

Due care

Here are some tools to take care of your Polyester Staple Fibre.

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#### **Introduction:**

The purpose of this note is to give detailed technical suggestions to users of "Recron" fibre, highlighting "best practices" currently used in the spinning industry. Surveys have shown that there is a large variance in standards of practices employed. This variance can lead to large differences in quality and productivity when spinning "Recron", unless due care is taken during the entire process.

A compelling need to exercise due care also arises from higher expectations of yarn quality both in domestic & export markets, as the pressure from weavers, knitters and garment makers to deliver consistency has progressively increased over the years.

In what follows, key "best practices" have been described in detail, with a focus on methods, which help in early detection of yarn deficiencies, so as to minimise value loss, as material is processed in the textile chain.

#### **1. Receipt of Material :**

Considerable care & attention must be paid right from the beginning, when receiving, storing and issuing "Recron" fibre for spinning.

- Weight of the entire consignment should be ascertained. The shortage, if any, in the total weight of the consignment (not individual bales) should be communicated to Reliance Industries.
- Denier, cut-length and type of material received should be verified to confirm that they are in line with what was ordered. Mix-up of merge/ denier / cut-length / type can lead to processing problems and / or dye-variation complaints.
- Any transit damage to bales like soiling with oil, mud, other contaminants or transit wetness can cause processing problems. In the event of any type of transit damage, an appropriate certificate on the reverse side of the relevant lorry receipt, indicating the nature of damage and reasons thereof should be obtained.
- All relevant documents received with the consignment should be checked and verified that they are in order.
- If there is any deviation in any of the above, all the bales must be kept aside and not taken into process.
- Reliance should be informed immediately but not later than 48 hours after receipt of the consignment.
- Under no circumstances the truck should be unloaded if Modvat document is not delivered along with the consignment.

#### **2. Handling, Storage and Issue of "Recron" PSF**

Many users of "Recron" do not use best practices when handling "Recron" bales. Some of the key precautions are as follows.

- Bales should be properly and carefully unloaded from the trucks and transferred to covered warehouses using forklifts or trolleys.
- Damage to bales or material due to improper handling during unloading and stacking, such as use of hooks or dropping of bales can seriously affect subsequent processes.
- Bales should be stored with sufficient care to prevent mix-ups.
- Issue of "Recron" bales for processing, must always be on a 'First in - First out' basis.

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### **3. Need for Segregation**

The importance of best practices in keeping materials properly segregated when processing "Recron" cannot be overemphasized. Improper practices can lead to serious variations and value loss in yarns and fabrics. Some of the more important reasons for practicing proper segregation are given below.

- The dyeing characteristics of "Recron" Polyester Staple Fibre, like all other polyester fibres, are entirely different from those of cotton, viscose, silk, wool etc. Therefore, the dyeing methods and the types of dyestuffs to be used are different.
- Different brands of Polyester Staple Fibres dye also differently under the same conditions.
- In the same brand of Polyester Staple Fibre, the dyeability varies for different deniers, merges and types.
- If a given type, denier and merge of Polyester Staple Fibre is spun with different blend ratios, it will have different dyeabilities.
- Different blend partners with polyester viz. Cotton, viscose, silk, wool etc. will have different dyeing characteristics leading to dyeing differences.
- Even the same count of yarns from the same merge of Polyester Staple Fibre but with different twist levels, will dye differently.

The above are a few illustrations of permutations and combinations which can cause differential dyeing. Any mix-up due to the above illustrative reasons, can cause very costly cloth damage. The need for proper segregation, therefore is extremely important at all stages of processing and storage.

- Besides differential dyeing, serious processing problems can also occur if cut lengths are mixed up. Some mills simultaneously use 40mm fibre for PC blends and 44 or 51 mm fibre for PV blends. If sliver from 51mm fibre gets mixed up with sliver from 40mm fibre and passes through machines set for processing 40mm cut length fibre, very serious processing problems will occur.

### **4. How to achieve segregation**

#### **4.1 Colour Coding**

- This is the most ideal method to achieve segregation.
- Colour coding is use of different coloured cans, inter-bobbins, ring-tubes and cones/cheeses of different colours or tipped with different colours.
- Many leading mills, in response to requirements of export customers, have already switched over to this preferred method of segregation.

#### **4.2 Tinting**

- "Recron" is dressed with a uniform coat of world-class finish to facilitate smooth processing. Tinting can damage this processing aid and is therefore not recommended. If tinting is considered absolutely necessary, it should be done with the utmost care as described below.

#### **4.3 Choice of Tinting Colour**

- An ideal tinting colour should have the following characteristics.
  - It should be soluble in cold water.
  - It should be easily washable in cold water.
  - It should have good tintorial value with minimum quantity of colour used.
  - It should have good light fastness. Should not fade under the light in the department.
  - It should not become fast on fibre/yarn/fabric on grey heat setting.
- Good quality fugitive tinting colour from any of the following reputed suppliers may be used

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- Uniquema (ICI India Ltd.)
  - Clariant India Ltd.
  - Atul Ltd.
  - Indo Swiss Textile Chemicals (Ciba)

#### **4.4 Preparation of Tinting Colour Solution**

The advice of the suppliers of tinting colour should be obtained. However, the following general guidelines will be of assistance when verifying and implementing the recommendations of the tinting colour supplier.

- The tinting colour used should not exceed 0.04 percent on the total weight of mixing.
- The required quantity of tinting colour is to be made into a paste with cold water and the final volume made up with the required additional cold water.
- The concentration of tinting colour solution should be in the range 40grams per litre to 60grams per litre.
- The final tinting solution thus prepared should be filtered through a fine cloth before use.

#### **4.5 Methods of Applying Tinting Colour**

There are three methods followed in the industry for applying tint.

*Method 1 :*

Bale tinting : Here the bale covers are removed and tinting colour applied on five sides of the bale. The volume of fibre covered is very low in this method leading to high concentration of colour. This can lead to shedding of colour during processing resulting in heavy soiling of blow-room and carding machines besides low depth of colour. This method therefore, must be avoided.

*Method 2 :*

In the second method, fibre from one "Recron" bale is spread on the floor in three or four layers. The required tinting colour is then applied uniformly and equally on top of each layer.

*Method 3 :*

In the third method about 15 percent to 20 percent of "Recron" involved in the mixing is spread on the floor layer by layer & the tint is applied uniformly. In this case the tinted fibre should be pre-opened after drying before using in the mixing.

Both methods 2 and 3 are being used with success in the industry. However, method 2 is considered to be more robust.

#### **4.6 Application of Tinting Colour**

- The tinting colour should be applied uniformly using a compressed air-spray gun capable of giving a very fine atomised spray.
- There should not be any drips of colour falling on the fibre. Drips can lead to pockets of high colour concentration leading to opening problems or card cylinder loading or roller lapping.
- The tinted material should be dried thoroughly under natural conditions or under a battery of infra-red lamps.
- The tinted fibre should be uniformly distributed layer by layer during sandwich mixing preparation.
- Besides soiling the spinning machinery and necessitating frequent cleaning with suitable solvents, tinting can cause higher imperfections, card loading or roller lapping during the spinning process. This is especially so, if tinting is improper and :
  - The tint application is not uniform
  - The tint applied is high

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- The tinting colour is not properly dried.

## **5 Mixing & Blending**

An important key to best results is good mixing and blending practices without which consistency of performance and yarn quality cannot be achieved. Mixing & blending methods which can contribute to good performance are described below.

- Mixing from a minimum of five bales of "Recron" or preferably more number of bales of "Recron" will ensure uniformity of properties within and between mixings.
- This will help in achieving consistency in performance and yarn quality within and between mixings.
- It is essential to maintain mixing-wise details of bale numbers and DCPI Nos. to be able to subsequently trace the reasons for poor performance.
- All partially consumed bales must be properly labelled for avoiding mix-ups.
- First grade "Recron" should not be mixed with any other quality of polyester fibre.
- Mixing of different deniers, cut-lengths, merges and types of "Recron" in the same mixing should be avoided except for the production of fancy yarns.
- Sandwich mixing in bins, for all "Recron" blends including 100% "Recron", is recommended.
- Pre-opening of viscose is a pre-requisite for PV mixing.

### **Blow-room blending**

- For blow-room blending of "Recron" with viscose or cotton, accurately weighed quantities of "Recron" and the second component should be laid one over the other in a sandwich mixing. While layering, each component should be distributed over the other uniformly, in such a manner that fibres from the previous layer are not visible. In case of blow-room blending of "Recron" and Cotton some mills are in the habit of putting big lumps of Cotton sliver carelessly on the "Recron" layer. This will most certainly lead to blend variation & fabric damages in terms of warp streaks or weft-bars.
- To avoid this, the cotton sliver should be broken in to small pieces and distributed uniformly over "Recron" layer.
- The sandwich layer should be pressed hard so that when vertically cutting the mixing, there is no preferential plucking of "Recron" or the second component, as this can lead to blend variation.
- PV and PC mixing should be given two blender toppling.
- One blender toppling is adequate for 100% "Recron" mixing.
- The final mixing should be conditioned for 18hrs to 24hrs in case of PV / PC blends and 8 hrs. in case of 100% "Recron" mixing.

### **Draw-frame blending**

- When blending "Recron" with the second component at the draw-frame stage, a leveling passage of draw-frame for both the components is recommended. This will help in adjusting & obtaining uniform linear densities before blending. Creel stop motions of draw-frames should be highly sensitive and effective to prevent blend variation. Two passages of draw-frame after blending are essential to achieve homogeneity of blend.

### **Other Precautions**

- Whatever be the blending method adopted, due allowances for differences in moisture content of Polyester and the cellulosic component and preferential loss of the cellulosic component during spinning must be given.

The proportion of Polyester and cellulosic components during sandwich layering in case of blow-room blending (and hanks of Polyester and cellulosic components in case of draw-frame blending) should be adjusted accordingly.

## **6 Recycling**

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Any type of soft waste must not be reused as it can lead to processing and quality problems. Most quality conscious mills generally accumulate all types of soft-wastes and separately spin claimless quality yarn so as to protect the value and reputation of their first quality products.

## **7. Overspray**

First grade "Recron" PSF does not normally require any overspray under optimum conditions. However, if overspray is necessary for compensating for deficiencies or deviations in operating conditions it should be done with utmost care as per the guidelines given below:

- Overspray oil should be from a reputable manufacturer like:
  - Uniquema (ICI India Ltd.)
  - Auchtel Products Ltd.
- Overspray oils are normally:
  - Lubricant cum antistat
  - Cohesive agent cum antistat
  - Purely cohesive agent
  - Purely antistatic agent
- The choice of the oil will depend on the nature of the processing difficulties encountered. Sometimes it may be necessary to use a combination of two oils in different ratios at different periods.
- The quantity of overspray oil to be used will depend upon the ambient and mechanical conditions of machines, blend composition and the second component used.
- This will vary between mills and within a mill between seasons.
- Each mill has to optimize the quantity of finish and water to be used through trial and error to achieve best performance.
- Whatever be the quantity and type of oil decided it should first be made into an emulsion in water at room temperature. Thereafter it should be sprayed uniformly and equally on all layers during sandwich layering using a compressed air gun which atomises the oil emulsion to a fine spray.
- No dripping of oil should be permitted during spraying as this will lead to pockets of high/low concentration of finish resulting in processing problems.

## **8. Processing**

For trouble free use of Grade-I "Recron" PSF it is absolutely essential that:

- All spinning machinery is maintained in good condition
- Effective quality control and process control systems are installed and diligently practiced.

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## **9. Early warning & Detection systems**

Early warning and detection systems for quick detection of mix-ups, identification of deficiencies in yarn or any other process variations are a must. Without these, experience has shown that very high value losses can occur if large quantities of defective yarn are produced.

- Traditionally some units have make shift arrangements for early detection. These may include trial weaving or knitting of selected bobbins followed by dyeing. For best results, however, the following equipment and procedure is strongly recommended.

## **9.1 Equipment for Early Warning and Detection System**

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The essential components for early warning and detection consist of :

- Facilities to determine blend composition (please see annexure-I)
- Laboratory model single feed hose knitting machine (please see annexure-II)
- Laboratory model HTHP dyeing unit (please see annexure-III).
- Day light cabinet – optional

## **9.2 Recommended procedure for early Warning and Detection.**

The following procedure is recommended for using the early warning and detection equipment listed above.

- Ideally from each lot or mixing advance yarn samples should be spun on a fast track basis.
- Ten random ring-bobbins of this advance sample should be knitted into a hose with alternate bands of about two inches wide from each ring-bobbin.
- The hose knitted with these alternate bands should then be dyed in laboratory HTHP dyeing machine. Only the "Recron" component should be dyed.
- After dyeing, the hose should be thoroughly inspected for any type of **speckiness** or dyeing deficiencies which might give dissatisfaction to the users of the yarn. Ideally, this inspection should be done with the help of a day light cabinet.
- In case speckiness or dyeing deficiency is observed, the mixing together with any unused bales from the same supply of "Recron" (DCPI or invoice) should be kept aside for further investigation.
- If no dyeing deficiencies are detected, two ring-bobbins from the above ten random ring-bobbins should be retained. These should then be used as the standard against which advance samples of successive lots or mixings can be compared for deficiencies.

## **9.3 Checking Blend Composition and Blend Variations.**

- Besides speckiness or other dyeing deficiencies, the yarn from the same advance spun ring-bobbins should be used to verify both blend composition and to ascertain any blend variation.
- In Annexure – I, both the equipment and the detailed procedure for conducting these two tests are provided. .

## **9.4 Early detection of variations in yarn strength**

- Besides speckiness, dyeing deficiencies or blend variations, the ten advance ring-bobbins provide an excellent opportunity to verify consistency in yarn strength. Yarn drawn from the same ring-bobbins should be used for testing yarn strength.

## **9.5 Suggestions for minimising speckiness and other yarn imperfections**

While well-maintained carding machines are absolutely necessary for producing good quality yarns, the following measures will help in minimising both speckiness or other yarn imperfections.

- Highest possible cylinder speeds
- Narrowest and uniform setting (10 Thou to 12 Thou) between cylinder and flat without precipitating cylinder loading.
- Higher number of wire points on cylinder without leading to cylinder loading.
  - Higher wire points on flats with optimum speed for effective removal of defects.

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## 10. Stock Dyeing of "Recron" PSF

Many users of "Recron" Fibre pre-dye the fibre for spinning. Some essential best practices, listed below, must be followed when fibre dyeing has to be carried out.

### 10.1 Dye vessel loading for Stock Dyeing

- Fibres of different types should never be loaded together in the same charge; otherwise it can result in channeling and uneven dyeing.
- Loading of the fibre in the machine should be done by a stamping machine with hot water to ensure uniform packing density.
- Finish on the fiber can interfere with the dyeing process and should therefore be completely washed and removed before starting dyeing.

### 10.2 Dyeing of "Recron" PSF:

- When choosing dyes, leveling properties must be given priority over other properties.
- Water quality should be checked for hardness, iron, total suspended solids & total dissolved solids to ensure the levels are within limits.
- Dyeing Cycle (Rate of heating, holding time, temperature) should be decided after checking the characteristics of the dyes and further confirmed by actual trials.
- Carriers or accelerators should not be used as they can cause unevenness.
- Heating Control should be done by microprocessor controllers and not manually.

### 10.3 Post Dyeing Practices:

- Dye bath should be discharged at high temperature, with adequate safety provisions to avoid problems associated with precipitation of dyes, chemicals, oligomer etc.
- Reduction clear and soaping should be carried out on all shades as it removes loosely adhering particles which can come in the way of smooth running in spinning.
- Hydro extraction should be automated and controlled for constant moisture as consistency of finish on fibre between lots depends on this.

## 11. Due Care Audit

Experience has shown that the Due Care procedures recommended above must be regularly and diligently audited. It is recommended that every user of "Recron" should assign this task to a separate Group or Team.

The observations and reports of such audits must be reviewed by the Top Management at regular intervals. This will ensure that all the due care systems described here are being fully complied with at all times.

*NOTE: The information provided above is in good faith but without any warranty.*

## Early Warning & Detection Systems

### Annexure – 1

- Blend Composition Test
- Equipment , accessories, chemicals and procedure
- Equipment
  1. Glass ware: beakers (250ml), Glass rods

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2. Oven to dry the samples at 105 ° C
  3. Weighing bottles
  4. Sintered glass crucibles - grade I.
  5. Desiccators with anhydrous calcium chloride.
  6. Sulfuric acid (75%)
  7. Ammonia for neutralization.
  8. Analytical balance – accuracy 1mg.

- Procedure

Reagent:

Prepare 75% Sulfuric Acid by adding slowly 700cc of 98% acid to 350ml of distilled water. Cool it to room temperature. Confirm by measuring with a Twadellmetre (should be 130° Tw).

Caution : Add acid to water and not vice-versa.

Moisture content

1. Take about 2gm sample & weigh ( $W_1$ )
2. Put in a clean dry tarred weighing bottle ( $W_2$ ) and dry at 105° C for 4hrs. to constant weight.
3. Cool in the desiccators & weigh ( $W_3$ )
4. Calculate moisture content  $Mc = \frac{[W_1 - (W_3 - W_2)]}{W_1}$

Polyester content

1. Take about 1gm sample & weigh ( $W$ )
2. Put in a dry beaker with 50ml of 75%  $H_2SO_4$  at room temp. Keep for 45mts with frequent stirring.
3. Filter through tarred sintered glass crucible & transfer the residue as welt.
4. Wash with water till acid free.
5. Neutralize with Ammonia solution.
6. Wash again till free from Ammonia
7. Dry the crucible & residue to constant weight in an oven at 105° C for 2hrs. Cool in the desiccators & weigh ( $M_1$ )

Calculate:

Polyester % on Bone dry basis =  $\frac{100 \times M_1}{M_0}$

$$\text{Where } M_0 = \frac{W(100 - Mc)}{100}$$

## Annexure – 2

### Hose knitting machine

#### Basic features

Single feeder laboratory model hose knitting machine.

Hose diameter 3½ inches to 4 inches suitable for knitting spun yarn in the count range spun in the mill.

- Parties who can supply such units:
  1. 1. M/s Rishikesh Electromatic Pvt. Ltd.  
A-1, Nityanand Apartments  
Kastur Park, Shimpoli Road  
Borivali (W), Mumbai – 400092.  
Tel: 022-8989595 / 8989596  
Fax :022 – 8986087 / 8989597  
Contact person : Mr. Vijay Parekh  
Model : ECO

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List price with two cylinder heads : Rs.60,000/- + Taxes

Special price for "Recron" users : Rs.45,000/- + Taxes

Commissioning charges extra

2. Bharat Machines

35/A Industrial Area

A – Extension

Ludhiana – 141003

Tel: 0161 651387 / 533689

Contact person : Mr. Ashish Kapoor

Model : Bharat

List price with two cylinder heads : Rs.68,000/- + Taxes

Special price for "Recron" users : Rs.65,000/- + Taxes

Commissioning charges extra

3. M/s Knitmac

Knitting & Textile Machinery Works

SF – 145/1A – Parapalayam Road

Mannarai post

Tiruppur – 641607

Tamilnadu

Tel: 0421 – 722162 / 722492

Fax : 0421 – 721896.

Contact person : Mr. Uma Shankar

Model : Knitmac – LB/24GG/SJ/Laboratory model

List price with two cylinder heads : Rs.60,300/- + Taxes

Special price for "Recron" users : Rs.53,000/- + Taxes

Commissioning charges extra

### Annexure – 3

- **Laboratory High Temperature High Pressure (HTHP) dyeing Unit**

**Basic features**

HTHP beaker dyeing machine

4 pots x 500 ML capacity.

Microprocessor for rate of heating and holding time control.

Glycerine heating bath.

- Parties who can supply such units:

1. R.B. Electronic & Engineering Pvt. Ltd.

9, 2<sup>nd</sup> floor, Jyoti Wire House

Near Kolsite, Off Veera Desai Road

Andheri (W), Mumbai 400053.

Tel: 022-6311073 / 6311656/6369797

Fax: 022-6333251

Contact person : Mr. Suresh Puntambekar

Model : GBBB - special

List price for 6 pots x 500ML : Rs.52,000/- + Taxes

Special price for "Recron" )

users 4pots x 500ML ) : Rs.34,000/- + Taxes

Commissioning charges extra

2. Innovative Engitech (P) Ltd.

Khasra No.322 (near Wadhera Furniture)

Neb Serai, Maidangarhi Road

(IGNOU Road)

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Neb Sarai, Opp. Saket

New Delhi – 110068

Tel: 011 6969692 / 6561402

Fax:011 6963170 / 6522031

Contact person : Mr Amitab Ghosh

Model : " INNOLAR" beaker dyeing machine

List price for 4 pots x 500ML : Rs.55,000

Special price for "Recron" users : Rs.50,500/- + Taxes

Commissioning charges extra

3. M/s Rishikesh Electromatic Pvt. Ltd.

A-1, Nityanand Apartments

Kastur Park, Shimpoli Road

Borivali (W), Mumbai – 400092

Tel: 022 8989595 / 8989596

Fax: 022 8986087 / 8989597

Contact person : Mr. Vijay Parikh

Model : 500S

List Price : Rs.69,000/- + Taxes

Special price for "Recron" users : Rs.55,000/- + Taxes

Commissioning charges extra