



# Cleaner Air Comes From Within

## Your Cartridge Dust Collector is Only as Good as Your Filters

by Petra Meinke, Senior Product Manager and Debbie Olson, Aftermarket Product Manager of Donaldson Torit

Cartridge dust collectors have evolved throughout the last 25 years to deliver cleaner air and long term cost savings, but nothing puts a wrench in progress like using ordinary or unproven replacement filters inside your collector. Next time your dust collector is due for a changeout, evaluate your replacement filter choices to determine the most reliable technology that will keep your collector running at its peak. With high performance filters now available for all popular cartridge collectors, there's no better time to focus on what's inside the box. The key is understanding what separates the filter technologies today and selecting the filters proven to perform with the highest efficiency and lowest cost over time.



### CONTENTS

- Advancing Filter Technology..... 2
- Understanding MERV Ratings ..... 3
- What MERV rating is best..... 3
- Longer filter life & lower emissions ..... 4
- Tough new filter technology..... 4
- Advanced replacement filters for all collectors ..... 5
- Best combination for cleaner air ..... 5
- 25 years of proof..... 5

### Cartridge Filters 101

Filters with standard commodity type cellulose and cellulose/synthetic (80/20) blend media have been around since the inception of the first cartridge dust collector in the 1970s. Considered on the lower end of the performance scale, commodity filters are called such because any manufacturer can provide them. These types of filters costs less to purchase, but offer significantly reduced filter life and use more energy due to higher operating pressure drop, making their value proposition low at best. In short, you have to replace these filters more often, which drives up cost.



**Cartridge Filters 101 (cont.)**

Filter manufacturers have tried to enhance commodity filters through the years. For instance, commodity filters are available with a cone in the middle that is intended to add additional media area to the cartridge and extend filter life. But in reality, the cone causes unbalanced airflow through the filter, and reduces

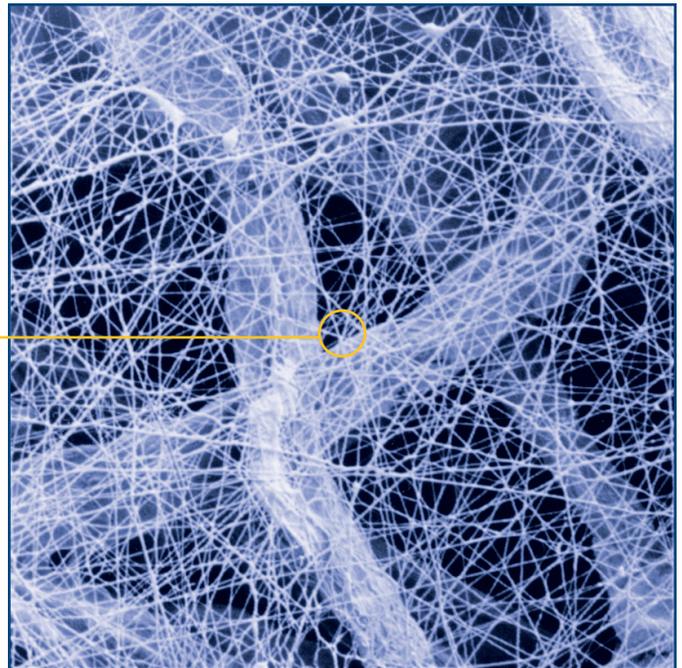
overall filter life. The cone adds 30% more media to the collector, restricts the airflow path at the bottom of the cartridge and over-compresses the pleats at the top. As a result, the cone design cleans less effectively and retains more dust, allowing the media on the cone section to plug.

**Graduating To Higher Performance**

Since the mid '80s, Donaldson Torit filtration engineers have developed, produced and improved Ultra-Web nanofiber filter media—a high performance alternative to commodity-type filter media that captures submicron dust particles on the surface of the media. In comparison, cellulose, blended, spunbond and meltblown media are depth-loading media that allow particulates to penetrate deep into the filter and choke off airflow. By keeping dust on the surface of the filter, Ultra-Web allows dust to be more easily released through pulse cleaning and promotes self-cleaning in the collector, helping maintain a greater effective media area over a longer period of time.

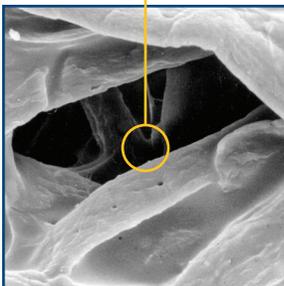
cellulose. Cellulose, blended, and spunbond media by themselves have fibers at least 10 micron in diameter and large pores between fibers (up to 60 micron) that allow dust to penetrate deep into the media, quickly plugging and reducing filter life.

**Ultra-Web Technology**

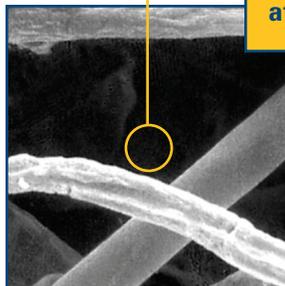


Ultra-Web technology is backed by 80 issued and pending patents worldwide and has been continually optimized throughout the last 25 years for better performance. Other technologies tout finer fiber, however, Ultra-Web has been perfected to strike just the right balance between the strength of the fiber, density of the web and the level of filtration. Ultra-Web is formed with layers of continuous synthetic fiber of 0.2 – 0.3 microns in diameter that forms a web-like net with very fine interfiber spaces while being constructed to a variety of substrate media. The most common and most economical media substrate is

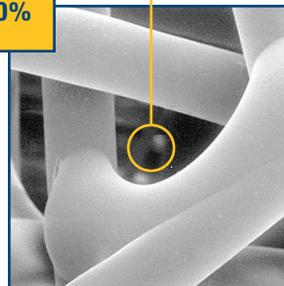
**10 Micron Particulate at 600%**



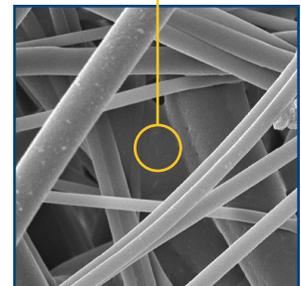
*Cellulose*



*Cellulose/Synthetic*



*Spunbond*



*Meltblown*



### Understanding MERV Ratings

For many years, filter efficiency was evaluated based on ASHRAE standard RP531, which represented operating efficiency and was the first to include pulse cleaning. From this standard came the familiar statement of 99.999% efficiency at 0.5 micron. But testing equipment has improved since then (today's scanners can see much more) making this standard obsolete because it is difficult to achieve consistently accurate results. In lieu of other acceptable industry standards, ASHRAE 52.2 was adopted to evaluate a filter's efficiency, but speaks only to initial efficiency. ASHRAE continues to work on standards that include cleaning mechanisms which may better represent the future of the industry.

ASHRAE 52.2 introduced the more current MERV (Minimum Efficiency Reporting Value) rating system to the industrial air filtration industry. It is deemed the most accurate scale for determining a cartridge filter's initial efficiency and ability to filter submicron dust particles. MERV ratings illustrate a filter's efficiency based on particle size. Since more manufacturers today need advanced filtration technology like Ultra-Web to capture smaller submicron particulate (0.3 -1.0 micron), MERV ratings that indicate initial efficiency based on particle size pinpoint a filter's efficiency in capturing smaller dust particles with much greater accuracy.

Cartridge Filter	MERV	3-10 µm	1-3 µm	.3-1 µm
<b>Ultra-Web SB</b>	<b>15</b>	✓	✓	✓
<b>Fibra-Web</b>	<b>14</b>	✓	✓	✓
<b>Ultra-Web</b>	<b>13</b>	✓	✓	✓
Typical Spunbond	11	✓	✓	✗*
Typical Cellulose	10	✓	✓	✗*
Typical 80/20 Blend	10	✓	✓	✗*

\* Not efficient enough to rate

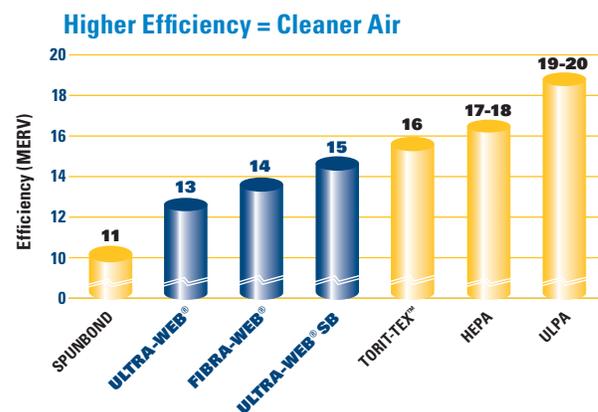
Independent lab tests of Ultra-Web, cellulose and blend media have revealed a dramatic difference in the MERV efficiency ratings for the various types of filter media. For instance, Ultra-Web filter media rates at a MERV 13 on the 20-point efficiency scale, and is considered pre-HEPA efficiency suitable for filtering submicron and larger dust. Typical cellulose and blend media filters have a significantly lower MERV 10 rating and some blend media filters actually rate lower at MERV 8 efficiency. This is important because MERV 10 filters are rated to capture 1-3 micron dust particles and MERV 8 filters are only rated to capture larger 3-10 micron particles. Since most every application generates some submicron dust, the higher MERV 13 rated filter provides better assurance that smaller particles are being captured, along with the larger ones. Bottom line—your air is cleaner.

### More MERV May Not Be Better

While MERV 13 meets the efficiency demands of most applications and there is very little difference between the efficiency of MERV 13 and MERV 15, there are a few applications that do call for higher efficiency. There are higher performance Ultra-Web filters available with MERV 14 and 15 efficiency and other specialty filters such as Torit-Tex (MERV 16) and HEPA (MERV 17-18) and ULPA panels (MERV 19-20) to meet those demands.

But there should be some caution exercised when choosing a filter with a MERV rating higher than 13. While delivering higher initial efficiency, filters with ratings greater than MERV 13 can have shorter filter life and consume more energy due to higher pressure drop except when the filter includes Ultra-Web. The MERV 15 Ultra-Web SB filter has lower stabilized pressure drop than a meltblown filter also rated at MERV 15. With ordinary MERV 15 filters, the cost savings benefits can be less as filters may need to be

replaced more often. Ultra-Web MERV 13 filters have been optimized and perfected throughout the last 25 years to deliver the right combination of high efficiency, longer filter life and energy savings.

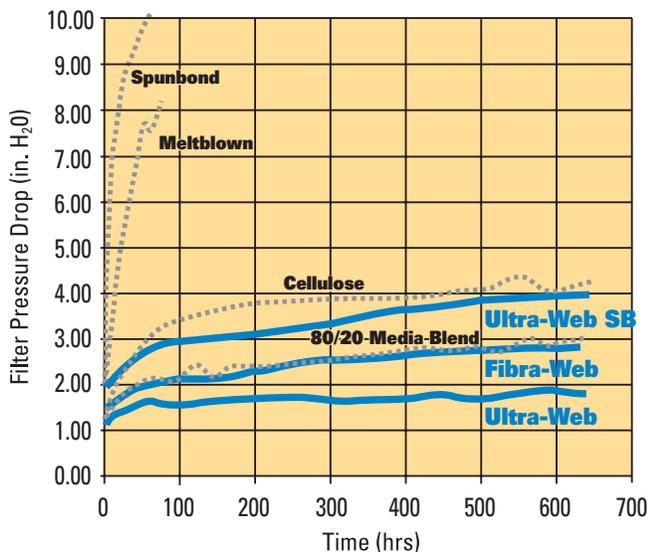


Ultra-Web MERV 13, 14, 15 efficiency has been certified by independent lab tests and tested per the ASHRAE Standard 52.2-1999, the most current industry accepted test method used to evaluate filter performance.



More MERV May Not Be Better (cont.)

Lower Pressure Drop = Longer Filter Life



Results were derived testing Atomite test dust in an 8-cartridge collector @1.0 gr./cu.ft, Goyen Millennium valves, 90 psi cleaning pressure, 100ms on time 10 second off time. Airflow goal = 4064 scfm.

When testing Ultra-Web filters against cellulose and blend media filters, Ultra-Web had the lowest operating pressure drop at 500 hours of operation and the filters were still functioning with low energy use. At 400 hours of operation, higher MERV rated filters with melt blown media actually had the highest pressure drop, requiring them to be changed. This is because melt blown media by nature tends to retain any static electricity buildup, binding the dust to the media. Dust that is electrostatically bound to the media is more difficult to pulse clean, which can result in higher energy use and much shorter filter life.

Proven and patented Ultra-Web filters also deliver cleaner air. They provide significantly lower emissions than other types of commodity media—40% lower emissions on 1 micron dust particles and 58% lower emissions on 0.5 micron dust.

Next Generation of Ultra-Web

In 2006, a new tougher Ultra-Web SB (spunbond) filter with a MERV 15 efficiency rating was introduced to address challenges from agglomerative dust in industries such as chemical, pharmaceutical, cosmetic, textile, grain, woodworking, metalworking and others. This filter media combines the excellent surface-loading and dust release capabilities of high efficiency Ultra-Web technology with a strong spunbond polyester substrate for enhanced durability, moisture and chemical tolerance when compared to typical spunbond or meltblown filter media. The spunbond substrate is also made with a unique resin-free process that allows Ultra-Web SB to perform in challenging conditions where higher temperature, chemicals and moisture could weaken or destroy the resin system within standard substrate media. Ultra-Web SB cartridge filters also feature wide pleat spacing which allows thorough pulse cleaning of fine and fibrous particulate including ceramics, cotton, fiberglass, grains, shotblast, grinding, polishing and dust from powder coating.





### Ultra-Web For All

Whether you have a Donaldson Torit cartridge collector or some other brand, Ultra-Web is now available in-stock for all popular cartridge dust collectors and ships in 24 hours. This helps eliminate prolonged production downtime in a catastrophic event when

your filters plug and the dust collector must be shut down. This ready-to-ship program also delivers high performance filters fast if you didn't plan ahead for collector servicing or you operate within a lean manufacturing or just-in-time environment.

### The Best Combination for Cleaner Air

Manufacturers that operate Donaldson Torit's Downflo® Oval (DFO) cartridge dust collectors and Ultra-Web filters know they have the best possible combination for cleaner air in their plant. How can they be so certain? Just like Ultra-Web cartridge filters, Donaldson Torit has perfected and improved cartridge dust collectors through the years to engineer a family of collectors that far outpace other technologies.

Today, DFO collectors provide up to a 25 percent increase in airflow capacity, an improved airflow path and up to 30 percent more pulse cleaning energy—all in a smaller collector with proven high performance filters that helps manufacturers conserve valuable floor space.

In the 1990s, Donaldson Torit invented proprietary DFO dust collectors with oval-shaped Ultra-Web filters and turned conventional round filter wisdom upside down. By re-shaping the cartridge filter from circular to oval, Donaldson Torit increased the effective media area of the filter—without adding more media or increasing the cartridge size. Combined with enhanced pleat configurations, increased space between pleats, shorter 1.5-inch pleat height, and improved Ultra-Web filter media technology, oval-shaped filters provide more effective media area and virtually eliminate clogging problems.



### 25 Years of Proof

For cleaner air, longer filter life and energy savings, there's nothing like proven and patented Ultra-Web. It's the world standard for nanofiber filtration and more than 1 billion square feet of Ultra-Web filter media has been used in dust collection applications to date. Ultra-Web technology is also used in medical

research, M1 Abrams tanks and more, improving lives beyond dust collection. Whether you need filters for your Donaldson cartridge collector or another popular brand, rely on the filter that has been performing for 25 years and counting. Ultra-Web.

#### FOR MORE INFORMATION CONTACT:

Petra Meinke, Donaldson Torit  
952-887-3966  
petra.meinke@donaldson.com

Debbie Olson, Donaldson Torit  
952-887-3866  
Debbie.olson@donaldson.com