



Competitive Comparison - Electromedia® to Manganese Greensand

Issue	Electromedia®	Manganese Greensand	Notes
Media Composition	Naturally Mined & Processed Proprietary Media	Manganese Oxide Coated Glauconite	Glauconite is an iron, potassium, alumino-silicate material of marine origin. Filtronics media is a multilayer media comprised of two support layers, two filtration layers, and an anthracite layer. The filtration media is a naturally occurring mineral which is specially processed. The media is both mined and treated in the U.S. All components of the media are NSF 61 certified.
Media Flux Rate	5 to 15 gpm/sf	1 to 5 gpm/sf	Greensand efficiency drops significantly when iron concentrations rise above 1 mg/l (3 gpm/sf or less). Electromedia® typically retains flux rates as high as 10 gpm/sf with iron levels as high as 2 mg/l.
Backwash Duration	4 minutes + 1 minute rinse	15 to 20 minutes + 15 minutes rinse	In a 1,000 gpm system the backwash volume from a Filtronics system will be 9,000 gallons vs. 60,000 gallons from a greensand system. At 1,000 gpm and 24/7 operation, the greensand system will produce 1.2+ million gallons more waste water than a comparable Filtronics plant
Foot Print	Small	Large	A Filtronics Electromedia® will be ½ to ¼ the size of a comparable greensand filtration plant – The footprint of a 3,000 gpm Filtronics system is 40' by 60' including chemical feed building
Backwash Efficiency	High	Low	Third party testing of backwash turbidity shows Filtronics achieves turbidity reductions from well above 450 FTU's down to 4 FTU's in four minutes. At four minutes, greensand had not dropped below the 450 FTU level and was still at an unacceptable 32 FTU's after ten minutes
Chemical Regeneration	Not Required	Required	Greensand requires chemical regeneration with potassium permanganate representing additional chemical and manpower costs
Air Scour	Not Required	Required	Longer intervals between greensand backwashes (due to high BW volumes) allow formation of mud balls which must be broken loose through use of compressed air scouring
Surface Wash	Not Required	Required	Iron schmutz forms gelatinous layer if backwash intervals exceed 12 hours – This must be broken in greensand systems using a surface wash nozzle array
Backwash Interval	8 to 12 Hours	24+ Hours	Greensand operators tend towards longer filtration to backwash intervals because of huge greensand backwash volumes and typically manual system interface. This extended backwash interval leads to premature media bed replacement

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Automation	PLC Controlled	Manual Operation or Mechanical Timers Typical	Filtronics' high level of automation reduces operator interface and provides smooth, consistent system operation as well as system safety, alarms, and advanced status reporting. Greensand systems may also be automated using mechanical timers or PLC's but this is not typical given the lack of system differentiation between various greensand manufacturers
Backwash Disposal Options	<u>Reclaim</u> , Sewer, Evaporation Pond, Drain Field	Sewer, Evaporation Pond, Drain Field	Because the backwash volume is comparatively small, it can be put into a reclaim storage tank for reclaim. Unlike greensand systems with huge backwash volumes which must discharge to a pond, the Filtronics backwash water does not become a surface water source and may, therefore be reintroduced into the system for processing. Solids in this tank will be disposed of every six to twelve months. In a 1,000 gpm 24/7 system, this means a greensand system will waste 21.9 million gallons a year compared to about 1,500 gallons for an Electromedia® based system. If another disposal option is selected, a 1,000 gpm Filtronics system will emit about 33,000 gallons <i>less</i> waste water per day than a comparable greensand plant
Periodic Media Bed Replacement	Not Required	Required Every Three to Seven Years	Greensand filter beds will become expended, allowing contaminant breakthrough, and must be replaced. The duration between replacements is based on water quality. Costs of media replacement can range from thousands of dollars to multiple tens of thousands of dollars. Because of the true adsorptive nature of Filtronics Electromedia® and the efficiency of backwash, our media never requires replacement
Capital Costs	Equal or Less	Equal or More	If a true "apples to apples" comparison is made using equivalent levels of automation, Filtronics Electromedia® systems will always be less because of the greatly reduced plant size. This pricing comparison is usually not the case and, since the Filtronics costs include a significantly superior level of computer automation, most Filtronics systems are, at worst, on a par with greensand filter plants in terms of capital costs. When operational costs and periodic greensand media replacements are considered, Filtronics always compares favorably at significant savings for superior performance.
Chemical Costs	Less	More	Using a 1,000 gpm 24/7 system with 1 ppm iron and ½ ppm of manganese, greensand operating chemical costs (excluding regeneration) will be \$14,979 per year (based on 22.8 ppd of KMnO ₄) or about \$28.50 per million gallons. A corresponding ® system will cost \$5,459 per year (based on 14.76 gpd of NaOCl and 4.86 gpd of NaHSO ₃) or approximately \$10.39 per million gallons. The annual cost savings in this scenario is \$9,520 in favor of the Filtronics system.

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Backwash to Filtration Ratio	2% or Less	4% or More	A function of backwash volume produced in a given filter run
Pink Water Complaints	None	Possible	Results from overfeeding potassium permanganate based on feed calculation or operator errors. Filtronics does not use potassium permanganate as an oxidant and does not regenerate media. Chemical feeds are automatically measured and monitored by the Filtronics PLC using a chlorine residual analyzer (when Cl ₂ or NaOCl are used as oxidants).
Disinfection Residual	Typically Inclusive	Must Be Added As An Auxiliary Feed	Using Cl ₂ or NaOCl as the system oxidant, a chlorine free residual may be maintained and monitored through the Filtronics plant. This must be performed as a separate and distinct feed added to a greensand system. The expense for this requirement was not factored in the cost comparisons above.
Odor & Taste Control Results	Superb	Inconsistent	Oxidation of sulfides using potassium permanganate requires high levels of chemical energy and time making greensand effectiveness solving odor & taste issues problematic. Filtronics systems using Cl ₂ or NaOCl as an oxidant require less chemical energy and time – Also, a small auxiliary feed of NaHSO ₃ or SO ₂ is applied as a catalyst reducing the time requirement to allow the system to easily eliminate rubber taste and rotten egg odors.
Weekly Operator Time	1 Hour or Less	7 Hours or More	The weekly Filtronics operator requirement is a check every one to three days (based on operator's site visit schedule) of alarm lights and the chlorine residual indicator. Chart recorder paper should be changed each week. Greensand operators must check chemical feeds, regeneration requirements, and perform backwashes (usually on a daily basis).
Water Customer Satisfaction	High	Varies	Filtronics media performs consistently well for the life of the system producing continuing high quality water. Manganese greensand's performance will degrade over time with a gradual slope of increasingly poor effluent quality until breakthrough. Breakthrough indicates the need to replace the media bed. As the greensand media bed nears its expiration, there will be increasing complaints relative to hot water heater rusting, laundry issues, porcelain & dishwasher stains, and perhaps taste & odor complaints.
Performance Warranty	Standard	None	Filtronics pilot tests every prospective system to determine chemical feed requirements, water quality issues, and system performance. Based on the results of this testing system performance as well as equipment is guaranteed. Greensand manufacturer's typically will provide limited warranties for their equipment, but not for the process itself.

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Quality Control	Superb	Limited	All Filtronics systems are fabricated in the company's Anaheim, CA facility prior to shipment. The system valve nest is shipped complete and attached to the filter vessels and system fit is verified. Automation panels are assembled and tested. Chemical feed panels are also pre-assembled to insure that they are installed properly by the contractor. Typically greensand manufacturers drop-ship components to jobsites directly from their suppliers without verifying quality standards.
Interface Capability	RS-232, Phone Dialers, Radio-Telemetry, SCADA, 0-20 mA signals, Local Relay Contacts	Typically None	Greensand system manufacturers provide the least possible automation to control costs in what is (for them) a commodity market. Though high levels of automation are also possible with greensand systems, they are usually not provided unless specified.
Reclaim Efficiency	Better Than 99.997%	None	Using the reclaim option, a 1,000 gpm 24/7 system will produce 525.6 million gallons of water per year and lose about 1,500 gallons when reclaim solids are removed from the tank.