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## **Design and Construction of a Healthcare Laundry**

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The definition of a healthcare facility includes nursing homes, assisted living facilities, skilled nursing facilities, clinics, and hospitals. A key concern with healthcare linen is the soiling with blood or other potentially infectious materials and that the laundry may contain sharps. It is through this concern that the design of a healthcare laundry facility may differ from a commercial laundry processing uniforms, hospitality or food and beverage.

The Occupational Health and Safety Administration (OSHA) addresses the concerns for this contamination through the Bloodborne Pathogen Standard. The Center for Disease Control (CDC) has published additional recommendations for infection control within a laundry processing textiles for a healthcare facility.

Research on all fronts is a must prior to discussions with the architects and engineers to meet all of the requirements through well planned engineering. There are specifics for the exchange and direction of airflow as well as general safety for evacuation, fire safety, and steam piping. In this document we will not be able to cover every detail, but will provide a general overview of requirements and best practices.

As with all business decisions it is essential, early in the process, to ensure that thorough consideration has been given to the location, the building type and the future growth potential of the enterprise.

It is suggested by the National Association of Institutional Linen Management (NAILM) that 1.2 square feet be allocated for every daily pound processed. Of that space, 50% is for equipment, 20% for soiled storage, 10% for clean linen storage, and 20% for support areas (boilers, air compressors, janitorial, water softeners, hot water etc.)

One particular difference with a healthcare laundry operation is the focus on infection control and cleanliness. It is essential to create surfaces that will not harbor microorganisms and provide a clean backdrop for the laundry operation. Detail to smooth surfaces that can be easily washed include wall surfaces, table tops and floor surfaces. Floor drainage is important as there will be water splashes and wet loads. Drainage is needed around the cart wash station as the carts drip dry after being processed through. The more horizontal surfaces utilized overhead, the more buildup of lint will occur. Work to minimize overhead piping by using pathways as high on the ceiling as possible. If using an overhead rail system make sure the engineering team works with the rail installer to ensure the piping is above the rail.

It helps to add an epoxy base onto the floor surface, this gives it a “shiny clean” look and makes it easier for ongoing maintenance. Standard paint does not last and a tile floor usually becomes torn and scratched due to cart and equipment traffic.

Lighting is also an important consideration. Bright lighting over the production floor makes it easier to identify tears, spots, and stains on the textiles. Energy efficiency is important here since lighting remains on most of the time and there are some conservation practices that can be employed including motion detector switches for the bathrooms and other spaces. On the plant floor bright lighting and back-up emergency lighting will provide direction in case of emergency. Florescent traffic lane markings can also help the evacuation routes to the exits. It is estimated that equipment consumes about 157 KWH/hr and operates less time than the lighting which consumes 4KWH/hr per square foot and remains on 15-20% longer for clean up and other tasks. In some cases lighting can be 20-30% of the electrical costs. Design that includes natural lighting through windows and skylights can minimize this issue.

If a rail system is installed on the soiled and/or clean side it can present some design challenges with lighting due to the placement of slings. It should also be noted that OSHA has voiced concerns over worker safety when using a monorail type system and the likelihood of 300 pounds of textiles falling on employee’s heads and shoulders. Safety netting installed beneath the slings can be an option or using floor markings to divert traffic patterns around the slings can also reduce the risks. The load weight of your truss system must be incorporated into the monorail system design. Most rail systems require 18-24 feet from ceiling to floor which allows for adequate clearance for the loaded slings to remain above the employee’s head-level.

In healthcare, the separation of the clean from soiled linen is paramount. There is no one methodology required, but there are best practices. Infection Control is the reason for the required separation which can be achieved through (1) a functional “barrier” wall to provide a visual separation between the soiled and the clean side; (2) a solid structure wall providing for negative air pressure that moves air from the clean processing area into the soiled side; and/or (3) “pass-through” washers at the barrier wall whereby textiles are loaded on the soiled side and unloaded on the clean side. The customer(s) and their goals may dictate to the extent of these systems deployed. For example, the Veterans Affairs Administration requires that all three systems be utilized (barrier wall, pass through washers and negative air flow) in their Statements of Work for outsourcing.

Employee safety should also be a prime consideration in the design of a healthcare laundry operation. To encourage staff in appropriate hand-washing a hand wash station is ideally placed near the doorway from the soiled to clean processing area. This is also an opportune area to place disposal receptacles for soiled/used PPE. Another consideration would be a sorting station that is ergonomically configured. Other points to consider include:

- Washable surfaces especially in high soil areas.

- The placement of sharps containers in locations that are convenient to the staff and located within 6-10 feet of an area where it is likely to encounter sharps such as the soil-sort line.
- Storage of ready to use (RTU) cleaning chemicals for the sanitizing of surfaces close to the sorting station should be considered.

While a cart washer is typically not required (requirements vary from state-to-state) it is essential to indicate how the soiled carts are cleaned prior to utilizing them for clean linens. If a pass-through washer system is utilized in a facility, it is often supplemented by placing the cart washer in such a fashion that it follows the linen flow as well.

Heat in the dryer can cause all kinds of problems with healthcare textiles. Children's wear has a low melting point as do some incontinent products. Textiles produced with certain embedded barrier materials may be constructed of fabric that tends to melt at higher temperatures. A modulating dryer unit can help reduce this problem. A lint collection system also needs to be considered for dryer efficiency and practicality for removal.

One common point of concern, especially to Infection Control Professions, is the area directly in front of the ironer; specifically the floor surface. Consideration should be given to maintaining a clean floor space and to keeping sheets from dragging the floor as they are fed into the ironer. There are multiple solutions that can be utilized including the installation of a tray for holding the sheet until it feeds through or a trough system that is undercut on the floor not allowing the sheet to touch the floor. Regardless, this area is one that should be consistently maintained and free from lint, trash or debris. Any linen item coming in contact with the floor should be considered "re-wash".

Knitted fitted sheets can create a challenge when it comes to finishing and folding. While there is automated equipment that can fold them, most healthcare laundries continue to use a table top and a manual folding system with people. Remember, table surfaces should be cleaned regularly and should be made of washable material.

A plastic wrap station and/or a tie station is often used to bundle items for ease of counting and or storage. The plastic wrap provides for an extra layer of protection for the item prior to being used for the patient. Additionally, carts containing clean linen must be covered with plastic or reusable cart covers. If reusable cart covers are used a cleaning schedule should be developed and the covers should be free from any visible soil. Once deployed on the floor, the carts should be covered at all times to avoid contamination. The bottom of the cart should be solid to disallow lint, dust or other debris from coming in contact with the clean linens. Tracking systems (like bar coding) is often utilized on the carts to track their locations.

The clean side (where the finishing equipment is) should be bright and clean. All surfaces should be washable and you should have a regular cleaning schedule in place.

Hot water and steam piping that could result in burns needs to be insulated. OSHA requires insulation within 7 feet of where a person may work.

“All exposed steam and hot-water pipes within 7 feet of the floor or working platform or within 15 inches measured horizontally from stairways, ramps, or fixed ladders shall be covered with an insulating material, or otherwise properly guarded.” *CFR 1910.261(k)(11)*

Storage of chemicals needs to be considered by the amount stored and the containment of those considered caustic, corrosive, flammable, and reactive. No containment of those considered hazardous can be drained to the sewer system. An eyewash system is required by OSHA within 10 feet of where the chemicals are placed, an additional shower unit is best practice.

*29 CFR 1910.151(c)* requires that eye/face wash units , "...shall be provided within the work area for immediate emergency use." OSHA standards are silent on a required distance and therefore the Agency refers to the recommendations with respect to highly corrosive chemicals contained in American Standard for Emergency Eyewash and Shower Equipment ANSI Z358.1-1990 (updated 2004 revision). OSHA interprets the phrase "within the work area" to require that eye/face wash units and emergency deluge showers both be located within 10 feet of unimpeded travel distance from the corrosive material hazard or, in the alternative, within the distance recommended by a physician or appropriate official the employer consulted.

Fire Safety should be planned based on your staff. For example, if hearing impaired employees are employed, you would want to consider strobe lights as well as an audible horn. Language and culture barriers should also be addressed. OSHA has information for all safety aspects and the responsibility of the employer falls under the general duty rule. The most overlooked issue is the actual fire drill. The old adage “if you don’t measure you can’t improve” holds true if you are unaware of employee response to an actual fire situation.

Comfort of staff should be considered. Controlled air stations can be used to direct air to work stations and exhausted air in the right locations can remove hot air (from the dryers and the ironers). Cushioned padding on the concrete floor at the work stations is beneficial. Break rooms, restrooms and water fountains should be considered. Storage

for employee coats, pocket books, and other personal items needs to be incorporated. Keep in mind that the make up air for the dryers is huge and it's a huge mistake to place the intake air beside of the exhaust air (all that lint).

Conservation of resources needs to be evaluated with the selection of equipment process. Accurate measurement and reduction methods for water, sewer, electric, gas and steam can have a profound affect on overall savings. Additionally, the more emphasis on operating in a "green" environment the more marketable you will be, especially in the healthcare arena. This would include the washing process and reducing the need for hot water, the volume of water, and the pollutants from the chemicals utilized. Some municipalities limit the effluent including the pH levels and temperature discharged. Some states may require a minimum temperature for processing healthcare textiles. However, state trends are now allowing laundries the opportunity to utilize low wash water temperatures as long as the manufacturer's recommendations are followed. Depending on the size of the facility, measuring the flow of utilities at strategic locations can be helpful to determine benchmarking goals and opportunities.

Processing surgical textiles requires the AAMI/ANSI standards manual (yes, surgical textiles are considered medical devices). There are specific guidelines surround the processing and storage environment as well as handling. A separate space is required with controlled air systems and light tables for identifying holes or tears in barrier products. The Food and Drug Administration (FDA) has placed barrier products into categories based on barrier protection and somewhere along the processing line the "integrity" of the barrier properties needs to be tested. What better place than at the healthcare laundry? These testing procedures are incorporated under AAMI/ANSI guidelines.

Costs for a healthcare laundry are dependent on geography, level of automation, and building type. Most can be built utilizing a concrete pad with a metal building. Total costs can range from \$89 to \$169 per square foot.

#### **ADDITIONAL INFORMATION AND REFERENCE MATERIAL**

General guidelines for a healthcare laundry exist, but they are found at different sites. During discussion of building a laundry one should always do the research to the following sites for clarification and guidance:

##### 2006 Guidelines for Design and Construction of Healthcare Facilities

American Institute of Architects (AIA)

Academy of Architecture for Health (AAH)

[www.aia.org](http://www.aia.org)

##### 2006 Laundry Operations Guidelines

National Association of Institutional Linen Management (NAILM)

[www.nlmnet.org](http://www.nlmnet.org)

Guidelines for Laundry in Health Care Facilities

Center for Disease Control (CDC) [www.cdc.gov/od/ohs/biosfty/laundry.htm](http://www.cdc.gov/od/ohs/biosfty/laundry.htm)

Laundry Module

U.S. Department of Labor Occupational Safety and Health Administration (OSHA)

[www.osha.gov/SLTC/etools/hospital/laundry/laundry.html](http://www.osha.gov/SLTC/etools/hospital/laundry/laundry.html)

Accreditation Standards for Processing Reusable Textiles for use in Healthcare Facilities

The Healthcare Laundry Accreditation Council [www.hlacnet.org](http://www.hlacnet.org)

ST65:2000 Processing of reusable surgical textiles for use in health care facilities

Association for the Advancement of Medical Instrumentation (AAMI)

American National Standards Institute (ANSI) [www.aami.org](http://www.aami.org) and [www.ansi.org](http://www.ansi.org)

Healthcare Textile Services: Policies and Procedures Manual

Healthcare Textile Services: Infection Control Manual

American Society for Healthcare Environmental Services (ASHES)

[www.ashes.org](http://www.ashes.org)

Federal Regulations

Barrier Surgical Gowns and Drapes

21 CFR 878.4040

[www.gpo.gov](http://www.gpo.gov)

Standards for Monorails and Underhung Cranes

American Society of Mechanical Engineers (ASME)

[www.asme.org](http://www.asme.org)

**ABOUT THE AUTHOR:** *Shane W. Woodson, RLLD is the Senior Program Manager for Laundry Services at NISH. NISH is a non-profit organization based in Vienna, Virginia whose mission is to create employment opportunities for people with severe disabilities. Providing employment opportunities to more than 45,000 people through the AbilityOne Program, they are the largest single source of employment for people who are blind or have other severe disabilities in the United States. More than 600 participating nonprofit organizations employ these individuals and provide quality goods and services to the Federal Government at a fair price. Shane has been an active member of NAILM for over 15 years and is very involved in the educational process and in improving the educational opportunities for laundry personnel.*