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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.

DEFECTS: A general term that refers to some flaw in a textile product that detracts from either performance or appearance properties.

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.

MIGRATION: Movement of dye from one area of dyed fabric to another.

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

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

SCOURING: Any treatment of textile materials in dilute acid. Its purpose is the neutralization of any alkali that is present in the material

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

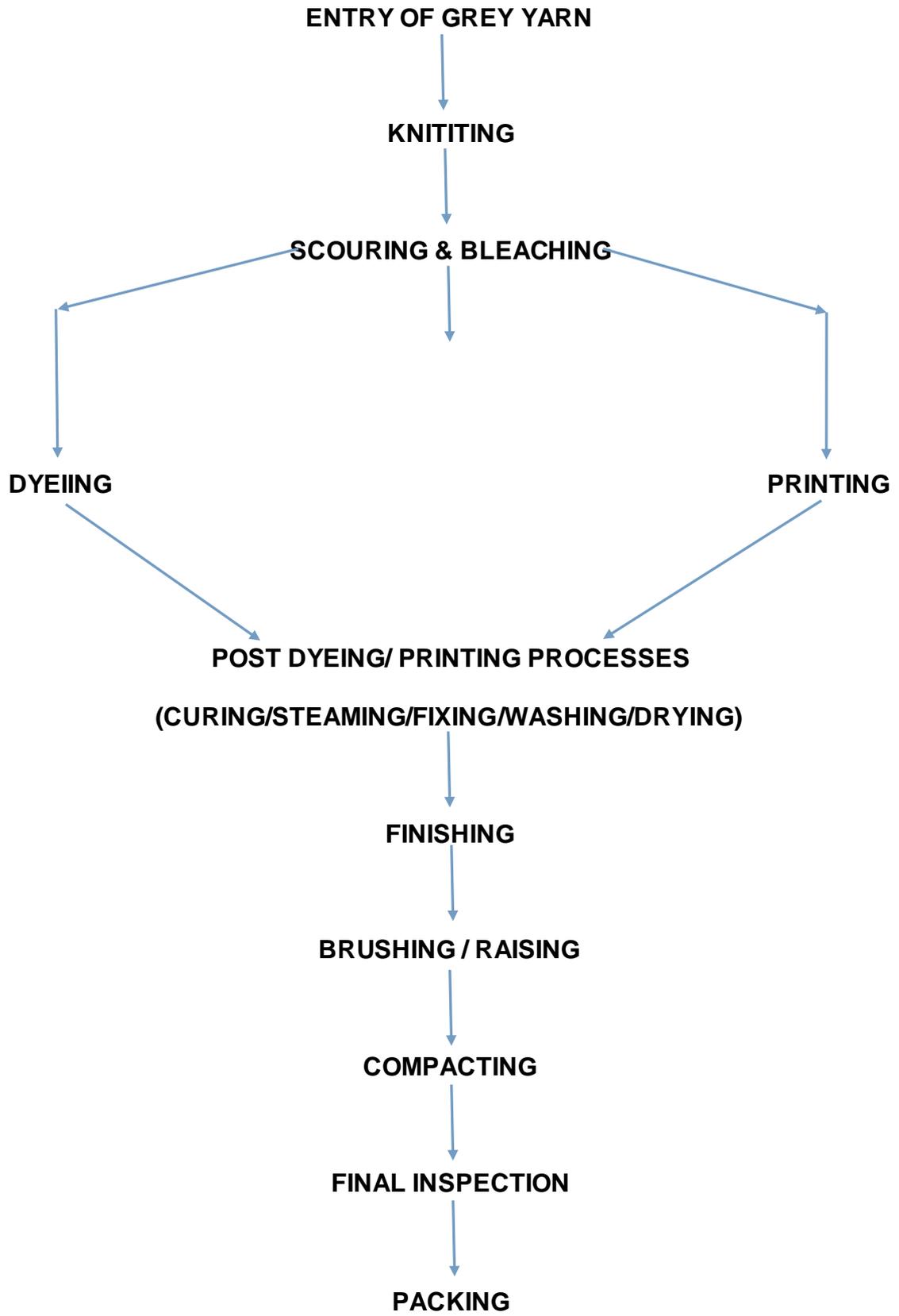
SOFTENER: A product designed to impart soft mellowness to the fabric.

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).

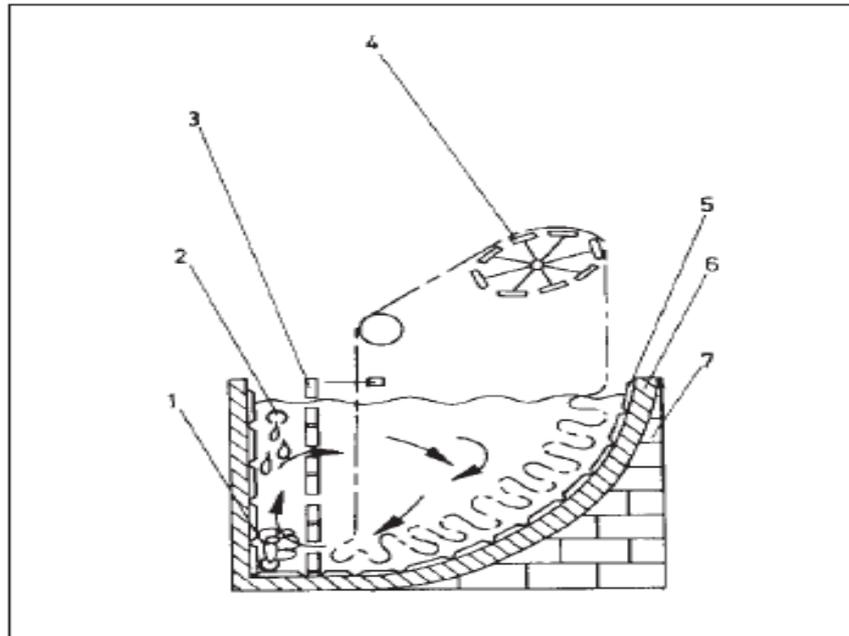
WIDTH: A horizontal measurement of a material. In woven fabric, it is the distance from selvage to selvage, and in flat-knit fabric, the distance from edge to edge.

2. SEQUENCE OF OPERATIONS IN WET PROCESSING (KNITTED GOODS)



3. Brief note on winch dyeing:

A winch dyeing machine consists of a vat (vessel) that has a curved back. Over the top of vat, extending its length is a horizontal elliptical winch rotated generally by an individual electric motor. In this machine operations like scouring, bleaching, dyeing and washing can be easily carried out.



*Fig. 1: Open atmospheric winch dyeing machine.
1 = perforated pipe; 2 = water feed; 3 = perforated, tiled partition; 4 = slatted wooden winch; 5 = tiled lining; 6 = cement bottom; 7 = brickwork.*

Cross sectional view of Winch dyeing machine

Winch can be classified as follows:

1. Conventional winch dyeing machine
2. High temperature winch
3. High temperature winch with circulating liquor

Passage of fabric in winch dyeing machine:

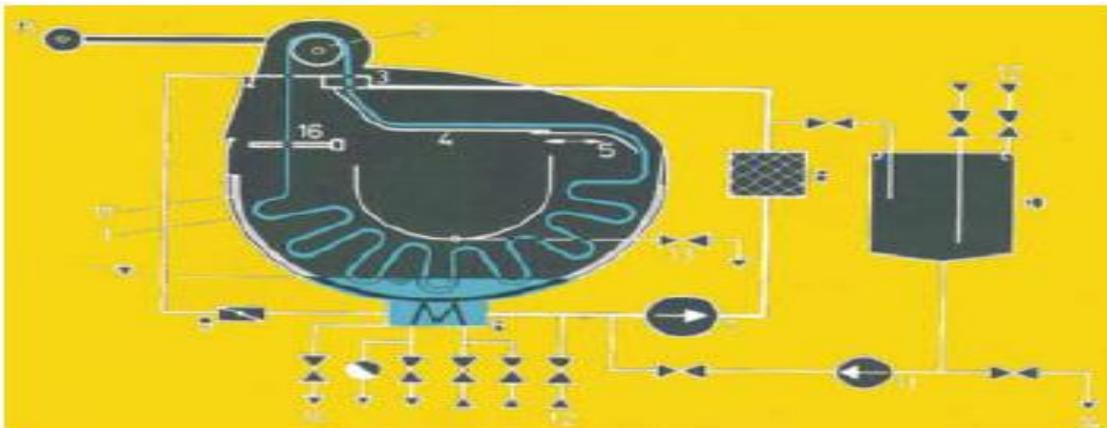
In loading a winch for dyeing operation each length of fabric is run over the guide roll and the winch, so that the fabric falls in the vat at the rear end of the machine; the fabric is allowed to run over the rotating winch and get piled at the bottom of the machine; as the bottom is sloped towards the front of the machine, the piled fabric slides along it, acquiring a wavy shape and moves slowly towards the

front end of the machine. When the free end of the fabric reaches the front end it is picked up, passed between the pegs and stitched to the other free end of the fabric. Thus the entire length of the fabric is now endless loop with much of it in a folded form at the bottom of the fabric winch.

The winch is the prime mover of the fabric, but for the greater part of the dyeing period the fabric lies wholly immersed in the dye liquor.

4. Details of winch dyeing machine:

- ❖ The machine operates at a maximum temperature 95-98°C
- ❖ The liquor ratio is generally quite high (1:20-1:40)
- ❖ This is a dyeing machine for fabrics in rope form with stationary liquor and moving material.
- ❖ In winch machines, a number (1-10) of endless ropes or loops of fabrics of equal length (about 50-100m) are loaded with much of their length immersed in folded form inside the dye bath.
- ❖ As for all forms of rope dyeing, the fabric must be fairly resistant to length ways creasing.
- ❖ A perforated separating compartment, positioned at a distance of 15-30 cm from its vertical side creates an inter space for heating and for adding reagents.



*Fig. 10: Then winch dyeing machine.
 1= fabric store; 2 = guide roller; 3 = flooding; 4 = transport length; 5 = plaiter; 6 = heating and cooling unit; 7 = liquor pump; 8 = filter; 9 = bypass; 10 = preparation tank; 11 = adding pump; 12 water feed; 13 = rinsing overflow; 14 = drain; 15 = unloading winch; 16 = fabric dividers; 17 = special slide bottom.*

- ❖ Heating can be supplied by means of direct or indirect steam heating.
- ❖ The rope passes from the dye bath over two elevated reels. The first roller is free-running (jockey or fly roller) and the second is winch reel.
- ❖ The winch reel not only controls the rate of movement of the fabric rope, but also the configuration of the rope in the dye bath
- ❖ The winch reel does not grip the fabric positively, but by the weight of the wet fabric and the friction between the reel and fabric.
- ❖ Now-a-days stainless reels with corrugated and broken surface for increased frictional forces are used.
- ❖ The maximum speed of the fabric must be approximately 40m/min.
- ❖ The winch dyeing method is suitable for all fabrics, excepts those which tend to originate permanent creases or which could easily distort under the winch stretching action.

Typical recipes for various processes in winch:

❖ **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%

5. Operating winch dyeing machine:



Switching on the main power panel



Opening Steam, water and air valve



Selection of dye powder



weighing the dye powder



Mixing of dyes in chemical tank



Setting sequence of operation



Transportation of chemical



Preparation tank



Loading of fabric in winch



Dyeing in progress



After dyeing fabric is taken for rope opener and further drying

- ❖ Understand and follow the instruction from lot card and programme book.
- ❖ Switch On main power and then open compressed air, water valve and steam.
- ❖ 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 of winch dyeing machine using hydraulic hand puller or electric truck.
- ❖ Clean the entire machine and winch roll, load 10-15 meters of leader fabric.
- ❖ Ensure the processes to be done (ie) scouring/bleaching or dyeing or washing.
- ❖ Initially fill the water in the trough and clean the bottom of the trough thoroughly.
- ❖ Prepare the required chemicals approved by supervisor.
- ❖ Start loading the fabric in the winch machine.
- ❖ While loading ensure no entanglement of fabric is there.
- ❖ Observe for any defect in the fabric while loading.
- ❖ Set the important parameter in the machine:
 - Machine speed – 10-40 m/min
 - Fixed speed of loading and unloading –as per quality
 - Max. Temperature – 98 °C
 - Fabric tension in practice – NIL
- ❖ Check for various fabric defects 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.

Cleaning in Winch dyeing machine:

- ❖ Remove regularly accumulated dust and dirt from the machine.
- ❖ Clean the machine while loading and unloading the fabric.
- ❖ Transport the dyes and other chemicals safely and avoid spillage of chemicals.
- ❖ Collect all the waste and store them at designated place.

6. INSTRUCTIONS DURING SHIFT CHANGE OVER:

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 instruction 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 superior.
- ❖ 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, 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 supervisor about the quality / production / safety issues/ any other issues faced in the shift and 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.