FACT SHEET

What to Know About Fiberglass Fabric

Fiberglass provides distinct advantages for industrial filtration, but it can also present certain limitations. CLARCOR Industrial Air research and development of fiberglass filtration media offers you multiple alternatives in this product.

Surface-to-Air reinforcements

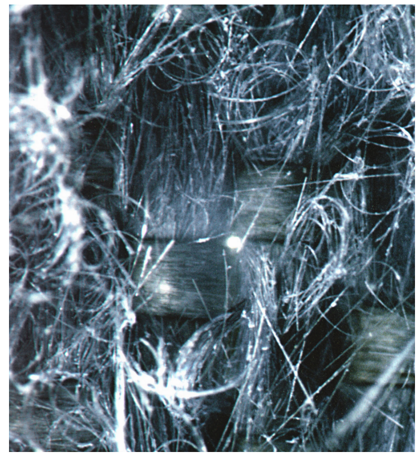
Because fiberglass fabric is woven, the surface is not as conducive to the buildup of a proper initial dustacake, the layer of dust that actually performs the filtration in a fabric filter. The intersections of the yarns woven together in the fabric are the trouble spots. Left exposed, these weave interstices offer less resistance than the strands themselves, and can create tiny zones of higher gas velocity that helps drives particulate into the crevices between the yarns.

Smaller particulate may actually bleed through the fabric at these points and escape as emissions. Larger particulate can become embedded and trapped, leading to an eventual blockage in that area. The trapped particulate resists cleaning causing eventual bag blinding that reduces collection efficiency.

Because fiberglass is fragile, aggressive cleaning isn't well tolerated. Over-cleaning can result in fibers fracturing, leaving bags even more prone to leakage. If the filter cleaning cycle is activated at pressure points, blinded bags can result in compartments be cleaned more often, reducing availability for collection and promoting even further bag damage.

The fibers of woven glass fabric can also be exposed to damage by support cage abrasion, bag-to-bag abrasion, rough handling during installation, and by chemical attack.

To combat the shortcomings of woven fiberglass, CLARCOR Industrial Air offers Tri-Loft®, a glass filtration fabric with a three-dimensional surface. Specifically designed for use in pulse-jet collectors with high-temperature applications, the lofty fibers of Tri-Loft present a surface similar to a felt, and help establish a good dustcake for better fltration as well



The highly texturized yarns of Tri-Loft offers benefits not found in traditional woven glass fabric.

Here the lofty surface fibers are moved aside to reveal the woven yarns that make up the fabric.

By forming a three-dimensional surface above the weave, the fabric promotes the formation of a proper porous dustacke as well as helps protect the fabric from abrasion damage and fiber fracture.

as fabric protection from dust impingement. This dustcake is critical for even airflow, low operating pressure drop and reduced cleaning cycles. The depth of the fibers also help cushion the fabric weave from surface abrasion as the fabric is flexed during cleaning.

Pulse-Jet Tri-Loft* (GL057) Performance

Fabric Type:	**18 oz. GL057 Tri-Loft**	**22 oz. GL059**	**16 oz. GL004**
Operating Efficiency:	99.983%	99.958%	99.936%
% Leakage: Outlet emissions	0.017%	0.042%	0.064%
Operating Pressure:			
Avg. Resistance to flow:			
Before cleaning:	3.60" w.c.	3.85" w.c.	3.20" w.c.
After pulse cleaning:	2.20" w.c.	2.40" w.c	1.90" w.c.

Note: All data taken from simulataneous 12 hour tests.
Particulate used was 0.5 micron in size.
Dust Loading at 10 grains/ACF with 4:1 air-to-cloth ratio.
Pulse Cleaning performed at same frequency and duration for each fabric.
GL057 fabric uses a Blue Max CRF-70 finish.

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CLARCOR Industrial Air also offers Reverse-Air Tri-loft, a fabric developed for Reverse Air collectors that uses the same highly texturized bluky fill yarns proven to be effective in pulse-ject collectors.

Reverse Air Tri-Loft (GL067) Performance

Fabric Type	Operating Efficiency	% Leakage Outlet Emissions	Operating Pressure Avg. Resistance to flow
12 oz. GL067 Rev.-Air Tri-Loft	99.992%	0.008%	3.90” w.c.
14.5 oz. 2x2 Broken Twill	99.984%	0.016%	4.30” w.c.
13.5 oz. 3x1 Twill	99.980%	0.020%	4.60” w.c.
9.5 oz. 3x1 Twill	99.881%	0.119%	3.90” w.c.

Note: All data taken from simulataneous 40 hour VESA tests.
Particulate used was 0.5 micron in size.
Dust Loading at 15 grains/ACF with 2.7:1 air-to-cloth ratio.
Cleaning performed at same frequency and duration for each fabric.
GL067 fabric uses a Blue Max CRF-70 finish.

The Finishing Touches

The process that happens to fiberglass after it’s woven makes all the difference in the world to how it works in your collector. Let’s start with the very first step that happens after weaving.

Coronizing

Fabrics that have been woven and subjected to no subsequent treatment are called greige (unfinished) fiberglass fabrics. Greige fiberglass yarns are coated with starches, oils, and various proprietary chemicals that lubricate the yarns during weaving to prevent abrasion and increase loom production. These coatings or sizings are applied to all yarns as they are produced, and sometimes to the warp yarns before weaving.

In the “loom” or greige stage, fiberglass fabric is unsuitable for use in filter bags because the lubricants applied for weaving purposes decompose at baghouse operating temperatures leaving the bare glass filament exposed and extremely susceptible to abrasion and chemical attack. It is critical to burn off these lubricants through the coronizing process prior to applying the final finish designed for use in the baghouse. This process prevents the final finish from being burned off with the weaving lubricants when they are exposed to baghouse temperatures and assures the most complete bond between the glass and the finish.

During coronizing, the glass yarns are also softened and the weave “crimp” is set to improve pliability and relieve flex stress. To coronize the fabric, it is passed through a furnace or an oven at temperatures of 1,000° to 1,300° F.

Purpose of the Finish

After coronizing, the fabric must have a finish applied prior to use in filtration. The primary function of all such coatings is to protect the glass yarns from yarn to yarn abrasion through lubrication. While fiberglass itself can withstand high temperatures, other conditions in a pollution control system, mechanical forces and gas stream chemistry severely limit the use of fiberglass as a durable filtration media. Due to this, there have been several types of finishes developed for fiberglass over the past 30 years. Generally, however, there are only four types of finishes which are used in the filtration industry.

Silicone Graphite PTFE Finish

This was the first finish developed and is still used successfully today. It possesses the lubricating properties necessary for use in high temperature baghouses with relatively neutral gas stream conditions. The original silicone/graphite/PTFE is a suspension of silicone oil, graphite, and fluorocarbon (PTFE). This finish is used in high temperature (up to 500° F) baghouses where chemically active gas steam conditions are mildly present. This finish provides good lubricating qualities to the fiberglass yarns, but very little protection against chemical attack. The finish is used primarily in cement and metal foundry applications.

PTFE

PTFE was the next finish developed, emerging in the mid-1970s. It was designed to provide continuing lubricating qualities and improved resistance to chemical attack. PTFE is chemically inert, but the particles are not soluble and do not bond to the glass fibers. Therefore, a high add-on (10% of the finished fabric weight) is required for more uniform coverage. The 10% PTFE finish is limited to mild pH conditions.

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What to Know About Fiberglass Fabric

Acid-Resistant Finish

This finish was initially developed for the carbon black industry in order to extend bag life with resistance to sulfuric acid attack. The finish consists of acid-resistant polymers, PTFE, graphite and silicone oils. The polymers form a covalent bond with molecules on the surface of the glass fibers. The bonded polymer encapsulates the glass fibers and forms a protective barrier to acid attack. This finish is suitable for applications such as carbon black and utility and industrial boilers using high sulfur coal.

Blue Max CRF-70® Finish

The original acid-resistant coating was enhanced to form the Blue Max CRF-70 finish. It is based upon a combination of two finishes successfully used in the utility industry: fluorocarbon (PTFE) and acid-resistant finish.

Blue Max CRF-70 finish is a proprietary formulation of a polymer to prevent the chemical attack of glass yarns and PTFE to provide superior abrasion resistance. It is based on a unique PTFE dispersion that has been formulated to promote covalent bonding and coalescence of the PTFE particles. The finish provides good glass fiber encapsulation for resistance to abrasion and chemical attack (both from acids and alkalis), and offers excellent dustcake release properties.

Field testing of this finish verified an original flex cycle endurance several times greater than fluorocarbon (PTFE) and other acid resistant finishes. Surprisingly, the finish has displayed even greater flex endurance after exposure to acids.

Blue Max CRF-70 finish is in service in applications ranging from carbon black, coal-fired boilers, incinerators, and cement and lime kilns to utility FGD systems.

Which Finish is Right for You?

There are four questions that can help you determine which finish is right for your industrial dust collection application:

1. Is the finish sufficiently cured for optimum performance?

Proper curing bonds the finish to the glass fibers, ensuring that chemical reactions of components are complete and also provides water repellency, both of which are critical to performance. A good method of testing this property is to drop a small amount of water on the fabric and allow it to stand for a minimum of 20 minutes. Wicking or absorption of the water prior to the end of this period indicates the finish has not been properly cured.

2. Has the fabric been coronized before finishing

It is critical to coronize fiberglass fabric before the chemical finish is applied. Coronizing is the heat cleaning of fiberglass fabric by running it through an oven at temperatures of 1,000° F (540° C) to 1,300° F (700° C). To prevent abrasion of the yarns during weaving, fiberglass yarns are coated with starches, oils and various proprietary chemicals. These temporary lubricants decompose at baghouse operating temperatures if not removed prior to finish application. When this decomposition occurs, the finish is separated from the glass surface, leaving the glass filaments exposed to abrasion and acid attack. We recommend coronizing be specified on your request for quotation and purchase orders for filter bags. You may verify this process by obtaining certification from your filter bag supplier.

3. How critical is LOI (Loss on Ignition) to performance?

The LOI test is a means of measuring the percentage of finish and is performed by measuring the amount of material that is volatile at 1250° F (680° C) for thirty minutes. This test does not indicate the components or the amount of each component used to construct the finish. For example, if the fabric is not coronized, the LOI would include the weaving lubricants which are approximately 2.5%. A higher LOI percentage does not insure higher performance due to what the LOI test measures and the other factors that control the effectiveness of the finish.

What to Know About Fiberglass Fabric

The effectiveness of the finish is determined by several factors such as the percent of finish, the properties of the components, and proper application and curing. In some cases, a higher percentage of finish (LOI) or more of an inexpensive component may be detrimental to performance of the filter.

A Silicon/Graphite/Teflon (SGT finish could be loaded with a high percent of the least expensive component (graphite) to yield a high LOI with no benefit to the performance of the filter bag. Graphite loses its lubrication properties at higher baghouse operating temperatures. Conversely, PTFE particles form a coating that does not protect the glass filaments unless a high add on is used. It should be noted that PTFE gives only abrasion resistance, and provides little or no resistance to chemical attack.

In the case of acid and chemical resistant finishes, the key for optimum performance is not in the percentage of add on (LOI) of the finish, but in the chemical components that react with each other and the glass surface (during the curing process) forming a protective barrier for the glass filaments.

The following LOI specifications have provided acceptable performance and are the most frequently used specifications in the industry:

Silicone Graphite PTFE: 1.4%

Fuorocarbon (PTFE): 10% minimum

Acid-Resistant Finish: 3.7% minimum, 4.0% average

4. Should only first-quality fabric be specified?
Specifying that the effective filter area of the bag (bag body) be manufactured with only first quality goods will help ensure that the bag is produced with fabric that is properly finished and does not contain functional weaving flaws that will effect bag performance. Material that is off grade due to weaving flaws may be used for ring covers since flaws may be cut out. Certification that goods are first quality may be requested from your filter bag supplier.

For more information, contact your BHA representative at **CLARCOR Industrial Air**.
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