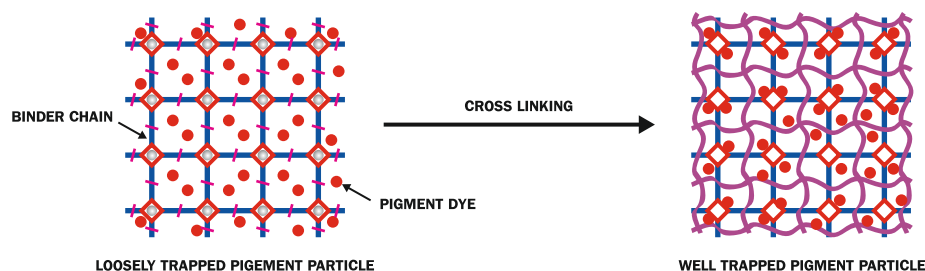
Binders For Textile
Printing & Coating

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Textile printing is the branch of textile wet processing industry and is becoming increasingly popular for all fibres and varieties of fabrics as well as garments. Basically, printing is a form of dyeing in which the colours are applied to specified areas instead of the entire fabric. The resulting multicolored patterns have attractive and artistic effects which enhance the value of fabric much more than the plain dyed ones. Printing of cellulosic fibres is considered to account for more than 70% of all printed substrates and pigment printing is a major method. The use of pigments for printing of textile products has dramatically increased over the last 50 years. Pigments are used to produce printed products for a number of end uses including apparels, home furnishing, crafts and nonwoven articles. Over 18 billion linear yards of printed fabric produced worldwide each year, about 50% of this yardage is pigment printed.

Textile pigments are defined as colored organic substance which do not solubilize in water or other solvents easily and require a binding agent to hold them on the textile fibre. Pigments have no affinity to cotton and no mechanism to bond with the fibre. The use of pigment binder is therefore very important in producing pigment colored fabrics in the textile industry. Textile binders are necessary to form a matrix to entrap the pigment particle and must be stable to outside forces that would tend to dislodge the pigment from the textile substrate, such as washing or rubbing.

During the earlier stages of the development of binders for use in pigment printing, polyvinyl acetate was considered a good binder. However, it was realized that it produced too stiff handle. On other hand, Acrylate resins gave soft effects but pigments bound with them were not fast to rubbing. Binders are high molecular weight film forming agents produced by the polymerization of simple intermediates initially present in the paste in a homogeneous, dissolved or dispersed state.



After evaporation of the solvent or other liquid vehicle, heating produces a thin coating or film. The film, several microns in thickness, encloses the pigment particles and adheres to the fibre. Since pigment coloration is an additive effect to the

CELLBIND-FF & CELLBIND-7838

substrate, the components of this addition will tend to change the feel of the substrate or fabric. The fastness that can be obtained is, in many cases, adequate for the majority of end use specifications. The resulting handfeel of the item being colored in this manner is important and is, by the nature of the process, going to be slightly harsher than the un-colored fabric. With proper selection of binder and the application system and variables, it is possible to produce an acceptable compromise in this regard. While handle is vital, it is not the only criteria used in selecting a binder. Durability, measured through color retention, is also important. Some of the softest binders have limited ability to hold the pigment onto the fabric so a binder system that can satisfy performance requirements on many levels is generally desired.

In pigment printing, insoluble pigments, which have no affinity for fibres, are fixed on to the fabric with binding agents or binders. Binders play important role in pigment printing in achieving optimum fastness properties. Depending upon the properties required in the binding film (softness, elasticity, plasticity, solvent stability), binders can be tailor-made by choosing suitable base product. The binder used in the pigment printing process is usually based on styrene-butadiene, styrene acrylate or vinyl acetate acrylate copolymer. Pigment printing technology of textiles has been applied widely because of its simple operation techniques, complete color and excellent fastness. Generally, poly-acrylate, polybutadiene, polyvinyl acetate and polyurethane all can be used as pigment printing binder. Very small amounts are required to achieve the desired properties, which offer cost effective textile operations and ensure negligible environmental impact.

Following are the properties which a textile binder should fulfill:

- It should not get coagulated due to shear forces.
- The binder film must be clear and transparent.
- The binder film must be of even thickness, smooth, neither too hard nor too soft.
- It should be elastic in nature and should have good adhesion to the substrate without being tacky.
- It should have good resistance to chemical and mechanical stress.

Following are the unique features of the Binders **Cellbind-FF** and **Cellbind-7838** offered by Sarex:

➡ UNIQUE FEATURES - CELLBIND-FF

- Cellbind-FF is a soft binder.
- It is a free formaldehyde binder for pigment printing of cellulosic and its blends.
- Gives very good brightness, soft and elastic hand feel to printed fabrics.
- Increases the resistance to abrasion. Imparts very good wash and rubbing fastness.
- Can also be used as a coating agent to impart soft feel to the fabric.

➡ UNIQUE FEATURES - CELLBIND-7838

- Cellbind-7838 is a medium hard binder.
- It is an acrylic copolymer emulsion having very fine particle size used especially for textile coatings and finishing.
- Gives hard, tough, flexible and glossy film. Hand feel of the fabric is medium hard.
- Excellent pigment loading characteristics.
- Alkali resistance and good durability to washing and dry cleaning.
- Highly water resistant combined with excellent UV resistance.
- Resins like Saraprint-AC can also be used along with Cellbind-7838 to increase wash resistance.
- Durable and excellent wet scrub and abrasion.

CELLBIND-FF & CELLBIND-7838

➡ APPLICATION

Cellbind-FF : Recommended Application Process

Recipe for Pigment printing - For 100% Cotton (Woven or Knits)

Pigment emulsion	1%	>1-4%	above 4%
Cellbind-FF	8%	12%	3 times the pigment
Synthick P-328	1.50%	2%	2-2.5%
Urea	5%	5%	5%
Saraprint-AC	**	2%	2%
Liquor ammonia	**	1%	2%
Water	balance	balance	balance






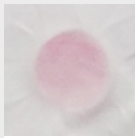
Recipe for Coating

Cellbind-FF	: 50-70 parts
Thickener	: 2.4 parts
Water	: Remaining

Process: Print → Dry in the drier at temperature above 130°C
→ Cure at 150°C for 5 mins.

Note: For pigment printing, it is very essential that the fabric pH should be acidic around pH 5.5-6.
To get sharp prints, the fabric should be free of salts.

Performance: Rubbing fastness of Pigment printed fabric

Conventional Binder		Cellbind-FF	
Dry rubbing	Wet rubbing	Dry rubbing	Wet rubbing
 3 - 4	 2	15 g/l	 3 - 4
 3 - 4	 2 - 3	20 g/l	 4+

Cellbind-7838 :

Recipe for Coating

Cellbind-7838	: 50-70 parts
Thickener	: 0.5-0.8 parts
Water	: Remaining

➡ CONCLUSION

There are a variety of different binders available to the textile processor. And there are many end use requirements that a particular binder has to fulfill. Sarex offers a range of textile binders, Cellbind-FF and Cellbind-7838 based on there end applications. These binders are extensively used in textile industries and are highly demanded in the market for there unique features.

CELLBIND-473 & HELAFIN-618

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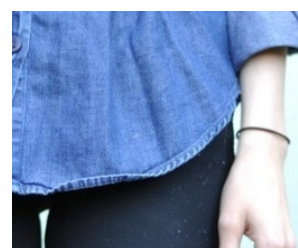
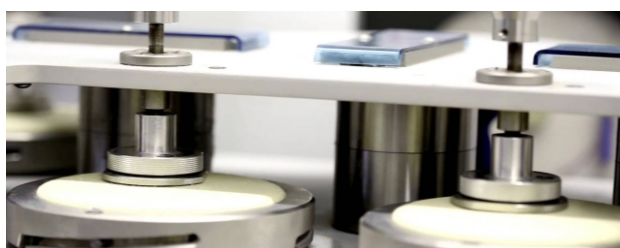
**CELLBIND-473
& HELAFIN-618**

Anti pilling Agents

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Pills are masses of tangled fibres that appear on fabric surface during wear or laundering. Pilling may be defined as a surface fabric fault comprising of circular accumulations, bunches or balls of entangled fibres that cling to the fabric surface thereby affecting the appearance and handle of the fabric.

Textiles are made with yarn, a spun thread which is used in both, knitted and woven fabrics. With every wash, wear and the ticking of time, the tiny fibres that make up the yarn, breaks. These broken fibres balls up to create pills on the fabric surface. These balls of tangled fibres are held to the fabric surface by longer fibres called anchor fibres. The number of pills on a fabric surface at any time is the result of a dynamic equilibrium between two opposing effects, pill formation and pill wear off. Through abrasion, loose fibres are pulled to the fibre surface and form a layer of 'fuzz'. The loose fibres are then entangled by the applied abrasion to form pills. As the abrasion continues, the anchor fibres are eventually broken and the pills break off. Pills proliferate in high-friction areas like the under-arms, sleeves, bust area, and inner thighs. Pilling normally happens on the parts of clothing that receive the most abrasion in day-to-day wear, such as the collar, cuffs, and around the thighs and rear on trousers thereby changing the aesthetic properties of garment.



Surface appearance of a textile material is very important to the consumer. Fabrics with pills have an unsightly appearance and an unpleasant handle. This unpleasant appearance can seriously compromise the fabrics acceptability for apparel. Ever since the invention of the loom, fabric producers have observed the phenomenon known as fabric "pilling," a process that results in the formation of small fuzzy balls or "pills" on the fabric surface.

CELLBIND-473 & HELAFIN-618

In the short term, pilling may lead to unattractive "fuzzy" fabric; over time, especially with natural fabrics, it can lead to a complete wear-through of the fabric. Pilling is one of the main quality problems especially encountered in cotton knitted fabrics. Since the pilling formation can cause decrement in usage life and quality of fabric and also affect the appearance of the fabric negatively, the elimination of this problem is crucially important. Although pilling affects only the fabric aesthetics and does not cause any functional problems, it is important to minimize or prevent pilling in order to maintain customer satisfaction.

There are many methods for removing the pills from fabric. Physical processes such as shearing, singeing, brushing or special treatments such as sanforizing or UV treatment help to remove pills. Thermosetting and chemical processing such as application of polymers can reduce the pilling tendency of the fabric. Out of these, surface modification by using different chemicals is the most acceptable method.

Pilling prevention is an ongoing challenge for manufacturers of cotton, polyester and blended fabrics. The pilling problem is widely encountered especially in cotton knitted fabrics. All fabrics pills to some extent but degree of pilling varies depending on type and quality of the fabric. The primary drivers of pilling are the physical characteristics of the textile (fibre denier, twist factor of the yarn and fabric construction), the method of textile processing, habits of the textile's wearer, and the environment in which the textile is used. Fine denier fibres tend to pill more as they possess less stiffness. The yarn with lower twist factor will pill more than the yarn with higher twist factor. Closed weave fabric with a high set, pills less. A very tight, compact construction, such as denim, usually pills very little. However, a loosely knitted or woven fabric will show more pilling with both wear and cleaning. Pilling is often more noticeable on knitted fabrics, such as sweaters, than on woven. This accounts to greater distance between yarn crossings in knitted fabrics than in woven ones. Blended fabric made of a pair of strong and a relatively weak fibre tends to pill more, as the weaker fibre wears and breaks, and the stronger fibre holds the pills onto the cloth. Fabrics and knitted products made from yarns with a synthetic fibre are inclined to pilling as a virtue of their considerable strength, flexibility and resistance to impact.

Different chemical finishing approaches are made to prevent pills from accumulating on fabric surface such as application of polymers by padding and coating techniques. In order to eliminate this problem in fabric stage, the anti pilling finishing treatments can be applied to the fabrics. In this method, fabrics are treated with anti pilling agents which promotes adhesion of the fibres in the yarn or the fabric. This anti pilling agents aims to suppress the ability of fibres to slacken and also reduce their mechanical resistance. Since the anti pilling agents suppress the ability of fibres to move, the finish fabric will loose its softness marginally. Anti-pilling chemicals are polymers used as a soft and flexible hand builder. This polymer reduces fraying, pilling and seam slippage of treated fabrics.

Pilling can critically compromise a textile's acceptability for consumers and hence is the focus of significant industry research. Pilling prevention is an ongoing challenge for manufacturers of cotton, polyester and blended fabrics. With this background, Sarex have developed Anti pilling agents, **Cellbind-473** and **Helafin-618** applicable for cotton, polyester and there blended fabrics, which will meet the current market demand. These finishing agents improves the resistance of treated fabric to pilling, snagging and also reduces the tendency of seam slippage.

➞ UNIQUE FEATURES - CELLBIND-473

- Cellbind-473 is a non ionic Anti pilling agent.
- Improves resistance to pilling, snagging and also reduces the tendency of seam slippage.
- Acts as an Anti slipping agent for fibres to avoid yarn slippage. Also improves bursting strength of knitted fabric.
- Since it is non ionic in nature, it can be used with softeners, resins as well as fluoro chemicals.
- Finish obtained with Cellbind-473 is resistant to washing and dry cleaning.
- Can be applied by exhaust as well as padding technique.
- Suitable for natural and synthetic fibres and their blends.

CELLBIND-473 & HELAFIN-618

UNIQUE FEATURES - HELAFIN-618

- Helafin-618 is a cationic Anti-pilling, Anti-slip and Anti-snag finishing agent.
- Suitable for natural and synthetic fibres and their blends.
- Applicable by padding and exhaust method.
- Keeps the fabric surface free from pills.
- Can be used with non ionic softeners and resins.

Recommended Application procedure

100% Cotton 300 TC sheeting fabrics were treated with the recommended dosage of Cellbind-473 and Helafin-618 by padding application.

CELLBIND-473		HELAFIN-618	
Padding Process	Exhaust Process	Padding Process	Helafin-618
Dosage : 20-30 g/l	Dosage : 2-3%	Dosage : 30-40 g/l	Dosage : 3-4%
Pick-up : 65-70%	Bath pH : 5.0-6.0	Pick-up : 65-70%	Bath pH : 5.0-6.0
Bath pH : 5.0-6.0	Bath Temp. : 30-40°C	Bath pH : 5.0-6.0	Bath Temp. : 30-40°C
Drying : 130-160°C	Time : 20-30 min.	Drying : 130-160°C	Time : 20-30 min.

The Anti-pilling efficiency of the finished fabrics was evaluated with the standard Test method: ASTM D4970 (500 rpm) on Martindale Abrasion cum Pilling Tester - James H. Heal.

Note : To achieve better results at higher revolutions, higher concentration of Cellbind-473 and Helafin-618 is recommended.

Results

Anti pilling Performance		
		
Untreated	30g/l Cellbind-473	30g/l Helafin-618
Rating : 1	Rating : 4 - 5	Rating : 4 - 5
(Severe pilling)	(Very slight pilling)	(Very slight pilling)

Rating : 1 to 5
Rating 5 : Good
Rating 1 : Poor

In this study, two types of anti-pilling agents were used to examine the anti pilling efficiency of the treated fabrics. It was found that pilling tendency of the treated fabrics could be decreased by applying antipilling agents. Better results achieved in higher concentrations. Pills are an aesthetic and physical nuisance because the surface appearance of a textile material is very important for consumers. Therefore an attempt has been made to control the pilling propensity of the fabrics by anti pilling finishing agents Cellbind-473 and Helafin-618.

C E R T I F I C A T I O N S



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