

(Berkshire)

The Environmentally Conscious Cleanroom: Consumable Selection and Use

How can the critical cleanroom environment meet standards for natural resource conservation and waste elimination?

With increasing consumer expectations, public scrutiny and government regulations the issue of environmental responsibility plays a bigger role in production and manufacturing than ever before. In response, many companies have introduced “green” initiatives to reduce their environmental impact, including programs to conserve natural resources and eliminate waste while producing environmentally sound products. This article focuses on issues surrounding cleanroom wipers and bond, introducing the concepts of repurposing, recycling and biodegradability for reduced environmental impact.

The hierarchy of waste management

Waste management is based on three main principles: reduce, reuse and recycle.

Reduce: Minimize waste and impact on the environment through use of more environmentally friendly products and lessened consumption. For instance, use lightweight, high absorbency wipers or more compact packing materials.

Reuse: Repeatedly use items whenever possible prior to recycling or disposal. While this is rarely viable for cleanroom wipers due to process requirements, it is possible for less critical environments.

Recycle: Arguably the most vital component of waste management, this includes collection of materials to reproduce the same product, or to be repurposed as another. Examples include recycling of corrugated and plastic packaging.

Implementation of these principles will reduce waste and energy usage, conserve natural resources, and minimize both air and water pollution. Once the concepts have been applied, remaining waste must be disposed of or incinerated. Landfall effects can be reduced with use of biodegradable materials.

Recyclability and biodegradability of common cleanroom materials

Recyclability and biodegradability of cleanroom wiping materials, packaging and bond paper can vary widely.

Synthetic fibers and yarns: Most commonly polyester, nylon or polypropylene, petroleum-based synthetics are non-biodegradable and non-renewable.

Cellulosic fibers: Sourced primarily from wood, biodegradable and sustainable cellulosic fibers are commonly constructed of cellulose pulp, abaca and soft wood.

Cotton fibers or yarns: 100% natural and biodegradable, cotton fibers are both renewable and sustainable.

Regenerated cellulose: Regenerated through a unique chemical process, these biodegradable cellulosic fibers are commonly found in the form of lyocell and rayon.

Corrugated cartons: While fully biodegradable, due to a market overabundance these cartons should be recycled.

Plastic bags or pouches: Typically used to house cleanroom wipers, these plastic bags and pouches are not usually biodegradable and should be recycled.

Plastic canisters: While the plastic canisters used with cleanroom wipers are not generally biodegradable, they can easily be reused and typically recycled.

Cleanroom bond paper: Constructed of biodegradable cellulosic fibers, most cleanroom bond paper is also treated with synthetic latex, which affects biodegradability and recyclability.

Minimizing impact through material selection and use

How can these waste management, recyclability and biodegradability principles be applied to cleanroom wiping materials and bond paper to minimize environmental impact?

- Carefully select packaging configurations which optimize cleanroom materials to minimize environmental impact while limiting the use of energy and natural resources.
- Compare various wipers based on material, size, weight and general performance and select a wiper with the highest absorbency for your application.
- Wipers and bond papers with lower basis weights require fewer natural resources, take less energy to produce, and consume less space in a landfill post-use if not recycled.

It is essential to train operators in proper wiping techniques to prevent decreased effectiveness, lower product yields, and depletion of natural resources. These are generally specified by the cleanroom wiper manufacturer in a reference guide or through operator training.

Advantages of using a pre-wetted option

Use of pre-wetted wipers brings a host of environmental benefits and should be evaluated in place of in-house wetting techniques whenever possible.

Reduced volatile organic compound (VOC) emissions: With many states now placing regulations on the amount of allowable VOCs, pre-wetted wipers typically weigh in on the low end of the scale. Packaged in a re-sealable pouch, pre-wetted wipers can be extracted one at a time with very low VOC emission.

Reduced solution usage: Wetting wipers in-house can lead to excessive solution waste and usage caused by oversaturation and spills.

Reduced process control and product waste: Ensuring cleaning consistency and control, pre-wetted wipers eliminate the potential for oversaturation of sensitive parts, increasing productivity while minimizing waste.

Can cleanroom wipers be reused?

Designed to control contamination levels and reduce the risk of process failures, cleanroom wipers are used in critical environments where purity and effectiveness are of crucial importance. These wipers are not generally launderable or reusable; however, in certain circumstances cleanroom wipers have been reused in low grade applications.

Can cleanroom wipers or bond paper be recycled?

In general most cleanroom wiping materials can be recycled, but due to the contamination from oils and solvents, recycling efforts can be difficult. This process can be identified by your current recycler.

How can landfill impact be reduced?

Generally accomplished via waste minimization efforts, weight reduction is especially important for knit cleanroom materials constructed of petroleum-based synthetic fibers that are almost impervious to biodegradation. Select cleanroom wipers and bond papers that are biodegradable while also meeting application requirements when possible.

Summary

Use of critical cleanroom consumables does not automatically cancel out environmental consciousness. Basic knowledge of waste management, environmental properties of the materials in use, and proper wiping techniques can lead to a significantly reduced impact on the environment.

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