

# All Cleanroom Wipes Are Not Created Equal

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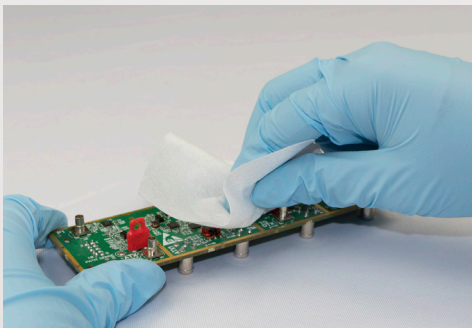
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*Lint-free wipes are ideal for electronics applications.*



To ensure cleanliness standards are kept within a cleanroom environment, wipes are an essential tool. They need to meet exacting criteria, especially when in a controlled environment. Any contamination must be eliminated from both the items being manufactured and from the manufacturing tools and equipment themselves. Wipes play a major role in this cleanliness control, but are the wipes being used just adding to the contamination problem rather than taking it away? Here we discuss the options and how to choose the right wipe to ensure cleanliness is guaranteed.

## Absorption

Although choosing wipes may appear simple, there is more to it than meets the eye. Wipes come in many sizes, materials, and various packaging options, all of which have an impact on just how clean your cleanroom environment will be after its use.

There are three main categories of wipes; non-woven, woven or knitted and swabs. But whatever the choice, the first consideration should be its absorbency. Dependent on the material makeup of the wipe, absorbency can differ. Absorption is usually expressed in milliliters of liquid absorbed by one square meter of the material. However, some wipes work well with cleaning fluids or lacquers but will not absorb water. For example, polyester is petroleum-based so polyester wipes easily absorb gasoline, oils or grease. Cellulose wipes are good for water-based contamination. It is important to note that the cleanest wipes may not be the most absorbent, and wipes that soak up liquid easily may in return leave unwanted fiber and residue behind.

There are several options when it comes to wipes and the material they are made from.

## Non-woven Wipes

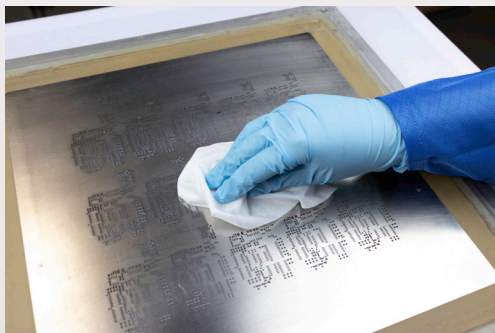
The least expensive option is non-woven. These wipes are generally made from paper or fabric. In addition, there is a range of 'hybrid' paper wipes which use a specially engineered "non-woven fabric". This material has the strength, softness, and quality of a woven textile, but is produced at the volumes, speeds and cost of a paper. These lint-free wipes often are found in applications where re-contamination cannot be allowed, such as electronics and medical applications, therefore they are a good option within a cleanroom environment.

Non-woven cellulose wipes, use glues or binders to hold the fibers in place. Binders can amount to 30% by weight of some non-woven products. The most common binder is a water-based latex such as polyacrylate. Many binders will dissolve when exposed to cleaning fluids, so wipes made with binders are undesirable in critical applications. They will leave adhesives, lint and fibers on the surfaces being cleaned, especially when wet. Most non-woven cellulose wipes simply are insufficiently strong, clean and absorptive to handle anything but the simplest cleaning tasks.

Another option is non-woven wipes made from synthetic fibers like polyester, rayon and polypropylene. These wipes are beneficial for a variety of applications. For example, textured polypropylene wipes presaturated with a solvent are ideal for cleaning grease and heavy oils. Polyester non-wovens are good for pharmaceutical companies as they may help to minimize the risk of bioburden by trapping contamination in the wipe.



*Presaturated wipes come pre-loaded with the correct amount of fluid for the task.*



*Larger sized wipes are good for screen cleaning and other maintenance jobs.*

It is important that the non-woven wipe is not abrasive in any way to eliminate any damage when cleaning. It should be able to endure cleaning without tearing, or dissolving when in contact with cleaning fluids leaving residue and particle contamination behind.

## **Woven or Knitted Fabric Wipes**

Fabric wipes are made from woven or knitted material and come in a range of qualities and prices. The least expensive material is reclaimed fabric, with "mill end" material following closely behind. Be aware that they can contain permanent press chemicals, stain-resisters and dyes and so can increase contamination issues. The next level is washed cheesecloth, but it is very hard and stiff, completely unsuited for wiping and may be abrasive. However, once thoroughly washed with special surfactants and detergents, the material becomes very smooth and flexible. The best quality wipe when it comes to fabric is "washed diaper fabric". This material is soft, strong and highly absorbent but can be expensive.

If cleanroom performance is essential, select knitted synthetic fabrics of polyester or rayon. These materials are soft, clean, absorbent, and lint-free making them the leading choice if high quality cleaning results are required.

## **Swabs**

Swabs are effective if cleaning is required in small or hard to reach places as the stick design helps to reach contaminant or absorb liquid. The key to selecting a swab is the design of the head. The materials of construction, plus size and configuration of the head and the handle are the primary factors to consider.

Swabs made from cotton fiber may be the least expensive but it comes at a price with a lot of lint left behind when in use. Reticulated foam makes a good swab for scrubbing but tends to leave particulate residues. The highest quality swabs are made from prewashed knitted fabric.

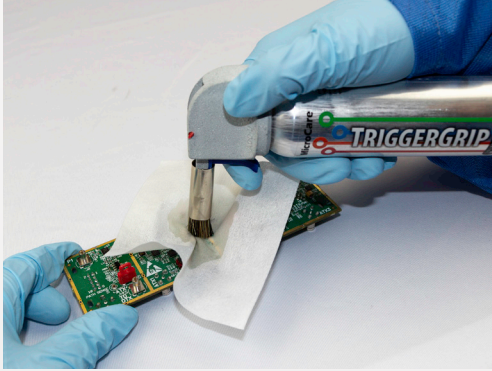
A key factor when selecting a swab is the materials compatibility. The construction of the swab must be compatible with the cleaning application, for example, if acetone is used on a foam swab, the foam tip will swell and weaken. In applications where acetone must be used, a polyester swab is the better option. Wipes made from synthetic material like polyester non-woven and knitted fabrics have the biggest range of chemical compatibility. Cellulose material, on the other hand, can easily disintegrate when used with certain cleaning solutions.

## **Other Wipe Options**

Presaturated wipes are convenient, quick to use and come pre-loaded with the correct amount of fluid for the task. They offer the right fabric and fluid in the correct combination, typically resulting in more consistent cleaning performance.

A broader array of cleaning fluids, both water-based and solvent-based, have enabled manufacturers to tailor their presaturated wipes for different environments.





Absorbent wipes help remove fluids and contaminants while cleaning.

The optimal cleaning fluids for presaturated wipes are water-based with soaps, alcohols, hydrocarbons or siloxanes. Stronger fluids, such as d-liomine, will often attack the plastic tubs. Fast-drying solvents are rarely used because they usually will not deliver the required shelf life. Good toxicity ratings (TLV of 200 or higher) are generally a sensible strategy.

Because presaturated wipes are not required to include high absorbency rates as the cleaning fluid is already impregnated, they can be made from non-woven fabric like polyester which is lint-free and ideal for controlled environments.

### Edge Finished Wipes

A good way to reduce lint from a wipe is to pick those that are finished with sealed edges. As wipes are usually manufactured in large rolls they must be cut down into individual wipes. This process increases the chance of fiber contamination. To reduce this risk choose a wipe with heat sealed or laser cut edges which will melt and seal the fiber ends and further minimize linting.

### Pre-Packaged Wipes

When it comes to choosing the right wipe, don't forget to consider the packaging. Most cleanrooms require special "double packaging". They will need to be contaminate-free with no fibers, no plasticizers, silicones or ionics. Some of the least expensive wipes come in cardboard or plastic packaging unsuited for cleanroom environments. Cardboard packaging can damage the fibers of the wipe as it is removed from the box, creating lint. Rough cardboard packaging may also deposit cardboard fibers on the wipe as it is pulled out of the box.

Some packaging can also add static to the wipe. Static will draw in dust adding to the contamination risk. If maximum cleanliness is required choose a wipe that not only has static-dissipative properties, but is packaged in Electrostatic Discharge (ESD) safe wrappers to limit dust attraction. These unique wipes are typically cut and packaged in a specialist facility to ensure their purity.

If using presaturated wipes check that the packaging is adequately sealed and effective in keeping the wipe moist, stopping any fluid evaporation during storage.

### Round-up

When it comes to choosing a wipe, consider these key features.

**Absorbency** – The cleanest wipes may be less porous and unable to absorb as much contamination, while more absorbent materials may leave fibers or residues. Think about what task the wipes need to achieve.

**Material** – Is it important that the wipe is highly absorbent? Does it need to be lint-free? Are durability and strength important to endure scrubbing, or does it need to get into hard to reach places that only a swab can do? Take into account what material the wipe is made from and what it needs to achieve. Non-woven lint-free wipes that combine strength, softness and quality are often selected for medical device and electronics manufacturing where residue must be strictly controlled. Remember to check how the wipes are finished. If you want them for a cleanroom, choose sealed edges to eliminate any fiber shedding.



**Packaging** – Many cleanrooms require wipes to be “double-packaged” to ensure they are free of particulate. They may also need to be in static-dissipative wrapping which limits dust attraction.

With so many wipe variations on the market, it is important to consult with an expert and experienced wipe manufacturer to ensure what you are using is right for the task.

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**About the Author:**

*Mike Jones, retired Vice President of International Sales for MicroCare, has over 30 years of experience in the critical cleaning industry. He is a prolific writer and educator focusing on critical cleaning in general and vapor degreasing and benchtop cleaning in particular. For more information, visit [www.microcare.com](http://www.microcare.com).*



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