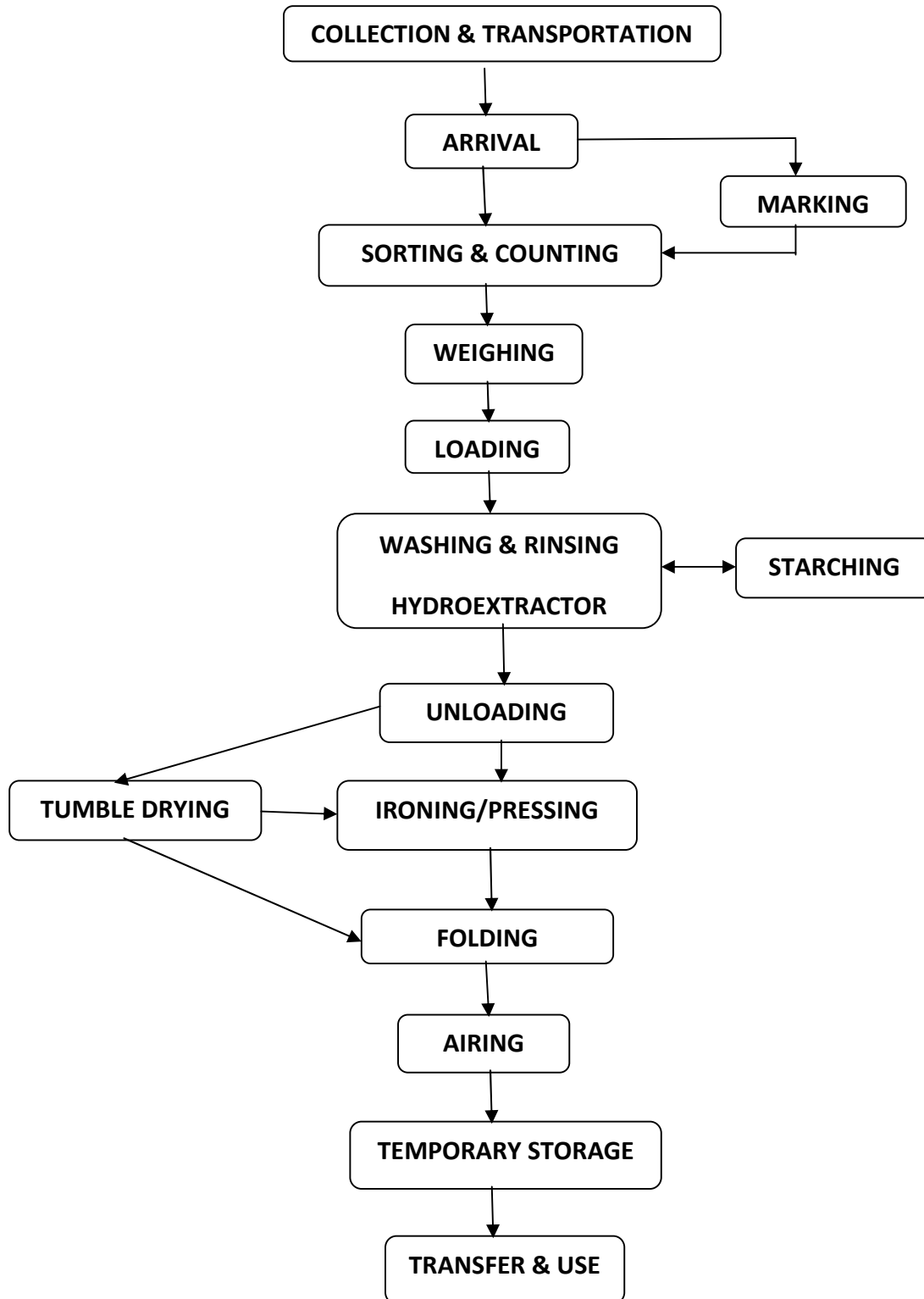


Flow process of Industrial Laundering-OPL



Collection

Collection of linen may be done in the Linen Room, if the laundry is off-site but is usually in the laundry itself, if the laundry is on-premises. Certain linen items are collected separately. For example, kitchen uniforms or dusters are collected separately, as are butchery aprons and dusters, because they have a specific type of soil. Similarly, in a hospital, linen from the surgical ward would be collected separately. The linen is usually packaged in canvas bags lined with polyvinyl. Eyelets on the rim of the bag facilitate passing a nylon cord through, which can be tightened in order to shut the opening of the bag. In some cases elasticized net bags called 'skips' are used to collect and carry linen. Trolleys are most popular for transportation and the collapsible wire cart can be used to transport clean as well as soiled linen. If planned at the construction stage, an in-built chute is used for transporting linen from the floor pantries. It is preferable to put linen into canvas bags before dropping it down the chute so that wear and tear is reduced.

Arrival

On arrival, linen must be dealt with as quickly as possible. There must be a separate section for guest laundry that is usually handled by the most experienced staff. Processing linen for laundering as quickly as possible is necessary:

- to ensure that linen items are available as and when required.
- to avoid transfer of stains and to prevent stains from becoming permanent.
- so that it does not provide a breeding ground for bacteria and pests.
- to prevent the formation of mildew on damp articles particularly bath linen.
- to reduce the possibility of linen getting misplaced or lost.

Sorting

Gloves may be used when handling or sorting linen. Sorting is carried out according to the type of fabric and item, colour as well as the degree and type of soil. Sorting is done to separate those articles that need dry cleaning from those that will go through the normal wash process. Those that need mending or stain removal will be separated so that they can be dealt with accordingly. Also, different articles take a different wash process in terms of temperature of water, type of laundering agent, length of wash cycle, whether hydroextraction should be done and if so, the length of the hydro-extraction cycle. It takes less effort to pre-sort linen than to post-sort washed linen which is 50% heavier in weight due to water retention. Post-sorting is often essential in healthcare processes.

Marking

Marking may be temporary (guest laundry) or permanent (monogramming of hotel linen). It is the temporary marking that is carried out at this stage. Most good establishments have a marking machine that attaches a heat sealed tape in an inconspicuous place. The tag has scope for six characters and is intended to indicate the initials of the guest as well as the room number. It provides a clear identification for correct billing, and although it does not come off in the normal wash process, it can be peeled off if so desired.

Weighing

Weighing is carried out to conform to the capacity of the washing machine. In case of overloading there is reduced centrifugal action because the linen articles are too tightly packed in the drum. As a result, there is inadequate friction and the deeply imbedded soil is not removed so the wash process is ineffective. Certain synthetics develop creases as a result of overloading that are difficult to get rid of in the subsequent ironing process.

Repeated overloading can cause the machine to breakdown. In case of underloading, there is inadequate friction because the linen articles are too far apart. It causes a good deal of wastage in terms of time, labour, laundry agents, water and power.

Many modern machines have sensors that can gauge not only the load but also the length of cycle, temperature of water, water level, the type and amount of laundry agent and when it will be dispensed in the wash cycle. This is highly beneficial in the conservation of water and energy as well as reducing wear and tear on the linen articles.

Loading

This is often done manually or with a certain degree of automation. Shovel type cranes may be used for lifting and depositing linen, thereby providing complete automation by eliminating the need for handling by operators. Alternatively, weighed linen in bags is transported along a track and directed to the opening of the washer extractor with the help of a nylon cord. A lock in the lower half of the bag is released, dropping the soiled linen into the washer extractor. Machines that tilt provide ease in both loading as well as unloading. Machines may be top loading, front loading or side loading.

Washing

This is the stage during which the actual cleaning of the items takes place. It is designed to perform three basic functions i.e. remove soil from the textiles and suspend it in solution so that it can be discharged from the machine through the drain.

Rinsing

Once the wash cycle is completed, rinsing becomes essential. A running rinse with an open drain is more effective but a larger volume of water is utilized. Rinsing is carried out at least twice so as to ensure removal of residual laundry agents and suspended dirt. It may also help to lower the temperature of the wash load by using a cold water rinse.

Hydro-extraction

Draining followed by hydro-extraction will remove excess moisture through centrifugal force by spinning the load at a high speed. The absorbency of the fabric affects the length of the cycle (6 to 8 minutes) and the residue of moisture. The most efficient extraction for cottons takes place at temperatures higher than 38° C but lower than 55° C so that they are not too hot to handle. Polyesters and blends should be extracted at a temperature below 38° C to prevent wrinkling.

Unloading

Transferring washed linen from the Hydro-extractor to the Tumble dryer is a difficult task because of the added weight of moisture. Articles may be manually removed and put into trolleys. Tilting and dumping machines reduce the physical effort of manual unloading. A laundry cart can be positioned under the door and a pushbutton operated to rotate the cylinder and empty its contents. Alternatively, the machine can unload onto a conveyor belt that will transport the linen to the next set of operations.

Tumble Drying

This process is capable of rendering the linen completely dry by blowing hot air between 40° C to 60° C onto the articles as they are slowly rotated in the drum. For articles that are susceptible to damage by heat, there is the option of simply airing by circulating air at room temperature. To avoid wrinkles and the risk of spontaneous combustion, many dryers have a cool-down cycle at predetermined intervals. The process of tumble-drying creates a good deal of wear and tear on the fabric as particles of lint come off the fabric in the drying process. The time taken is approx. 30 minutes depending on whether the article is to be completely or partially dried.

Finishing

For those articles that require a pressed finish, ironing and pressing are usual. Articles like blankets, towels, candlewick bedspreads, hosiery, etc. that do not require a pressed finish are only tumble-dried.

Folding

This can be done by machine but in most cases is carried out manually. The use of a folding stand helps minimize this otherwise very labour-intensive operation. Manual folding makes it possible to achieve the desired fold as well as ensure quality control. Employees in this area are the one ones who ‘reject’ stained linen and are a good source for ascertaining what types and quantities of stains commonly occur. Correct folding is important to the appearance of the article and makes it convenient to store and use.

Airing

This is essential prior to storage, especially if the articles are to be stored in closed shelves. It ensures that any moisture that is likely to cause mildew will be got rid of.

Storage

This should be properly done in a well–designed storage space. Linen should be allowed a rest period to recuperate before it is used again. The life span of linen is greatly increased if proper rotation of stock is carried out, thereby ensuring a ‘rest period’ between uses. As a general rule, at any given time, approximately 50% of the total linen inventory should be on the shelves, 25% in use and 25% in processing. The storage area must be isolated from the soiled linen and kept clean.

Transfer & Use

The linen is issued to the concerned department for use. Since transfer of clean linen is usually done by linen trolleys, it is important to keep the trolleys clean. The linen is utilized for the purpose intended and the cycle begins all over again.

WASH FORMULA/STAGES IN WASH CYCLE

The wash formula or cycle is a proper balance using the four basic cleaning factors and will vary according to the degree and type of soil. Proper sorting and loading will help ensure that the cleaning factors-time, temperature. Mechanical action and chemical action are used to design a balanced washing formula. The basic steps of a washing formula are:

- i. Flush : (2-3 minutes)-** This step in the wash process is designed to prepare the laundry load for the washing procedure by loosening soil and heating up the load. Classifications and soil content will directly affect the time, temperature and chemicals required for this step in order to achieve optimal outcomes though items are generally flushed at medium temperature and a high water level. The

flush will break-up and remove gross soils so that the subsequent steps are effective.

- ii. **Break: (5-10 minutes)**- The term break is derived from the fact that it is at this point in the wash formula that the bulk of the soil is broken loose from the fabric and suspended in the washing solution with the help of a highly alkaline product that has been added at a medium temperature and low water levels. This is an optional step.
- iii. **Suds: (5-8 minutes)**- The actual wash cycle is known as 'suds' when the articles are agitated in hot water and low water levels. The detergent is added at this suds stage.
- iv. **Carryover Suds/Intermediate Rinse: (2-5 minutes)**- This step usually employs no chemicals, but can remove or flush residual soils that were not removed during the break/suds. Its main function is to lower the soil and alkalinity concentration, usually prior to the bleaching step. It rinses linen at the same temperature as the suds step.
- v. **Bleach: (5-8 minutes)**- This step is used for whitening or to discolor stains. Bleach is added at high temperature and a low water level. Sodium Hypochlorite is the most commonly used. This step is also affected by time, temperature and mechanical action. For most operations, sanitizing and disinfection is accomplished here.
- vi. **Rinse: (3-5 minutes)**- Once all the washing and bleaching is accomplished, we can now begin to rinse out and flush the chemicals and soils out of the goods. Typically this is a high water step and the temperature gradually decreases through each rinse. Rinses usually average around two minutes with up to three rinses per formula.
- vii. **Intermediate Extract: (2-3 minutes)**- This is an optional high speed spin that removes detergent and soil from the linen. It should not be used after the suds step to avoid driving the soil back into the fabric and also should not be used on no-iron fabrics except at lower temperatures.
- viii. **Sour or Softener: (3-5 minutes)** - Often called a "finish step," the softener and/or sour is added to this step to condition the goods for removal. The chemicals added here will directly affect the quality of the goods after being processed. Starch/sizing replaces the sour/softener step when cotton or polyester items need to be stiffened. This cycle runs at medium temperature and low water levels.
- ix. **Extract: (2-12 minutes)**- This removes excess moisture from laundered items through a high speed spin prior to drying. The length of the spin depends on

various factors such as fabric type, extract speed etc. This step is also important to reduce the weight of the linen for ease of movement to the dryers.

DRY CLEANING

This is a process by which textiles are cleaned using a solvent other than water. This solvent is usually an organic liquid that acts first to remove the layer of grease which bonds most grease particles to the surface and then to carry this dirt away. The solvents used are

1. Perchloroethylene
2. Tri-chloro-tri-fluoro-ethane

The solvent is removed first by centrifugal action and finally by evaporation. The solvent being expensive is filtered and recycled. Darker coloured articles are dry-cleaned after the lighter coloured ones. All articles require to be aired after the dry-cleaning process.