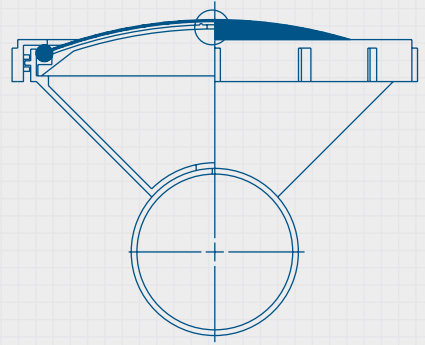


Membrane Disc

Fine Bubble Aeration Systems



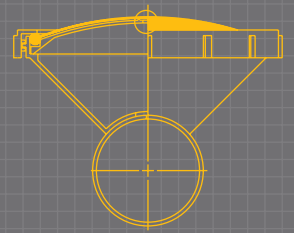
Sanitaire



ITT Industries
Engineered for life

Membrane Disc

Fine Bubble Aeration Systems



Technology You Can Count On

SANITAIRE® is the trade name recognized throughout the wastewater treatment industry for quality products and advanced technology. SANITAIRE Silver Series membrane fine bubble disc diffusers are recognized worldwide for their high oxygen transfer efficiency and durability in wastewater treatment plant aeration processes.

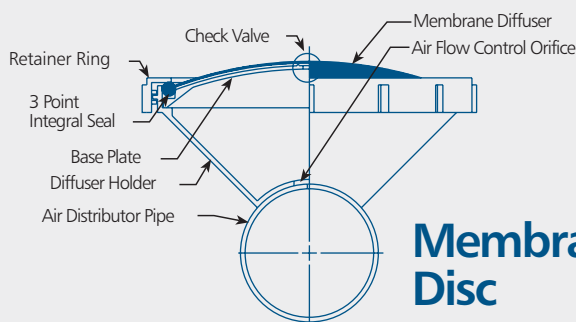
Owners and engineers prefer SANITAIRE fine bubble diffusers because:

- Power costs can be reduced by 50% or more.
- High oxygen transfer efficiency and low system headloss lead to low energy costs.
- Minimal maintenance is required.
- Gentle positive mixing action using full floor coverage aeration grids promotes excellent floc formation.

Sanitaire's leadership and experience in aeration technology has resulted in high quality SANITAIRE fine bubble disc aeration systems being specified more than any other. The SANITAIRE Membrane Disc fine bubble aeration system offers advantages in performance, ease of maintenance, construction integrity and quality. Ongoing research and development shows Sanitaire's commitment to the most technologically advanced diffused aeration system.

Diffuser and Holder Features

- Diffuser holders are factory solvent welded to the air distribution piping providing superior mechanical strength and eliminating the necessity for field installation and leveling of individual assemblies.
- Membrane diffusers include an integral check valve. The non-perforated center portion of the membrane collapses onto the air release port of the base plate when the air is turned off. The diffuser slits also act as check valves and close onto the base plate when the air is turned off.
- Integral seal and threaded retainer ring design prevents air leakage and resulting contamination from mixed liquor solids leakage into the aeration system.



**Membrane
Disc**

Top centerline diffuser mounting prevents cantilever or torque forces from being transmitted to piping system.

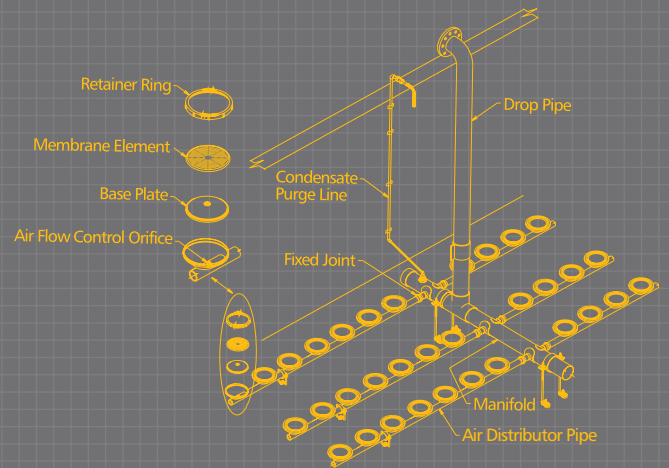


- Diffuser and holder are designed to provide full surface uniform air distribution and bubble release.
- The membrane is completely supported by the base plate, preventing reverse flexing.
- Available in 9-inch (229-mm) and 7-inch (178-mm) diameters.

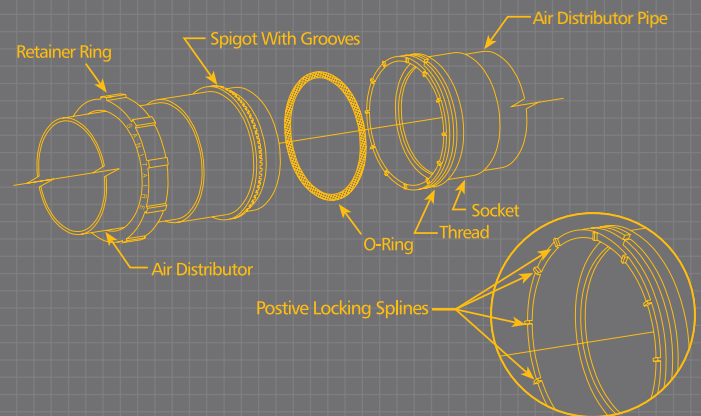
Proven System Components

- The SANITAIRE air distribution system incorporates patented locking pipe joints combined with guide type supports that do not positively grip the pipe to accommodate thermal expansion and contraction. The unique system design allows the individual distributor pipes to move freely through the pipe supports.
- The patented SANITAIRE fixed joint features an airtight O-ring seal, anti-rotational splines and a positive locking threaded retainer ring to prevent air leakage, pipe blow apart and distributor rollover.
- PVC air distribution piping system provides long-term mechanical integrity.
- Submerged components of corrosion resistant materials.
- Unique all stainless steel anchorage system with threaded supports for infinite adjustments on sloped or irregular floors.
- Joint components are factory solvent welded to the pipe ends, allowing for quick and easy field assembly of air distributor sections.
- Condensate removal with sumps and purge system.
- Over 10 million fine bubble diffusers installed worldwide.

Typical Membrane Disc Grid Layout



Sanitaire Positive Locking Fixed Joint



Membrane Disc Diffuser Advantages

- Provides full surface, uniform air distribution and bubble release.
- Operating air pressure creates peripheral seal to eliminate air leakage.
- Precision die-formed slits are punched perpendicular to membrane grain direction for greater resistance to elongation and tearing.
- Proprietary technologically advanced membrane material blended from special synthetic rubber compound has been specifically engineered for domestic and industrial waste applications providing:
 - Extended service life.
 - Resistance to material property changes.
 - High modulus of elasticity.
 - Proper material thickness - lower unit stress.
 - Resistance to oils and ultraviolet light.
 - High oxygen transfer efficiency.
- Alternative materials and configurations available for specific applications.
- The unique design eliminates the use of hold-down bolts, lift limiters and metallic mechanical fasteners.
- Existing aeration tanks can be easily upgraded with membrane disc aeration, upgrading existing plant's organic treatment capacity without adding tankage.
- Convenient shipping - diffusers and piping are delivered in a compact palletized arrangement.
- Ease of installation - up to 12 units installed per man-hour. Step-by-step O&M manuals, educational videos and field service startup training provided with every system.
- Factory installed diffuser holders and pipe end fittings to reduce installation time.
- Pressure monitoring system available.

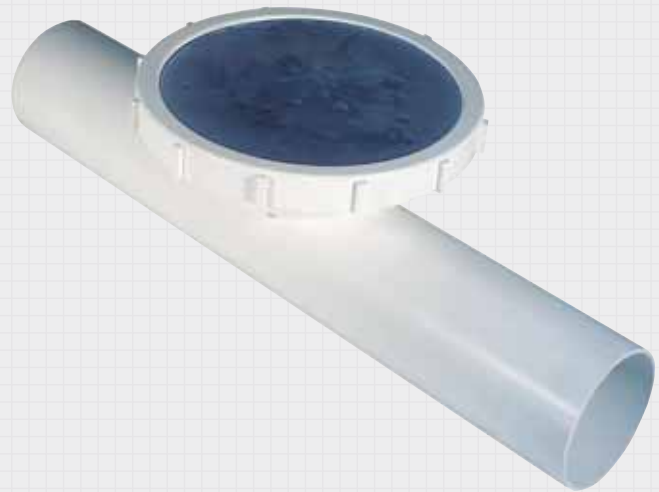
Applications

- ~~Aeration Tanks~~
- ~~Sludge Holding Tanks~~
- ~~Aerobic Digesters~~
- Sequencing Batch Reactors
- ~~Channel Aeration~~
- Air On/Air Off Processes
- ~~Membrane Bioreactors~~

Those Who Choose Membrane Disc Aeration...

get the best of all worlds when they choose proven SANITAIRE systems for their wastewater treatment needs.

Sanitaire provides time-tested aeration technology and products for municipal and industrial markets worldwide.



Call Sanitaire - the aeration leader for more information

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www.sanitaire.com

Sanitaire



ITT Industries
Engineered for life

FLUIDYNE CORPORATION



THE EXPERIENCED LEADER IN SEQUENCING BATCH REACTOR TECHNOLOGY



ISAM™

SEQUENCING BATCH REACTOR PROCESS



THE EXPERIENCED LEADER IN SEQUENCING BATCH REACTOR TECHNOLOGY

TRUST FLUIDYNE'S EXPERIENCE

The Fluidyne ISAM™ Sequencing Batch Reactor (SBR) system incorporates the latest and most innovative technology and over three decades of experience in providing the most reliable SBR systems with the highest effluent quality. Fluidyne SBR systems are in operation around the World and have won numerous awards. Fluidyne SBRs consistently provide better than 10/10/5/1 (BOD5/TSS/TN/TP) effluent quality. Fluidyne engineers have designed over 500 SBRs, and been granted over twenty patents.

A TOTALLY NEW CONCEPT IN SBR DESIGN

The Fluidyne ISAM™ Sequencing Batch Reactor system is a single train SBR system which incorporates a constant level anaerobic selector chamber, followed by a surge/anoxic/mix (SAM™) tank, and one or more SBR basins.

In operation, all influent flow enters the anaerobic selector chamber where influent solids are allowed to settle much like a primary clarifier. Elimination of primary solids in the anaerobic chamber allows for much smaller SBR basins at an equivalent SRT than conventional SBRs. The anaerobic selector also creates soluble carbon as a food source for biological nutrient removal through anaerobic conversion of settleable BOD to soluble BOD.

The influent then flows to the SAM™ surge basin (influent equalization basin). The surge basin provides flow and nutrient equalization to optimize treatment at the full range of flows and loadings. When the level in the surge basin reaches a predetermined level, the jet motive liquid/fill pump is started, and a batch is quickly fed to the reactor basin.

Several unique features of the Fluidyne ISAM™ SBR include odor control and scum skimming. Mixed liquor is maintained in the SAM™ tank to immediately react with incoming flow from the anaerobic chamber to suppress odors and initiate and accelerate carbon and nitrogen reactions. Mixed liquor from the SBR tank overflows the proprietary flow and scum control system weir, and is returned to the SAM™ surge basin, and mixed with incoming wastewater in what is referred to as an "Interact" period. In addition, nitrates are recycled to the SAM™ tank for effective and rapid denitrification. Denitrification reactions are accelerated in the presence of the unreacted soluble carbon from the raw sewage entering the SAM™ tank. Aeration and energy requirements are reduced as nitrates are fully reduced to nitrogen gas in the SAM™ tank.

FLUIDYNE PREPACKAGED ISAM™ SBRs

The Fluidyne prepackaged ISAM™ SBR is available in standard sizes for average influent flows from 5,000 GPD to 110,000 GPD. Each unit is shipped complete; prewired and prepiped. Packaged systems can be buried or installed above grade on customer provided concrete pad.

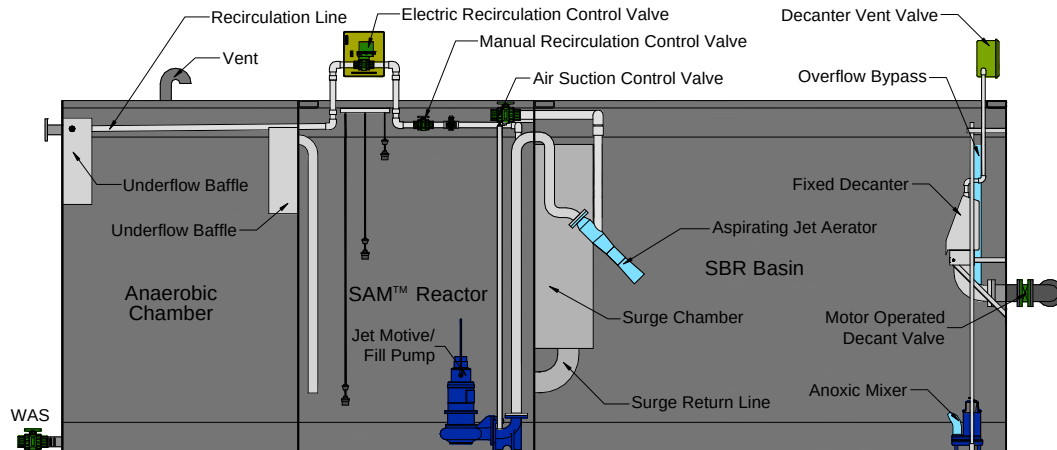
100% ON-LINE STANDBY EQUIPMENT

Fluidyne's prepackaged ISAM™ SBRs are furnished with spare mixing/fill pump and aerator assembly installed for 100% redundancy.

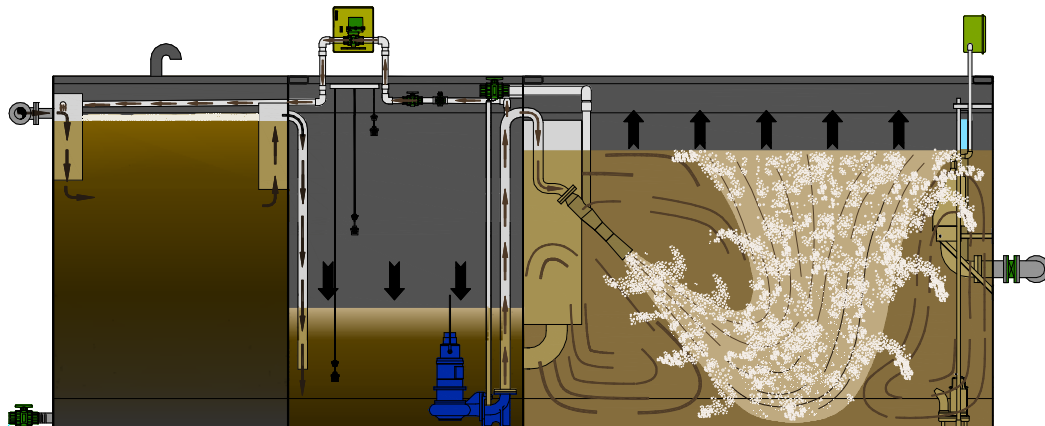


REDUCES WASTE SLUDGE BY 80%

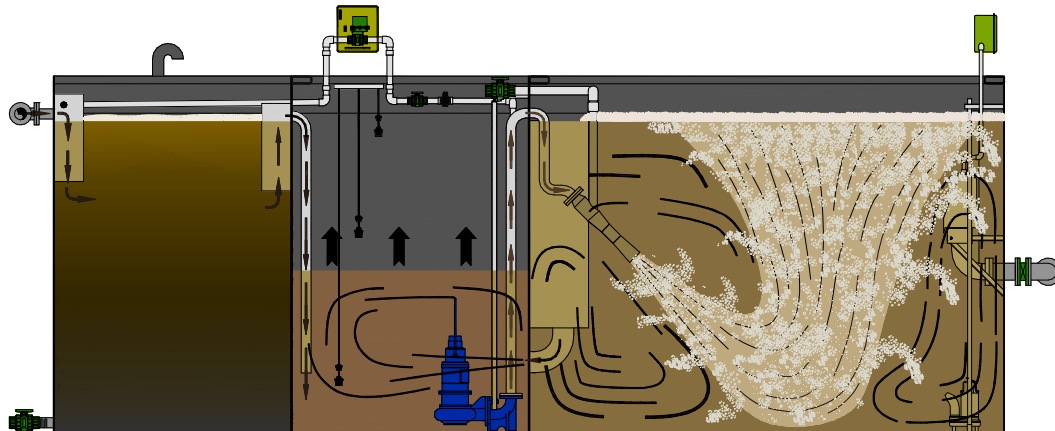
The Fluidyne ISAM™ Sequencing Batch Reactor incorporates an anaerobic selector chamber with the SAM™ SBR. All influent flow enters the anaerobic selector chamber where influent solids settle. The anaerobic selector chamber also creates soluble carbon as a food source for denitrification through anaerobic conversion of settleable BOD to soluble BOD. During the "Interact" phase, a portion of the motive liquid is also recirculated to the anaerobic selector chamber where the mixed liquor solids are converted from an aerobic-dominant population to a facultative-dominant population. Aerobic bacteria are selectively destroyed while enabling the low-yield, facultative bacteria to breakdown and utilize the remains of the aerobes and their byproducts. The mixed liquor then flows to the SAM™ surge basin where the facultative bacteria, in turn, are out-competed by the aerobic bacteria and subsequently broken down in the alternating environments of the aerobic SBR treatment process and the anaerobic chamber. A balance between selection and destruction is developed between the anaerobic selector chamber and the SBR treatment process resulting in extremely low net biological solids produced. The ISAM™ process will reduce the volume of waste sludge by approximately 80%, compared to a conventional SBR/aerobic digester system, and eliminate the need for separate digesters.



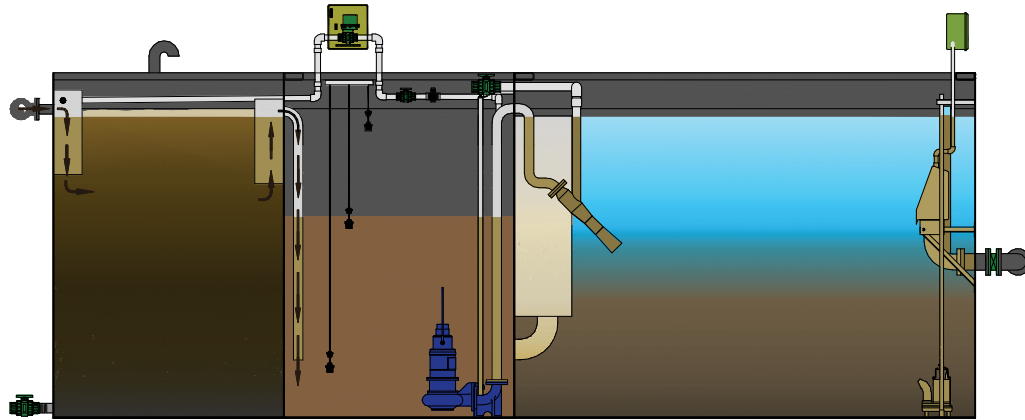
System Components: Influent continuously enters the anaerobic chamber where solids settle. Settleable BOD is converted to soluble BOD. BOD is reduced by 30%, and solids are reduced by 60%. The influent then flows to the SAM™ reactor. Mixed liquor is maintained in the SAM™ reactor to suppress odors, and initiate and accelerate carbon and nitrogen reduction.



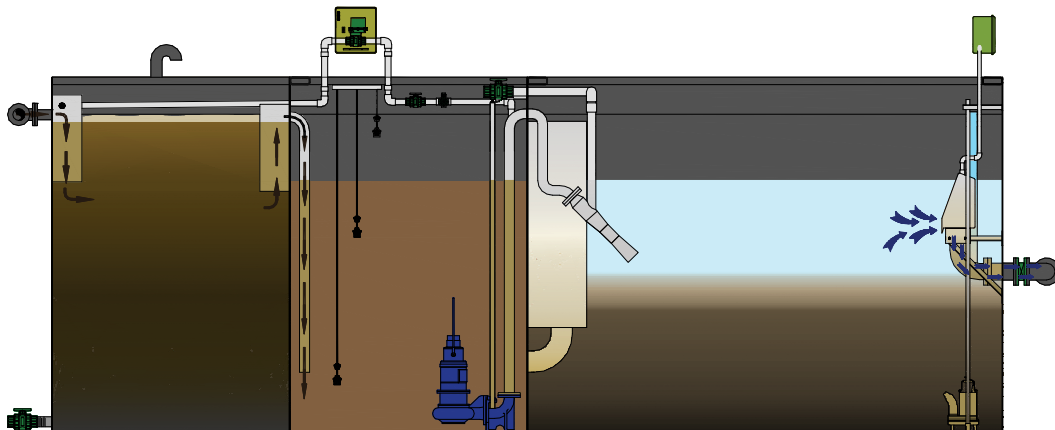
Fill Phase: When the level in the SAM™ reactor reaches a predetermined “control level” the motive liquid pump is started. The SBR basin is filled and mixed. A percentage of the pumped flow is returned to the anaerobic chamber where biological solids settle. The recycle flow is adjustable to maintain the desired MLSS concentration in the SBR basin. Settled solids in the anaerobic chamber are digested.



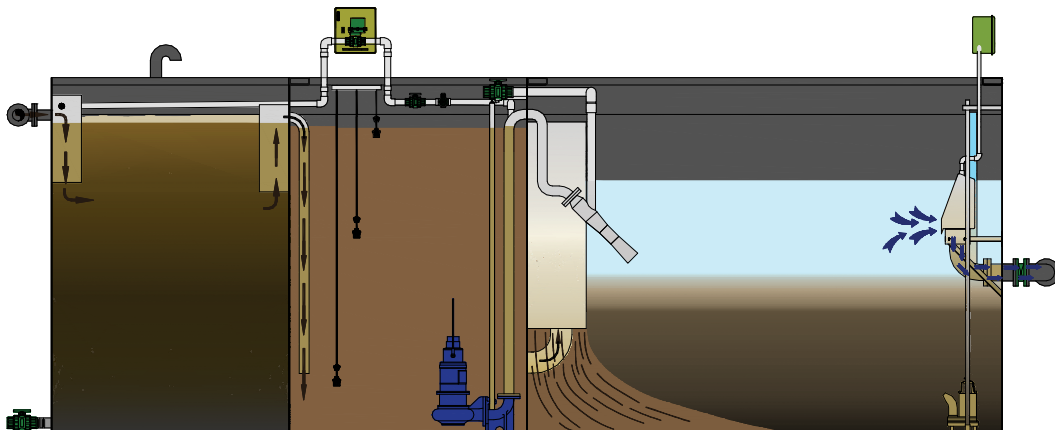
Interact Phase: When the level in the SBR reaches TWL, nitrified mixed liquor overflows the surge chamber weir and is returned to the SAM™ chamber to mix and react with the raw influent. Aeration is cycled on and off to provide the required oxygen. Denitrification is reliable and complete. Scum is also removed from the SBR basin.



Settle Phase: When the level in the SAM™ reactor again reaches “control level,” aeration is discontinued, and the SBR basin settles under perfect quiescent conditions.



Decant Phase: When the settle timer expires, the decant valve is opened, and treated effluent is withdrawn from the upper portion of the SBR basin by means of a fixed solids excluding decanter.



Filled Decant Phase: If, during peak flow events, the SAM™ reactor reaches TWL before the decant phase ends, influent flows in a reverse direction through the surge return line and overflows the surge chamber secondary weir, and is diffused into the settled sludge at very low velocity as the decant phase continues.

CUSTOM ENGINEERED ISAM™ SYSTEMS

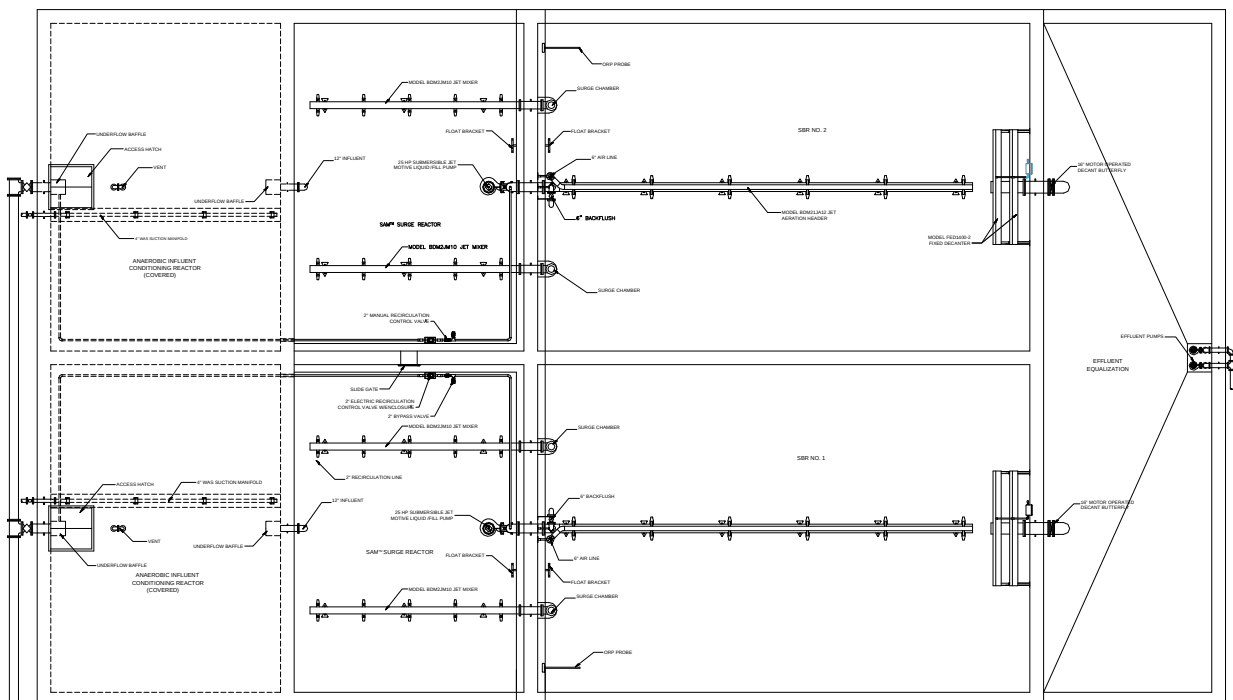
The majority of ISAM™ systems currently operating are packaged systems for daily flows of less than 100,000 GPD. However, the process offers the same advantages for larger facilities. The first advantage is that the ISAM™ requires smaller SBR basins than a conventional SBR, at identical loadings. This is due to the fact that 65% of the influent solids are removed in the anaerobic chamber, and are therefore not considered in calculation of the SRT. An ISAM™ designed for an average daily flow of 1.0 MGD, and an SRT of 20 days will have an SBR basin capacity of 0.67 MG, and an HRT of 16 hours. A conventional SBR designed for a 20 day SRT would have a capacity of 1.24 MG, and an HRT of 30 hours. The 1.0 MGD ISAM™ SBR design also includes the SAM™ reactor having a capacity of 0.14 MG. Since the SAM™ reactor contains mixed liquor, the actual working SRT for the ISAM™ process is 25 days, and the total volume is only 66% of that of the conventional SBR.

The ISAM™ design also includes two anaerobic influent conditioning chambers having a total capacity of 0.50 MG. Therefore, the total volume of the entire ISAM™ SBR process is 1.31 MG, and no additional digesters are required. Aerobic digesters for a conventional 1.0 MGD SBR would have a capacity of 0.30 MG if designed for a 30 day sludge age. This

means that the total volume for a 1.0 MGD conventional SBR plus aerobic digesters would be 1.54 MG. The total volume for the ISAM™ process is 1.31 MG.



The total power consumption for a 1.0 MGD conventional SBR plus aerobic digestion would be approximately 1,680 KWH/day. The total power consumption for a 1.0 MGD ISAM™ SBR is approximately 845 KWH/day; 50% less than a conventional SBR.

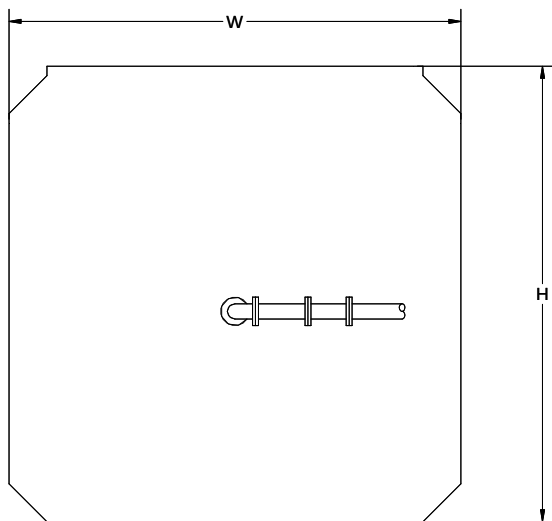
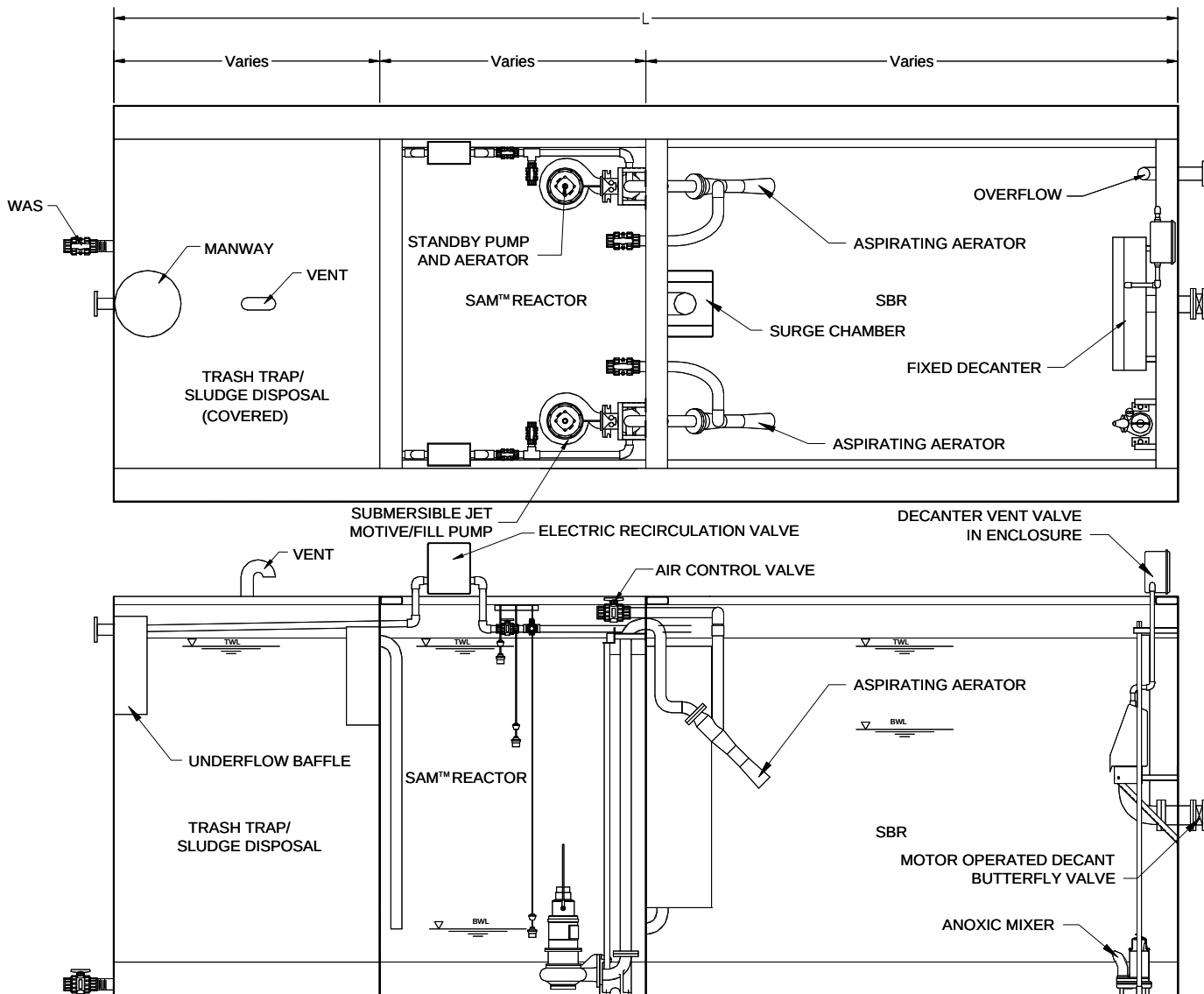


THE EXPERIENCED LEADER IN SEQUENCING BATCH REACTOR TECHNOLOGY



FLUIDYNE SAM™ SBR - BARONA, CA - WEEKLY REPORTS

DATE	INFLUENT					EFFLUENT						
	BOD ₅	TSS	NH ₃ -N	TKN	FOG	BOD ₅	TSS	NH ₃ -N	NO ₃	NO ₂	TKN	FOG
02/16/05	632	327	20.2	36.0	64.8	2.0	ND	ND	0.1	0.02	0.50	<1.0
02/23/05	338	226	6.7	7.8	45.5	ND	ND	ND	ND	0.02	0.60	ND
03/02/05	813	390	23.5	35.0	75.8	4.6	ND	2.0	0.1	0.01	0.80	ND
03/09/05	653	328	15.1	22.7	88.8	4.9	ND	0.2	0.3	ND	1.10	ND
03/16/05	640	237	23.7	35.9	79.4	2.7	ND	0.2	0.3	0.02	1.10	ND
03/23/05	385	445	24.1	38.2	80.7	2.2	ND	2.0	0.2	0.13	0.70	ND
03/30/05	736	358	15.2	19.3	217.0	10.0	ND	0.1	0.1	0.03	0.50	ND
04/06/05	627	338	28.3	34.5	97.0	9.0	ND	0.4	ND	ND	0.40	ND
04/13/05	784	356	23.0	27.2	31.0	12.0	ND	0.5	ND	ND	0.70	ND
04/20/05	336	223	14.0	16.6	8.4	3.5	1.9	0.4	ND	ND	3.30	<1
04/27/05	579	485	6.7	8.9	27.5	<2	ND	0.3	ND	ND	3.10	<1
05/04/05	940	334	1.0	33.1	48.9	2.9	2.5	1.0	0.1	0.08	2.60	<1
05/11/05	622	330	22.2	74.2	66.7	<2	ND	ND	ND	ND	1.80	ND
05/18/05	718	329	20.8	28.0	492.0	2.2	ND	ND	ND	ND	0.49	ND
05/25/05	575	322	13.1	13.3	450.0	4.6	ND	0.5	ND	ND	0.50	ND
06/01/05	711	688	24.0	25.8	327.0	12.3	ND	0.5	0.2	ND	0.50	ND
06/08/05	508	277	22.4	27.9	52.6	2.4	NO	0.1	0.4	ND	0.70	<1
06/15/05	343	155	14.9	22.5	90.8	<2	ND	0.5	0.4	ND	1.00	ND
06/22/05	661	477	27.6	33.5	87.2	<2	ND	0.2	0.4	ND	0.70	1.1
06/29/05	444	345	32.6	50.5	61.5	2.0	ND	0.1	0.3	0.03	0.50	ND
07/06/05	925	379	27.6	48.1	87.5	1.7	ND	0.2	0.3	0.03	0.80	ND
07/13/05	673	346	33.1	52.5	99.5	<2	ND	0.5	0.5	ND	0.90	<1.0
07/20/05	650	109	29.1	43.0	84.9	<2	ND	0.1	ND	0.04	0.70	<1.0
07/27/05	694	305	33.0	43.0	83.1	<2	ND	0.2	0.3	0.08	0.40	ND
08/03/05	580	324	26.3	28.0	65.9	3.6	ND	0.6	0.3	0.02	0.80	ND
AVG. YTD	623	337	20.9	32.2	116.5	4.6	ND	0.4	0.2	0.03	1.01	ND



MODEL	W	L	H	HP*
ISAM™ 05	6.5	16	10.0	3
ISAM™ 10	8.5	24	10.0	5
ISAM™ 15	8.5	24	12.0	5
ISAM™ 20	11.9	24	12.0	7.5
ISAM™ 25	11.9	30	12.0	7.5
ISAM™ 30	11.9	34	12.0	10
ISAM™ 40	11.9	45	12.0	10
ISAM™ 42	11.9	48	12.0	10
ISAM™ 50	11.9	56	12.0	15
ISAM™ 60	11.9	68**	12.0	20
ISAM™ 70	11.9	72**	12.0	20
ISAM™ 75	11.9	80**	12.0	25
ISAM™ 80	11.9	90**	12.0	25
ISAM™ 90	11.9	96**	12.0	30
ISAM™ 100	11.9	112**	12.0	40
ISAM™ 110	14.0	112**	12.0	40

* EACH PUMP (ONE IS STANDBY)

** TWO TANKS (EACH TANK IS HALF OF TOTAL LENGTH)



THE EXPERIENCED LEADER IN SEQUENCING BATCH REACTOR TECHNOLOGY

The Fluidyne ISAM™ SBR system provides the following benefits,

1. Ability to handle highly variable flows and loading associated with small, to medium size plants. The ISAM™ is more flexible than continuous flow plants. Regardless of flows or loading, aeration and mixing can automatically be adjusted to optimize power and prohibit filamentous growth.
2. At high flows, solids cannot wash out as with extended aeration plants as the ISAM™ SBR process utilizes quiescent settle and decant.
3. ISAM™ facilities are easily expandable by adding a new tank. The additional tank does not require major changes in controls; only a new tank and associated equipment.
4. ISAM™ provides a small footprint with no digesters, secondary clarifiers, RAS piping and pumping.
5. ISAM™ produces the highest quality effluent. Typical Fluidyne ISAM™ facilities are achieving less than 10 mg/l BOD and TSS, less than 1 mg/l NH₃-N, less than 5 mg/l total N, and less than 2 mg/l phosphorous.
6. Easy to operate and maintain as mechanical equipment is minimized with no chasing of sludge associated with extended aeration plants.
7. Use of self-aspirating jet aerators eliminate blowers and blower accessories.
8. Built in sludge reduction system using the anaerobic selector chamber significantly reduces sludge handling and hauling costs.
9. 100% stand-by aerator is included with the system to allow continuous operation with one unit out of service.
10. Built in flow equalization is provided in the ISAM™ reactor to handle peak hourly flows.
11. Automatic scum skimming prior to effluent discharge provides highest quality effluent.
12. Exceptional after sales service by Fluidyne technicians. Fluidyne employees have been granted over 40 patents in wastewater and water treatment technology and equipment.
13. Reduced operation and maintenance costs as power usage is controlled through the Fluidyne control panel.
14. Installed cost is lower as the system comes with the in-basin equipment pre-installed
15. The anaerobic selector chamber is covered and raw wastewater reacts immediately with mixed liquor in an aerated environment, there are no odor concerns.

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