

Expanded
AEROMIX
Product Line
Includes
All Major
Wastewater
Aeration
Technologies

TWISTER™

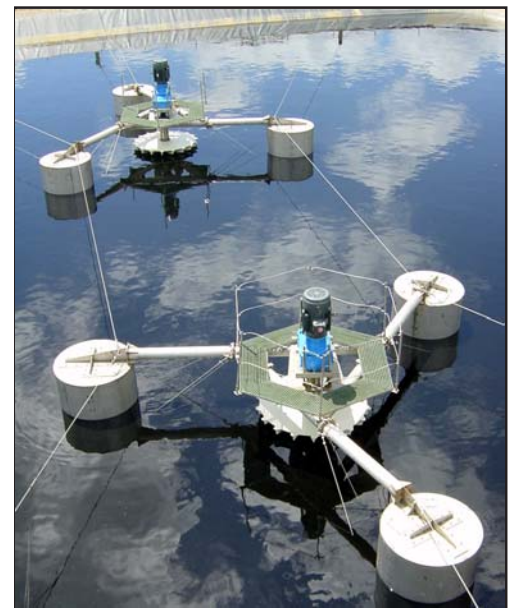
Low Speed Surface Aerator

Highest Oxygen Transfer

The proven TWISTER™ Low Speed Surface Aerator delivers unmatched oxygen transfer rates, with reliable long lasting performance. Featuring a refined high-efficiency design, the TWISTER Aerator effectively stirs the basin while creating intense air-to-water mixing, resulting in one of the highest oxygen transfer rates available from mechanical aeration technology.

TWISTER Aerators are ideally suited for use with other aeration and mixing technologies. Models are available from 2 to 150 horsepower (1.5 to 110 kW) at 50 or 60 hertz. AEROMIX can recommend the power and size best suited for your applications.

Typical TWISTER™ Low Speed Aerator on floats.



Typical TWISTER™ Low Speed Aerator mooring.

Extensive Applications

TWISTER™ Low Speed Surface Aerators are ideal for oxygen transfer in a wide range of wastewater applications, including:

- High Rate Aeration
- Leachate Treatment
- Extended Aeration
- Oxidation Ditches

Maximum Durability - Minimal Maintenance

Ideal for wastewater treatment and extended aeration, the TWISTER Aerator provides unmatched durability. All shafts, couplings, gearboxes and support apparatus are oversized to reduce wear, vibration and long-term maintenance.

The FRP (fiberglass reinforced plastic) rotor is wear resistant. It is molded around a central steel frame and filled with closed cell foam for additional structural support. These materials ensure an exceptional resistance to corrosion and abrasion. In addition, the rotor floats! This eases installation and reduces the axial stress on the gearbox. The rotor's special shape is proven to eject debris — keeping the system working in all conditions. The smooth edge design of each blade prevents ragging while maximizing oxygen transfer. Rotors are appropriately sized to convert the mechanical output of the gearbox into efficient mixing and aeration.

Motors are specifically designed for outdoor use in wet environments and can be supplied to meet any power requirement. Both motor and gearbox parts are commercially available worldwide. As additional safety measures, rotor guards, platforms, access ladders and handrails can be added.

Designed For High Oxygen Transfer

Whether float or fixed mounted, the TWISTER Aerator's partially submerged rotating turbine is turned at a slow speed (40 to 100 rpm) by an integral motor and gearbox. As the turbine rotates, specially designed veins create a strong pumping force. A column of water rises and is deflected, nearly horizontally, in a fine spray of small water droplets. A large surface area is created, making an ideal air-to-water interface which creates very high oxygen transfer.

Mechanical Reliability

Proprietary engineering and meticulous construction specifications ensure that the TWISTER Aerator runs right from the beginning and keeps running without time-consuming maintenance.

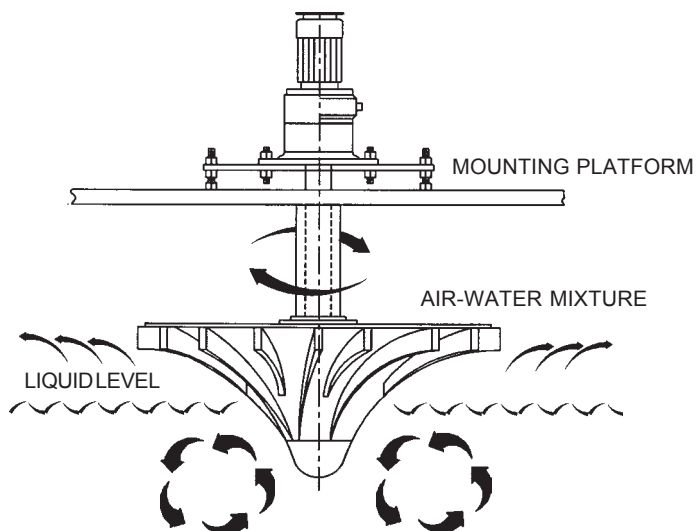
All bearings are ball- or roller-type, and standard units are dip or splash lubricated — providing a constant flow of oil to all surfaces without the need for pumps or piping.

The gear reducer features double or triple reduction with a service factor of 1.25 or greater. The high efficiency gearbox lessens power consumption and provides for longer gear life.

A rotor-type coupling is attached to the upper end of the shaft and mates with the speed reducer output shaft coupling.

Available gear box convenience features include a sight glass to allow monitoring of oil level while the unit is operating, and gasket covers to allow for inspection of gearing without disassembly of the speed reducer. In addition, factory testing for each TWISTER Low Speed Surface Aerator checks and rechecks that the equipment meets the AEROMIX stringent standards for quality.

TWISTER Aerator THEORY OF OPERATION



Mounting Flexibility

The TWISTER Aerator offers flexibility to be configured as a floating or fixed mounted unit. Each float mounted aerator installs on a “three-pod” pontoon system. The stainless steel pontoons are filled with closed cell polymer foam, making a rugged long-life float system. With a flotation safety factor of 2, a 250 pound (114 kg) operator can safely step on the fully assembled float and aerator system to check equipment or perform routine maintenance.

Fixed mounted aerators include an adjustable mounting plate for each aerator. The mounting plate accepts four mounting rods, allowing for proper leveling and aerator height adjustment.

Aeration Knowledge - Wide Range Of Products

AEROMIX is your aeration expert. We offer all major wastewater aeration technologies and the expertise to help you select and apply the equipment best suited for your application. Let our technical experts assist you in proper sizing, layout, and operation of your aeration system.



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Rental units available.

Covered by United States Patent Nos. 4,741,870 - 5,160,667 - 5,183,596.

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TWISTER LOW SPEED AERATION SPECIFICATION

A. General

Provide a total of ____ TWISTER low speed aerators as manufactured by AEROMIX Systems, Incorporated of Minneapolis, Minnesota, USA. Each aerator shall be __ horsepower (__ kW), and shall consist of an electric motor driven gear reducer coupled to a rotor. The spinning rotor shall be immersed in the wastewater upward and project wastewater upward and outward providing intimate contact with the air. The pumping action produced shall also thoroughly mix the basin. Specifications for accessories such as oil heaters, pressure switches, ect. are available upon request.

B. Aerator Motor

All motors furnished shall be of high efficiency and shall comply with all applicable provisions of the standards of the National Electric Manufacturers Association (NEMA). Each motor shall be standard TEFC (totally enclosed, fan cooled), with c-face and have NEMA class B insulation. Thrust loads shall not be placed on the motor bearings. All motors will operate at ____ VAC, ____ hertz, ____ phase, ____% efficiency, ____ RPM.

C. Gear Reducer

The gear reducer shall be helical gear type, double or triple reduction, designed specifically for mechanical aerator service. The service factor of the speed reducer shall be 2.0 or greater.

Gear reducer housings shall be high-grade cast iron of adequate section for the intended load and precision-machined to insure concentricity and proper alignment of all internal components. Gasketed covers shall be provided for inspection of gearing without disassembly of the speed reducer.

Gears shall be designed in accordance with AGMA standards 211.02 and 221.02. Bearings shall be ball or roller type and shall be selected in accordance with AGMA standards 265.01.

All gear meshes and bearings shall be dip or splash lubricated except the lower output shaft bearing, which may be of dry well construction and shall be grease lubricated. Each aerator shall be supplied with the correct grade, and quality of lubricant for the operating conditions at the site.

D. Aerator Shaft

The aerator shaft shall be stainless steel of adequate size to transfer the applied torque and to resist bending. A precision-machined stainless steel flange-type coupling shall be welded to the upper end of the shaft for mating to the speed reducer output shaft coupling.

E. Rotor

To maximize strength and performance the rotor shall be one piece molded fiberglass of monolithic construction and internally reinforced with a steel structure. The entire assembly shall be filled with closed cell polyurethane foam for additional structural support and to assure the rotor floats in water thus easing assembly and reducing downward load on the gear drive bearings.

Each blade shall be smooth-edged to prevent ragging and specifically designed to maximize oxygen transfer.

F. Aerator Mount (Fixed)

When fixed mounted the aerator manufacturer shall supply, for each aerator, an adjustable angle frame support made of stainless steel to secure the aerator in position each aerator. The angle frame support shall accept 4 mounting rods with nuts (provided by others) embedded in the structure and allow proper leveling and aerator height adjustment.

G. Aerator Mount (Float)

See Stainless steel float system specification.

H. Warranty

A separate warranty statement shall be provided by the manufacturer, which defines the terms of a 12-month warranty.

I. Performance Testing

The manufacturer shall have available on site a test tank with minimum volume of 100,000 gallons where oxygen transfer rate, velocity, and mixing tests can be executed. Upon request, the manufacturer shall provide independently certified oxygen transfer test, data generally following the ASCE Oxygen Transfer Standard to document equipment performance.

J. Safety

The manufacturer shall provide visible safety warning labels on the shipped equipment, that comply with OSHA regulations (29 CFR 1910).

TWISTER Low Speed Surface Aerator - TECHNICAL DATA SHEET

Power Horsepower	2	3	5	7.5	10	15	20	25	30	40	50	60	75	100	125	150
Output Kilowatt	1.5	2.2	4	5.5	7.5	10	15	18.5	22	30	37	45	55	75	90	110
Rotor rpm																
60 hertz	87	80	100	110	130	72	77	77	60	70	70	70	50	42	48	36
50 hertz	87	80	100	110	130	72	77	77	60	70	70	70	50	42	48	36
Minimum Basin Diameter																
feet	16	16	16	23	23	30	34	34	39	39	39	49	49	59	69	79
meters	5	5	5	7	7	9	10.5	10.5	12	12	12	15	15	18	21	24
Complete Mix Diameter																
feet	28	33	43	49	59	66	75	79	85	92	102	108	118	131	144	157
meters	9	10	13	15	18	20	23	24	26	28	31	33	36	40	44	48
Oxygen Dispersion Diameter																
feet	80	99	118	141	164	184	213	220	239	262	292	302	334	370	403	446
meters	24	30	36	43	50	56	65	67	73	80	89	92	102	113	123	136
Maximum Liquid Level Variation																
inches	3.1	3.1	3.1	3.1	3.1	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	7.9	7.9	7.9
centimeters	8	8	8	8	8	10	10	10	10	10	10	10	10	20	20	20
Spray Diameter																
feet	12	12	12	14	14	15	18	18	18	22	22	22	23	25	28	28
meters	3.6	3.6	3.6	4.2	4.2	4.5	5.4	5.4	5.4	6.6	6.6	6.6	7	7.5	8.5	8.5
Minimum Liquid Level																
feet	4.9	4.9	4.9	4.9	4.9	5.9	5.9	5.9	5.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
meters	1.5	1.5	1.5	1.5	1.5	1.8	1.8	1.8	1.8	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Oxygen Transfer (per ASCE)	2.7 to 3.2 pounds per horsepower hour 1.7 to 1.8 kilograms per kilowatt hour															
Approximate Weight																
pounds	380	396	440	528	616	1100	1650	2200	3080	3300	3520	3520	3960	5940	6600	8800
kilograms	170	180	200	240	280	500	750	1000	1400	1500	1600	1600	1800	2700	3000	4000

NOTES: All numbers are approximate. Actual performance may vary. All data subject to change. Actual rotation speeds may vary depending on installation.

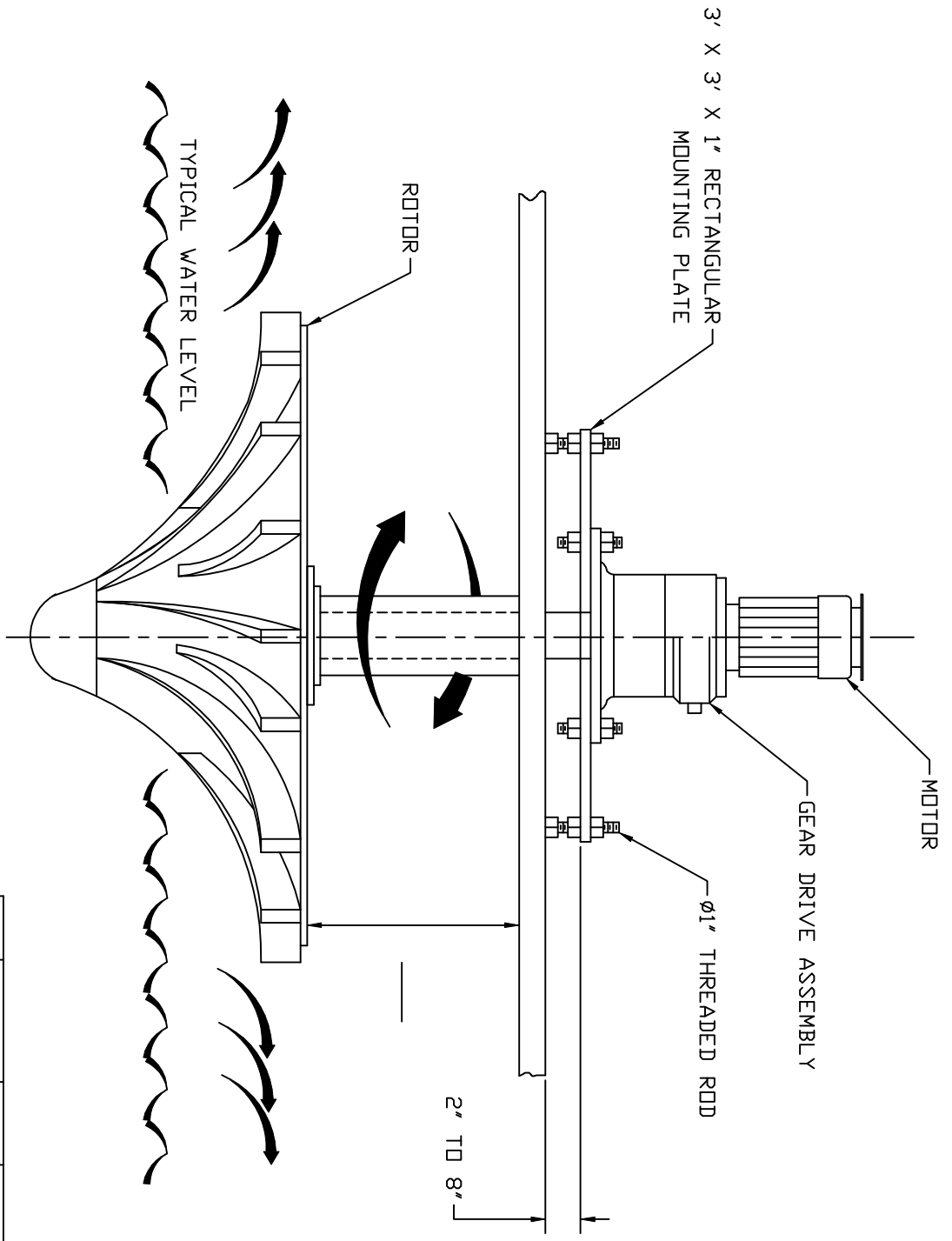


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REV.	ECD#	DESCRIPTION	DATE	CHK.



ITEM	DWG.#	PART#	DESCRIPTION	QTY
PARTS LIST				

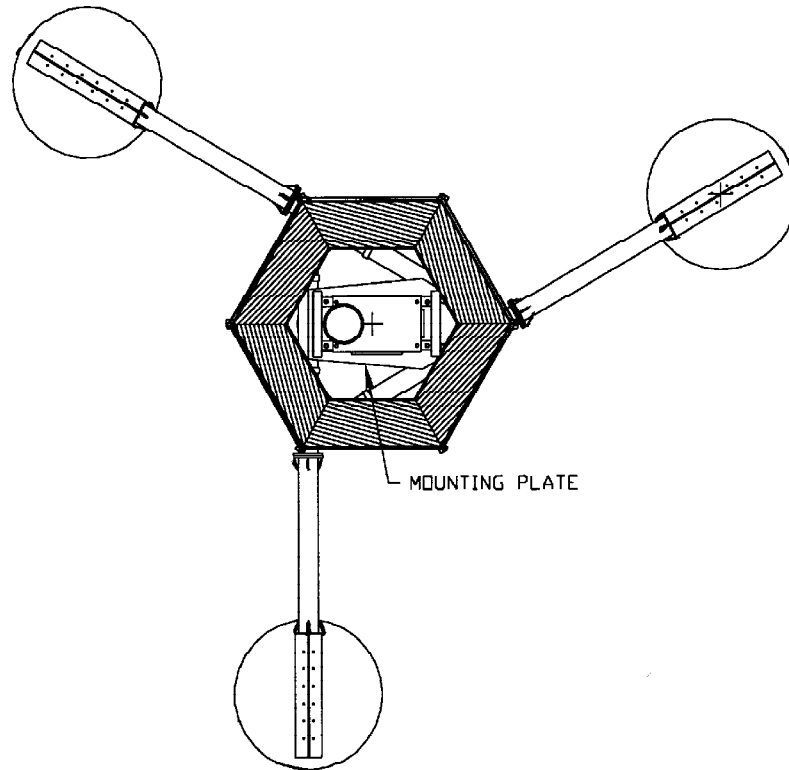
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DATE: 4-15-99 DRAWN BY: TAJ PATENTS: AERONAUTIC PRODUCTS MAY BE COVERED BY ONE OR MORE PATENTS OR PATENTS PENDING. THESE REMAIN THE PROPERTY OF AERONAUT.

TITLE: TWISTER SALES DRAWING

DRAWING#: AS103492

Float & Work Platform



TWISTER AERATOR FLOAT SYSTEM WORK PLATFORM SPECIFICATION

A. General

A non-skid, stainless steel work platform surrounded by a railing shall be provided on each float system to provide adequate safety for an operator to service each aerator. The platform shall encircle the aerator providing safe access to the entire gear box and motor. This platform shall be manufactured by AEROMIX SYSTEMS, INCORPORATED of Minneapolis, Minnesota, USA.

B. Materials

All materials, including the platform and railing shall be stainless steel for maximum corrosion resistance and to eliminate the need for painting or maintenance.

C. Platform

The work platform shall be made of grating and must be non-skid and provide an open surface such that debris, ice, or water will not accumulate on its surface.

D. Railing

A tubular railing shall be provided 3 feet (0.9 m) above the work platform and surround at least 75% of that platform.

TWISTER AERATOR STAINLESS STEEL FLOAT SPECIFICATION

A. *General*

A multi-pontoon system with support brackets and aerator-mounting platform shall be provided for each aerator. This float assembly shall be manufactured by AEROMIX SYSTEMS, INCORPORATED of Minneapolis, Minnesota, USA.

B. *Materials*

All materials including pontoons, brackets, mounting platform, and fasteners shall be 304 stainless steel for maximum strength and corrosion resistance. No galvanized, plastic, fiberglass or aluminum components shall be used.

C. *Pontoons*

1. Each pontoon shall have all seams and ends fully closed. Marine grade polymer foam shall be injected into each pontoon and totally fill the interior. All foam fill ports shall be plugged.
2. Each pontoon shall be provided with stainless steel supports on which brackets can be bolted.

D. *Support Brackets / Mounting Platform*

Structural members shall be provided to span between the pontoons and provide a support for the aerator mounting platform and aerator accessories. The mounting platform shall be $\frac{3}{4}$ " (19 mm) minimum thickness plate and incorporate four threaded rods and nuts for varying the aerator rotor depth of submergence over a range of 12" (300 mm).

E. *Flotation Capacity*

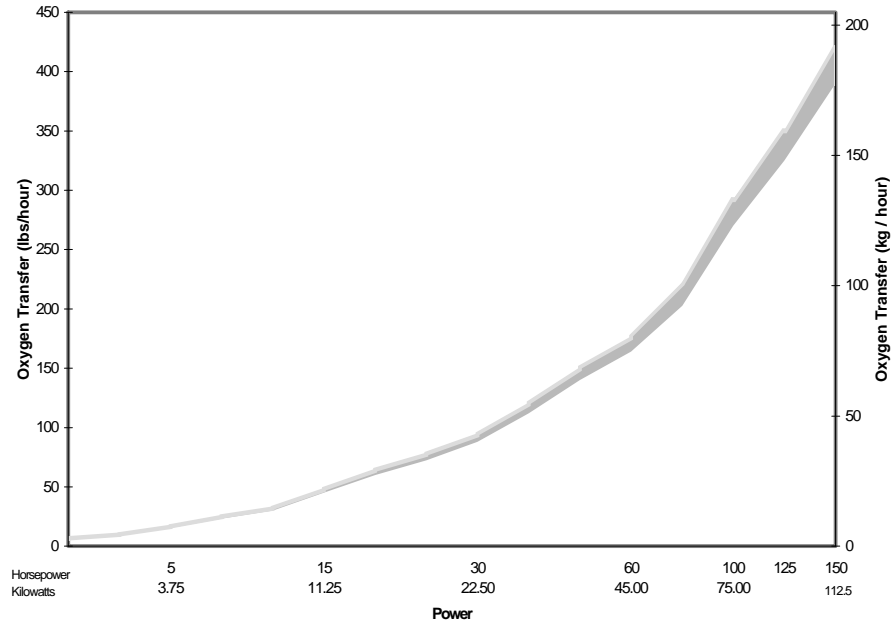
Each float system shall provide a flotation safety factor of at least two times the total assembly weight, including the aerator and motor. The flotation system shall withstand normal wave action, wind velocities and aerator torque without capsizing. The complete aerator float system shall not be more than $\frac{3}{4}$ submerged when a 200 lb. (91 kg) person is standing on it.

F. *Mooring Cable Attachments*

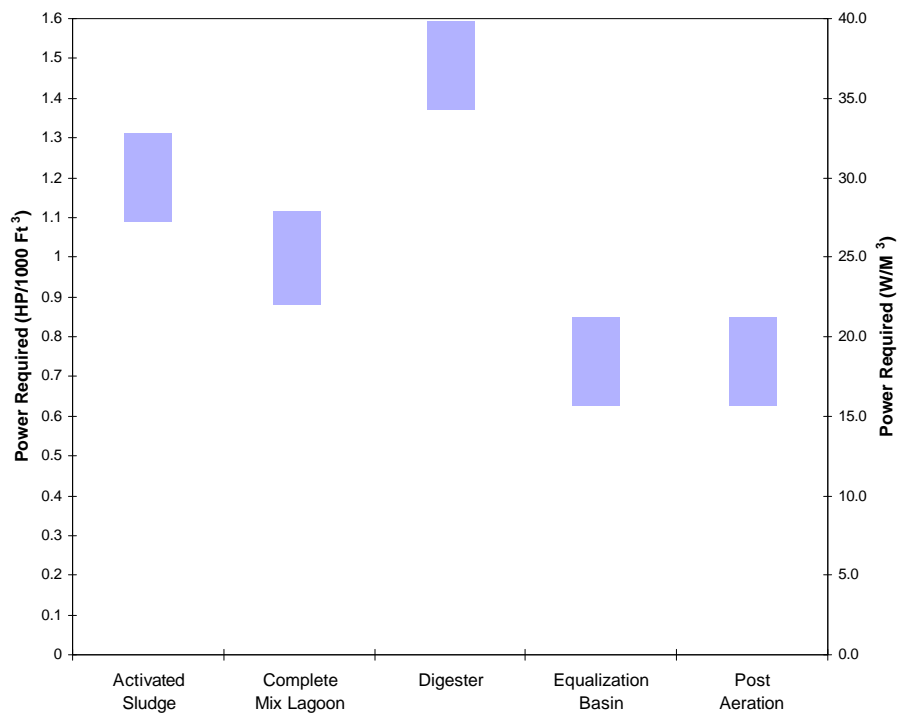
Each float system shall be capable of being moored in position as shown on the layout drawing. Special stainless steel eye attachment points shall be provided for anchoring assembly in place.

PERFORMANCE DATA
AEROMIX TWISTER Low Speed Aerator

OXYGEN TRANSFER CURVE



MIXING CHARACTERISTICS



All performance is approximate. Contact AEROMIX for specific performance tests and data.
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APPLICATION GUIDE
AEROMIX TWISTER Low Speed Aerator

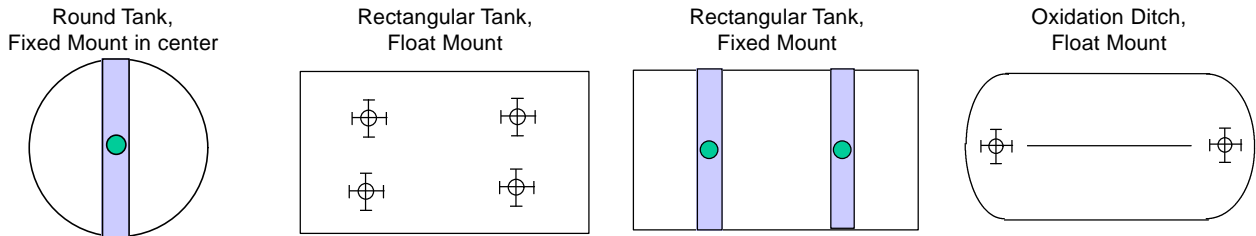
This guide is written to assist the user of the TWISTER Low Speed Aerators in the effective and efficient sizing and application of this product. Your AEROMIX Regional Sales Manager can draw on years of process experience to provide additional sizing criteria and to make a final recommendation for each application.

When making a recommendation for TWISTER Aerators you must carefully consider mixing and oxygen requirements, as well as the configuration of the process system.

How is it applied?:

TWISTER Aerators can be fixed mounted on a platform or float mounted within a basin. Single aerators are used to aerate and mix small tanks while multiple aerators are used in large basins. Tank baffle walls are sometimes used to limit rotational mixing.

These aerators can be used in round tanks, rectangular tanks, lagoons or oxidation ditches. Typical positioning is as follows:



Design and process advantages:

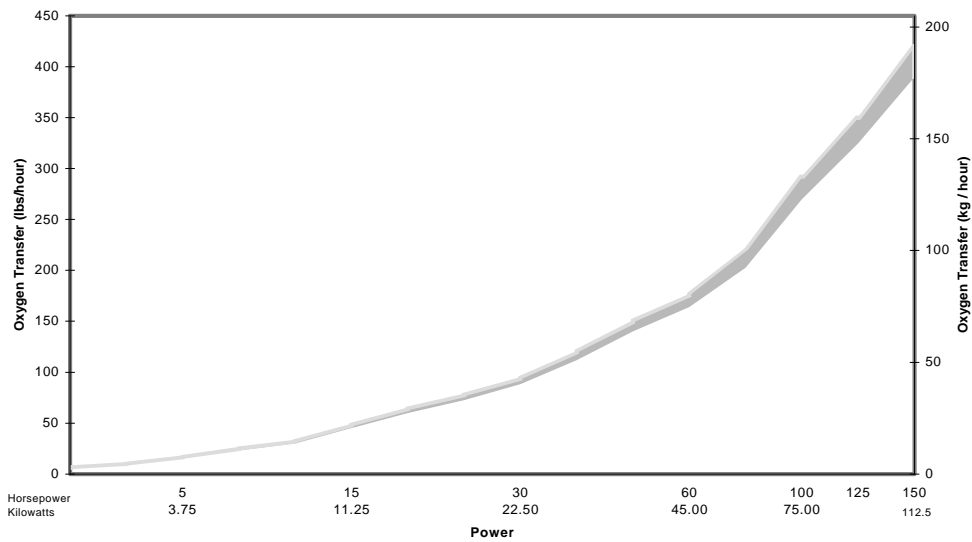
High oxygen transfer rates make TWISTER aerators excellent for highly loaded basins. Oxygen transfer rates are typically higher than with other mechanical aeration devices. Simplicity and reliability are other advantages as the aerator has only one rotating part in the wastewater.

Oxygen considerations:

The oxygen requirement must first be determined through standard calculations or by the use of the AEROMIX Sizing Program made available by AEROMIX to Consulting Engineers and Customers. Your AEROMIX Regional Sales Manager will be happy to calculate the oxygen requirements for your specific application.

The initial calculation for oxygen transfer power is generally made based on an intermediate transfer rate (usually 3.0 lbs/Hp-Hr) for all TWISTER Aerators, keeping in mind that later adjustment may be needed based on the final unit power selection of the aerators. The chart on the reverse side illustrates this point.

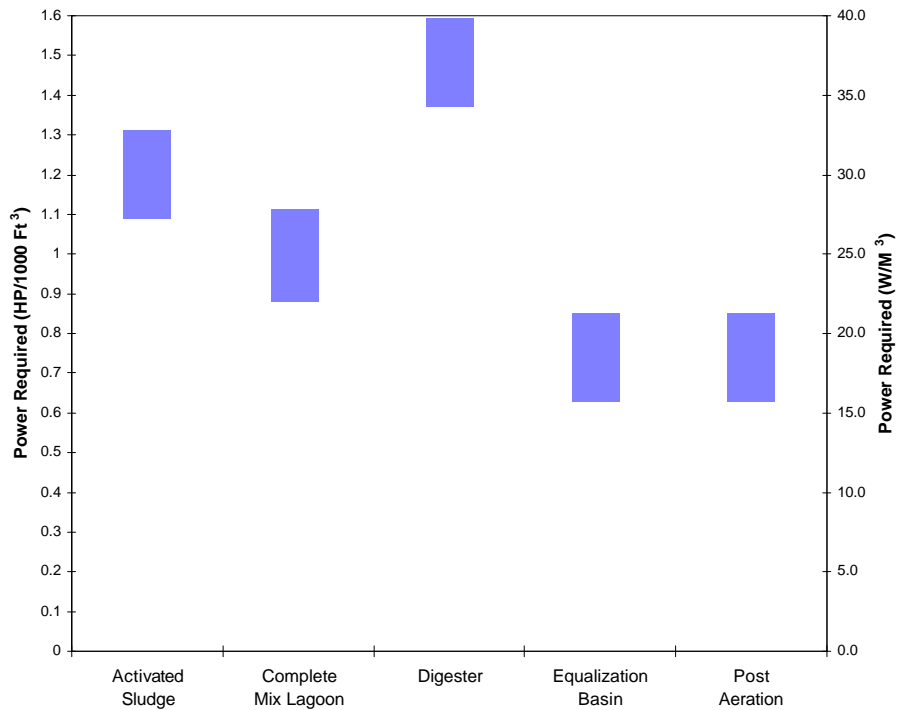
OXYGEN TRANSFER CURVE



Mixing considerations:

Mixing power required is dependent on the process, but can generally be determined by considering basin volume and solids levels. In most cases, mixing power is maximized in the first aeration cell, with subsequent cells receiving less mixing energy. The following chart shows some examples of TWISTER Aerator mixing ratios for a complete mix in different processes.

MIXING CHARACTERISTICS



Basin configurations:

Once the total mixing and oxygen horsepower requirements have been defined, the next step is to determine the quantity, unit size and layout of the individual units to be used. The general rule is to use the largest unit size aerators that can be efficiently placed in the basin without risking damage to the basin or creating excessive turbulence. Circular basins often require baffle walls to limit excessive circulation and turbulence. The layout of the aerators is critical for maximizing mixing efficiency while minimizing installation costs.

Caution must be taken when power levels exceed 1.5 Hp/1000 ft³ (40 watts/m³) as excessive turbulence may reduce aerator performance.

Sizing Examples:

Example #1:

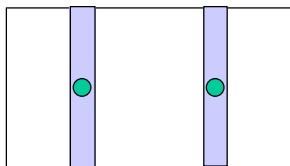
An activated sludge basin 80 feet long x 40 ft wide x 12 feet deep requires aeration and mixing. Flow is 1 mgd and 300 lbs/hr of oxygen is needed under standard conditions.

Using an average oxygen transfer rate of 3.0 lbs/Hp-Hr :
 $300 \text{ lbs/hr} / 3.0 \text{ lbs/Hp-Hr} = 100 \text{ Hp}$ is required for oxygen transfer.

For mixing, 1.2 Hp/1000 ft³ is needed in activated sludge or
 $(80 \text{ ft} \times 40 \text{ ft} \times 12 \text{ ft}) \times 1.2 \text{ Hp}/1000 \text{ ft}^3 = 46 \text{ Hp}$

The greater of the oxygen and mixing horsepower is used. Thus a minimum of 100 Hp is required.

Two 50 Hp units are recommended because of the rectangular shape of the basin.



Example #2:

A large lagoon measuring 100 ft wide x 300 feet long x 10 feet deep requires aeration and mixing. Flow is 0.5 mgd and 200 lbs/hr of oxygen is needed under standard conditions.

Using an average oxygen transfer rate of 3.0 lbs/Hp-Hr:
 $200 \text{ lbs/hr} / 3.0 \text{ lbs/Hp-Hr} = 67 \text{ Hp}$ is required for oxygen transfer.

For mixing, 1.0 Hp/1000 ft³ is needed for a complete mix lagoon or $1.0 \times \frac{100 \text{ ft} \times 300 \text{ ft} \times 10 \text{ ft}}{1000 \text{ ft}} = 300 \text{ Hp}$

The greater of the horsepower for oxygen transfer and mixing is required. Thus the mixing power requirements govern meaning that at least 300 Hp should be used.

Use six 50 Hp float mounted TWISTER aerators to provide the needed power and evenly distribute mixing and oxygenation.

