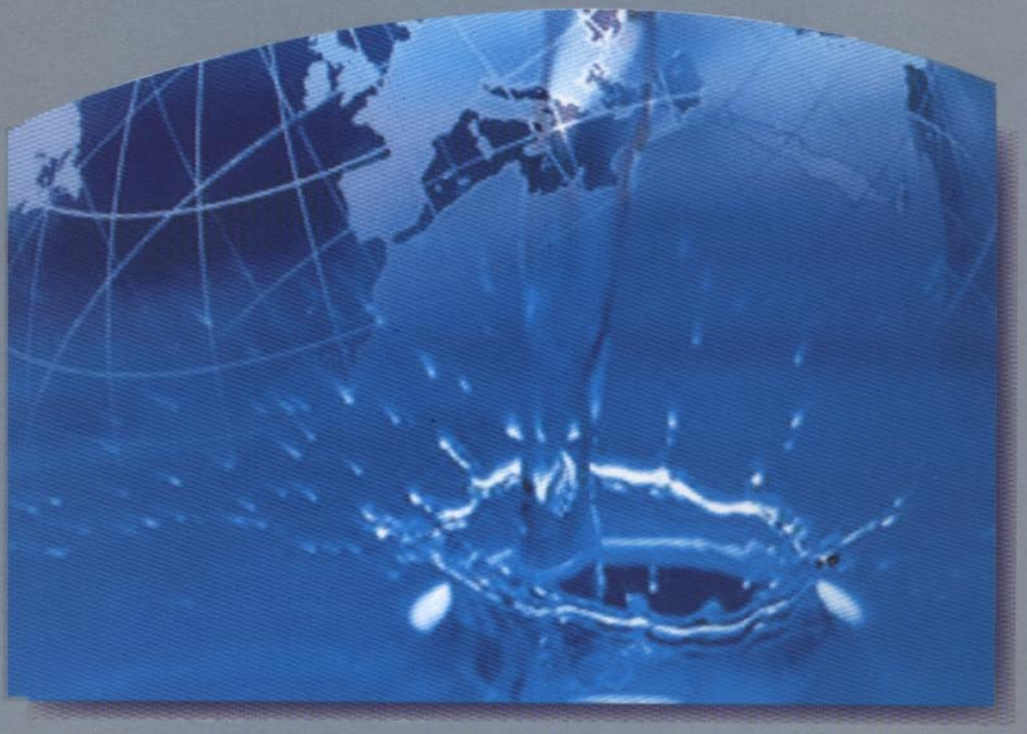


Water & Wastewater Treatment

Water and Wastewater Treatment

EBD

EBD Water, the Water and Wastewater Treatment arm of the EBD Group of Companies, is responsible for the engineering, design and manufacturing of the Group's water and wastewater treatment products.

This booklet introduces the main water and wastewater treatment systems offered, through the following technical data sheets :

- Brackish Water Reverse Osmosis
- Seawater Reverse Osmosis
- Sewage Treatment
- Industrial Wastewater Treatment
- Ion Exchange Demineralization
- Water Softening
- Pressure Filtration
- Chemical Feed Systems

Specific products are introduced through individual, detailed, product data sheets.

EBD Water is also responsible for the design and supply of other water treatment works such as thermal desalination and conventional water treatment, covering the full spectrum of water and wastewater treatment technologies.

As part of EBD's full commitment to after sales services, the company offers a full range of spare parts, chemicals and other consumables, covering the supplied water and wastewater treatment products.

For full details on specific requirements, please contact any of our offices worldwide, or visit our website at www. ebdwater.com

EBD Water®

The Water Treatment Experts™

Brackish Water Reverse Osmosis

Technical Data Sheet

The Integrated Solution

EBD Water's package Reverse Osmosis Systems are cost effectively designed for the purification of brackish waters.

Although R.O. System is the best solution to a problem for many processes, it usually requires auxiliary equipment for proper system operation: EBD Water offers many options with the package R.O. systems providing design flexibility for optimum performance.

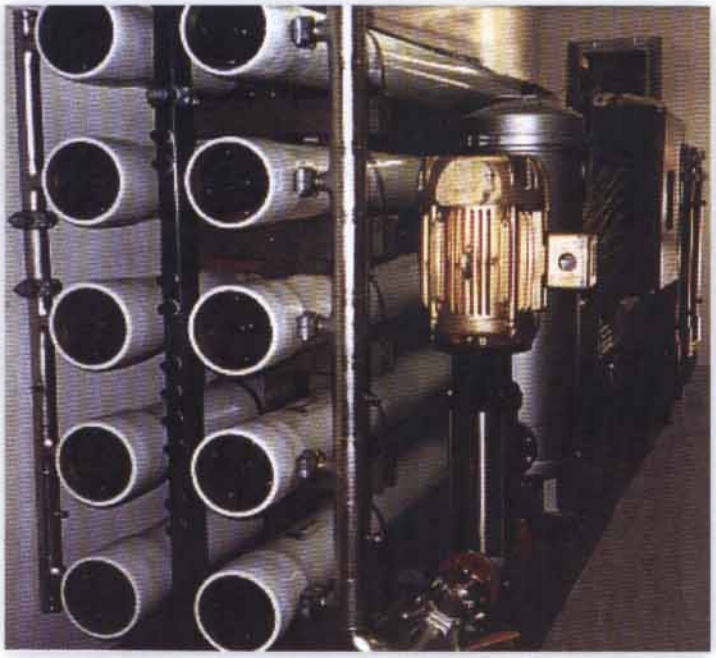
Principles of Operation

The Feedwater must normally be pretreated to ensure optimum membrane performance and reduce maintenance requirements.

The Feedwater enters the first stage where a portion of the water is purified (permeate). The remaining (concentrate) becomes the second stage feed and so on . [EBD Water design is optimized at 2 to 3 stages].

The concentrate from the last stage is directed to drain. The permeate streams from all stages are collected in one manifold for a total system recovery of 50 - 85% (depending on Feedwater quality and system capacity).

The total system salt rejection varies, depending on such items as the type and age of elements, the system recovery, and other factors. Typically, rejection of 80 - 99% of the TDS and 90 - 99% of the suspended material (organics and microcontaminants) can be realized by Brackish Water Systems.



Typical Features

- Thin film composite membranes in 4" or 8" diameter (cellulose acetate membranes are also used).
- Antiscalant Chemical Dosing (for control of Calcium Sulfate and Calcium Carbonate Scale), complete with Chemical Feed Pump, Polyethylene Day Tank and Level Control.
- Cartridge Filtration protection up to 1 micron, with SDI sample port (to determine fouling potential due to Silt, colloidal and suspended material).
- Pretreated Feedwater dump valve (to allow stabilization of the pretreatment system prior to the feedwater entering the R.O.).
- High efficiency multistage centrifugal pumps 316SS with TEFC motors or multi-stage turbine pumps with submersible water tight motors depending on the application.
- Pre-and Post-Flushes to minimize water hammer and remove supersaturated solutions.
- Instrument board containing all process instruments, including safety and operational shut down switches, liquid filled SS pressure gauges, flow, PH, conductivity indicators and controllers, etc.
- Centralized control panel, using state-of-the art control technologies, full voltage starters, phase protection, alarm silence buttons, integral disconnect switch, control switches, heavy duty indicating lights, control logic circuits, elapsed time meter, etc.
- Cleaning connections of the grooved type for easy maintenance.
- Sample and test valves for ease of trouble shooting and data collecting.
- Future expansion capabilities.
- Corrosion resistant material; using FRP for structural skid members and supports, pressure vessels, control and instrument panels; inert thermoplastics on low pressure pipes, hoses and fittings; 316L stainless steel and high quality alloys on high pressure pipes and fittings.

Desalination Processes
Deionization Processes
Municipal Water Treatment
Industrial Water Treatment
Municipal Wastewater Treatment
Industrial Wastewater Treatment
Chemical Services
Technical Services

Brackish Water Reverse Osmosis

Technical Data Sheet

Selective Data

Model	Capacity (m^3/day)	Dimensions (meters) (LxWxH)	HP	Element Size (inches)	Recovery (%)
BROA-020	20	4.7x0.61x1.5	5.0	4	30-35
BROA-040	40	4.7x0.61x1.5	5.0	4	50
BROA-060	60	4.7x0.61x1.5	5.0	4	50-60
BROA-080	80	4.7x0.61x1.5	5.0	4	70-75
BROA-140	140	5.7x0.76x1.8	7.5	4	75
BROA-210	210	5.7x0.90x1.8	10.0	8	70-75
BROA-300	300	5.7x0.90x1.8	15.0	8	75
BROA-460	460	5.7x0.90x1.8	20.0	8	75
BROA-610	610	5.7x1.30x1.8	25.0	8	75
BROA-760	760	6.7x1.30x1.8	40.0	8	75
BROA-910	960	7.9x1.30x1.8	40.0	8	75

Larger systems are available as follows:

- up to 12,000 m^3/day containerized.
- up to 4,000 m^3/day skid mounted.
- 1,000 m^3/day and larger site assembled.

The above specifications are based on the following:

- Third year operating performance.
- Feedwater at 25 °C [Design limitations at 1 °C - 45 °C].
- Highest recommended permeate flow and recovery .
- Properly treated feedwater.
- Turbidity less than 1 NTU.
- Inlet silt density index less than 4 [Design Limitations at SDI = 5].
- Inlet pressure of 25 - 60 psig.
- Feed water TDS at 3,500 ppm [Design limitations at 1,000 - 15,000 ppm].
- Membrane feed pressure: 175-350 psig.
- Product pressure up to 15 psig.

Electric characteristics: 230/460 V, 3 PH, 60 HZ as standard (380 V, 3 PH, 50 HZ available).

Environment: Ventilated, indoors, ambient temperature less than 50 °C, and shielded from direct sunlight.

Auxiliary Equipment

- Multimedia Filtration
- Iron Removal Filtration
- Activated carbon Filtration
- Micro Filtration
- Ultrafiltration
- Softening
- Chemical Pretreatment
- Chemical Post-treatment
- Degasification
- Organic Trap
- Clarification
- Ion Exchange
- Ultraviolet Sterilization
- Storage Tanks
- Raw Water Booster Pumps
- Transfer Pumps
- Hydropneumatic Systems
- Cleaning Systems
- Test Equipment
- Spare Parts

Desalination Processes
Deionization Processes
Municipal Water Treatment
Industrial Water Treatment
Municipal Wastewater Treatment
Industrial Wastewater Treatment
Chemical Services
Technical Services

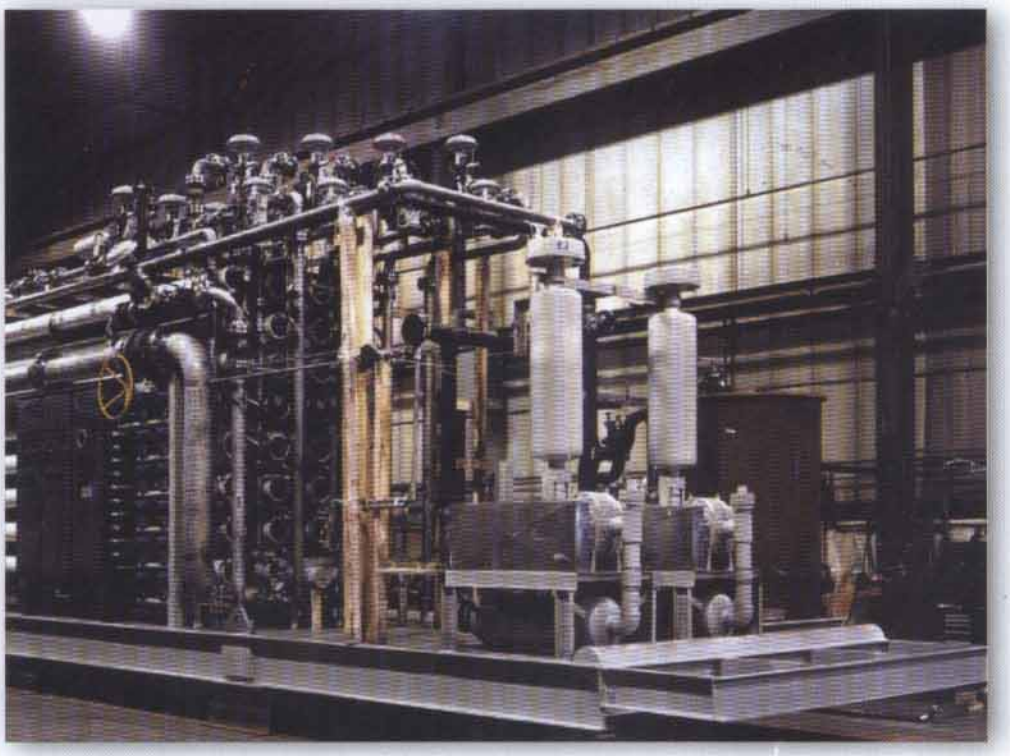
Seawater Reverse Osmosis

Technical Data Sheet

The Ultimate Desalting Solution

EBD Water's Seawater Reverse Osmosis Systems are effectively designed to desalinate seawater, producing potable water quality which exceeds the World Health Organization (W.H.O.) standards.

The EBD Water range of Seawater Reverse Osmosis Systems can also be used for other applications, such as increasing the overall recovery for a Brackish System by desalting the brine reject, and many industrial applications requiring high rejection features.



Principles of Design

As for Brackish Water streams, the feedwater must be properly pretreated to ensure optimum membrane performance.

Depending on the feedwater and design specifications, recoveries of up to 50% and rejections of up to 99.9% can be achieved. At all times, EBD Water Seawater Reverse Osmosis Systems are designed to operate within the technical limitations of the water chemistry, temperature, and water velocities.

Specifically, the membranes performance is projected at the third year of operation, the average temperature of feedwater is assumed at 25 °C [Design range from 1 °C to 45 °C], Turbidity at less than 1 NTU [after pretreatment], inlet silt density index at less than 4 [Design range 3 - 5], feedwater TDS at 35,000 ppm [Design range 15,000 - 50,000 ppm], and inlet pressure of 25 - 60 psig. Based on the above, the highest recommended permeate flow and recovery are calculated.

Typical Features

- Hollow fiber or spiral wound membranes configuration, in 4" or 8" diameter.
- Thin Film Composite (TFC), Cellulose Acetate (CA), Polyamide (PA), or Aramid membrane materials.
- Extensive chemical pretreatment, such as Chlorination and Dechlorination, Coagulation, Algae control, Scale control and PH adjustment.
- Extensive physical pretreatment, such as Multimedia Filtration and Micron Filtration.
- Automatic flushing system using permeate water.
- Energy Recovery Turbine [ERT] operating within the high pressure pump installation, achieving power consumption savings of 30 - 40%.
- A full range of process instruments for complete monitoring and safety controls.
- Centralized control panel, using state-of-the art control technologies, full voltage starters, phase protection, alarm silence buttons, integral disconnect switch, control switches, heavy duty indicating lights, control logic circuits, elapsed time meters, etc.
- Cleaning connections of the grooved type for easy maintenance.
- Extensive sample and test valves locations.
- Future expansion capabilities.
- Corrosion resistant materials, using FRP for structural skid membranes and supports, control panel, and instrument panel.
- All wetted parts protected by especially selected anti-corrosive materials: inert thermoplastics on low pressure sides and high quality alloys such as 904 SS and monel on high pressure sides.

Desalination Processes
Deionization Processes
Municipal Water Treatment
Industrial Water Treatment
Municipal Wastewater Treatment
Industrial Wastewater Treatment
Chemical Services
Technical Services

Seawater Reverse Osmosis

Technical Data Sheet 2/2

Selective Data

Plant Type	Model Range	Capacity Range (M^3/day)	Approximate Room Dimensions (meters) (L x W x H)	Recovery Range
Package Plants	SROA - 020 to SROA - 600	20 m^3/day to 600 m^3/day	4 x 4 x 4 to 10 x 10 x 4	25 - 35 %
Containerized Plants	SROB - 020 to SROB - 500	20 m^3/day to 500 m^3/day	_____	25 - 35%
Modular Plants	SROC - 600 to SROC - 6000	600 m^3/day to 6,000 m^3/day	10 x 10 x 4 60 x 10 x 5	30 - 45 %

Larger systems are custom designed as follows:

- up to 20,000 m^3/day containerized.
- up to 100,000 m^3/day site assembled.

The above specifications are based on the following:

- Third year operating performance.
- Feedwater at 25 °C [Design limitations at 1 °C - 45 °C].
- Highest recommended permeate flow and recovery .
- Properly treated feedwater.
- Turbidity less than 1 NTU.
- Inlet silt density index less than 4 [Design Limitations at SDI = 5].
- Inlet pressure of 25 - 60 psig.
- Feed water TDS at 35,000 [Design limitations at 15,000 - 50,000 ppm].
- Membrane feed pressure: 600 - 1200 psig.
- Product pressure up to 15 psig.

Electric characteristics: 230/460 V, 3 PH, 60 HZ as standard (380 V, 3 PH, 50 HZ available).

Environment: Ventilated, indoors, ambient temperature less than 50 °C, and shielded from direct sunlight.

Auxiliary Equipment

- Multimedia Filtration
- Activated Carbon Filtration
- Chemical Pretreatment
- Chemical Post-treatment
- Organic Trap
- Ultraviolet Sterilization
- Storage Tanks
- Raw Water Booster Pumps
- Transfer Pumps
- Hydropneumatic Systems
- Cleaning Systems
- Variable Frequency Drives
- Test Equipment
- Spare Parts

Sewage Treatment

Technical Data Sheet 1/2

The Environmental Solution

EBD Water offers a variety of sewage treatment plants, handling raw sewage from various sources, producing different discharge qualities to meet each of the specific local requirements, all however meeting the international environmental standards.

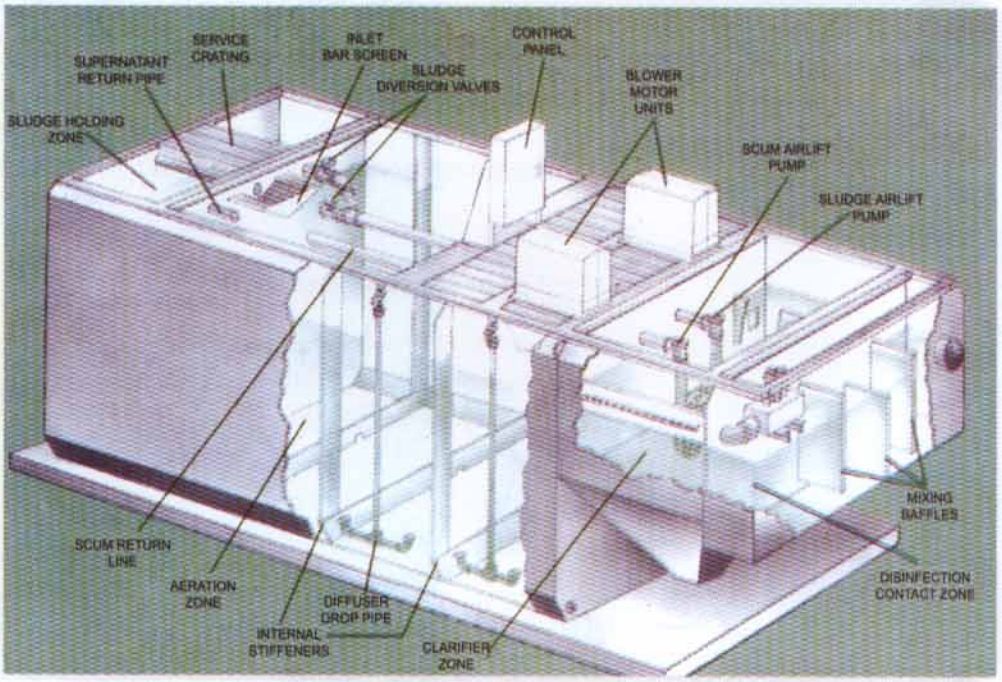
Principles of Operation

EBD Water sewage treatment plants utilize the extended aeration process for the reduction of the Biological Oxygen Demand (BOD) loading, being the main regulated discharge parameter.
By providing sufficient oxygen levels and mixing, the microorganisms are allowed to breakdown the organic impurities in the raw sewage.

Secondary treatment is achieved using the Pre-Engineered EBD Water package plants. These package plants produce treated effluent levels of 20 mg/l BOD and 30 mg/l suspended solids. This is featured through a five-step treatment process: Comminution and screening, diffused aeration, clarification, sludge recirculation and disinfection.

Tertiary Treatment and Advanced Wastewater Treatment (AWT) are further options to improve the discharge qualities. EBD Water multi-media Filtration Systems are used to achieve the tertiary treatment levels of 10 mg/l BOD and 10 mg/l suspended solids.

Further treatment, using technologies such as Coagulation, Flocculation, Reverse Osmosis and Ion-exchange produces water for reuse and recycle in all applications.



Typical Features

- Rectangular Design (Circular Design available for special site requirements)
- Welded Carbon Steel Construction (1/4 inch structural plate), with interior and exterior lining suitable for above and below ground installation (Tanks can also be constructed in concrete on site).
- Membrane check valve fine bubble diffuser preventing the back flow of water when the diffuser is not aerating [up to 12 cfm capacities]. Due to its self sealing configuration using a flexible membrane, this diffuser is less susceptible to clogging by solids or biological fouling.
- Aerated sludge holding tank with up to 6 months sludge storage capacities.
- Cast Aluminum comminutor up to 850 gpm each, for durability and long life. A built-in torque clutch and auto reverse system protects the gearbox from heavy shock loads (shredder-type submersible pumps are available as alternative).
- Blower modules provide a single air source for all mechanical and electrical components within the plant. Entire module system is protected by a fiberglass Nema 4x enclosure.
- Hypochlorite Feed by positive displacement pumps to baffled chlorine contact tank (Gas chlorination by vacuum system is an alternative).
- Motor Controller housed in a Nema 4x enclosure, incorporating the main circuit breaker, starters, relays, terminal blocks, switches, pilot lights, fuses and all necessary electrical components.

Sewage Treatment

Technical Data Sheet 2/2

Selective Data

Model Range	Capacity (m^3/day)	BOD Loading (Kg/day)	Dimensions (meters) (W x H x L)
EAP - 010	11.4	2.3	2.4 x 2.9 x 2.00
EAP - 020	18.9	3.8	2.4 x 2.9 x 3.30
EAP - 022	22.7	4.5	3.0 x 3.3 x 2.70
EAP - 060	60.6	12.1	3.0 x 3.3 x 7.00
EAP - 065	64.4	12.9	3.7 x 3.3 x 6.10
EAP - 190	189.4	37.9	3.7 x 3.3 x 18.2
EAP - 210	208.0	44.5	7.3 x 3.3 x 9.90
EAP - 340	378.8	75.8	7.3 x 3.3 x 18.3

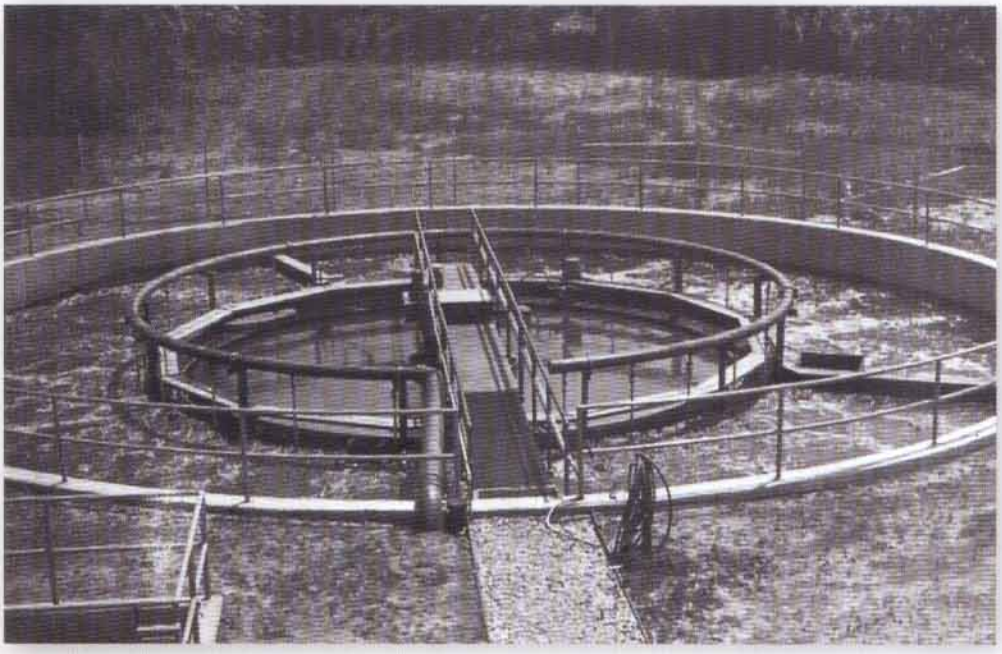
Larger systems are custom designed for villages and small cities' applications reaching the multi-hundred thousands cubic meters per day capacities.

The above specifications are based on the following:

- U.S. Corps of Engineers and the United States EPA Guidelines for Extended Aeration Systems.
- Peak Flow at 3 times the average flow.
- Raw sewage from human waste (For industrial waste streams, please ask about EBD industrial wastewater treatment systems).
- Raw sewage parameters of 240 ppm BOD and 300 ppm S.S. (BOD up to 400 ppm and SS of 500 ppm can be treated with certain system modification).
- Twenty Four (24) hours retention time in the aeration tank [Design ranges from 18 to 36 hours based on BOD levels].
- Two streams operation to provide flexibility, handling low flows and improving efficiencies.
- Gravity clarifiers with 1.5 $m^3/m^2/hr$ rise rate [Design ranges from 1.0 to 1.8 $m^3/m^2/hr$] and 4 hours retention time [Design ranges from 3 to 4.5 hours].
- Aerated Sludge digestion tank for 15 days retention time.
- Chlorine contact tank for 45 minutes retention [design ranges from 30 to 90 minutes].

Electric characteristics: 230/460 V, 3 PH, 60 HZ as standard [380 V, 3 PH, 50 HZ available].

Below ground or above ground installation is possible. Welded steel packages are provided with magnesium anodes for cathodic protection.



Auxiliary Equipment

- Froth Control System
- Chemical Pretreatment
- Covers
- Grease Trap
- Grit Removal Chamber
- Oil/Water Separator
- Hydropneumatic Systems
- Storage Tanks
- De-Nitrification Systems
- Filtration Systems
- Advanced Wastewater Treatment (AWT) Systems
- Sludge Thickeners and Belt Presses
- Test Equipment
- Spare Parts

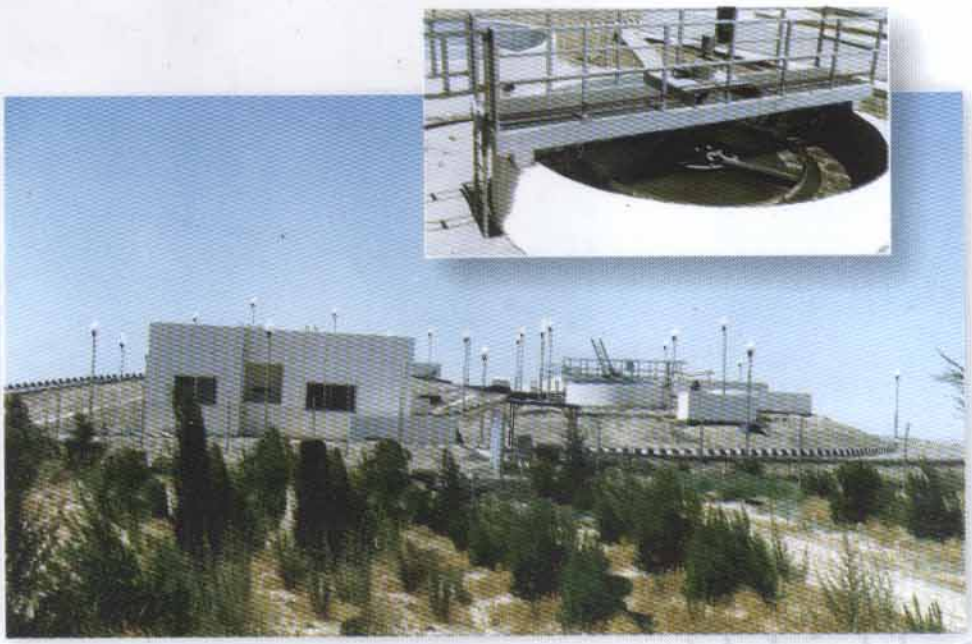
Industrial Wastewater Treatment

Technical Data Sheet 1/1

Solving the Industrial Wastewater Problem

Industrial Wastewater has always been a serious threat to our world's environment. Today, it is recognized that the wastewater streams must be treated before their safe discharge into the environment. EBD Water offers comprehensive biological, chemical and physical treatment methods, handling any source of wastewater.

The comprehensive approach of EBD Water provides more than a safe wastewater discharge option, in fact EBD Water designs complete integrated systems for wastewater recycling and re-use.



Comprehensive Solutions

EBD Water designs its systems based on three important factors : simplicity, efficiency and cost-effectiveness. As part of a comprehensive solution, EBD Water will provide complete treatability services, system engineering and project management, installation, testing and start-up, performance warranty and site service.

At each step of our mission, we will remember that our customers needs are to :

- Meet environmental regulations set for wastewater discharge.
- Recycle certain wastewater streams.
- Re-use certain wastewater streams.
- Recover valuable chemicals.
- Minimize capital costs.
- Optimize operation.
- Enjoy a Worry Free Operation.

Treatment Steps

Wastewater is first exposed to physical separation processes. Then the wastewater goes through biological treatment, followed by chemical treatment, coagulation, flocculation and clarification. The clarified water then is entered through Advanced Wastewater Treatment (AWT) Systems with the final product suitable for recycling. Sludge produced during the process is dewatered and dry sludge is directed to disposal.

Treatment Methods

Biological Treatment is achieved through Aerobic or Anaerobic Systems. EBD Water uses systems such as bio-towers, activated sludge, sequencing batch reactors, and rotating biological contactors.

Physical and chemical treatment technologies are used for the precipitation of heavy metals, oil and water separation, and removal of suspended solids. EBD Water uses systems such as Sorption Filters, Ceramic Membranes, Precipitators, Gravity Separation Systems, Induced Air Flotation Systems and others.

Advanced Wastewater Treatment Systems are used for removal of dissolved solids and microcontaminants for the production of completely recyclable streams. Reverse Osmosis, Ultrafiltration and Ion Exchange are such proven methods.

Desalination Processes
Deionization Processes
Municipal Water Treatment
Industrial Water Treatment
Municipal Wastewater Treatment
Industrial Wastewater Treatment
Chemical Services
Technical Services

Ion Exchange Demineralization

Technical Data Sheet

Protecting Liquid Processing Streams

Naturally occurring impurities are present in all raw water supplies, and will be introduced in the process operation or end product when untreated water is used. Typical impurities are calcium, magnesium, sodium, alkalinity, chlorides, sulfates, nitrates, and silica. All of these contaminants cause scaling in boilers, spotting on finished surfaces, precipitation in chemical products, defects in electronic components as well as other problems in each process application. The EBD Water IED Ion Exchange Systems will reduce these contaminants to negligible levels.

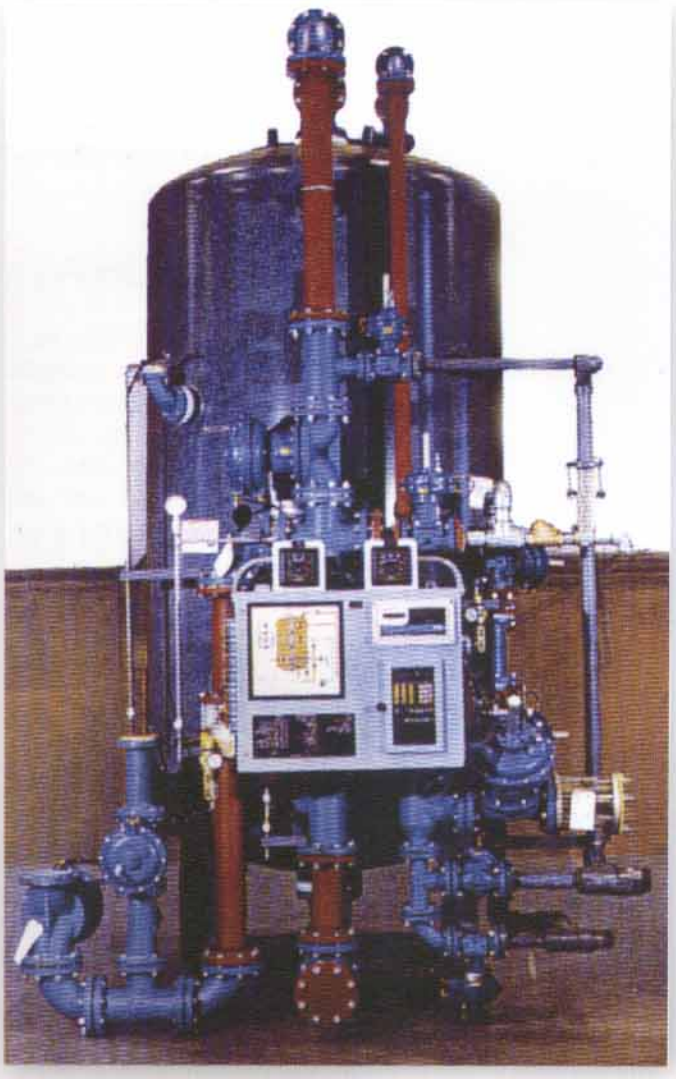
Principles of Operation

An EBD Water IED Demineralizer is a complete system utilized to deionize water or other liquids to an acceptable level for various industrial uses.

The EBD Water Demineralizers can be used as primary or polishing Ion Exchangers. When used as a primary ion-exchanger following an EBD Water Reverse Osmosis System, water of 10 - 18 megohm is produced. As a polisher, an EBD Water Demineralizer can produce water of up to 18.3 megohm quality.

EBD Water Demineralizers consist of single or multiple two bed or mixed bed units, depending upon production requirements and the degree of purity needed for a particular process. Because of the characteristics of the raw water supply, many systems require cation and anion exchangers of unequal sizes to obtain optimum performance. The addition of a decarbonator for the removal of CO_2 will reduce the load on the anion exchanger.

Weak base resins are used to produce low solids water, however silica and CO_2 are not removed by these units and require the use of strong base.



Typical Features

- 100 Psig Vessels
- Graded Fiberglass on FRP models up to 48 inch sizes
- Epoxy coating and rubber lining on carbon steel models from 36 inch diameter and higher
- Manual, automatic, or semi-automatic operation
- Resin removal nozzle
- Inlet water meter and flow indicator
- Solenoids with manual override and air flow control
- Effluent sight strainer
- Drain piping to common point
- Sample and test points
- Acid and Caustic rate set valves
- Resistivity indicators
- Backwash sight Glass
- Position indicators on automatic valves
- Limit stops for flow control
- Air regulator/filter where air used for mixing
- Manholes and handholes
- Separate, supported regenerant distributors
- Visual and audible alarms
- Decationized water caustic tank fill
- Skid mounted systems

Ion Exchange Demineralization

Technical Data Sheet 2/2

Selective Data

Model	FLOW RATE Primary (gpm)	FLOW RATE Polishing (gpm)	Total Resin Volume Primary (ft^3)	Total Resin Volume Polishing (ft^3)	Tank dia. (in.)	Pipe Size Primary (in.)	Pipe Size Polishing (in.)
IED-24	30	40	12.4	12.4	24	1 1/2	1 1/2
IED-30	50	70	19.4	19.4	30	1 1/2	1 1/2
IED-36	70	100	31.0	33.0	36	2 1/2	3
IED-42	90	140	43.0	41.0	42	2 1/2	3
IED-48	120	180	57.0	42.0	48	3	3
IED-54	150	230	73.0	53.0	54	3	4
IED-60	180	280	90.0	66.0	60	3	4
IED-66	230	340	110.0	81.0	66	3	4
IED-72	270	410	132.0	97.0	72	4	6
IED-84	370	560	182.0	135.0	84	4	6
IED-90	430	640	212.0	155.0	90	6	8

Notes:

1. The resin ratio, anion to cation is selected as required.
2. Standard tanks for primary demineralization are 8'0" straight height while polishing demineralization are 6'0" straight height.
   Optional 6'0" straight height primary demineralizer is also available.

Instrumentation and Controls

The EBD Water IED Demineralizers are automatically controlled by solid state Programmable Logic Controllers (PLC) in conjunction with pilot solenoid valves or stagers. The pilot solenoid valves and the stagers can be provided with manual by-pass. The controller is capable of controlling individual or multiple regenerations. A resistivity controller monitors the quality of treated water and initiates the regeneration sequence. Silica analyzer can also be provided as an option.

The following controlling instruments are installed within the IED Systems:

- Rate of flow indicator for water and air.
- Resistivity monitor.
- Automatic reset totalizing water meter (option).
- Electrical interlock for multiple units .
- PC based monitoring and control system (option).

Auxiliary Equipment

- Softeners
- Filters
- Degasifiers
- Raw Water and Product Pumps
- Caustic Dosing System
- Acid Dosing System
- Recirculation System
- Storage Tanks

Optional Accessories

- Programmable Logic Controller
- Process Instruments
- Process Equipment
- Spare Parts

Water Softening

Technical Data Sheet 1/1

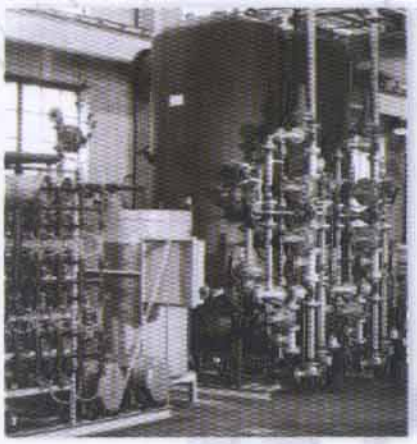
EBD Water softeners provide continuous soft water supply at the lowest possible costs. The produced high quality softened water is ideal for boiler feed, cooling towers, process and manufacturing plants, and all other applications requiring low or zero hardness water.

Typical Features

- Solenoid Valves or Stagers easily activating the Diaphragm Valve, in automatic, semi-automatic or manual mode.
- Completely pre-assembled systems, ready for connections to water, drains and electrical lines.
- High capacity and superior quality resins, providing years of uninterrupted operation.
- Typical ion exchange resin capacity of 30,000 grains per cubic foot at 15 pounds per cubic foot salt dosage.
- Tanks designed to 100 psig ASME Code from carbon steel (with internal epoxy lining) or graded fiberglass.
- Manholes and clean out connections provided in the top head and side shell.
- Structural steel legs on steel vessels, and reinforced support system on fiber glass vessels.
- PVC Header and lateral design of the underdrain system provides efficient collection of soft water and distribution of backwash water. Top distribution system provides even flow of inlet water preventing channeling within the resin bed.
- Brine tank of polyethylene construction, equipped with float valve system.
- Regeneration initiated by switch, time clock or water meter controller. The regeneration sequence is controlled by mechanical Timer/Relay or PLC.

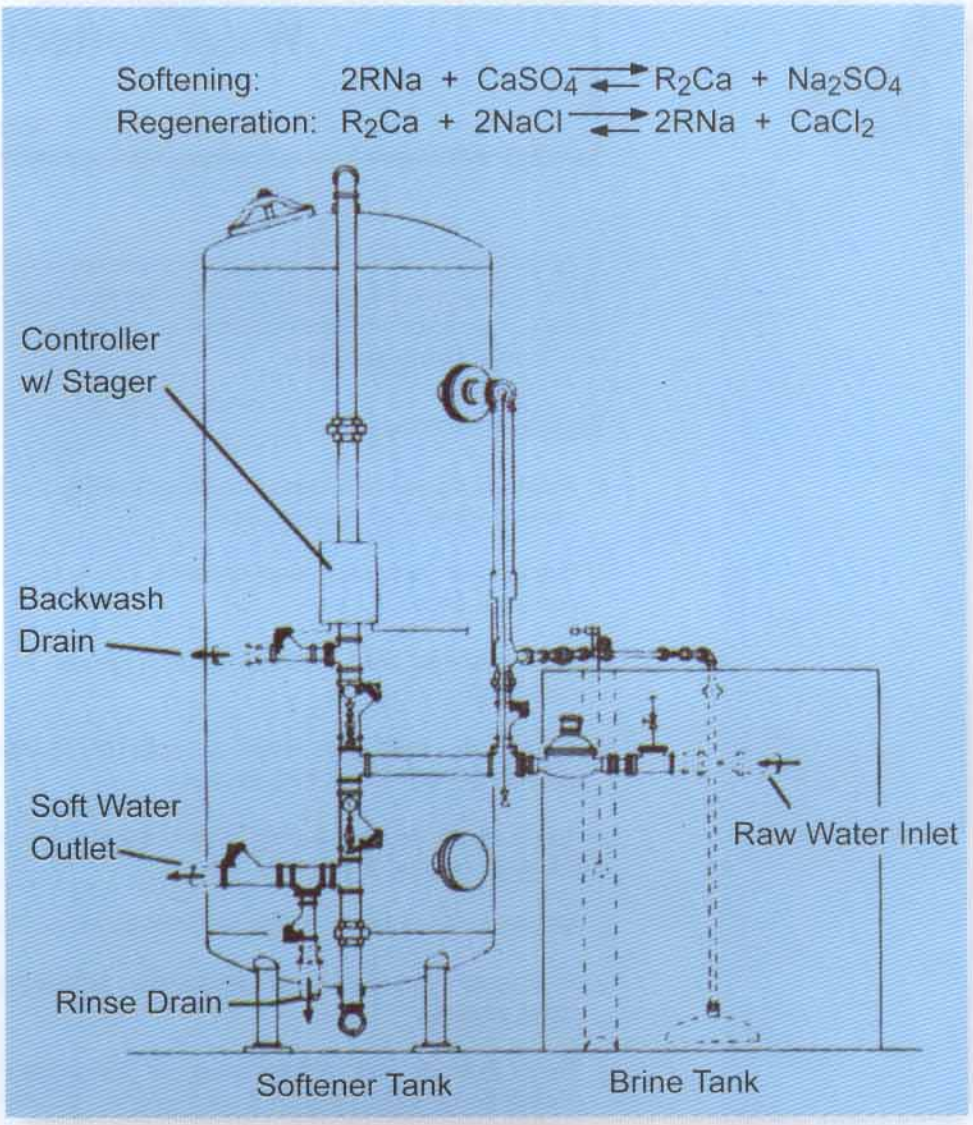
EBD Range of Water Softeners

- EBD Water manufactures a wide range of water softeners with diameters ranging from 18 inches to 48 inches using GRP vessels, and from 36 inches to 130 inches using welded steel vessels.
- The EBD Water softeners are available in simplex, duplex or multiple arrangement.



Optional Accessories

- Batch flow meter
- Time clock
- Hardness meter
- External signal initiation
- Interlock
- Programmable Logic Controller
- Pilot solenoid valves
- Pneumatic actuated valves



Selective Data

Model	Flow (gpm)		Exchange Capacity (grains)	Softener Tank Dimension D x H (in)	BrineTank Diameter (in)
	Rated	Max			
SA 30-1	75	100	300,000 - 450,000	30" x 72"	36"
SA 36-1	90	125	400,000 - 600,000	36" x 72"	42"
SA 42-1	150	200	500,000 - 900,000	42" x 72"	48"
SA 48-1	175	250	750,000 - 1,200,000	48" x 72"	52"
SA 60-1	200	275	1,100,000 - 2,300,000	60" x 72"	66"

* The exchange capacity is based on 15 lbs/ft^3 salt dosage, subject to actual conditions.

* The suffix -1 in the model number is for simplex arrangement and -2 for duplex arrangement.

Pressure Filtration

Technical Data Sheet 1/2

EBD Water pressure filters provide the most effective methods of removing suspended solids, turbidity, iron, color, odor, and other particulates from the raw water. The produced high quality filtered water is suitable for the pretreatment of feedwater to Reverse Osmosis desalination plants, potable water systems, wastewater re-use, and other wide range of applications.

The Filtration Solution

Raw feedwater is introduced at the top of the filter vessel under pressure and flows downward through the filter media. During the downward flow of raw water, most of the suspended solids are trapped in the uppermost layer of the media, while some are captured in the void spaces between the filter media particles. Also, some dissolved impurities are adsorbed or absorbed in the filter media. The filter media may react with the dissolved impurities or may act as a catalyst to initiate reaction.

For treatment of raw water containing suspended solids, sand is the most common media. Coarse media such as anthracite is added to the uppermost layer of the sand media when filtering raw water with relatively high suspended solids such as wastewater. The coarse media will retain larger particles that cause premature blinding of the sand media.

The combination of filter media of various sizes and densities arranged in layers, provides high filtration efficiency as the entire depth of the bed is utilized. Depth filtration is effective and achieves longest filter runs.

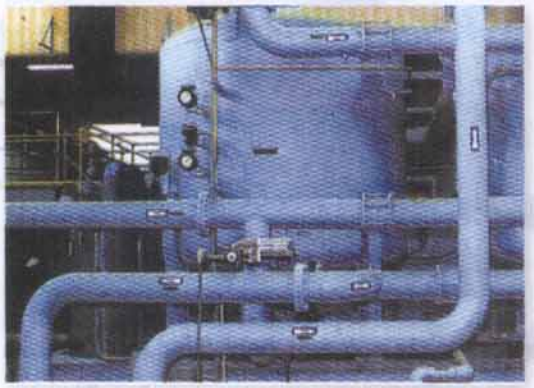
Removal of dissolved iron or manganese in raw water can be achieved using Manganese, Greensand or BIRM. BIRM is a proven media effective in precipitating dissolved iron and manganese in water, without the addition of chemicals.

Most organic impurities causing taste and odor can be effectively removed using activated carbon media. Activated carbon media is also effective in removing chlorine, toxic impurities and substances suspected of causing cancer.

EBD Range of Pressure Filters

EBD Water manufactures a wide range of pressure filters with diameters ranging from 18" to 48" using vertical GRP vessels, from 30" to 130" for vertical welded steel vessels, and from 48" to 144" for horizontal welded steel vessels.

The pressure filters can be supplied as a single unit or multiple units. Multiple filter arrangement can be in series or parallel.



The pressure filters can be supplied with manual or automatic valves for backwashing. For manually backwashed filters, globe, butterfly, diaphragm, and multi-port valves are normally used. Automatically backwashed filters use butterfly, diaphragm and multi-port valves with electric, hydraulic, or pneumatic actuators.

Features of EBD Pressure Filters

The EBD Water pressure filters are selected and designed to meet specific process requirements.

The GRP filter vessels are manufactured from high quality materials manufactured under strict quality control procedures. The steel vessels are fabricated according to the latest ASME code and undergo tedious inspection and testing procedures prior to their release.

The internal linings are carefully selected to be compatible with the characteristics of the water and impurities to provide years of trouble-free operation.

The internal distributor is designed to assure uniform flow within the media. The underdrain collectors are the header and lateral type, with proven effectiveness in the field during many years of operation.

There is also a wide selection of face pipework materials, such as PVC, uPVC, GRP, Polypropylene, Galvanized or Black Iron, and lined steel, depending on the characteristics of the liquid being filtered. Typical valves materials used are cast iron, steel, GRP, PVC.

The filter backwashing can be initiated manually or automatically. Automatic backwashing can be initiated by timer, pressure switch, flowmeter or any external signal. The backwashing sequence is controlled by an electro-mechanical timer with relays or programmable logic controller. The controller can also be connected to a PC based monitoring and control system.

Most of the EBD Water pressure filters are delivered to the site pre-piped complete with the valves and face piping, ready for site connection to water, drain and electrical lines. Larger filters are delivered in semi-knock down condition to minimize site work and installation procedures.

Pressure Filtration

Technical Data Sheet

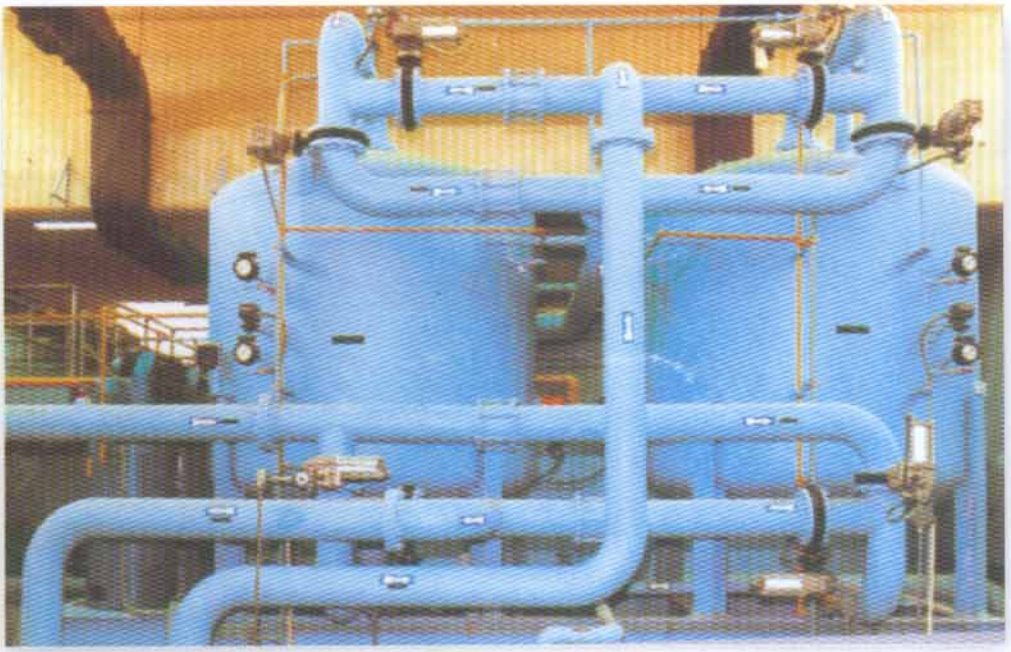
Selective Data

Model	Filter dia (in)	Pipe Size (in)	Capacity (gpm) S	Media Volume (ft^3) S	Capacity (gpm) MM	Media Volume (ft^3) MM	Capacity (gpm) AC	Media Volume (ft^3) AC	Capacity (gpm) BM	Media Volume (ft^3) BM
VF-30	30	2	20	7	50	15	50	16	20	15
VF-36	36	2	30	10	70	21	70	22	30	21
VF-42	42	2	40	12	90	29	90	30	40	29
VF-48	48	3	50	16	120	38	120	40	50	38
VF-60	60	3	80	26	190	60	190	62	80	60
VF-66	66	4	95	32	240	70	240	72	95	70
VF-72	72	4	110	37	280	85	280	89	110	85
VF-78	78	4	130	44	330	100	330	105	130	100
VF-84	84	6	150	50	380	115	380	118	150	115

- S = Sand, MM = Multi Media, AC = Activated Carbon, BM = Birm.
- Design Pressure = 100 psig.
- Carbon Steel vessels are designed with welded dish heads.
- The above specifications apply to vertical pressure vessels. Horizontal pressure vessels are available from 48 inch diameter and above.
- Larger capacities are available.
- Electric characteristics for automatic systems:

  220 V, 1 PH, 60 HZ as standard
  (110 V, 3 PH, 50 HZ available)

- Environment: ambient temperature less than 50 °C, and shielded from direct sunlight.



Optional Accessories

- Batch Flow Meter
- External Signal Initiation
- Programmable Logic Controller
- Pilot Solenoid Valves
- Process Instruments
- Test Equipment
- Spare Parts

Auxiliary Equipment

- Chemical Treatment
- Storage Tanks
- Booster Pumps
- Hydropneumatic Systems

Chemical Feed Systems
Gas and Liquid Feeders
Technical Data Sheet

EBD Water Features a complete line of Gas and Liquid Feed Systems. Depending on the application, systems are selected to provide the most effective approach for a broad range of chemical treatment.

Gas Feeders

EBD Water range of Gas Feeders are designed to feed Chlorine, Sulfur Dioxide, Ammonia and Carbon Dioxide. EBD Water can provide standard systems ranging from 0.1 kg/hr to 40 kg/hr (2000 ppd). Larger Systems can be customized using modular arrangements.

The EBD Water Gas Feeders are fabricated using the finest, fully chemical resistant materials. The systems can be supplied for direct cylinder, manifold, wall or floor cabinet mounting. The EBD Water Gas Feeders operate under vacuum, with no components carrying gas under pressure. A loss of vacuum causes the regulating valve to shut off the gas supply.

Liquid Feeders

EBD Water provides a full range of Liquid Feeding Systems for dosage of Hypochlorite solutions, Sodium Bisulfite, Polymers and other chemical solutions.

EBD Water package Chemical Feed Systems are skid mounted, completely preassembled for easy installation on site. The systems incorporate the highest quality metering pumps (corrosion proof, chemical resistant construction for long, service free operating life), storage tanks, agitators, and process instruments.

The systems can be designed for output as low as 0.02 GPD providing accurate dosage in critical applications and up to 100 Gallons per hour for large applications.

Gas Feeders - Selective Data

Model Range	Capacity	Description
GFD 0005 to GFD 0500	5 ppd (0.1 kg/hr) to 500 ppd (10 kg/hr)	Direct mounting to chlorine cylinder, ton container or manifold system
GFW 0005 to GFW 0500	5 ppd (0.1 kg/hr) to 500 ppd (10 kg/hr)	Wall Mounting
GFC 1000 to GFC 2000	1000 ppd (20 kg/hr) to 2000 ppd (40 kg/hr)	Floor Cabinet Mounting

Liquid Feeders - Selective Data

Model Range	Capacity	Description
A 0002 to A 5000	0.02 GPD to 50 GPD	Maximum injection pressure up to 250 psi, adjustable stroke frequency from 1 to 100 strokes per minute, adjustable stroke length from 0 to 100%
B 0001 to B 2400	1 GPD to 2400 GPD	Maximum injection pressure up to 150 psi, adjustable stroke frequency and length, operate from external 4 - 20 ma signal source

Optional Accessories

- Remote Ejectors and Meters for Gas Feeding Systems
- Water Meters
- Automatic Switch-over Systems
- Automatic Controllers
- Gas Leak Detectors
- Chlorine Residual Analyzers
- ORP Controllers
- Static Mixers
- Variable Frequency Drives on Chemical Feed Pumps

EBD Water®

The Water Treatment Experts...™

For more information, please contact your nearest regional office, or authorized distributor.