

Protector™ Red-D Ultra

SUBMICRON DEPTH FILTRATION

The Protector™ Red-D Ultra Submicron Depth Filtration Series manufactured by QMP using a proprietary, patented, electroadsorptive media technology, are capable of removing submicron pathogens and inorganic contaminants through electroadhesion and ion exchange. This technology makes it possible for a nonwoven media to produce filtration efficiency comparable to ultra membrane filtration but at very low pressure drop, with high flow rates and high loading capacity working equally well in fresh, brackish or salt waters.

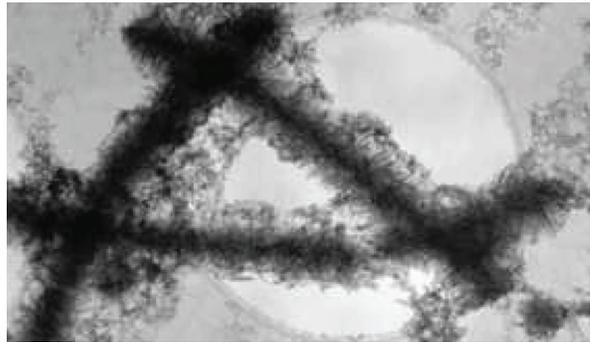


Fig. 1: Shown above are three, 0.65 micron microglass fibers coated with alumina that form a pore approx 3 x 2 microns in size. Such a large pore allows for high flow rate at very low pressure drop but as a mechanical filter, has only about 2-3 micron initial efficiency. There are approximately 400 such pore structure layers in the Red-D Ultra filter media to produce an excellent depth filtration media.

Photos courtesy of R. Ristau, IMS, Univ. of Conn.

The Protector™ Red-D Ultra media consists of coated micro-glass fibers produced using a wet laid nonwoven manufacturing technology. The base media is laminated between layers of spun-bond to provide both strength and pleat support. The media in the Protector™ Red-D Ultra filter is NSF 61-approved (Drinking Water System Components - Health Effects), and USP Class VI testing and endotoxin testing.

With the ability to remove membrane biofoulants such as organic acids, bacteria and cellular debris the Protector™ Red-D Ultra is an effective pre-filter to protect reverse osmosis membranes from biofouling. By reducing membrane biofouling, the Protector™ Red-D Ultra filter extends the performance and life of RO membranes by increasing the time between clean-in-place treatment and reduces the volume of reject water. Energy savings are also gained, because clean membranes operate at reduced pressure drop, saving energy. Opportunities for improving RO membrane performance include industrial and municipal wastewater, water re-use, municipal drinking water and desalination.

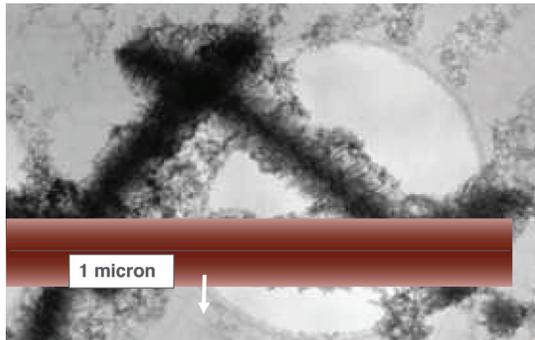


Fig. 2: When exposed to water between pH 5 – 9.5, a charge potential is generated by the natural crystal structure of the alumina fibers. The resulting charge field radiates to a maximum distance of 1-micron from the fibers as represented by the red shaded area. Expressed as streaming zeta potential, the charge field of Red-D

Ultra has been consistently measured as greater than 53 millivolts at pH 7.2.

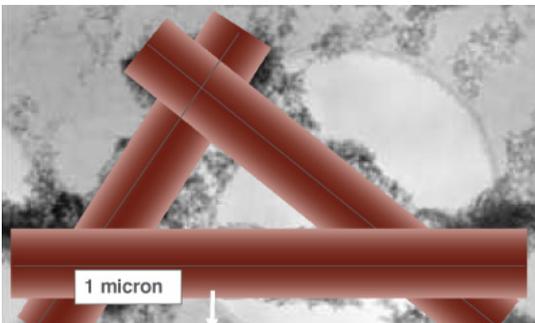


Fig. 3: Red-D Ultra has been specifically engineered to have an average pore size of 2 microns and a mean flow pore of 0.7 microns. This allows the charge field created by the alumina fibers to effect the total volume of the individual pores as well as virtually the entire void volume of the filter media

itself! 1-micron Red-D Ultra media has more than 400 individual pores making up the average sheet thickness of 0.8 mm. Contaminants are removed by being exposed to a torturous path through the media, depth and the powerful electropositive charge field generated by the alumina fibers.

Figures 1-3 above represent magnified views of the Protector™ Red-D Ultra filter media, and the processes of what takes place during the electrical charge created by the alumina fibers (from natural boehmite). (Turn over for benefits and features of Protector™ Red-D Ultra)

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In addition to its submicronic benefits, the Protector™ Red-D Ultra filter is also available in three other versions:

1. With natural silver impregnated in the media to protect the filter surface from bacterial and fungal growth, killing pathogens on the filter surface. This makes the filter environmentally intelligent and allows the filter to be disposed of at any recycling center or waste facility.
2. With powdered activated carbon with an average particle size of only 8 microns. Activated carbon at this particle size produces remarkably high dynamic adsorption*.
3. With powdered activated carbon and natural silver with the same benefits as above.

*See contaminant removal lists below.

The Protector™ Red-D Ultra filter reduces or removes the following pathogens:

- >99.99% viruses (polio, rotovirus, norovirus, etc.)**
- >99.99% bacteria (e coli, legionella, pseudomonas, etc.)**
- >99.95% cysts (giardia, cryptosporidium, etc.)**

**Tested by a certified laboratory in the U.S. (testing was done at 6.5pH)

The Protector™ Red-D Ultra filter removes or reduces the following heavy metals:

- >95% Lead**
- >80% Ferrous Iron**
- >95% Arsenic V**
- >95% Cadmium**
- >85% Chromium**
- >75% Selenium**
- >60% Mercury

**Tested by a certified laboratory in the U.S. (testing was done at 6.5pH)

The Protector™ Red-D Ultra filter removes or reduces the following organics and inorganic chemicals:

- Chlorine (carbon version)
- Bromine (carbon version)
- Iodine (carbon version)
- VOCs (volatile organic compounds)
- PCBs and BPA
- Residual pharmaceuticals
- Biofouling precursors: organic acids, proteins, polysaccharides

Applications for and industries benefitting from the Protector™ Red-D Ultra filtration process:

- Residential use where cost effective systems must be used and presence of pathogenic-laden water is of ongoing concern
- Food and beverage industry for high purity water
- Pharmaceutical industry for high purity water
- Commercial pre-RO and ultra filtration treatment to sustain the life of the membranes
- Greywater recycling for removal of pathogens
- De-salination for pre-filtration
- Other high purity applications
- Water re-cycling treatment for circuit board industry

Benefits using the Protector™ Red-D Ultra Filter Cartridges versus other medias:

- Finer particle retention and filtration capacity (2 to 3-micron pore size comparable to a 0.02-micron size for virus removal)
- Higher loading capacity (up to 25 times greater)
- Greater efficiency in salt, brackish and fresh water
- Wider pH operating window (4-9pH)
- Very low pressure drop (approximately 2 psi)
- Lower cost of ownership
- The capability of using one stand-alone filter system to achieve pathogen, heavy metal, taste and odor, chemical and organics removal or reduction (the carbon and silver version); for a broad range of applications including residential whole house point-of-entry and point-of-use water filtration; shower filters; portable water filtration for bottles and backpacks; unlimited commercial water filtration applications.

The Protector™ Red-D Ultra Filter Series are available in 2.5-inch and 4.5-inch diameters (OD), and in 5 to 40-inch lengths.



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