

Engineering Data Sheet

5315

Process: FilterFresh™ Potable Water Production Plants

Product Description

The FilterFresh™ product line are skid mounted factory piped and wired package plants which have been designed to produce potable water from brackish and polluted lakes and rivers. The FilterFresh™ process is shown on attached drawing No. S-2000. Process treatment consists of solids removal followed by granular activated carbon adsorption and reverse osmosis purification. Lastly, finished water is chlorinated for disinfection.

Product Applications

Total dissolved solids as high as 2,500 mg/L can be accommodated. Pollutants consisting of pesticides, fungicides, herbicides, nitrates, DDT, PCB, and dissolved organics, including toxins and sanitary wastes, are also removed. In addition, radionuclides, hardness, iron, and manganese are effectively removed along with algae, color, bacteria, viruses, cryptosporidia, and the cysts of the parasite Giardia Lamblia.

Use of the product in major disaster areas is ideal. Earthquakes, floods, grid failures, hurricanes, tornados, and volcanic eruptions can cause power outages. When power outages occur potable water supplies are always cut off for the length of the power outage as the entire infrastructure depends on electrical power.

Potable water quality meets the potable water quality maximum limitations listed in Appendix I. The potable water produced may be bottled or otherwise distributed. Finished water quality complies with the *International Bottled Water Association - Model Bottled Water Regulation*. The product water complies with the Primary and Secondary Water Quality Regulations of the United States Environmental Protection Agency in Appendix II as well as the World Health Organization Guidelines for Drinking Water Quality, Vol. 1, 3rd ed. (2004).

Product Usage

Routine plant operation is entirely automatic and fail safe. Refilling the chemical feed tablet hypochlorinator and changing out the bag and cartridge filters are the only operational requirements. Operator skill requirements have been intentionally minimized. The use of "best quality available" components translates into a high degree of treatment reliability. All treatment vessels are entirely enclosed thereby preventing against the introduction of atmospheric contaminants such as acid rain, radioactive particles, volcanic fallout, bacteriological spores, forest fire ashes, and wind-borne dust.

A 15 year mechanical warranty on the reverse osmosis membranes and a 5-year mechanical warranty on the remainder components are standard. These warranties apply whether the plant is moved from location to location or placed at a single site.

The FilterFresh™ Potable Water Production Plants are available on prepiped and prewired skids for immediate deployment under all field conditions. The skids are equipped with wheels and trailer hitches for rapid hauling to each project site. Diesel fuel is required for routine operation.

Quality Control

FilterFresh™ plants are fully tested prior to shipment to minimize set-up time at destination. A factory trained service engineer is available to assist in plant start-up and to provide operator training. A comprehensive operation and maintenance manual accompanies the equipment. FilterFresh™ Plant operational services are also available.

The Engineers, Chemists, and Scientists At **WaterSmart Environmental, Inc.** Welcome Your Inquiries With Enthusiasm.

From the Engineering Department of
WaterSmart
Environmental, Inc.



Appendix I

FilterFresh™ Water Quality - Maximum Limitations

Water Properties	
Color	< 5
Turbidity	< 1 NTU
pH	6.5-8.5
Odor	3 T.O.N.
Radionuclides	15 pCi/L
Gross Beta	50 pCi/L

Inorganic Compounds, mg/L	
Antimony	0.006
Arsenic	0.05
Barium	1.0
Beryllium	0.004
Cadmium	0.005
Chloride	250.0
Chlorine	< 0.1
Chromium	0.05
Copper	1.0
Cyanide	0.1
Fluoride	4.0
Lead	0.005
Manganese	0.05
Mercury	0.001
Nickel	0.1
Nitrate	10.0
Nitrite	1.0
Total Nitrate/Nitrite	10.0
Selenium	0.01
Silver	0.025
Sulfate	250.0
Thallium	0.002
TDS	500.0
Zinc	5.0

Organic Compounds, mg/L	
Di(2-ethylhexyl)adipate	0.4
Alachlor	0.002
Atrazine	0.003
Benzo(a)pyrene	0.0002
Carbofuran	0.04
Chlordane	0.002
Dalapon	0.2
Dibromochloropropane	0.0002
Dinoseb	0.007
2,3,7,8-tetrachlorodibenzo-o-dioxin (dioxin)	3x10 ⁻⁸
Diquat	0.02
Endothall	0.1
Endrin	0.0002
Glyphosate	0.7
Hexachlorobenzene	0.001
Hexachlorocyclopentadiene	0.05
Lindane	0.0002
Methoxychlor	0.04
Oxamyl (vydate)	0.2
Pentachlorophenol	0.001
Di(ethylhexyl)phthalate	0.006
Picloram	0.5
Simazine	0.004
Toxaphene	0.003
2,4-D (dichlorophenoxy acetic acid)	0.07
Ethylene dibromide	0.00005
Heptachlor	0.0004
Heptachlor epoxide	0.0002
(PCB) polychlorinated biphenyls	0.0005
2,4,5-TP (silvex)	0.01
Phenolics	0.001

Volatile Organic Compounds, mg/L	
Trichloroethylene	0.005
Carbon tetrachloride	0.005
Vinyl Chloride	0.002
1,2-Dichloroethane	0.005
Benzene	0.005
1,1-Dichloroethylene	0.007
1,1,1-Trichloroethane	0.200
1,2,4-Trichlorobenzene	0.07
1,1,2-Trichloroethane	0.005
o-Dichlorobenzene	0.600
p-Dichlorobenzene	0.075
trans-1,2-Dichloroethylene	0.100
1,2-Dichloropropane	0.005
Ethylbenzene	0.700
Dichloromethane (methylene chloride)	0.005
Monochlorobenzene	0.100
Styrene	0.100
Tetrachloroethylene	0.005
Trihalomethane	0.010
Toluene	1.000
Xylene	10.000

Appendix II
United States Environmental Protection Agency
Water Quality Criteria
Section I: Primary Standards

Synthetic Organic Compounds (SOC)

Values in Milligram/Liter

<i>Compound</i>	<i>Federal MCL</i>	<i>Compound</i>	<i>Federal MCL</i>
2,3,7,8-TCDD (Dioxin)	3x10 ⁻⁸	Endrin	0.002
2, 4, 5-TP (Silvex)	0.05	Epichlorohydrin	T.T.*
2,4-D	0.07	Ethylene Dibromide (EDB)	0.00005
Acrylamide	T.T.*	Glyphosate (Rodeo, Roundup)	0.7
Alachlor (Lasso)	0.002	Heptachlor	0.00004
Aldicarb	0.003	Heptachlor Epoxide	0.0002
Aldicarb Sulfone	0.002	Hexachlorobenzene	0.001
Aldicarb Sulfoxide	0.004	Hexachlorocyclopentadiene	0.05
Atrazine	0.003	Lindane	0.0002
Carbofuran	0.04	Methoxychlor	0.04
Chlordane	0.002	Oxamyl (Vydate)	0.2
Dalapon	0.2	PAHs (Benzo(a)pyrene)	0.0002
Di(2-ethylhexyl) adipate	0.4	PCBs	0.0005
Dibromochloropropane (DBCP)	0.0002	Pentachlorophenol	0.001
Diethylhexyl Phthalate	0.006	Picloram	0.5
Dinoseb	0.007	Simazine	0.004
Diquat	0.1	Toxaphene	0.003
Endothall	0.1		

*T.T.—No MCL, the Treatment Technique used satisfies state & federal water quality requirements.

Volatile Organic Compounds (VOC)

Values in Milligram/Liter

Compound	<i>Federal MCL</i>	<i>Compound</i>	<i>Federal MCL</i>
1,1,1-Trichloroethane	0.2	Ethylbenzene	0.7
1,1,2-Trichloroethane	0.005*	Ortho-Dichlorobenzene	0.007
1,1-Dichloroethylene	0.007	Para-Dichlorobenzene	0.0785
1,2,4-Trichlorobenzene	0.07	Styrene	0.1
1,2-Dichloroethane	0.005	Tetrachloroethylene (PCE)	0.005
1,2,-Dichloropropane	0.005	Toluene	1
Benzene	0.005	Total THM	0.1
Carbon Tetrachloride	0.005	Trans-1,2-Dichloroethylene	0.1
Chlorobenzene	0.1	Trichloroethylene (TCE)	0.005
Cis-1,2-Dichlorobenzene	0.07	Vinyl Chloride	0.002
Dichloromethane	0.005	Xylenes (total)	10

*The MCLG is 0.003, lower than the MCL of 0.005.

Inorganic, Including Heavy Metals

Values in Milligram/Liter

<i>Compound</i>	<i>Federal MCL</i>	<i>Compound</i>	<i>Federal MCL</i>
Arsenic	0.05	Lead	0.015
Antimony	0.006	Mercury	0.002
Asbestos (Fiber>10 Microns)	7 MFL*	Nickel**	0.1
Barium	2	Nitrate (As N)	10
Beryllium	0.004	Nitrite (As N)	1
Cadmium	0.005	Selenium	0.05
Chromium	0.05	Silver	0.0001
Copper	1.3	Thallium	0.002
Fluoride	4		

*MFL—millions of fibers per liter; monitoring is required once every nine years.

**EPA remanded nickel MCL in 1995 and may repose a different level in the future.

Radionuclides

Values in Picocuries/Liter

Standards for radiological quality are set for specific elements and for the total radioactive element content as measured by alpha, beta, and gamma radiation. Monitoring is required once every four years.

<i>Parameter/Element</i>	<i>Federal MCL</i>	<i>Parameter/Element</i>	<i>Federal MCL</i>
Gross Alpha	15	Radium 228	20
Gross Beta	50	Radium 226-+228	5
Radium 226	20		

Microbiological/Physical

Organisms are removed or inactivated by physical processes and disinfectants. The efficiency of these processes is indicated by bacteriological testing to demonstrate the absence of coliform bacteria, as well as the clarity of the finished water and the residual disinfectant level.

<i>Compound</i>	<i>Federal MCL</i>
Total coliform	<1 per 100 ml in 95% of samples
Turbidity (filtration)*	0.5 NTU
Disinfection*	CT Ratio >1

*The filtration and disinfection requirements are treatment technique requirements to protect against the potential adverse health effects of exposure to *Giardia Lambia*, viruses, *Legionella* and heterotrophic bacteria, as well as many other pathogenic organisms that are removed by these treatment techniques (quote from June 29, 1989 EPA Surface Water Treatment Rule).

Section II: Secondary Standards

Secondary Standards			
Values in Milligrams/Liter			
These tests assure non-enforceable aesthetic standards of appearance, odor and taste.			
<i>Parameter</i>	<i>Federal Recommendation</i>	<i>Parameter</i>	<i>Federal Recommendation</i>
Aluminum	0.2	Silver	0.1
Chloride	250	Sulfate	250
Iron	0.3	Total Dissolved Solids	500
Manganese	0.05	Total Chlorine	4
Odor	3 T.O.N.	Zinc	5
*T.O.N.—threshold Odor Number (range 0-3 is best).			

Section III: Unregulated Parameters

These compounds have no EPA regulated MCL but are required to monitor.

Volatile Organic Compounds	Synthetic Organic Compounds	Microbiological/Physical
Bromobenzene		

Section IV: No Standards

The EPA does not regulate these parameters. Many cities test them to assess aesthetic quality and corrosivity of water. Water is often softened to make it more palatable and to reduce the amount of soap and detergents used by customers.

Alkalinity, phenol

Alkalinity, total

Ammonia

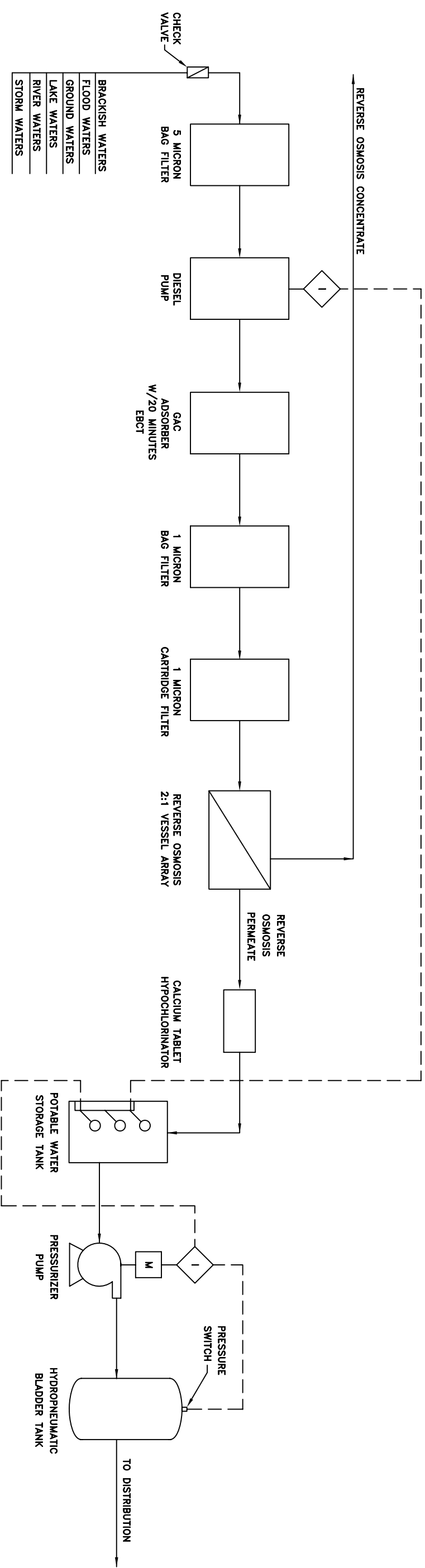
Calcium Hardness

Corrosivity

Magnesium Hardness

pH

Total Hardness



FilterFresh™ Potable Water Production Plants

SPECIFICATIONS

FILTER FRESH™ MODEL NO.	CAPACITY MGD	SKID SIZE	NUMBER OF SKIDS	NEMA CONTROLS	SUPPORT AXLES PER SKID	TIRES PER AXLE	TOTAL SHIPPING WEIGHT, TONS	TOTAL OPERATING WEIGHT, TONS
FF-1	0.5	8'x40'x12'H	2	4X	4	4	20	30
FF-2	1.0	8'x40'x12'H	4	4X	4	4	40	60
FF-3	1.5	8'x40'x12'H	5	4X	4	4	50	75
FF-4	2.0	8'x40'x12'H	6	4X	4	4	60	90

SPECIFICATIONS AND PROCESS FLOW SCHEMATIC

FilterFresh™
 Potable Water Production Plants

WaterSmart Environmental, Inc.
 Post Office, Box 26346
 Shawnee Mission, Kansas 66225-6346

REV.	DATE	DESCRIPTION	BY	CHK

DO NOT SCALE DRAWING. USE DIMENSIONS ONLY.

JOB: FilterFresh™
 TITLE: SPECIFICATIONS AND PROCESS FLOW SCHEMATIC
 SCALE: NONE
 DRAWN: B.E.H.
 CHECKED: C.G.S.
 DATE: 12/27/05
 PWS. NO. S-2000
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