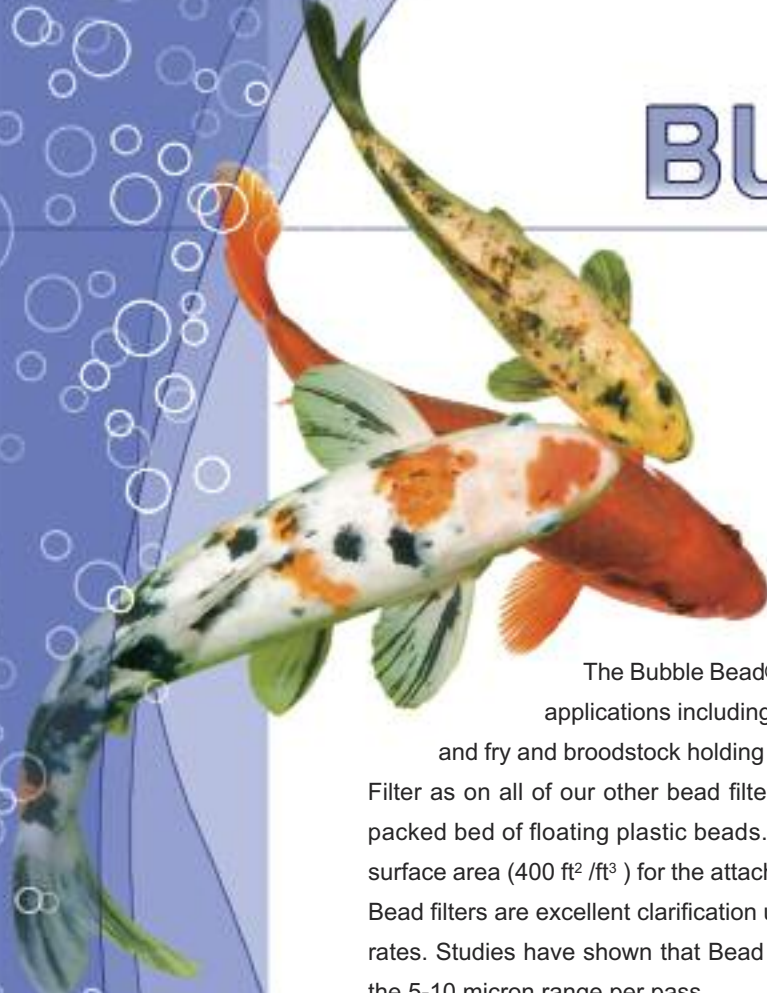



BUBBLE BEAD[®]

FILTERS

- SUPERIOR SOLID REMOVAL
- EXCELLENT BIOFILTRATION
 - LOW MAINTENANCE
 - EASILY AUTOMATED
- CAN BE SITED REMOTELY



The Bubble Bead[®] Filter is our simplest Bead Filter Technology designed for lightly loaded applications including Koi Ponds and Water Gardens, research systems, quarantine systems and fry and broodstock holding systems. The filtration mechanisms are the same on the Bubble Bead[®] Filter as on all of our other bead filters, namely water from the aquatic system passes upward through the packed bed of floating plastic beads. The beads capture the solids, while simultaneously providing a large surface area (400 ft² /ft³) for the attachment of nitrifying bacteria which remove dissolved nitrogenous wastes. Bead filters are excellent clarification units, capable of maintaining display quality water at high waste loading rates. Studies have shown that Bead Filters capture 100% of particles > 50 microns and 48% of particles in the 5-10 micron range per pass.



The Bubble Bead[®] Filters differ from the Propeller Bead[®] and PolyGeysers[®] Bead Filters in its simpler, yet very effective method of backwashing. A backwash is accomplished by shutting off the circulation pump and opening the sludge valve. As the water drains from the filter, a check valve on the effluent line closes creating a negative pressure in the filter. The potential energy of the water leaving the filter pulls air in through the "air inlet" expanding and agitating the bead media in a vigorous boiling type action as it passes downward through our unique washing throat. As the beads enter the lower expansion chamber, the downward velocity decreases due to the increased cross sectional area so the beads are suspended as the water washes the solids away from the beads and out of the filter. Once the flow of wastewater stops, the backwash is complete, simply close the sludge valve and turn the circulation pump back on. Your BBF filter is now in normal operation with a clean filtration bed. The Bubble Bead[®] Filter backwash process is vigorous enough to remove unwanted solids and debris, yet gentle enough to maintain a healthy bio-film on the bead media, in fact during testing the nitrification rate actually increased with increased backwash frequency.

Our filters have been more thoroughly tested than any other filter on the market. Period! For over 17 years, Bubble Bead[®] Filters have been the choice of the most discriminating water garden and Koi pond enthusiasts in the U.S., Southeast Asia and Europe. Also, many research facilities and aquaria have discovered there is simply no substitute for the easy maintenance and effectiveness of our Bubble Bead[®] Filters.

BUBBLE BEAD® FILTER SIZING RECOMMENDATIONS

Filter Model	XS300A*	XS500	XS1000	
Flow Rate (gpm)	10	10	10	
Cubic Feet Bead Media	.25	.25	.5	
Bioclarification Aquaculture Fingerling/ Ornamental Grow-out. >15 deg C. Mesotrophic Warmwater. Std Bead/ EN Media. (lbs feed/day)	.14/.20	.14/.20	.29/.39	
Bioclarification Aquaculture Fingerling/ Ornamental Grow-out. 10-15 deg C. Mesotrophic Coolwater. Std Bead/EN Media. (lbs feed/day)	.09/.12	.09/.12	.18/.25	
Bioclarification Aquaculture Broodstock/Fry/Holding/ Conditioning Oligotrophic. Std Bead/EN Media. (lbs feed/day)	.08/.13	.08/.13	.16/.26	
Bait Fish/Shrimp Holding (lbs)	9.5/12.5	9.5/12.5	18.75/25	
Recommend Bait System Holding Volume	37.5/50	37.5/50	75/100	
Max Koi Pond Loading (lbs)	6.25	6.25	12.5	
Recommend Max Koi Pond Volume (gallons)	200*	500	1,000	
Recommend Volume of Display with Underwater Viewing (gallons)	200	300	300	
Max Daily Feed Rate Solids Filtration Only Bubble Bead Filters are Bioclarifiers and are Not Recommended for Mechanical Filtration				

* Aquarium Model rated for tanks up to 200 gallons. Includes backwash pump for rapid removal of backwash water and increased vigorousness of backwash.

BUBBLE BEAD® FILTER SPECIFICATIONS

Filter Model	Cubic Feet of Bead Media	Dimensions Material/Color	Recommended Maximum Pond Volume (gallons)	Maximum Pressure (psi)	Maximum Koi Load (lbs)	Maximum Flow Rate (gpm/gph)
BBF-XS300A	.25	20" h x 12" dia PE/Green	75-200 Aquarium	10	6.25	10/600
BBF-XS500	.25	32" h x 10" dia PE/Green	500	10	6.25	10/600
BBF-XS1000	.5	35" h x 12" dia PE/Green	1,000	10	12.5	10/600
BBF-XS2000	1	42.5" h x 16" dia PE/Green	2,000	10	25	15/900
BBF-XS4000	2	49" h x 19.5" dia PE/Green	4,000	10	50	30/1,800
BBF-XS6000	3	49" h x 19.5" dia PE/Green	4,000	10	75	45/2,700
BBF-XS8000	4	60" h x 26" dia PE/Green	8,000	10	100	60/3,600
BBF-XS10000	5	60" h x 26" dia PE/Green	8,000	10	125	75/4,500
BBF-XF4000	2	53.5" h x 26" dia Fiberglass/Green	4,000	15	50	30/1,800
BBF-XF6000	3	53.5" h x 26" dia Fiberglass/Green	4,000	15	75	45/2,700
BBF-XF8000	4	63" h x 33" dia Fiberglass/Green	8,000	15	100	60/3,600
BBF-XF10000	5	63" h x 33" dia Fiberglass/Green	8,000	15	125	75/4,500
BBF-XF12000	6	78" h x 36.5" dia Fiberglass/Green	12,000	15	150	90/5,400
BBF-XF20000	10	84" h x 40" dia Fiberglass/Green	20,000	15	250	150/9,000

* AST UV Sterilizers are manufactured by Emperor Aquatics, Inc.®

	XS2000	XS4000/ XF4000	XS6000/ XF6000	XS8000/ XF8000	XS10000/ XF10000	XF12000	XF20000
	15	30	30	60	60	90	150
	1	2	3	4	5	6	10
	.58/.79	1.15/1.57	1.73/2.36	2.31/3.14	2.88/3.93	3.46/4.72	5.76/7.86
	.35/.49	.70/.98	1.05/1.47	1.40/1.97	1.76/2.46	2.11/2.95	3.51/4.92
	.31/.52	.63/1.05	.94/1.57	1.26/2.10	1.57/2.62	1.89/3.14	3.14/5.24
	37.5/50	75/100	112.5/15	150/200	187.5/250	225/300	375/500
	150/200	300/400	450/600	600/800	750/1,000	900/1,200	1,500/2,000
	25	50	75	100	125	150	250
	2,000	4,000	6,000	8,000	10,000	12,000	20,000
	450	900	1,350	1,800	2,250	2,700	4,500

ation Only at Feed Loading Rate Greater Than That Listed Above for Mesotrophic Warmwater Aquaculture.

LENGTH/WEIGHT CONVERSION CHART*

Use this chart to estimate your current Koi Load and project your maximum Koi Load.

	Backwash Waterloss (gallons)	Inlet/Outlet Size (inches)	Recommended UV Sterilizer* for Algae Control
	2.5	3/4"/3/4"	AST 25-1 25 watt
	5	3/4"/3/4"	AST 25-1 25 watt
	8.5	1"/1"	AST 25-1 25 watt
	12	1-1/2"/1-1/2"	AST 40-1 40 watt
	25	1-1/2"/1-1/2"	AST 80-1 80 watt
	25	1-1/2"/1-1/2"	AST 80-2 80 watt
	45	2"/2"	AST 80-2 80 watt
	45	2"/2"	AST 80-2 80 watt
	25	1-1/2"/1-1/2"	AST 80-1 80 watt
	25	1-1/2"/1-1/2"	AST 80-2 80 watt
	45	2"/2"	AST 80-2 80 watt
	45	2"/2"	AST 80-2 80 watt
	65	3"/3"	AST 120-2 120 watt
	150	3"/3"	AST 150-2 150 watt

Length (in)	Weight (oz)	Length (in)	Weight (oz)
4"	0.4	21"	64
6"	0.5	22"	74
5"	1.5	23"	84
7"	2.4	24"	96
8"	3.6	25"	109
9"	5.1	26"	122
10"	6.9	27"	137
11"	9.2	28"	152
12"	12	29"	169
13"	15	30"	186
14"	19	31"	207
15"	23	32"	228
16"	28	33"	250
17"	34	34"	273
18"	41	35"	298
19"	48	36"	324
20"	56		

* Assumes normal size healthy fish. Reprinted from Koi USA May/June 2001 issue with permission of author, Larry Lunsford.

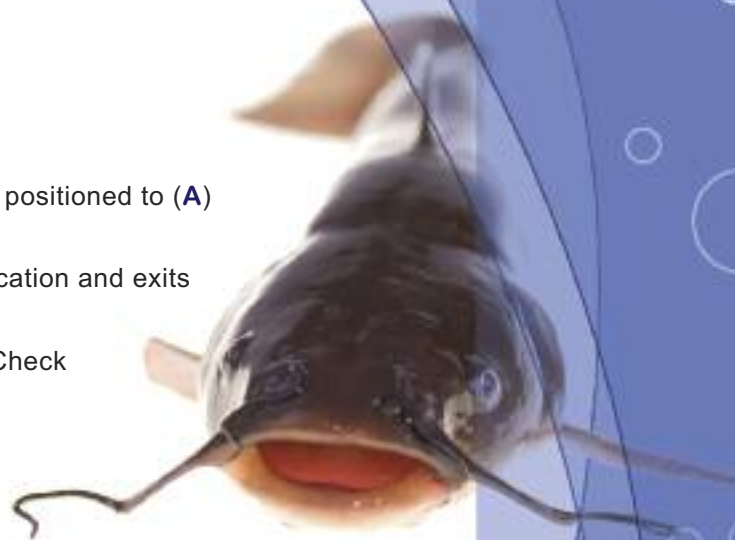
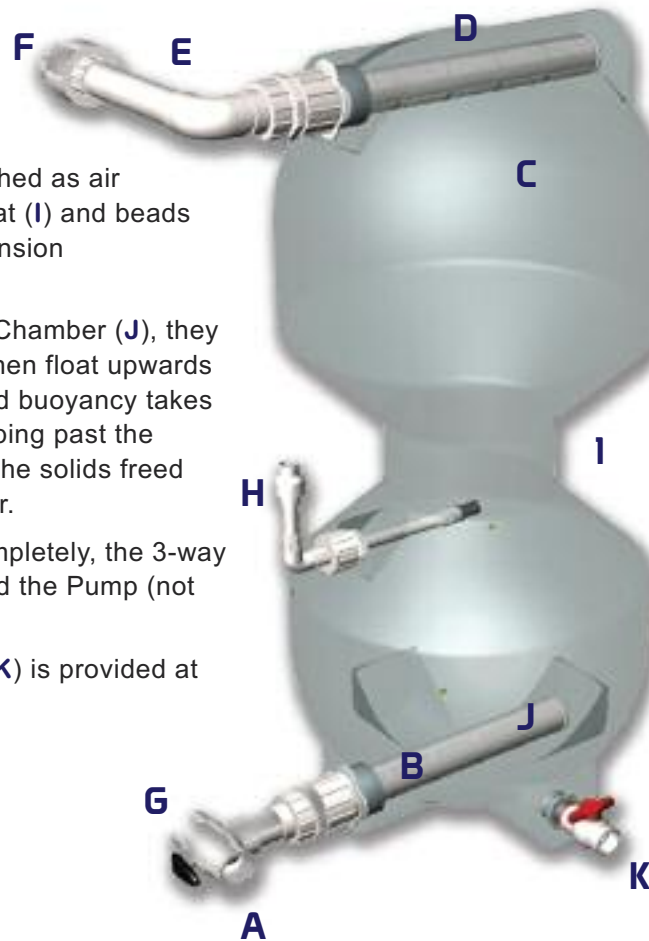
BUBBLE BEAD® FILTER CONFIGURATION

Normal Operation:

- Water is pumped through the Filter Inlet via a 3-way Valve positioned to (A) and the Diffuser (B).
- Water passes upwards through Bead Bed (C) for bioclarification and exits through Screen (D).
- Filtered water is returned through Effluent Line (E) and a Check Valve (F) to the aquatic system.

Backwashing:

- The pump (not shown) is turned off and the 3-way Valve at the Inlet is turned to the Sludge Drain Position (G).
- Backwashing is accomplished by completely draining the water from the filter.
- As water drains from the filter, the check Valve (F) on the Effluent Line closes and air is sucked into the Air Inlet Check Valve (H).
- Agitation of the beads is accomplished as air rises up through the Washing Throat (I) and beads and water drop down into the Expansion Chamber (J).
- As the beads enter the Expansion Chamber (J), they initially sink with momentum, and then float upwards as the water velocity decreases and buoyancy takes hold. As this occurs, water is sweeping past the beads which serves to carry away the solids freed from the bead media out of the filter.
- Once the filter unit has drained completely, the 3-way Valve is returned to position (A) and the Pump (not shown) is turned back on.
- An unscreened Emergency Drain (K) is provided at the bottom of the filter unit.



AQUACULTURE
SYSTEMS TECHNOLOGIES
THE SCIENCE OF BEAD FILTRATION

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