

Ahlstrom Disruptor® Nonwoven filter media



Some things you expect to be a little dirty -
but not your drinking water.

The patented nanoalumina technology used in Disruptor® was developed through basic research by the Argonide Corporation that was partially funded by NASA. Argonide's NanoCeram® water filter received the Space Foundation's Hall of Fame award for 2005. This technology is now under exclusive license by Ahlstrom.

At 2 nm in diameter and 250 nm in length the alumina nanofibers have a surface area of >500 gm, making them among the smallest, commercially available nanofibers fibers available.

The nanoalumina fibers generate a natural positive charge that radiates a distance of up to 1 micron from each nanofiber. This charge field emanates through water to disrupt the path of the contaminant as it traverses through the pore structure of the

filter media until becoming adsorbed by the nanofibers and removed from the water stream. Since the nanofibers are attached to a microglass structural fiber, the pore size of the nonwoven media has been designed such that the capture cross section of the 0.7 micron pore by the charge field is total. Being a depth filter media, the liquid must pass through approximately 400 pores in the Z direction that are fully permeated by the charge field generated by the nanoalumina fibers. This is the reason that a 0.8 mm thick media with a 0.7 micron average pore size can efficiently remove virus and other submicron particles making it comparably to UF or MF membranes but having very high flow rates and very low pressure drop.

The filter media itself is designed to synergistically maximize the benefit of all the above features to create a depth filter media that has very high loading capacity at less than a 0.2 bar pressure differential, yet removes submicron particulates as effectively as polymeric membranes. This is accomplished by fully covering the surface of the microfiber glass with nanoalumina fibers while creating a mean pore volume of less than 1 micron. This design has in excess of 42,000 square meters of nanoalumina fiber surface area per square meter of filter media. Since the charge extends up to 1 micron from the nanofiber it effects the entire volume of the average pore throughout the 0.8 mm depth of the sheet.

This design gives the media >3LRV of MS2 virus (0.027 um), >4 LRV of B. Diminutia bacteria (0.3 um) and > 4 LRV of cryptosporidium (3.0 um).

Testing has also found the media to be able to remove certain dissolved metal such as copper, tin, iron, and aluminum. This feature can provide significant benefits for both potable and waste water processing.

The Disruptor® nonwoven filter media can be easily converted using standard converting equipment to fit nearly any flat sheet, pleated or lenticular filter design.



Small fibers. Big difference.

Disruptor® PAC

In addition to containing 32% by weight of nanoalumina fibers, this media also contains 32% by weight of powdered activated carbon (PAC) with an average particle size of only 8 microns. PAC at this particle size produces remarkably high dynamic adsorption as compared to nonwovens containing granular carbon. This retention mechanism makes nearly all the pores of the PAC available for adsorption of chlorine, iodine, volatile organic compounds (VOCs), disinfection by products (DBPs) and humic compounds from water. Even with 32% PAC added, all the nanoalumina fibers are still available to remove particulate and colloidal contaminants as effectively as Disruptor® without PAC.

Testing has determined that unlike microfiltration (MF) or ultrafiltration (UF) polymeric membranes, Disruptor® PAC is very effective in removing humic compounds. Removal of humic compounds prior to disinfection can reduce or eliminate the disinfection by products (DBPs) that are often created due to interaction with chlorine or bromine. Removal of humic and other organic compounds from reverse osmosis feed water will improve membrane performance and life by reducing membrane biofouling.

Health Safety and the Environment

Being a naturally occurring element, boehmite has none of the known HSE issues surrounding other nanofibers such as single and multiwalled carbon nanotubes. Boehmite has long been used as an additive to food products, digestive analgesics, industrial applications and as an adjuvant for human vaccines.

Submicron boehmite has been commercially manufactured for many years for use in refractory materials and fillers. The manufacturers of the media classify it as a nontoxic nuisance dust.

This media has passed Standard 53 for potable water contact, USP Class VI testing and endotoxin testing.

Typical Properties of Disruptor® Grades ⁽¹⁾

Grade		5281	5283	5282	5284
Description		Cellulose Laminated	Heat Seal Laminated	Carbon Cellulose Laminated	Carbon Heat Seal Laminated
Weight	g/m ²	319	319	319	319
Thickness	mils	36	40.5	34.5	34.5
Frazier	cfm	0.4	0.55	0.4	0.6
Air Flow	L/mim/100cc	3.2	4.4	3.2	4.8
Rapidity	mls/min	5	8	5	9
Herzberg	Sec/100 mls	1400	860	1400	765
Wet Burst	inch H ₂ O	>250	>250	>250	>250
Peel Strength	grams	50	185	75	110
Pore Size ⁽²⁾	microns				
MFP		0.7	1.2 (5)	0.7	0.8
Min		0.2	0.25	0.2	0.25
Max		2.5	3.25	2.25	2.5

(1) This is typical data for comparison purposes and not specifications of the grade. (2) Pore size is determined using PMI.

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More information and a video demonstration of the power of Disruptor® filter media are available at www.ahlstrom.com/disruptor.
Contact Rod Komlenic, VP of Liquid Filtration Business Development for more information at: rod.komlenic@ahlstrom.com



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