



Viscose and Bamboo



VISCOSE and BAMBOO RECOMMENDATIONS for PRE-TREATMENT, DYEING and FINISHING

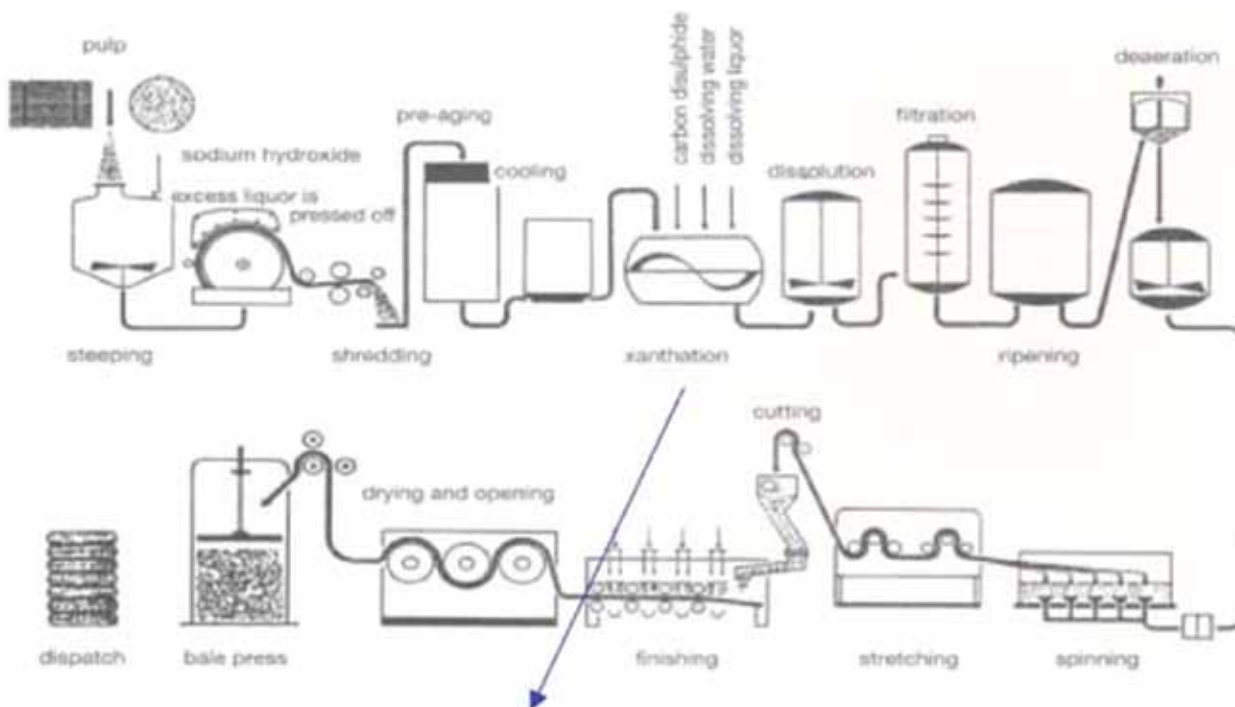
VISCOSE MANUFACTURE

To make rayon, sheets of purified cellulose are steeped in caustic soda, dried, shredded into crumbs, and then aged in metal containers for 2 - 3 days. The temperature and humidity in the metal containers are carefully controlled. After ageing, the crumbs are combined and churned with liquid carbon disulphide, which turns the mix into orange-coloured crumbs known as sodium cellulose xanthate. The cellulose xanthate is bathed in caustic soda, resulting in a viscose solution that looks and feels like honey.

SPINNING

After the syrupy viscose solution is prepared it is forced through a spinneret into an acid bath containing sulphuric acid, sodium sulphate and, usually, Zn⁺ ions, causing the cellulose to be regenerated and precipitate from solution. The resulting strings or filaments are then stretched on godet wheels to strengthen them, and put into a spinning Topham box. The result is the formation of fine filaments of cellulose or rayon.

VISCOSE MANUFACTURE

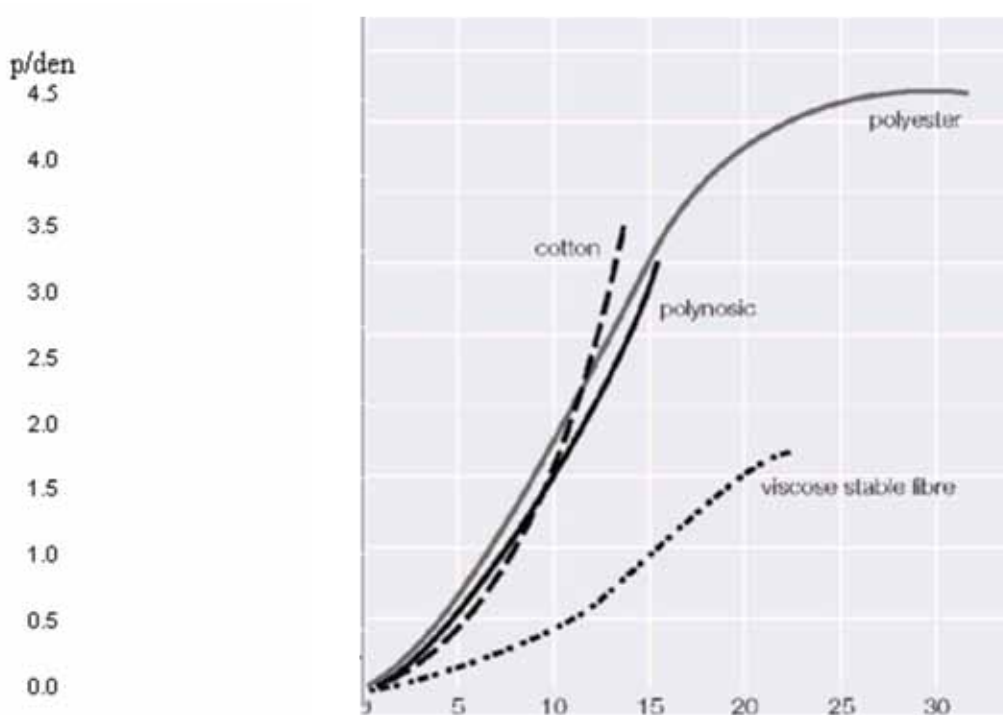


Possible sulphur residues can generate reducing conditions-destroying or changing the shade of dyestuffs.

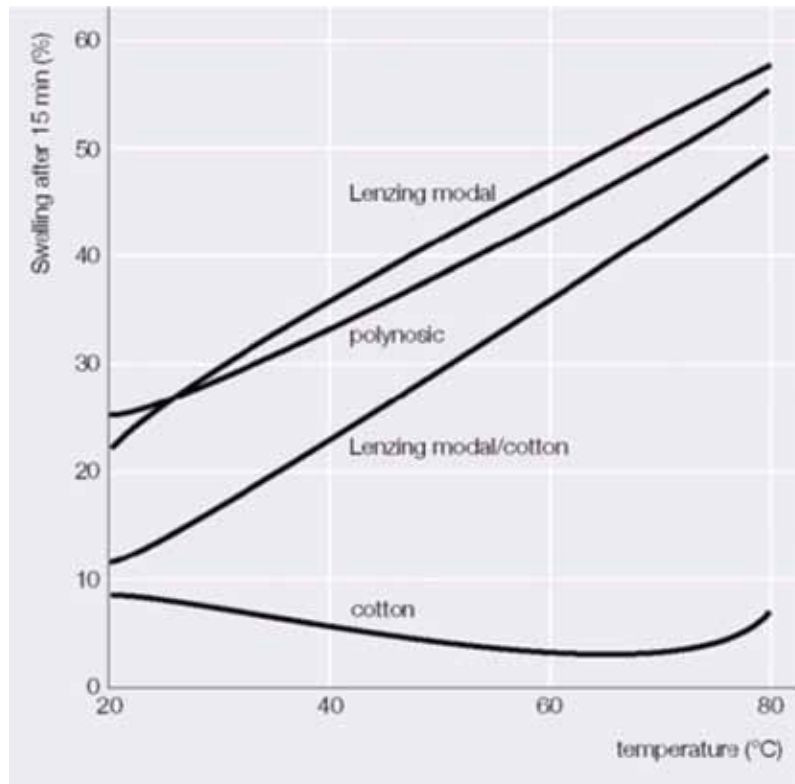
Physical Properties

	Viscose	HWM	Polynosic	Cotton
DP value	250 - 350	350 - 450	450 - 800	2200 - 3000
Swelling in water %	80 - 115	70	60	30 - 50
Tensile strength cN/tex	up to 28	35 - 37	38	25 - 30
Rel. wet strength				
Extension at break %	ca. 55 15 - 3	ca. 70 13 - 14	ca. 80 11 - 13	>100 11 - 13

Viscose has lower tenacity in both wet and conditioned state than cotton.



Stres-strain curves, wet



Swelling of cellulosic fibre fabrics in water

How Manufacture and Physical Properties Influence Dyeing

Different ratio of crystalline and amorphous regions compared to cotton.	Viscose has higher dye affinity than cotton.
Viscose has irregular serrated skin and cross section.	Inferi or diffusion and penetration. More kinetic energy needed. Isothermal dyeing recommended.
Viscose loses tenacity when wet.	More care needed to avoid damage.
Wet swelling increases to cold temperature.	Very important in package dyeing.
Swelling of fibres makes wet fabrics stiff. Swelling and heat can set creases.	Use longer L.R. than for cotton. Keep liquors above 50 °C, cool at max. 1 °C per min. Use suitable anti-crease lubricants. (EXOLUBE NC)
Viscose may contain residues of sulphur.	Mild peroxide bleach may be necessary to remove sulphur. (VISCOBLEACH-VISCODYE).
Viscose is creamy white in colour. Naturally clean. Fabrics free from natural fats and waxes, motes and seeds.	Little preparation required. Bleaching chemicals can be reduced. Always give some preparation to avoid carry over of sulphur.
Dyes have higher substantivity and faster fixation.	Use Kimsoline Easy Match Dyes.

PRETREATMENT

Woven Fabrics

Warps of viscose rayon can be sized with a variety of agents: starch based systems, polyvinyl alcohol systems or a combination of both, modified starch, starch ethers or CMC or combinations of these. Identification of the size present is important prior to deciding on a suitable desizing procedure, however, many factories will opt to use their standard cotton desize treatment ; e.g. applying in the quench box of a singeing machine, pad 2 - 3 g/L amylase enzyme (AMILAZ TK 200) 1 - 2 g/L wetting agent (E WET 205, nonionic) impregnate at 60 - 70 °C; pick-up 100 % ; batch minimum 4 hours-normally overnight; wash-off.

Knitted fabric

Sulfur Cleaning by Peroxide Bleaching Alkaline

VISCOBLEACH	1 g/L
Peroxide, 50 %	2 "
EXOLUBE NC	1 "
Temp.	70 °C
Time	30 min

- Water is heated and fabric is loaded.
- After bleaching 60 °C wash and antiperoxide treatment is necessary.

BIOKILL	0,2 ml/L
Temp.	50 °C
Time	20 min

- In case of highly twisted viscose fabrics,

Reductive, acidic,
Alkaline peroxide,

treatmenty are required.

Sulfur Cleaning by VISCODYE Complexing Acidic

VISCODYE	2 - 3 g/L
EXOLINE 3H	x %
pH	4 - 4,5
EXOLUBE NC	1 %
Temp.	80 °C
Time	20 min

Hot wash at 80°C and cold rinse.

FULL BLEACH with OBA

Peroxide, 50 %	6 - 7 ml/L
VISCOBLEACH	3 g/L
EXOLUBE NC	1 ml/L
Temp.	95 °C
Time	60 min
OPTIC CO	0,45

Load the fabric into the machine, heated to 50 - 60 °C containing EXOLUBE NC cool at a gradient of not more than 1 °C per minute to prevent hydro plastic creasing. In case of uneven bleaching, VISCODYE treatment is advised.

Causticising: Causticisation modifies the viscose fibre surface or skin to enable more rapid diffusion of dye into the fibre. Yield gains of up to 50 % are possible. Typical conditions for pure viscose are treatment with 6 - 8 Be' caustic soda at 25 - 30 °C for at least 2 minutes followed by low tension washing with boiling water to assist the rapid removal of alkali.

In order to improve penetration of NaOH solution, into fabric uniformly;
Ender Bey,

E WET OH 8 - 10 ml/L

is added into the lye solution.

Pad batch processing is popular although dedicated continuous plant, employing a scray or conveyor for tensionless swelling and reaction, is preferable. Liquor pick-up of about 120 % should be achieved. The best after-washing device is probably a sieve drum continuous open-width range. Low uniform processing tensions are essential for consistent results and good quality. Rinsing should be done as hot as possible to minimise swelling and ensure rapid and complete removal of caustic soda. An addition of 2 - 4 g/L soda ash in the initial wash boxes will promote removal of alkali, and help maintain a good fabric handle. Neutralisation with EXOLINE 3H is also advisable, for core neutralization.

PRETREATMENT-VISCOSE/LYCRA®

Where blends of viscose/elastane contain more than about 5 or 6 % elastane, it will be very difficult to achieve satisfactory dimensional stability in the final garment (e.g. less than 5 % shrinkage on washing) unless the fabric is pre-set before wet processing.

For Best Results We Recommend:

Pad the greige fabric in;

FIXECLEAN JT CONZ 10 ml/L

Heat set for 30 - 60 seconds at 190 - 195 °C (depending on type of elastane). FIXECLEAN JT CONZ, contains antioxidants and emulsifiers in its composition and prevents the fabric charred during heat setting. After heat setting the fabric will feel very soft and bulky compared to fabric heat-set without auxiliaries, and when put into water the knitting and spinning oils and charred colour are immediately rinsed out of the fabric. In bleaching bath, extra wetting agents is not required, because FIXECLEAN JT is a highly strong degreasing agent.

Caustic Treatment and Mercerizing of Viscose, Modal and Cotton/Viscose Fabrics

	Viscose	Modal	Cotton/Viscose
Soft	3 °C Be' NaOH	3 - 8 °C Be' NaOH	handle (60 °C)
High colour yield	6 - 8 °C Be' NaOH	8 - 20 °C Be' NaOH	>18 °C Be' NaOH

Covering of dead cotton; good solid shades only possible if during stabilization the critical concentration range is rapidly traversed with a lot of fresh water. (as tension-free as possible)



Examples of The Caustic Treatment of Viscose and Modal;

- Caustic treatment in the mezzera machine;

3 - 8 Be' caustic soda,

3 - 5 ml/L E WET OH,

Reaction temperature 20 - 80 °C,

Treatment time 20 - 40 min.

- Caustic treatment by the pad-dwell process;

6 - 8 Be' caustic soda,

4 - 6 ml/L E WET OH,

Liquor pickup 100 %,

Reaction temperature 20 - 40 °C,

Reaction time (plaited down) 30 - 180 min .

- Caustic treatment in the roller vat;

6 - 8 Be' caustic soda,

8 - 10 ml/L E WET OH,

Reaction temperature 80 - 90 °C,

Treatment time 20 - 60 sec.

- Caustic treatment in the steamer;

6 - 8 Be' caustic soda,

8 - 10 ml/L E WET OH,

Liquor pickup 100 %,

Reaction temperature 100 °C,

Reaction time 30 - 120 sec.

KNITTED FABRICS

- Mild peroxide bleach is necessary to eliminate sulfur residue.
- VISCOBLEACH performs the bleaching at pH: 9,5 and at low temperature.
- VISCODYE eliminates sulfur residue at pH: 4 - 5 sensitive viscose fabrics do not deteriorate under these conditions.
- Fabrics will tend to stiff in tight constructions so efficient lubricant is inevitable. EXOLUBE NC prevents hydro crease Marks.

REACTIVE DYEING

Recommendations!

Use special reactive Range with equal substantivity.

Recipe, %

<1	Vivizol K-LL range
1 - 3,5	Vivizol EM range
>3,5	Vivizol K-ED range

- Electrolyte, sodium sulphate, 30 % less with respect to cotton amounts.
- Efficient lubricant and dye migration enhancer. (**EXOLUBE NC**)
- Isothermal dyeing process. Run the machine with 80 % of the max. load.
- Fabric circulation speed should be set between 80 - 120 seconds.
- Heating and cooling rate is set as 1 °C/min.
- Efficient soaping to prevent migration of unfixed dyes while waiting for drying.

EXOLINE 3025, 3027 or FLASH SOAP

EXOLUBE NC

- Oil-ester based lubricant, impairing;

Dispersing,
Levelling,
Crease-preventing,
Wash-off,
Relevelling for PES unlevel dyeings.

BUFFERON R11

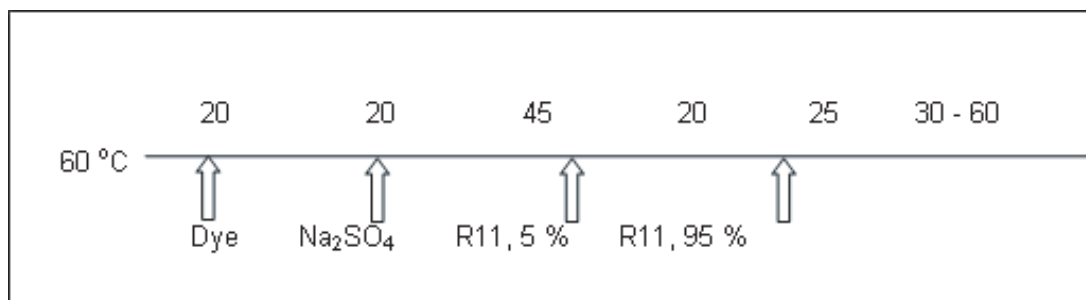
- Powder alkali with buffering mission;

Low hydrolization,
 Low pH,
 Better build-up,
 Not effected by bicarbonate content,
 Better repeatability and shade consistency,
 Short wash off period,
 Economical against soda-ash.

- Consumption amount, depending upon dye in the recipe;

BUFFERON R11 1 - 7 %

DYEING PROCESSES (Dye at the beginning), Conventional, Isothermal



EXOLUBE NC 0,5 - 1ml/L
 ANTISIL CONZ or
 ANTISIL AC 1 ml/L

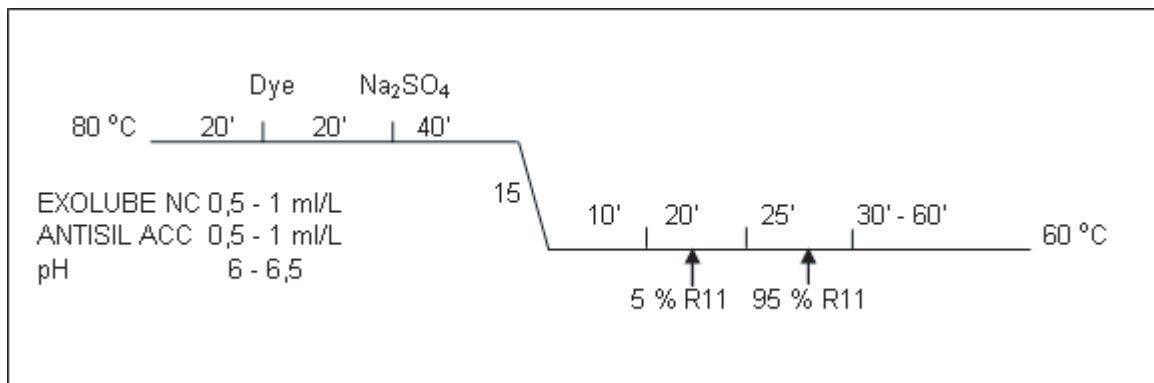
- Cold rinse, 10 min,
- Cold neutralize, acetic acid, 15 min,
- Soaping, 95 °C, 15 min, EXOLINE 3025 or 3027: 0,5ml/L

Light Shades no soaping,
 Dark Shades two soapings.

- Hot wash, 95 °C 10 min,
- Hot wash 80 °C, 10 min,
- Cold rinse.

DYE AT THE BEGINNING, MIGRATION

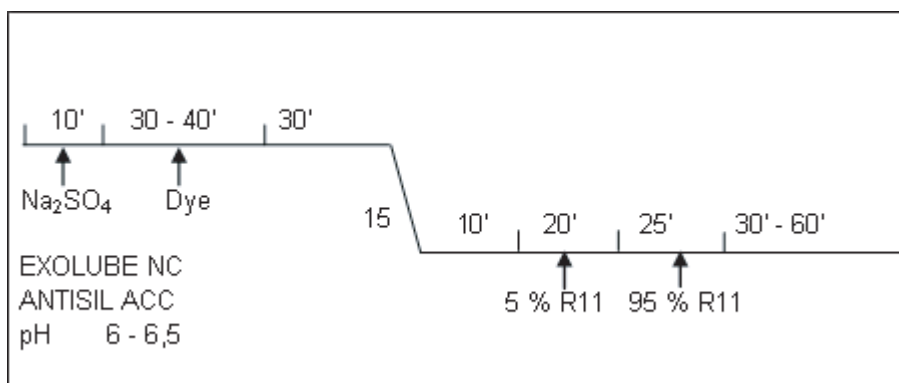
Migration System (In case of hard levelling property fabrics)



SALT AT THE BEGINNING

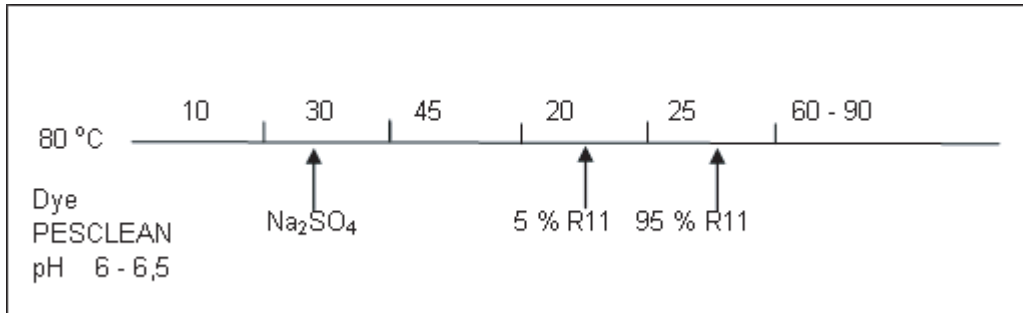
Migration System (In order to control Liquor Ratio) For Package Dyeing

- If salt should be given prior to start to dyeing-to control the liquor ratio-then dye addition is realised in 30 - 40 min.



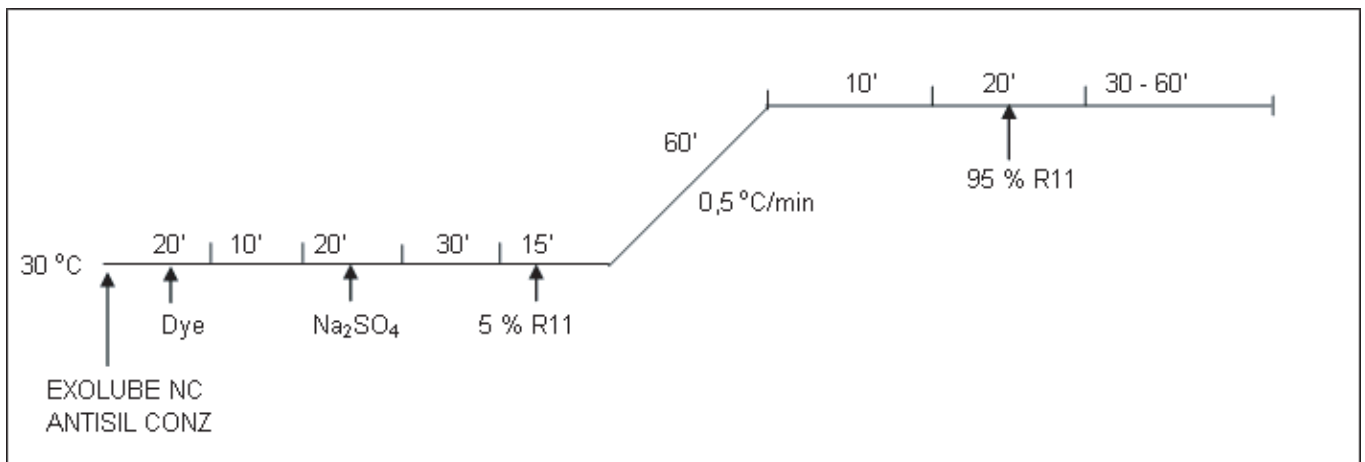
TURQUISE BLUE HF G%266 and YELLOW HF-4GL

- In case of high amount of TURQUOISE HF-G 266 % (Blue 21) eg. >2 %, in order to increase the dye yield, or in combination with YELLOW HF 4GL, 80 - 80 isothermal method is preferred.

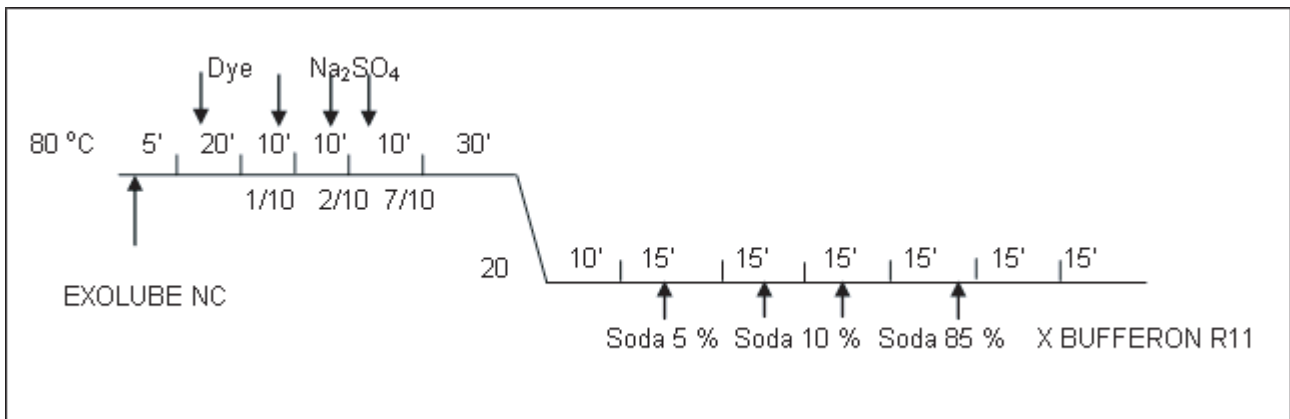


BRILLANT BLUE RSP

- Use 30 - 60 method.
- Use max. 50 g/L sodium sulfate.



TURQUOISE BLUE HF %266 WITH OTHER DYES



YARN DYEING

- Due to high swelling property of viscose;
 - Uneven dyeing (inside to outside),
 - Loss of yarn strength,
 - Reproducibility,
 - Yarn and cone damages may happen,
 - Undyed or white spots at cross points of yarn winding.

AFTER SOAPING

At the end of dyeing, for the sake of short washing and shade compatibility;

- Cold rinsing (until salt content 2 Be')
- Cold neutralising with acetic acid, until

Bifunction Dyes	pH 7 - 8
Vinly sulfon Dyes (Blacks, Blue 19, Blue 21)	pH 6 - 6,5

- Soaping, 95 °C, 15 min, EXOLINE 3025 or 3027 0,5 ml/L

Below	<0,5 %	No soaping
Between	0,5 - 3 %	One soaping
Above	>3,8 %	Two soapings

Adapt the following precautions!

- Uniformity of the winding, winding density and cone dia.
- Cone density should be around 350 - 370 g/dm , 25 shore max. Diameter 16 - 17 cm. All cones should be the same weight.
- Liquor ratio, approx. 25 - 30 L/kg. min. Check differential pressure 0,2 - 0,3 bar.
- Liquor flow cycle as, 3 - 4 min in/out 4 - 5 min out/in.
- Sulphur residues should be removed from the yarn, as explained in pretreatment.

Higher alkali pretreatment lead to increased fiber. Swelling and can substantially reduce the liquor flow. So acidic VISCODYE treatment is more helpfull. In -take water at 80 °C.

- Dyeing is the same as knitt dyeing (salt at the beginning, 80/60 migration)
- Thourough soaping with EXOLINE 3025 or 3027. Unfixed dye, residual hydrolysedye, will tend to migrate more in dyed viscose than in cotton and appearedas dark layer at the top and bottom of cones.

FINISHING

Exhaust System

UNISIL HMP	3 - 4 %
Temp.	50 °C
Time	20 min
pH	4 - 5

Impregnating System

UNISIL NLP W	10 - 20 g/L (Dry-on-wet) or 50 - 100 (wet-on-wet)
EXOLINE 3H	1 - 2 g/L

Imparts wool like, handle, slippery surface.

ANTIPELLING FINISH

Exhaust System

ANTIPELL JET CONZ	2 - 3 %
UNISIL H JET	1 - 3 %
EXOLINE 3H	1 - 2 %
Temp.	50 °C
Time	20 min
pH	4 - 5

Impregnating System

ANTIPIILL JET CONZ	20 - 40 g/L
UNISIL NW	20 - 30 g/L (for optical whites)
EXOLINE 3H	x
UNISOFT KT	20 - 30 g/L (for coloured fabrics)
pH	4 - 5

RECOMMENDED CHEMICALS

AMILAZ TK 200	: Alpha-amylase for desizing of woven fabrics.
ANTISIL CONZ 1	: Phosphonate based sequestering agent .
ANTISIL ACC	: Polymer based sequestering agent .
E WET NF	: Foam-free wetting and scouring agent .
EXOLINE 3025/3027	: Foamless soaping chemical .
E WET OH	: Penetrator 4-10 Be' NaOH solutions
EXOLINE 3H	: Core neutralizing, nonvolatile organic acid. Calcium and iron complexing.
EXOLINE PAD	: Pick-up enhancer in padder.
VISCODYE	: Acidic sulphur complexing agent for viscose and bamboo.
VISCOBLEACH	: OBA bleaching enhancer for viscose and bamboo fibers .
UNISIL HMP	: Silicon softener for JET and package dyeing, hydrophilic.
UNISIL NLP W	: Micro-Macro silicon softener for padder.
ANTIPIILL JET CONZ	: Chemical to improve pilling tendency.
EXOLUBE NC	: Oil esterbased lubricant and levelling agent. Crease preventer.