

**efi** MEZZERA MERCERIZING

*Chainless Mercerizing Line for Woven and Knitted Open Width Fabric*

Extremely delicate treatment  
for first-class fibres.

# MERCERIZING

## Extremely delicate treatment for first-class fibres

### ***From micro chemistry...***

Mercerizing is one fundamental step in cotton fabric preparation. During the mercerizing process, the crystalline structure of the cellulose is permanently altered to the benefit of the macroscopic characteristics and fibre reactivity to the dyestuffs. The action of the concentrated lye on the cellulose polymeric structure may be summarized as follows: firstly, the lye hinders the formation of cross linkages between polymeric chain causing a partial re-orientation of the crystallites in the cellulose structure. The section of the fibre changes from kidney-shaped to almost circular due to the swelling and to the modified structure, which involves also the "twisting" of spiral coils in the cellulose. The so modified polymeric chains finally lose the convolutions that are their peculiarity before the mercerizing, and this results in quite interesting effect on the macroscopic scale.

### ***...to macro-results on the fabric***

The macro effect of the crystalline modifications of the cellulose structure changes very usefully the properties of the cotton fabric, to the benefit of the final product quality:

- **Increase of dyeing affinity up to 35%**
- **Dimensional stability**
- **Improved lustre**
- **Better mechanical properties**
- **Coverage of immature/dead cotton**
- **Softer hand**
- **Colour brilliance**

### ***THE MERCERIZING IN THE DYEHOUSE***

#### ***On knitted or desizing fabric (shirt)***

The individual motorization of the lower grinding cylinders and the pneumatic compensator properly studied, allowed the best control of the fabric tension and grant a small shrinkage also in weft direction. For those reasons it's possible to utilize the mercerizing unit also for the knitted fabric, with better dimension stability and minimum residual shrinkage.

The mercerizing process before the bleaching is suggested to avoid the whitening and hydrophilicity effect or to stabilize particular kind of fabric.

#### ***On bleached fabric***

This is the most commonly used treatment as the resulting dyeing affinity and lustre are maximum. Last but not least, small defects, creases from roller-bed steamer, naps etc. are covered by the mercerizing when this is used as last process.



ACTIVA: cylinders washing unit

## **MERCERIZING BASIC PROCESS PARAMETERS**

### **Wet on wet**

Avoids the usage of drying and allows for somehow a reduced steam consumption on the overall process. The washing of cold pad batch usually is made before mercerizing process or sometime there is only a small tank with foulard to equalize the residual fabric pick up. In this case the Caustic soda feeding system is working with a small overflow.

### **Dry on wet**

The process of caustic imbibitions is simpler. The fabric enters dry, therefore the wetting is uniform and constant, the strong caustic feed is still regulated by PLC according to the weight of the incoming cloth.

### **Hot mercerizing (50-60° C)**

The exothermic process in this case is cheaper. There isn't refrigeration costs and having less process/reaction time, the speed can be higher. We can obtain a uniform distributed swelling of the fibre core, with a good dead cotton coverage.

### **Cold mercerizing (10-15°C)**

The lower temperature doesn't permit to swell so much, but donate the typical lustre aspect. The reaction time is consequentially more long compared to hot mercerization.

## **MERCERIZER - BASIC PROCESS UNITS**

### **Preparation vat**

The preparation and the impregnation zones are combined into a single "double deck" unit, where the preparation vat lies on the bottom part. In the preparation vat, strong caustic coming from the main headstock is mixed with a preset amount of water; the concentration of the resulting lye is constantly monitored and maintained through a high precision refract-meter connected to the PLC; when necessary, strong fresh caustic or water are added, to maintain the processing caustic concentration. The preparation vat features a process caustic filter and a recirculation pump that distributes the lye on the upper compartment (the impregnation zone).



ESSETEX: drums washing unit

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### **Impregnation section**

The impregnation section is the zone where the caustic comes into intimate contact with the fabric; the caustic is filtered and sprayed with a number of distributors on the top of each roller, after which the lye is constantly recirculated through the pump of the preparation vat. Each distributor ensures a uniform coverage of the area widthwise, and each impregnation compartment is constantly flooded. The entire impregnation is driven by motors connected to inverters. The tension on the fabric is controlled by specially designed pneumatic compensators. The bottom rollers are chemically plated with Nickel, and grooved. A proper squeezing of the fabric on the bottom grooved rollers is achieved by the upper soft rubber coated rollers, which press the fabric by their own weight.

### **Reaction section**

The position of the reaction section allows sufficient dwell time between the cellulose and the lye in order to have a complete process, while the fabric is still in the plastic state. The complete mercerizing reaction will taken place, according to the process temperature, after 25-30 sec in hot mercerizing and after 40-50 sec in cold mercerizing.

### **Stabilization section**

This section is vital for the final dimensional stability of the fabric and for attaining a proper washing and neutralizing in the washing section, for the sake of the minimum water consumption. The weak lye coming from the washing section is taken to the end of the stabilizing section; from there, the lye flows countercurrent the main fabric direction, while being continuously recirculated and sprayed on the fabric, section by section, in order to improve the contact time. Recirculation in each counter current section is guaranteed by a number of pumps. Each section in the stabilization has its own temperature control. The control of the residual caustic on the fabric is achieved by measuring the lye equilibrium concentration at the beginning of the stabilization section.

## **WASHING**

### **ACTIVA or ESSETEX washing section**

After the stabilization, the modularly assembled washing range ACTIVA or ESSETEX take care of the final washing and neutralizing. The washing is required to achieve the desired neutralization of the fabric, with the least acid and washing water consumption. Choice between ACTIVA or ESSETEX ranges mainly depends on the type of fabric, whether woven or knitted.

### **Individual drive system and load cell tension control**

Individual drive system of rollers and drums, and load cell tension control, are the guarantee for a crease free operation, and a perfect tension control any time required, even at the lowest values required by the knitted fabric.

### **Optimized process control**

Separate and independent thermoregulations are provided in each washing box, to adapt the temperature profile to the required processing for the specific dyestuff. The water flow rate is optimised by means of PLC managed flow meters, to cope with different fabric weights and range speeds (the washing liquor flows in the opposite direction of the fabric, therefore minimizing the water consumption in the overall process).



### ***Increased washing efficiency with finned rolls technology***

The specially designed fluted rollers or drums in both washing boxes (ACTIVA or ESSETEX) allow a high water turbulence under liquor and a higher washing efficiency, if compared to the traditional washing boxes with plain rollers. In ESSETEX, the fluted drum is also the perfect system to provide an in-depth penetration of the water spray through the fabric.

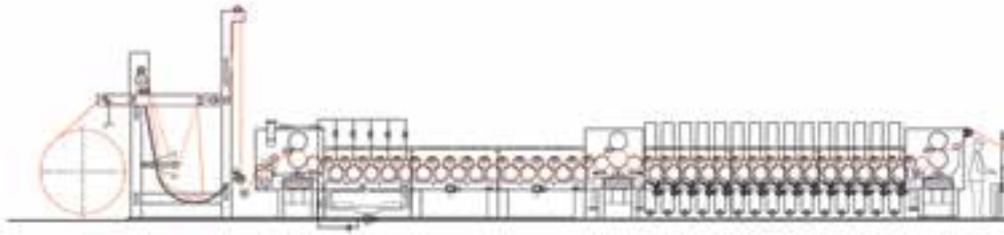
### ***Automatic pH control and neutralization***

The pH control is achieved in the last washing box, it is specially designed for having two separate and independently regulated compartment. One compartment is equipped with a recirculation pump and a pH probe connected to the PLC for automatic neutralization via metered injection of acid.

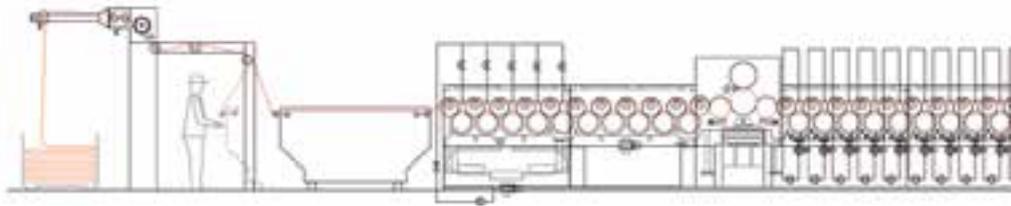
### ***MEZZERA PROCESSING OPTIONS***

Mezzera experience, accrued with the day - by - day activity in many dye houses, has led to the implementation of state-of-the-art mercerizing process; Mezzera provide his customers a basic mercerizing scheme, that may be adapted from time to time to the customer's specific requirements with the addition different options (cold, hot, chainless, chain, combi).

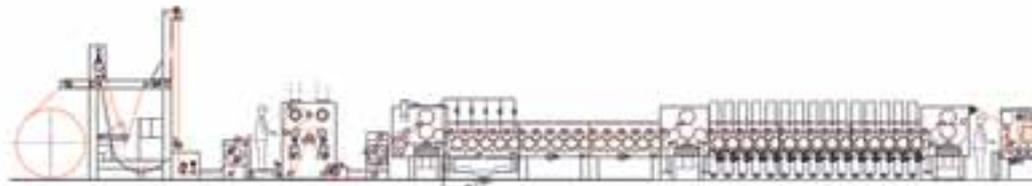




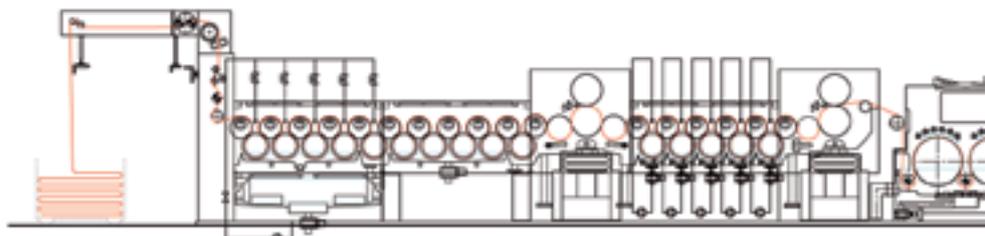
*Chainless mercerizing*



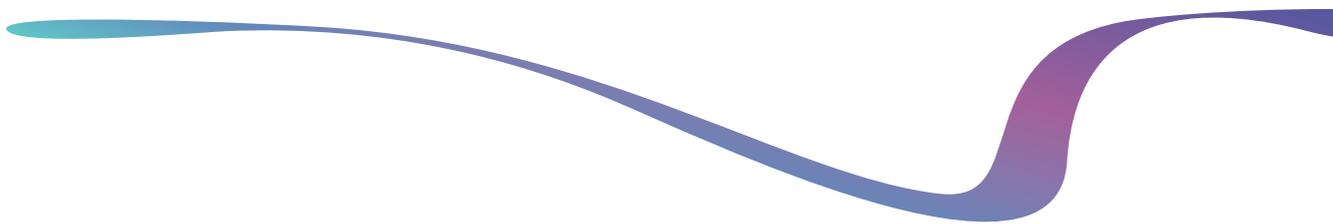
*Chain/chainless mercerizing*

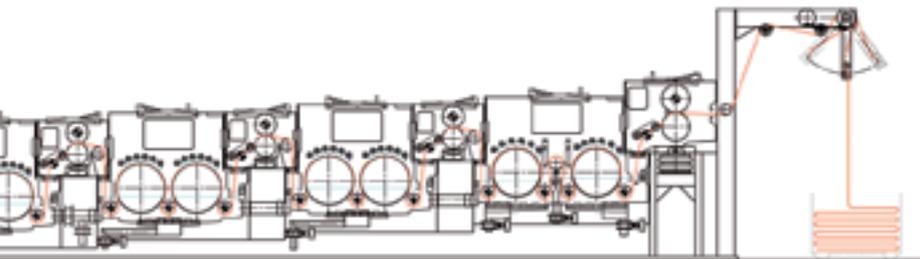
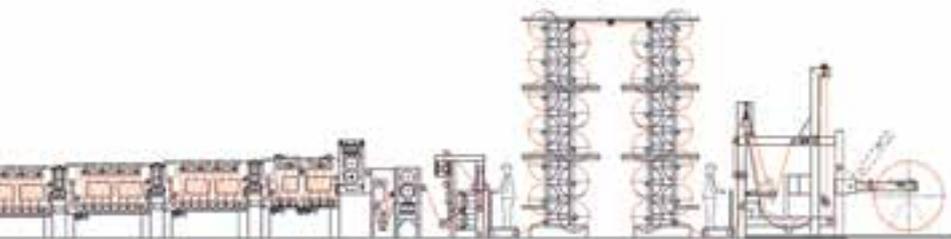
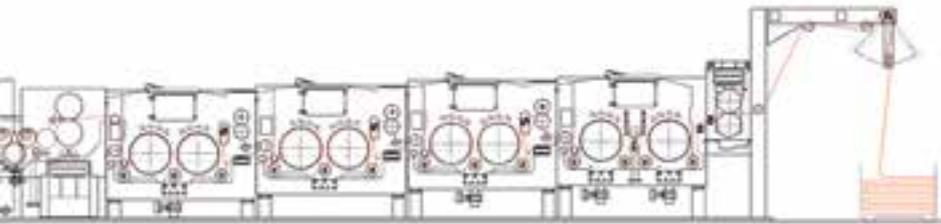
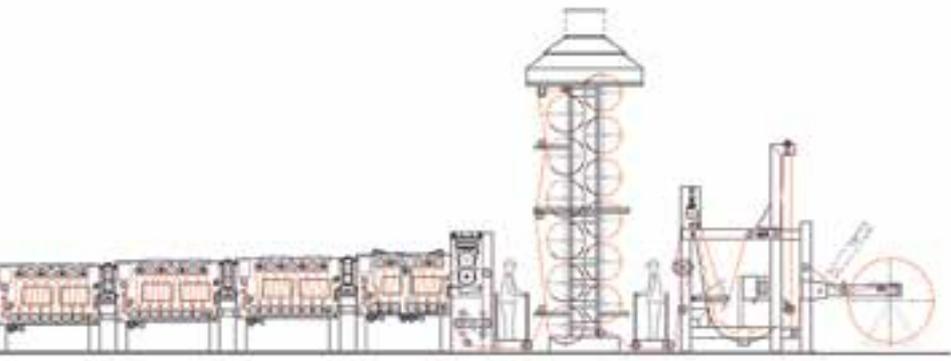


*Long chain mercerizing*



*Chainless mercerizing for knitted fabric*





TECHNICAL DATA	Impregnation & reaction	Stabilization		Washing		
		Fabric inlet	Fabric outlet	Fabric inlet	Fabric outlet	Neutralized fabric exit
Lye concentration (°Bé)	28-32	6-8	1-2	1-2	0	
100% NaOH (g/kg) On the fabric	200-270	200-270	50-80	50-80	Neutralized	
L/kg weak lye o l/kg fresh water	n.a.	4-5	4-5	4-5	5 - 6	

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