

TABLE OF CONTENTS

SI No	Contents	Page No.
1	Basic Textile Wet Processing Terms	1
2	Sequence of operations in Wet processing	2
3	Brief Note on jigger machine	3
4	Details of jigger machine	4
5	Operating jigger machine	7
6	Instructions during shift changing	11
7	Importance of Health & Safety aspects	12

1. BASIC TEXTILE WET PROCESSING TERMS

ABSORBENCY: The ability of one material to take up another material.

BLEACHING: It is a process to remove the natural and artificial impurities in fabrics to obtain clear white for finished fabric or in preparation for dyeing and finishing.

DENSITY: The mass per unit volume

DIMENSIONAL STABILITY: The ability of textile material to maintain or return to its original geometric configuration.

DYEING: It is a process of coloring fibers, yarns, or fabrics with either natural or synthetic dyes.

DYES: Substances that add color to textiles.

EFFLUENT: Waste water released after pretreatment, dyeing & finishing of Textile.

FINISHING: It includes various operations such as heat-setting, napping, embossing, pressing, calendaring, and the application of chemicals that change the character of the fabric.

HEAT-SETTING: The process of improving dimensional stability with high temperature.

LUSTER: The quality of shining with reflected light on textile material.

pH: Value indicating the acidity or alkalinity of a material.

PIGMENT: An insoluble, finely divided substance, used to color fibers, yarns, or fabrics.

SHRINKAGE: Widthwise or lengthwise contraction of a fiber, yarn, or fabric, usually after wetting a re-drying or on exposure to elevated temperature.

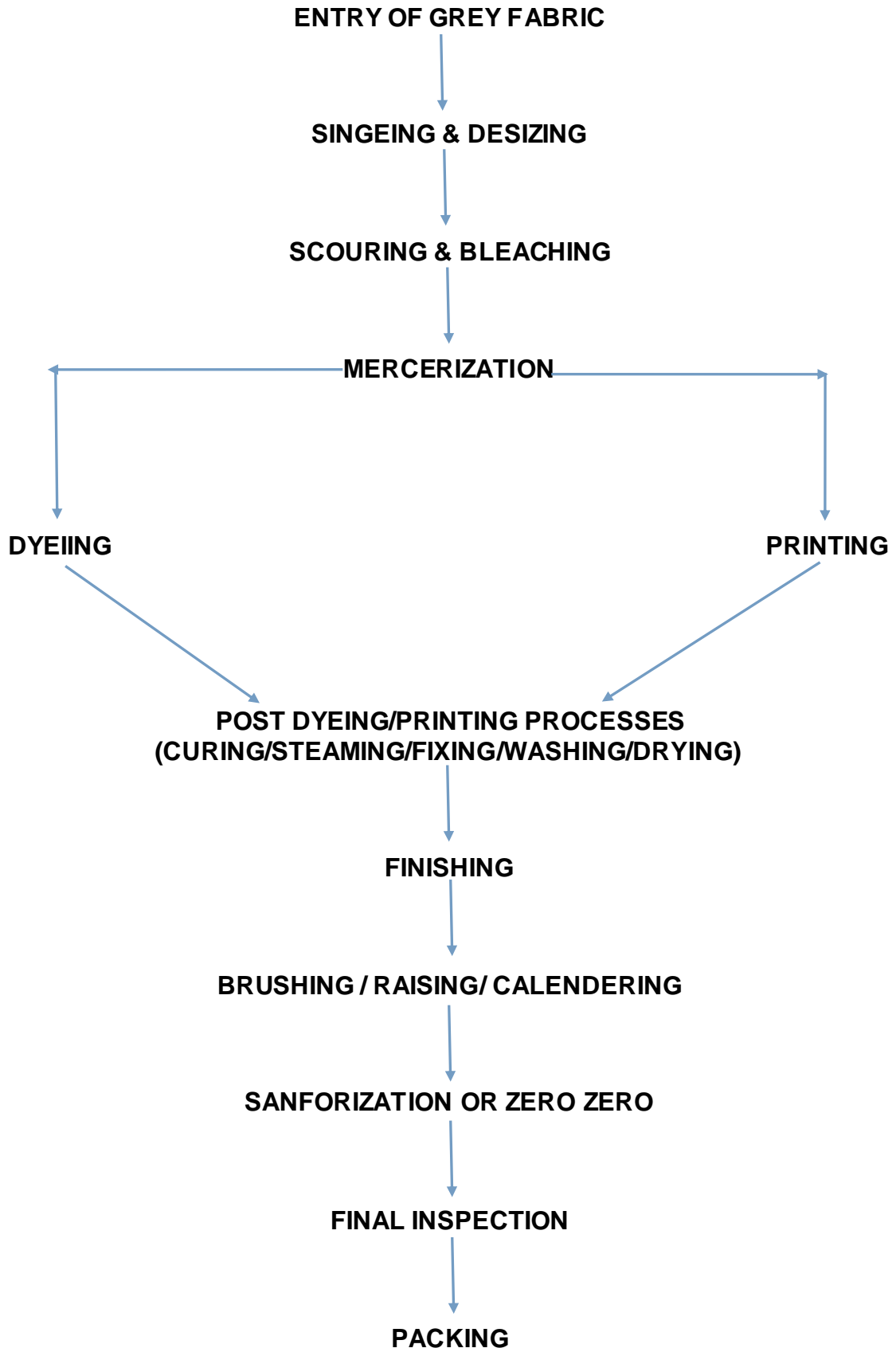
SOFTENER: A product designed to impart soft mellowness to the fabric.

YARN: A generic term for a continuous strand of textile fibers, filaments, or material in a form suitable for knitting, weaving, or otherwise intertwining to form a textile fabric.

YARN COUNT: Yarn count is the numerical expression of yarn, which defines its fineness or coarseness. (Linear density).

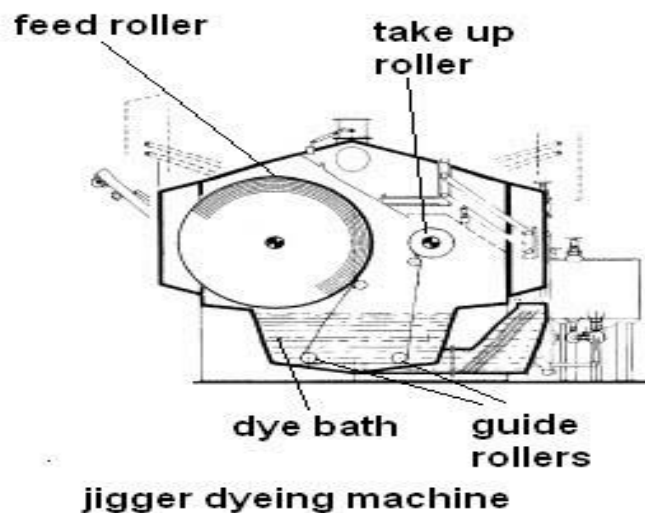
WIDTH: A horizontal measurement of a material. In woven fabric, it is the distance from selvage to selvage, and in flat-knit fabric, the distance from edge to edge.

2. SEQUENCE OF OPERATIONS IN WET PROCESSING



3. Brief note on Jigger machine:

The jigger machine is one of the oldest types of machine for scouring, bleaching and dyeing of woven fabric in full width form. The fabric passes from one roller to other roller in the medium of dyes or bleaching chemicals at the bottom of the machine. When all the fabric has passed through the bath, the direction is reversed. Each passage is called an “end”. Jigger process always involves an even number of ends.



Importance of jigger machine:

- ✧ The jigger is a short liquor dyeing machine for textile fabrics in open-width form.
- ✧ The small lots can be easily processed in jigger machine.
- ✧ Most suitable for all kinds of shades.
- ✧ Excellent colour fastness properties are achieved in Jigger.
- ✧ Lower investment cost compared with continuous dyeing technique.
- ✧ Suitable for all kind of processes in open width, from pretreatment to finishing.

Modern Jumbo Jiggers:

Modern machines such as jumbo jiggers have full automation in drive , tension regulation and control , fabric speed and metering, smooth and jerk less stop and start , counters for number of turns, gradual and noiseless reversal, automatic temperature regulation and control etc.

Various processes carried out in Jigger machine:

- ❖ Combined scouring and bleaching is carried out in Jigger machine

Dyeing and washing:

The object of dyeing is uniform application of coloring matter on textile material. Dyeing in the jigger machine is called “Exhaust dyeing” technique. Careful control of the dyeing temperature, pH and auxiliary chemical concentrations is often necessary to obtain well-penetrated dyeing.

After dyeing, the material is rinsed to remove unfixed dyes and if needed additional washing is also done in the Jigger dyeing machine.

4. Details of Jigger machine

Trough: Dyeing trough has a special high efficiency design allowing constant and controlled liquor ratio dyeing and high efficiency washing with minimum liquor content. The intended liquor ratio is minimum 1:4.

Stainless steel compartment: The machine consists of an enclosed stainless steel compartment with 6 mm thick sides. This compartment has inclined doors and heated door frames, which prevent dripping of condensate on the fabric.

Take up and Let off rollers: These are two stainless steel rollers, running in external bearings with mechanical seals to take up and let off the fabric rolls.

Pump for liquor circulation: Liquor circulation system consists of centrifugal pump at 2 bar pressure, internal sieve, stainless steel piping, manual flow control valve and deflector system for even liquor distribution.

Quick liquor discharge: The Large diameter pneumatically controlled drain valve enables quick liquor discharge allowing short change over time.

Stainless steel guiding frame: There is one stainless steel guiding frame supported by 2 air cylinders for single unloading, including fixed stainless steel fabric spreading bar and mechanical safety lock.

Stainless steel side tank: Machine is also provided with a stainless steel side tank of 300 litres capacity with direct manual heating. The tank is equipped with sieve, manual drain valve, automatic mixer, level sensor, re-circulation connection and rinsing rim for automatic cleaning.

A typical recipe for various processes in jigger:

Combined scouring & bleaching:

Hydrogen Peroxide (Bleaching agent)	-	2-5%
Caustic soda (Scouring agent)	-	1-2%
Wetting agent (Improve wetting tendency of fabric)	-	0.1-0.5%
Sodium silicate (Peroxide stabilizer)	-	1-3%
Sequestering agent (To reduce hardness of water)	-	0.5%

Dyeing and washing:

Reactive dyes (Colouring agent)	-	2-4%
Wetting agent (Improve wetting tendency of fabric)	-	0.5%
Sodium chloride (Exhausting agent)	-	5%
Sodium carbonate (Fixing agent)	-	1-2%
Soap (Removing unfixed dyes)	-	0.5%

Various parts of Jigger dyeing machine:



Take up and Let off rollers



During machine running



Unloading in Jigger



Spraying system



Preparation tank & main panel



Modernized High Temperature Jigger machine

5. Operating Jigger machine:



Finding the exact dye powder



Measuring of dye powder



Mixing of required chemical



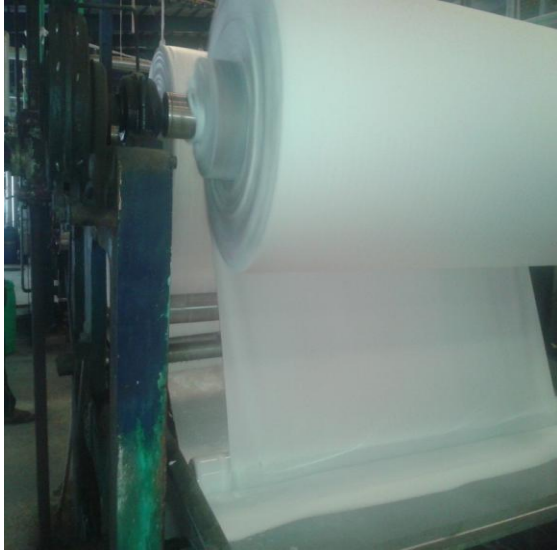
Transportation of chemical



Filling of water in jigger machine



Adjusting fabric tension



Bleaching in progress in Jigger



Dyeing in progress in Jigger



Operating panel



Unloading after dyeing

- ❖ Understand and follow the instruction from lot card and programme book.
- ❖ Ensure main power is switched ON and open then compressed air, steam and water valve.
- ❖ Check the quality and lot number of the fabric before putting on the machine by checking the label.
- ❖ Transport the fabric to be run, to the inlet feeding unit of Jigger machine using hydraulic hand puller or electric truck.

- ❖ Initially load 10-15 meters of leader fabric and clean all the rollers properly.
- ❖ Ensure the process to be done, scouring & bleaching or dyeing or washing.
- ❖ Initially fill the water in the trough and clean the bottom of the trough thoroughly.
- ❖ Prepare the approved chemicals in front of the Supervisor.
- ❖ Start loading of the fabric in the Jigger machine.
- ❖ Do proper loading of fabric and ensure that no fabric crease occurs.
- ❖ Observe for any defect of the fabric while loading.
- ❖ Set the important parameters in the machine as shown below or as instructed by supervisor:

Machine speed – 10-100 m/min

Fixed speed of loading and unloading – 60 m/min

Max. batch diameter – 700 mm - 1100 mm

Max. temperature – 98 °C

Fabric tension in practice – depends on fabric type

Set the No of ends according to the process type - 2 to 16 Nos

- ❖ Check for various process damages in the fabric like stains – dust, chemicals, rust, handling stains, crease, water dropping, oil, grease, etc.
- ❖ Check the fabric shade if dyeing process is carried out and whiteness index for bleaching process before unloading.
- ❖ Ensure proper batching in the outlet without any crease.

Cleaning in jigger machine:

- ❖ Remove regularly accumulated dust and dirt from the machine.
- ❖ The inlet sensors and fabric guider are to be cleaned properly.
- ❖ While loading and unloading clean the machine's surrounding area.

- ❖ Transport the dyes and other chemicals safely in a proper way.
- ❖ Collect all the waste and store them in designated place

6. INSTRUCTIONS DURING SHIFT CHANGE:

Taking charge of duties while starting of shift:

- ❖ Come at least 10 - 15 minutes earlier to the work place.
- ❖ Meet the previous shift operator and discuss regarding the issues faced by them with respect to the quality or production or spare or safety or any other specific instructions etc.
- ❖ Understand the Fabric being processed & process running on the machine.
- ❖ Ensure technical details are mentioned on the job card & displayed in the machine.
- ❖ Check the next batch to be processed is ready near the machine.
- ❖ Check the cleanliness of the machines & other work areas.
- ❖ Question the previous shift operator for any deviation in the above and bring the same to the knowledge of the shift supervisor.

Handing over charge at the end of shift:

- ❖ Properly hand over the shift to the incoming operator.
- ❖ Provide the details regarding Fabric quality & the process running on the machine.
- ❖ Provide all relevant information regarding the stoppages or breakdown in the machine and any damage to the material or machine.
- ❖ Ensure the next lot to be processed is ready near the machine
- ❖ Get clearance from the incoming counterpart before leaving the work spot.

- ❖ Report to the shift supervisor in case the next shift operator doesn't report for the shift.
- ❖ Report to the shift supervisor about the quality / production / safety issues/ any other issues faced in the shift and should leave the department only after getting concurrence for the same from superiors.
- ❖ Collect the wastes from waste bags, weigh them & transport to storage area.

7. IMPORTANCE OF HEALTH AND SAFETY:

- ❖ Use and maintain personal protective equipment such as Hand Gloves, Gum Boots, head cap etc., as specified.
- ❖ Never handle chemicals with bare hands
- ❖ Report to the supervisor any service malfunctions in the machine that cannot be rectified.
- ❖ Store materials and equipment at their designated places.
- ❖ Minimize health and safety risks to self and others due to own actions .
- ❖ Monitor the workplace and work processes for potential risks.
- ❖ Do not carry any metallic parts during machine running as there are chances of fire and damage to machine parts.
- ❖ Take action based on instructions in the event of fire, emergencies or accidents and participate in mock drills/ evacuation procedures organized at the workplace as per the organization procedures.