AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Section-3

Maintenance and Troubleshooting

6306 N. Alpine Rd. Loves Park, IL 61111-7655 p 815.654.2501 f 815.654.2508 www.aqua-aerobic.com

Maintenance Summary Form

PROJECT: Artesian NSRWF, DE CONTRACT NO: _____

1. EQUIPMENT ITEM: Aqua-Jet® Surface Mechanical Aerator

2. MANUFACTURER: Aqua-Aerobic Systems, Inc.

3. EQUIPMENT/TAG NUMBER(S): Endura® Series, Model FSS

4. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS): The power section weights 1,775.0 lbs, FRP float assy weighs 880.0 lbs, and the total unit assembly weight is 2,835.0 lbs.

5. NAMEPLATE DATA: Horsepower 75HP Amperage FLA is 86.9

Volt/Ph/Hz 460 / 3 / 60 Service Factor (SF) 1.15 Enclosure Type TEFC

Speed 1200 RPM Capacity Impeller flow is 17,874 GPM

Other Total reserve buoyancy 2,660.0 lbs

6. MAUFACTURER'S LOCAL REPRESENTATIVE

a. Name Aqua-Aerobic Systems, Inc. Telephone No. 815/654-2501

b. Address 6306 North Alpine Road, Loves Park, IL. 61111-7655

7. MAINTENANCE REQUIREMENTS: Motors are initially packed with Chevron Black Pearl EP 2 grease for the NO maintenance warranty. **No** motor lubrication is necessary for the first initial three (3) years of operation with the Endura® Series motor furnished.

Maintenance Operation Comments	Frequency	Lubricant (*If Applicable*)
A check of all securing hardware should be conducted any time a unit trips out due to ingestion of foreign debris. Semi-Annually as a minimum.	As Required	N/A
Amperage reading checks of the motors to verify they are running normally.	6 Months	N/A
Periodic checks to verify the cable mooring lines *if applicable* and hardware are secure.	Monthly	N/A
Check wiring / electrical cable. Check for any visible wear any other damage, or possible wear points. Replace or rearrange wiring, as needed.	Semi-Annually	N/A
After the first initial three (3) years of initial operation, routine maintenance lubrication for the Endura Series motors is required. **Mixing of grease types is not recommended in any Endura Series motor.**	once every four (4) months	Chevron Black Pearl EP 2 grease "**A**"
Motor inspection for repair and/or rewind	8-10 Years	N/A

Motor I.D. # A40-1168-0769
Drive end bearing # 5316
OPP D.E. bearing # 6313

8. LUBRICANT LIST:

Reference Symbol	Shell	Chevron	Mobil	Arco	Or Equal
A		Black Pearl EP 2 AASI Part # 2608275			
Alternate-B			Polyrex EM AASI Part # 2600956		

Refer to the Preventive Maintenance Schedule, and the Operation and Maintenance Instructions Manual, for further maintenance recommendations, warnings, and how to repair or recondition your equipment, should it be necessary.

9. RECOMMENDED SPARE PARTS:

Part No.	Description	Unit	Quantity	Unit Cost
Note: No spare parts are required or recommended for the initial five (5) years of operation for the aerator units.				

It is very difficult to determine or estimate the reliability or cycle life of equipment or parts, as every application is different. The aerator equipment selected and provided was designed for years of trouble- free maintenance, when applied and maintained in accordance to Aqua-Aerobic Systems' Operation and Maintenance recommendations listed herein.

Preventive Maintenance Schedule
for Floating Aerators and Mixers

Because floating equipment such as Aqua-Jet® Surface Mechanical Aerators and AquaDDM® Direct-drive Mixers operate in liquid filled basins, any work done on these type units when they are in or near a basin, should be done only by persons wearing Coast Guard approved personal flotation devices. No person should work on this type of equipment while alone. The floating equipment is not made for the purpose of supporting persons to carry out maintenance work. All maintenance work required for larger size units that cannot be retrieved for servicing, should be limited, and **NO** maintenance work should be done by a single person alone. It is recommended that any floating equipment being serviced, be first removed to the edge of the basin, and secured from possible movement. In addition, anyone working in or around equipment operating within the wastewater treatment facilities, should exercise all necessary safety precautions, as well as review all personal hygiene and sanitation precautions.

Description of Work	Daily	Weekly	Monthly	Semi-Annually	Yearly	AS Req'd.
1. Cable mooring lines *if applicable:* Check and adjust all mooring lines to proper tension. They should be just snug and not taut.			√			√
2. Check all securing hardware. Conduct checks of all securing hardware from becoming loose, and any time a unit trips out due to ingestion of foreign debris.				√		√
3. Motor Condensate Drains *if applicable.* Verify motor condensate drains are clear.				√		√
4. Check wiring / electrical cable. Check for any visible wear or any other damage, such as from the cables rubbing against the float, etc. Replace or rearrange wiring, as needed.				√		√
5. Check amperage. Check amperage reading of the motors to verify that the units are running normally. Adjust, as necessary.				√		
6. Routine motor lubrication for all 1 &2 HP Aerator motors is required after the initial start-up, as they are not available in the Endura® Series line motors.				Refer to Note 2, below.		
7. Motor lubrication for all Endura® Series motors will not be required for the initial first three (3) years of operation from the date of start-up. Mixing of grease types is not recommended in any Endura® Series motor.				Refer to Notes 1, and 3 below.		

NOTES:

No motor re-lubrication is necessary for the Endura® Series AASI motors during the initial first three (3) years of operation, and very little maintenance will be required. After the first three (3) years of operation with the Endura® Series motors, they must be re-lubricated with **Chevron Black Pearl EP 2** grease (AASI #2608275) or an approved equal lubricant. The simplicity of the unit's design eliminates the need for extensive maintenance programs however, preventative maintenance is suggested. Refer to the Maintenance Schedule & the Troubleshooting documents for additional details.

1. **Visual Inspections**: Refer to Description of Work items 1, 2, 3, and 4, above.
2. The 1 & 2 HP Aerator motors only are **not available** in the Endura® Series motors, and they are required to be lubricated with the same **Chevron Black Pearl EP 2** grease, or the approved equal lubricant, every six (6) months.
3. All other brand size aerator and mixer motors are provided in the Endura® Series and those motors will not require lubrication until after the initial first three years of operation.

4. After the first three years of operation for all Endura® Series motors; 1 HP - 15 HP Mixer motors and 3 HP - 25 HP Aerator motors must be lubricated once every six (6) months. The larger 20 HP and above Mixer motors, and the 30 HP and above Aerator motors, must be lubricated once every four (4) months.
5. **Procedural Inspections**: Refer to Description of Work items 4 and 5 above.
6. **Calibration Routines**: Refer to Description of Work items 5 and 6 above.

BLACK PEARL® GREASE EP

NLGI 0, 1, 2

PRODUCT DESCRIPTION

Black Pearl® Greases EP are multipurpose, polyurea, extreme pressure, water-resistant greases.

CUSTOMER BENEFITS

Black Pearl Greases EP deliver value through:

- **Excellent pumpability** — Easy pumping in typical centralized lubrication systems and at low temperatures.
- **High load capacity** — High film strength provide good overall EP performance, shock load protection and low wear protection.
- **Corrosion protection** — Pass the modified ASTM D1743 Bearing Rust Test.
- **Water resistance** — Product provides exceptional water wash out results.
- **Excellent adhesion** — These greases stay in place and continue lubricating under most operating conditions.
- **Long lubricant life** in storage and in use.

FEATURES

Black Pearl Greases EP are multipurpose, polyurea, extreme pressure, water-resistant greases.

Black Pearl Greases EP are formulated with highly refined base stock, a polyurea thickener, and rust and oxidation inhibitors. They are black in color and smooth and buttery in texture.

FUNCTIONS

Black Pearl Greases EP provide outstanding film strength and adhesive properties. As a result, these products are particularly effective in providing excellent wear protection in heavily loaded and shock load conditions.

Black Pearl Greases EP are formulated to stay in place, stick to bearing surfaces and, thus, provide excellent lubrication under a wide range of operating conditions. They perform particularly well in roller bearings. These products provide exceptional water wash out results. The rust inhibitors effectively protect bearing surfaces against corrosion. Pumpability is excellent over a wide range of temperatures as indicated by the Lincoln ventmeter test and the relatively low pressure drop in piping. Oxidation inhibitors promote long life in storage and in use. In addition, Black Pearl Greases EP also perform well at high temperatures.

APPLICATIONS

Black Pearl Greases EP are recommended for general lubrication service in many types of automotive and industrial applications.

Typical industrial applications are:

- Presses
- Antifriction bearings
- Low and high speed journal bearings
- Roller and needle bearings
- Shaker or classifier screen bearings
- Conveyors and run out rolls
- Electric motor bearings (especially cylindrical roller bearings)
- Exhaust fan bearings
- Crusher bearings
- Pump bearings

Product(s) manufactured in the USA.
Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

A **Chevron** company product

13 April 2015
GR-10

Typical automotive applications are:

- Chassis points including ball joints and universal joints
- Wheel bearings
- Water pumps
- Fifth wheels
- Steering system bearings
- King pins

Black Pearl Greases® EP NLGI 1 and 2 are approved for the NLGI Certification Mark GC-LB for use as automotive chassis and wheel bearing greases based on ASTM D4950. They work well in both plain and antifriction-type bearings, particularly those subjected to shock loading.

Black Pearl Greases EP are registered by **NSF** and are acceptable as a lubricant where there is no possibility of food contact (H2) in and around food processing areas. The NSF Nonfood Compounds Registration Program is a continuation of the USDA product approval and listing program, which is based on meeting regulatory requirements of appropriate use, ingredient review and labeling verification.

Always confirm that the product selected is consistent with the original equipment manufacturer's recommendation for the equipment operating conditions and customer's maintenance practices.

Typical Test Data

NLGI Grade	0	1	2
Product Number	*254590*	*254592*	*254591*
SDS Number	*7237*	*7237*	*7237*
Operating Temperature, °C(°F) Minimum[a] Maximum[b]	 -40(-40) 127(260)	 -40(-40) 177(350)	 -40(-40) 177(350)
Penetration, at 25°C(77°F) Unworked Worked (60 strokes) Worked (100,000 strokes)	 350 365 >400	 320 325 360	 255 280 335
Dropping Point, °C(°F)	240(464)	270(518)	270(518)
Timken OK Load, lb	55	70	70
Four-Ball Weld Point, kg Wear Scar Diameter, mm	 250 0.42	 500 0.42	 500 0.42
Lincoln Ventmeter, psig at 30 s at 75°F 30°F 0°F -22°F	 185 210 240 465	 215 235 280 625	 300 350 800 †
Copper Corrosion	1a	1a	1a
Bearing Rust	Pass	Pass	Pass
Water Washout, 79°C, %	—	<1	<1
Thickener, %	9.5	11.5	13.5
Type	Polyurea		
Viscosity, Kinematic* cSt at 40°C cSt at 100°C	 145 14.4	 145 14.4	 145 14.4
Viscosity, Saybolt* SUS at 100°F SUS at 210°F	 761 77	 761 77	 761 77
Viscosity Index	97	97	97
Flash Point, °C(°F)*	260(500)	260(500)	260(500)
Pour Point, °C(°F)*	-9(+16)	-9(+16)	-9(+16)
Texture	Smooth, Buttery		
Color	Black		

a Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.

b Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.

† Too stiff at this temperature to pump through device.

* Determined on mineral oil extracted by vacuum filtration.

Minor variations in product typical test data are to be expected in normal manufacturing.

Lubrication Schedule
Aqua-Jet® Surface Mechanical Aerator

Component	Lubrication Interval	Service	Quantity per Interval*
1 & 2 HP Non-Endura Motors	Every 4-6 months	Refer to HP sizes as listed below	Refer to the Lubrication Chart in the O&M Instruction Manual for grease volumes
Endura® Series Motors **	After the first 3 years		
Recommended Grease: **Chevron Black Pearl* EP 2**, AASI Part # 2608275, (14oz Tube) Alternate Grease: **Mobil Polyrex EM Grease**, AASI Part # 2600956-001, (14.5oz Tube)			

Lubrication interval's for all **1 & 2 HP** Non-Endura aerator motors must be started immediately upon start-up with the Chevron Black Pearl EP 2 grease or the approved equivalent lubricant as listed above. Refer to the lubrication frequency below based on the unit HP size listed below.

** All Endura® Series / Centaur type motors have been designed and factory lubricated for a three year No-Maintenance free operation for the first three (3) years. Endura® Series motors are supplied with the grease zerk's for servicing the motor for the first time. After the first three (3) years of operation, the motor must be re-lubricated with **Chevron Black Pearl EP2** grease, or the above approved equivalent lubricant. The different type and frame size motors used on the Aqua-Jet® are not lubricated identically. Follow the lubrication and maintenance requirements below when the time comes that the motor's need to be re-lubricated for the first time. These procedures must be started within the same 3-year anniversary date, and month, from when the unit was first put into operation, and continued regularly as your routine maintenance plan.

- The **1 & 2 HP** Non-Endura motors must be routinely lubricated once every six (6) months with the Chevron Black Pearl EP 2 grease listed above.
- After the first three years of operation, all **3 HP-25 HP** Endura® Series motors must be routinely lubricated once every six (6) months with the Chevron Black Pearl EP 2 grease listed above.
- The larger **30 HP and above** Endura® Series motor's must be routinely lubricated every four (4) months with Chevron Black Pearl EP 2 grease listed above.

⚠ WARNING

If you re-lubricate units in position, a floating platform of sufficient stability should be used to access the motor. In addition, you must be certain to lock-out / tag-out the electrical power from all sources, and use adequate personal flotation devices and safety lines, and work in groups of two or more, at all times.

A full bearing and cavity purge, along with replacing the old grease is the only way to insure complete grease exchange with fresh. Additional steps can also be taken to lengthen the life of the motor, such as inspecting the rotor and stator for signs of failure and repairing if necessary.

Lubrication Schedule
Aqua-Jet® Surface Mechanical Aerator

Refer to the Aqua-Jet® Operation & Maintenance Instruction Manual for quantity of grease, and further maintenance recommendations based on the motor HP for your equipment, should it be necessary.

Contact Aqua-Aerobic Systems, Inc. Customer Service Department for assistance, and pricing, to have your motor inspected and re-packed with grease to lengthen the life of your motor.

Endura® Series Motor
Lubrication Procedures

Endura® Series Maintenance Free Products do not require lubrication for the initial first three (3) years of operation. After that time, lubrication is required, and the method of lubrication is suggested as:

> Install a grease fitting (if one does not exist), and add the recommended amount of lubricant as described within the Installation, Operation and Maintenance Manual located within this section of your manual, and run the motor for 2 hours.

The simplest method of purging is to open or remove the outlet plug (grease vent) on the opposite side of the motor, and apply grease to the inlet until fresh grease is visible at the outlet. The motor should be warm for this procedure, and must be run for at least 2 hours. While this method replenishes the bearing with fresh grease, it does not insure complete grease exchange. The above method assumes re-lubricating in place, and only adding the recommended quantity of grease to the bearing cavity. It also assumes that a routine re-lubrication cycle has been started and will be maintained. Refer to the document titled Lubrication Schedule within this section of your Operation and Maintenance Manual for proper lubrication and intervals.

⚠ CAUTION

Do not over grease the bearings. If, after applying the recommended amount of grease, none is visible at the outlet, discontinue the procedure.

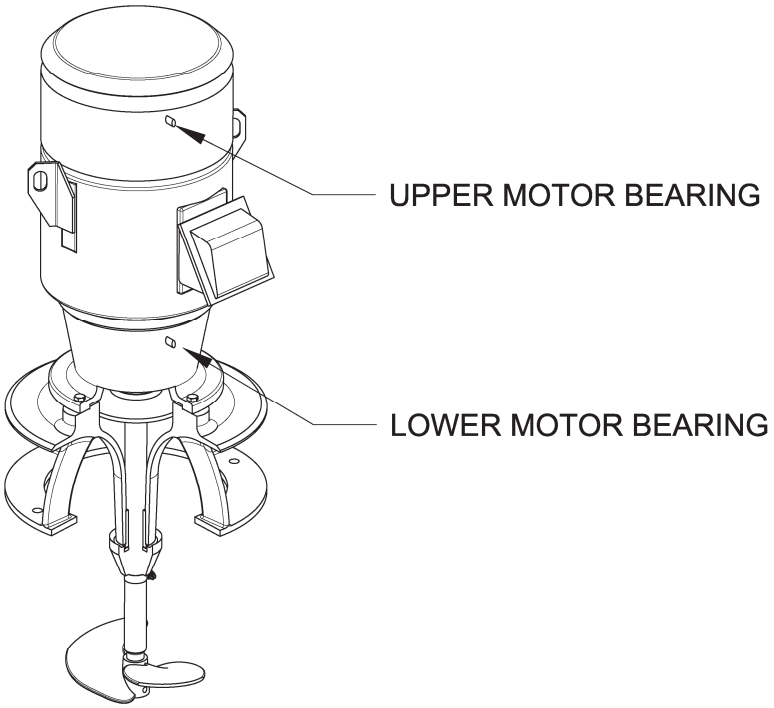
If the initial three year no-maintenance time line has elapsed and the unit must be pulled from service for re-lubrication, then it is recommended that a full bearing and cavity purge to replace the old grease with fresh should be done to lengthen the life of your motor.

The only way to insure complete exchange of grease is to disassemble the motor. The bearings and cavities can then be completely cleaned and inspected, repacked, and re-assembled. Additional steps can also be taken to lengthen the life of the motor, such as inspecting the rotor and stator for signs of failure and repairing if necessary. Contact Aqua-Aerobic Systems, Inc. and ask for the Customer Service Department for assistance and pricing, or to have your motor re-packed with grease, and inspected to lengthen the life of your motor.

NOTICE

The above methods are a recommendation for achieving additional steps to lengthen the life of the motor. Bearings are subject to wear; therefore this should not be construed as a warrantee or a lengthened guarantee.

Motor Lubrication Points
Aqua-Jet Aerator



Recommended Lubricant	All Endura® Series motors must be lubricated with the **Chevron Black Pearl EP2** grease. Refer to the Maintenance Schedule for details.
Lubricant Frequency and Method of Application	**All Standard Non- Endura motors**: The 1 & 2 HP Aerator motors are not available in the Endura Series line and are required to be re-lubricated regularly. All Non-Endura Series motors must be lubricated regularly with the **Chevron Black Pearl EP 2** grease or the approved equivalent lubricant. Refer to the Lubrication Schedule and the Maintenance Schedule for lubrication frequency based on motor HP size.
	All Endura® Series Motors: No motor re-lubrication is necessary for the first three (3) years of operation. After the three year maintenance free time table has expired, re-lubricate the motor regularly with the **Chevron Black Pearl EP 2** grease. Refer to the Lubrication Schedule and the Maintenance Schedule for details, and frequency required by motor HP size.
Number of Pumps with a standard hand grease gun for lubrication process.	Re-lubricate the bearings based on the chart listing the amounts and average pumps based on motor HP.

Maintenance Schedule
Aqua-Jet®

ITEM	SIZE	FREQUENCY	REMARKS
Aqua-Jet® Surface Mechanical Aerator	*1 HP (0.7KW) to 2 HP (1.5 KW) Non-Endura Motors	6 Months	Routine Maintenance
	3 HP (2.2KW) to 25 HP (18.5KW) Motors	6 Months	
	30 HP (22.5KW) and larger Motors	4 Months	
	Motor repair and/or rewind	8-10 Years	Preventive Maintenance
	Periodic checks to verify the mooring / span lines are secure.	Bi-Monthly	
	A check of all securing hardware should be conducted any time a unit trips out due to ingestion of foreign debris	As Required	
	Amperage reading check of the motors to verify they are running normally.	6 Months	

* Routine lubrication maintenance for the 1 HP (0.7KW) and 2 HP (1.5 KW) Aerator Non-Endura Series type motors is required regularly after start-up. These motors should be re-lubricated with the Chevron Black Pearl EP 2 grease or the approved equivalent lubricant.

No motor lubrication is necessary for the first three (3) years of operation with any AASI furnished Endura® Series motor 3 HP or larger. Refer to the Preventive Maintenance Schedule EP-10447, and the Operation and Maintenance Instructions Manual, for further maintenance recommendations, warnings, and how to repair or recondition your equipment, should it be necessary.

After the initial three (3) years of operation, routine lubrication maintenance for the Endura Series motors is required regularly as listed in the above frequency chart. These motors should be re-lubricated with the Chevron Black Pearl EP 2 grease or the approved equivalent lubricant.

Refer to the Lubrication Schedule EP-10214-001, and the Endure Series Lubrication Procedure EP-10177, within this Section of the Operation & Maintenance Manual for the proper lubrication procedures, and lubricants.

 2016-06-09

Consumables
For Maintenance and Repair of Aerator Equipment

The Aqua-Jet Aerator is the most durable, highly efficient, and the most trusted aerator in the wastewater industry. Inside this document you'll find the full range of aerator parts considered as consumable repair parts, in an easy to view format, including a complete description of the recommended products and their usage. This document lists all the AASI part numbers including the leading brand names with their product codes, for accurately defining replacements. It is important to us that you locate the parts that you may need as quickly as possible, and that you understand the frequency for inspecting or replacing them. Your parts are the first step in getting a job done fast, and keeping your equipment running smoothly. Contact Aqua-Aerobic Systems, Inc. Customer Service Department if you have any questions about a replacement part or for prices and delivery on any of the following parts.

Motor Lubricant:

The motors will be AASI Endura® Series, which includes a 3-year no maintenance (motor lubrication / greasing). After the first three (3) years of operation, the motors can be sent back to the factory to be checked out, and repacked with grease, to extend the no maintenance program for another three (3) years. After the first three (3) years of operation, the motors may be lubricated and maintained using the recommended lubricant; **Chevron Black Pearl EP 2** (AASI part number 2608275). Refer to the Endure Series Lubrication Procedure EP- 10177, and the Product Lubrication Schedule EP-10214-001, in Section-3 Maintenance and Trouble Shooting for the proper amount of lubricant, and the frequency required.

Propeller Pin:

The propeller pin is a 17-4 PH stainless steel material and should be replaced every time the propeller is removed, or when the motor is being repaired or replaced. Refer to the Propeller Removal and Balancing Instructions Manual for service, instructions for removal, and replacement of the propeller pin and propeller.

The chart to the right lists replacement propeller pin part numbers by unit size (HP). The chart also lists part numbers for optional propeller pin kits that include all components required for proper replacement of the motor propeller. Each size kit includes: propeller pin, Loctite® #660 Quick Metal, and the Loctite® #271 Threadlocker, set screw, and a propeller manual with complete instructions to correctly install the new propeller pin and propeller.

Replacement Propeller Pins

Unit Size HP (KW)	Propeller Pin Part Number	Propeller Pin Kit Part Number
1 (.75KW)	2500549	2962505
2 (1.5KW)		
3 (2.2 KW)	2500550	2962506
5 (3.7 KW)		
7.5 (5.6 KW)		
10 (7.5 KW)	2500551	2962507
15 (11.0 KW)		
20 (15.0 KW)	2500552	2962508
25 (18.6 KW)		
30 (22.3 KW)	2500553	2962509
40 (29.8 KW)		
50 (37.3 KW)		
60 (44.75 KW)	2500554	2962510
75 (56.0 KW)		
100 (74.5 KW)	2500555	2962511
125 (93.2 KW)		
150 (111.8 KW)		

Consumables
For Maintenance and Repair of Aerator Equipment

Labyrinth Seal Guard:

Labyrinth Seal Guards are made from Ethylene-Propylene Rubber Copolymer, ASTM designation (EPDM), and the Labyrinth Seal Guards are assembled at the bottom of the motor base, and held in place with a stainless steel hose clamp. Refer to the parts list exploded view diagram located in Section-2 Installation and Start-up for the actual position of this part for assembly.

This is a very durable and long lasting part however; it should be inspected after operating the motor for 3-5 years. This part should be checked, and replaced if it becomes worn or damaged in any way. It is estimated that this part may need to be replaced after the first five (5) years of operation however, it should be replaced as a minimum when repairing or replacing the motor for any reason. The chart to the right lists the replacement part numbers for the Labyrinth Seal Guard, and the hose clamp required for securing it in place, based on the unit size (HP) size.

Replacement Labyrinth Seal Guard

Unit Size HP (KW)	Labyrinth Seal Part Number	Hose Clamp Part Number
1 (.75KW)	2600137	2603273
2 (1.5KW)		
3 (2.2 KW)	2600001	2603274
5 (3.7 KW)		
7.5 (5.6 KW)		
10 (7.5 KW)	2600013	2603275
15 (11.0 KW)		
20 (15.0 KW)	2600019	2603276
25 (18.6 KW)		
30 (22.3 KW)		
~~40 (29.8 KW)~~	~~2600025~~	2603277
~~50 (37.3 KW)~~		
~~60 (44.75 KW)~~	2600036	
75 (56.0 KW)		
100 (74.5 KW)	2603481	2603276
125 (93.2 KW)		
150 (111.8 KW)		

Anti-Deflection Insert:

Anti-deflection inserts are made from Delrin and it is assembled in the bottom of the diffusion head. Refer to the parts list exploded view diagram for the actual position of this part for assembly.

After operating the motor for at least 3-5 years, this part should be checked, and replaced if it becomes worn or damaged in any way. It is estimated that this part may need to be replaced after the first five (5) years of operation however, it should be replaced as a minimum when repairing or replacing the motor for any reason.

The chart to the right lists replacement part numbers for the Anti-deflection inserts based on the unit size (HP). Contact Aqua-Aerobic Systems, Inc. Customer Service Department if you have any questions about the assembly and replacement of this part.

Replacement Anti-Deflection Inserts

Unit Size HP (KW)	Part Number
1 (.75KW)	2600139
2 (1.5KW)	
3 (2.2 KW)	2600004
5 (3.7 KW)	
7.5 (5.6 KW)	
10 (7.5 KW)	2600016
15 (11.0 KW)	
20 (15.0 KW)	2500022
25 (18.6 KW)	
30 (22.3 KW)	2600028
~~40 (29.8 KW)~~	2600032
~~50 (37.3 KW)~~	
~~60 (44.75 KW)~~	
75 (56.0 KW)	
100 (74.5 KW)	2603482
125 (93.2 KW)	
150 (111.8 KW)	

Consumables
For Maintenance and Repair of Aerator Equipment

Thrust Washer:

The Thrust Washer is a special part made of Ultra High Molecular Weight (UHMW) Polyethylene, which is assembled between the Anti-Deflection Insert, and the Fluid Deflector. Refer to the parts list exploded view diagram for the actual location of this part.

After operating the motor for at least 3-5 years, this part should be checked, and replaced if it becomes worn or damaged in any way. It is estimated that this part may need to be replaced after the first five (5) years of operation however, it should be replaced as a minimum when repairing or replacing the motor for any reason.

The chart to the right lists replacement part numbers for the Thrust Washer based on the unit size (HP).

Replacement Thrust Washer	
Unit Size HP (KW)	**Part Number**
1 (.75KW)	2600141
2 (1.5KW)	
3 (2.2 KW)	2600005
5 (3.7 KW)	
7.5 (5.6 KW)	
10 (7.5 KW)	2600017
15 (11.0 KW)	
20 (15.0 KW)	2600023
25 (18.6 KW)	
30 (22.3 KW)	2600029
~~40 (29.8 KW)~~	2600033
~~50 (37.3 KW)~~	
~~60 (44.75 KW)~~	
75 (56.0 KW)	
100 (74.5 KW)	2603483
125 (93.2 KW)	
150 (111.8 KW)	

Fluid Deflector:

The Fluid Deflector is made of made from Ethylene-Propylene rubber copolymer, ASTM designation (EPDM), and it is assembled at the bottom of the motor shaft above the propeller, and held in place with a stainless steel hose clamp. Refer to the parts list exploded view diagram for the actual location of this part.

After operating the motor for at least 3-5 years, this part should be checked, and replaced if it becomes worn or damaged in any way. It is estimated that this part may need to be replaced after the first five (5) years of operation however, it should be replaced as a minimum when repairing or replacing the motor for any reason.

The chart to the right lists replacement part numbers for the Thrust Washer based on the unit size (HP).

Replacement Fluid Deflector		
Unit Size HP (KW)	**Fluid Deflector Part Number**	**Hose Clamp Part Number**
1 (.75KW)	2600140	2603273
2 (1.5KW)		
3 (2.2 KW)	2600002	2603274
5 (3.7 KW)		
7.5 (5.6 KW)		
10 (7.5 KW)	2600014	2603275
15 (11.0 KW)		
20 (15.0 KW)	2600020	2603276
25 (18.6 KW)		
30 (22.3 KW)	2600026	
~~40 (29.8 KW)~~	2600030	~~2603277~~
~~50 (37.3 KW)~~		
~~60 (44.75 KW)~~		2603278
75 (56.0 KW)		
100 (74.5 KW)	2603480	2603525
125 (93.2 KW)		
150 (111.8 KW)		

Consumables
For Maintenance and Repair of Aerator Equipment

Rubber Splicing Compound:

For connecting power supply cable to the motor, Aqua-Aerobic Systems always uses crimp-on type closed-eye connectors to provide "bolt and nut" connections from the motor leads to the power supply leads. This is followed by rubber insulating tape and plastic insulating tape.

AASI utilizes a Rubber Tape Splicing Compound; Plymouth # 122 a 30-mil (0,76mm) self-amalgamating, low voltage rubber tape which can be used as primary insulation for splices rated through 600 volts when used in conjunction with a friction or vinyl jacketing tape. UL-510

The rubber splicing compound (AASI part number's: 2602569) is black in color, and is ¾" x .030" x 22 ft (19mm x 0.76mm x 6.7m) in size.

Safety Wire:

The safety wire (AASI part number 2600011) is used whenever the equipment is arranged to accommodate safety wiring to secure the bolts, such as the power section assembly to the float assembly. The safety wire is .050 in diameter, made from 304 stainless steel, and is a soft temper uncoated wire in coil form. The bolt heads described within this Operation and Maintenance Manual as drilled Heads will have custom drilled holes to accommodate the safety wire size, and all drilled head bolts will require this safety wire to secure them in place. The safety wire will need to be long enough to wrap around the bolts and the parameter of the flange base, once the bolts have been tightly installed. The two ends of the safety wire must be pulled tight leaving no slack in the wire around the parameter of the bolts, and both ends must be twisted and tethered together to tightly secure the bolts in place. It is recommended that the safety wiring be replaced each time it has been removed for repairs or replacement of the equipment. Refer to the Safety Wiring Procedures within the Operation & Maintenance Instruction Manual for proper wiring details and diagrams.

Tempilstick or Markall:

The Tempilstick and/or Markall brand thermo-melt sticks that are described within this O&M manual for removal of the propeller, and are listed as recommendations only however, not a necessity. The thermo-melt sticks will aid in helping any workmen, to ensure the propeller hub reaches the correct temperature of 475°-500° F (245°C - 260°C) for easy removal of the propeller. Either one of these thermo-melt sticks will prevent overheating the propeller hub or blades that could produce undue stresses in the stainless steel. The Tempilstick and/or Markall brand or any equivalent thermo-melt stick, with the required temperature range may be found at any local welding supply store.

Consumables
For Maintenance and Repair of Aerator Equipment

Loctite® #660 Quick Metal:

The Loctite® Quick Metal (AASI part number 2603111-A, 1.7 oz. tube) is an adhesive / sealant that is designed for bonding cylindrical fitting parts, particularly where bond gaps can approach 0.02 inches (0.50mm). This product cures when confined in the absence of air between close fitting metal surfaces and prevents loosening and leakage of propellers from shock and vibration. The Loctite® Quick Metal cures at room temperature without the use of surface activators or heat when installing the propeller to the motor shaft. Fixturing strength develops in 10-30 minutes while full cure time takes 1-2 hours at room temperature. The use of Loctite® Primer T or Primer N may be used to speed up the cure time for propeller installation if necessary. The Loctite® Quick Metal has been tested and approved by Aqua-Aerobic Systems, Inc. and other substitutes are not recommended.

Loctite® Stud Lock #271:

The Loctite® # 271 (AASI part number's: 2610660, .5ml capsule, or 2607273, 10ml bottle) is designed for the permanent locking and sealing of threaded fasteners. It cures when confined in the absence of air between close fitting metal surfaces and prevents loosening and leakage from shock and vibration. The Loctite® # 271 is used when attaching and securing the propeller set screws. This item has been tested and approved by Aqua-Aerobic Systems, Inc. and other substitutes are not recommended.

Degreasing Solvent:

The motor shaft and propeller hub parts need to be cleaned each time the propeller is to be removed and/or replaced. The parts should be cleaned with a good cleaning-degreasing solvent of a non-distillate type, which removes all traces of oil and grease, and leaves no residue. A good grade of degreasing solvent, such as Loctite ® Safety Solvent # 755 (or equivalent degreasing solvent) is recommended, and may be found at any local motor repair shop or supply store. AASI does not offer a Degreasing Solvent due to the problems in handling and shipping this material which is considered as hazardous materials.

Thread-Eze Ultra Lubricant:

Anti-Seize lubricant (AASI part number 2607272, 4 oz. can with brush) is recommended for applying to all stainless steel bolt threads prior to assembly to prevent galling. Anti-Seize lubricant may also be found at any local supply stores.

Consumables
For Maintenance and Repair of Aerator Equipment

Aerial Support Cable Tie:

When the units are moored in place with the optional cable mooring method, the aerial support ties are the preferred method desired for easy attachment of the electrical cable, to one of the mooring cable lines. The aerial support cable ties (AASI part number 2603255) are polypropylene, black in color, UV stable, and weather resistant. The nominal spacing for this application would be to attach one (1) aerial support tie for every two (2) feet of mooring cable span, for each electrical cable size utilized, per unit. This attachment method for the mooring and electrical cables is however limited to the weight of electrical cables for the application. Too much weight will cause the mooring line to sage, and possibly prevent the operator from disconnecting the mooring line, or being able to retrieve the unit over to the basin side wall for inspection or maintenance.

Electrical Cable Floats are available and recommended in applications for protecting and floating larger or multiple electrical cables. Contact Aqua-Aerobic Systems, Inc. Customer Service Department for suggested design, and the type of electrical cable floats that would work best for your application.

Ty-Wrap Cable Tie:

When the units are moored in place with the optional restrained mooring method, or in applications where the weight of the electrical cables is a concern, this cable tie would be used to tether electrical cable floats to the electrical cables. The Ty-wrap cable tie (AASI part number 2600286) is a heavy duty Nylon material, black in color, and is UV stable. With the use of the Ty-wrap cable ties, and the electrical cable floats, it allows the electrical cables to float at the water surface, avoiding the possibility of it dragging on the bottom and becoming tangled in a unit. Four (4) Ty-wrap cable ties should be used (two per each end of float) to tether the cable float to the electrical cable.

When the units are moored in place with the optional pivotal mooring arm method, this Ty-wrap cable tie is used to tether the electrical cable to the mooring arm. Two (2) cable ties must be tethered together to make one long Ty-wrap, in order to wrap around the 4” diameter mooring arm and the electrical cable. This method to secure the electrical cables should initially be within the first foot of the pivotal mooring arm, and positioned at every five (5) foot intervals along the length of the mooring arm. This ensures the electrical cable will be secured to the pivotal mooring arm, and allow free movement without damaging the electrical cables.

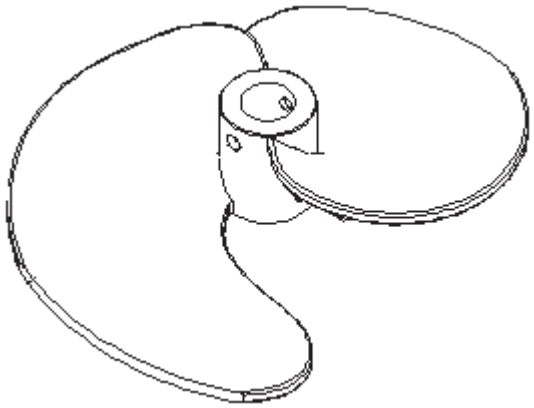
If multiple electrical cables are utilized, each electrical cable must be tethered separately to the pivotal mooring arm as described above. The Ty-wraps with this application must be staggered along the length of the mooring arm, utilizing the same five (5) foot intervals to secure the electrical cables.

These Ty-wrap cable ties are also used for the application of tethering and securing the coiled excess ends of the electrical cables at the basin wall and/or disconnect box.

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Propeller

Removal, Installation and Balancing Instruction Manual



6306 N. Alpine Rd. Loves Park, IL 61111-7655 p 815.654.2501 f 815.654.2508 www.aqua-aerobic.com

Propeller Removal and Installation

1.1 Service and Replacement

Please read all instructions before starting disassembling the power section. You need to disconnect the power from the unit, and remove your unit from the basin (or tank). You will also need to disassemble the power section from the float assembly by removing the safety wiring and bolts from motor base. Refer to the Operation & Maintenance Instruction Manual in Section-3 for details to disassemble your unit.

1.2 Propeller Removal Instructions

1. Place the power section upright on metal sawhorses so that the assembly is stable and the shaft is in a vertical position. Match mark the propeller and shaft if match marks are not already there.

NOTICE

"Tempilstik or Markall" brand thermo-melt sticks will aid in helping any workmen, to ensure the propeller hub reaches the correct temperature of 475°-500° F (245°C - 260°C) for easy removal of the propeller.

1.2.1 Procedures

1. Place the power section upright on metal sawhorses so that the shaft is in a vertical position. It is critical that you match mark the propeller and shaft at this time if match marks are not already there and visible.
2. Grind the flared or peened over end of one side of the propeller pin completely off.

NOTICE

It may be necessary to grind a short distance into the side of the propeller hub to obtain complete removal of the flared end of the pin. Be sure to use eye protection and observe all normal safety precautions.

3. Using a drive punch, hammer and backup support, drive the propeller pin out through the shaft.

⚠ CAUTION

Be sure to use a backup anvil or support when driving the propeller pin out. This will prevent damage to the shaft and bearings.

4. Use an acetylene torch at low temperature, or a butane torch, to heat the hub of the propeller to approximately 475°-500° F (245°C - 260°C).

⚠ CAUTION

Do not overheat the propeller hub or blades. This could produce undue stresses in the stainless steel. No discoloration should appear during or after heating. Proper temperature can be assured by using the 475° F (245°C) Tempilstik.

NOTICE

It usually takes 8-10 minutes of continuous heating to achieve full thermal penetration through the entire hub and shaft.

5. Remove the set screws and gently tap downward on the hub. Once the hub is up to the proper temperature, the propeller should "fall" off the shaft.

⚠ WARNING

Never pound or hammer directly on the propeller blades. This could crack the blades and/or change the pumping values of the propeller.

1.3 Propeller Installation Instructions

The following Loctite® adhesives/sealants are required to install propellers according to Aqua-Aerobic Systems' instructions:

NOTICE

These items have been tested and approved by Aqua-Aerobic Systems, Inc. and substitutes are not recommended. These items can be purchased from Aqua-Aerobic Systems or purchased locally. Observe all precautions for handling and use as indicated on the labels.

A. Loctite® #660 Quick Metal* for propeller and shaft.

B. Loctite® Stud Lock*, Part #271 or equivalent equal # 07331 for set screws.

Refer to the Loctite® Technical data sheets at the end of this document. In addition, a good grade of degreasing solvent will be required.

Please read all instructions before starting

1.3.1 Procedures

1. Remove set screws from propeller. Check both propeller bore and motor shaft for bumps or scrapes (remove same).
2. Insert propeller on shaft to ensure a proper fit aligning the match marks of the propeller and shaft. Place the propeller pin through the propeller hub and motor shaft. The pin should be measured and cut off so that 1/16" (2mm) protrudes from each side of the propeller hub. Remove propeller from shaft.

NOTICE

A new pin is required every time the propeller is removed from the motor shaft. These pins are special 17-4 PH stainless steel and are carried in stock at Aqua-Aerobic Systems, Inc.

3. Clean parts with a good degreasing solvent such as; Loctite ® Safety Solvent # 755. The solvent should be of a non-distillate type, which removes all traces of oil and grease, and leaves no residue.

4. Apply Loctite ® #660 Quick Metal* to shaft in a thin, even coat, using applicator wand. Assemble propeller to shaft using a turning motion to ensure that the parts are evenly coated.

⚠ CAUTION

Be sure propeller blades are facing in the proper direction. Align match marks on shaft and propeller where applicable.

5. Immediately coat propeller pin with anti-seize compound and place the propeller pin in position through the propeller and shaft. Allow to fully cure.

NOTICE

Loctite® #660 Quick Metal* cures only when the loss of oxygen occurs. Any excess should be wiped from the top and bottom of the propeller after assembly.

Loctite® #660 Quick Metal® is designed to cure at room temperature without the use of surface activators or heat. To speed its cure, activators or heat may be used.

Fixturing strength develops in 10-30 minutes while full cure takes 1-2 hours at room temperature. The use of surface activators reduces fixturing time to a minute or less but may reduce ultimate strength. Gaps over 0.010" diametral and temperatures below 50°F will slow cure. If necessary, the use of Loctite® Primer-T or Primer-N may be used to speed cure.

Bond line temperature of 250° F (120° C) for 1/2 hour will fully cure Loctite® #660 Quick Metal*.

6. Peen the propeller pin on both sides until rounded with the propeller hub.

⚠ CAUTION

A backup post or anvil must be used when peening the propeller pin. Use eye protection.

7. Immediately place two drops of Loctite® #271 or #07331 on each set screw and tighten into position.

⚠ WARNING

All set screws should have a flat face or cup point. If a set screw has any other type of point, it should be ground off flat.

1.4 Propeller Balancing

1.4.1 General

To help insure proper unit power draw and overall performance, Aqua-Aerobic Systems, Inc. precision pitches and balances each new or reconditioned propeller from our factory. However, since the overall unit vibration is a combination of the motor, shaft, and propeller, the power section should be checked for overall vibration after assembly of the propeller to the power section.

NOTICE

The motor shaft, at shaft end, should be checked for straightness [.006" (0.15mm) T.I.R from motor flange] and the motor checked to ascertain good condition. Also, when reinstalling an existing propeller, pitch must be checked and equal for each blade before attempting

balancing. When in doubt about propeller pitch and balance, or motor condition, contact Aqua-Aerobic Systems, Inc. Propeller pitch, in particular, must be carefully set and can only be done with pitching equipment built for that purpose.

Each time a new propeller is installed, or a propeller is removed and reinstalled, the assembled power section should be checked for vibration. Vibration testing is done as a "check"; therefore, the full scale/filter out reading is taken. However, when actually balancing the propeller during balancing setup, the rotating element is strobed to exact operating speed. Vibration is checked at the top and bottom motor bearings, perpendicular to the motor shaft with the aid of a vibration analyzer (Balance Pac, or equal), and magnetic base pickups. Displacement readings (unfiltered/full range) of 2.0 mils (0.05mm) or more or velocity readings (unfiltered/full range) of 0.20 inches/second (5.0mm/second) or more at either one of the motor bearings indicate an out of balance condition that must be corrected before placing the unit into service.

1.4.2 Preparing the Power Section

Vibration analysis and balancing must be done with the power section supported in the vertical (operating) position. Supporting the power section horizontally may produce inaccurate readings.

The power section must be firmly supported on a suitable stand to allow access to the propeller. Also, neoprene pads or other suitable material must be used to isolate the power section from the support stand. To keep the power section in place, install long bolts down through the diffusion head flange and isolation pads and the support stand and install nuts on bolts. **DO NOT** tighten these bolts down. They are used only to keep the power section from moving up and around on the stand.

After the power section is set up, wire the motor to a suitable electrical supply. A suitable electrical supply is defined as:

1. Proper voltage with ground.
2. Adequately sized starter with all three phases fused.
3. Start and stop controls.
4. Electrical disconnect with means for lockout.

NOTICE

Be certain propeller is rotating in its proper direction.

Two vibration pickups should be used for vibration analysis and balancing. The use of magnetic base pickups is recommended. Attach one pickup to the motor housing in the area of the top motor bearing, and the second pickup in the area of the bottom motor bearing. The pickups should be in line with one another vertically. This is very important as this could affect the phase angles during balancing.

1.4.3 Balancing

Portable or in-place balancing is accomplished by:

1. Adding a trial balance weight to the propeller.
2. Moving the trial weight to the light spot on the propeller.
3. Marking the heavy spot on the propeller (which is 180° from the light spot).
4. Grinding the heavy spot of the propeller until the vibration level is brought into tolerance.

NOTICE

It is important to remember that an aerator operates by pumping the liquid up. Grinding of the propeller blade must always be done on the BOTTOM * of the blade, otherwise the propeller may cavitate when the aerator is placed into service.

Also remember that a mixer operates by pumping the liquid down. Grinding of the propeller blade must always be done on the TOP* of the blade, otherwise the propeller may cavitate when the mixer is placed into service.

*The propeller must be balanced in its proper assembled orientation as shown in the O&M Manual. It is important that the propeller is positioned properly when balancing; and it is important to match mark the propeller hub and shaft to assure location index for refitting the propeller to its proper location when it is removed. Also, the propeller must be rotating in the proper direction for up flow pumping. The actual balance procedure is dependent on the specific balance equipment, and the technique incorporated by the balance technician. However, the final results of the balancing operation should be recorded on the propeller balance record form, and the form signed by the balance technician.

To assemble the power section to the float assembly, refer to the section titled "Reassembly of the Unit" within the Operation & Maintenance Instructions Manual, for details and the safety wiring procedures required.

LOCTITE® 660

May 2004

PRODUCT DESCRIPTION

LOCTITE® 660 provides the following product characteristics:

Technology	Acrylic
Chemical Type	Urethane methacrylate
Appearance (uncured)	Metallic Grey Paste[LMS]
Fluorescence	No
Components	One component - requires no mixing
Viscosity	High
Cure	Anaerobic
Secondary Cure	Activator
Application	Retaining
Strength	High

LOCTITE® 660 is designed for the bonding of cylindrical fitting parts, particularly where bond gaps can approach 0.50 mm (0.02 in.). The product cures when confined in the absence of air between close fitting metal surfaces and prevents loosening and leakage from shock and vibration. This product possesses excellent gap cure characteristics. Typical applications include restoring correct fits on worn shafts, spun beraings, and damaged keyways.

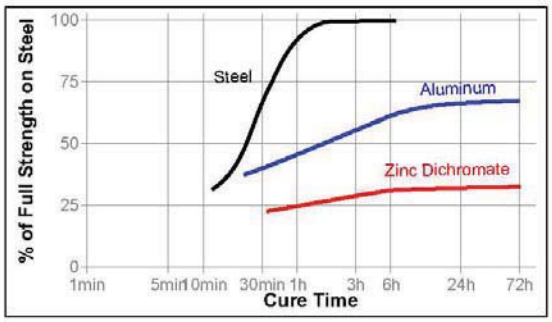
TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.13
Flash Point - See MSDS	
Viscosity, Brookfield - HBT, 25 °C, mPa·s (cP):	
Spindle TB, speed 0.50 rpm, Helipath	1,000,000 to 2,000,000[LMS]
Spindle TB, speed 5.00 rpm, Helipath	150,000 to 350,000[LMS]

TYPICAL CURING PERFORMANCE

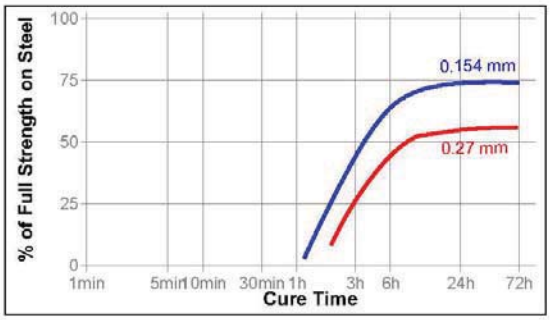
Cure Speed vs. Substrate

The rate of cure will depend on the substrate used. The graph below shows the shear strength developed with time on steel pins and collars compared to different materials and tested according to ISO 10123.



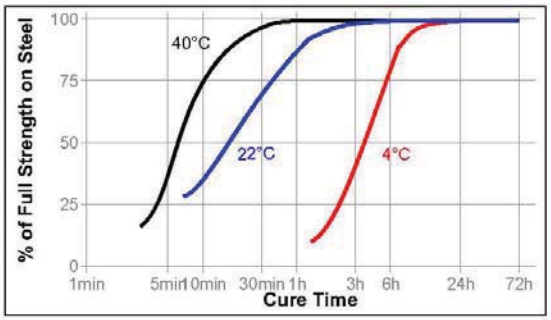
Cure Speed vs. Bond Gap

The rate of cure will depend on the bondline gap. The following graph shows shear strength developed with time on steel pins and collars at different controlled gaps and tested according to ISO 10123.



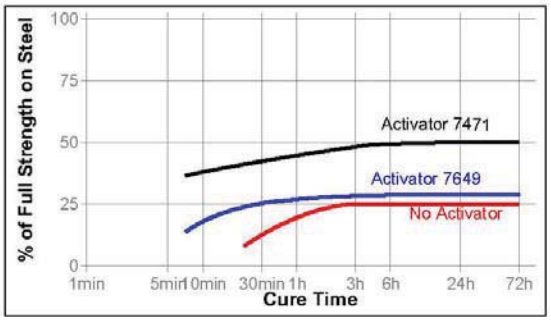
Cure Speed vs. Temperature

The rate of cure will depend on the temperature. The graph below shows the shear strength developed with time at different temperatures on steel pins and collars and tested according to ISO 10123.



Cure Speed vs. Activator

Where cure speed is unacceptably long, or large gaps are present, applying activator to the surface will improve cure speed. The graph below shows shear strength developed with time using Activator 7471 and 7649 on zinc dichromate steel pins and collars and tested according to ISO 10123.



Henkel Technologies

TYPICAL PROPERTIES OF CURED MATERIAL

Physical Properties:

Coefficient of Thermal Expansion, ASTM D 696, K[1]	80×10^{-6}
Coefficient of Thermal Conductivity, ASTM C 177, W/(m·K)	0.10
Specific Heat, kJ/(kg·K)	0.30
Elongation, at break, ASTM D 412, %	<2

TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

After 24 hours @ 22 °C

Compressive Shear Strength, ISO 10123:

Steel pins and collars	N/mm²	≥17.20[LMS]
	(psi)	(2,490)

TYPICAL ENVIRONMENTAL RESISTANCE

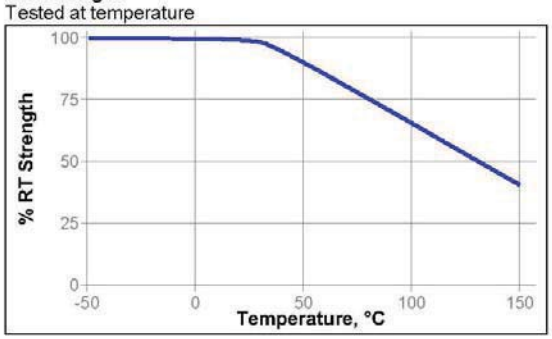
Cured for 1 week @ 22 °C

Compressive Shear Strength, ISO 10123:

Steel pins and collars

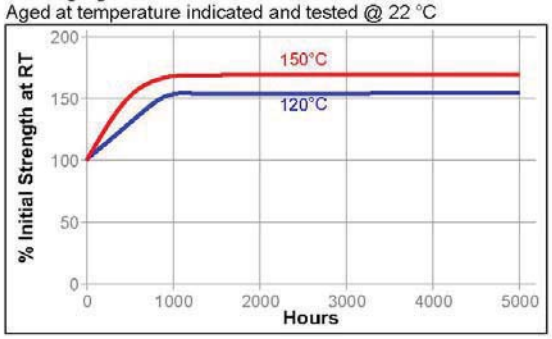
Hot Strength

Tested at temperature



Heat Aging

Aged at temperature indicated and tested @ 22 °C



Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C.

		% of initial strength		
Environment	**°C**	**100 hr**	**500 hr**	**1000 hr**
Motor Oil	125	100	100	100
Unleaded Gasoline	22	100	100	100
Brake fluid	22	80	75	75
Water Glycol 50/50	87	100	90	80
Ethanol	22	95	95	95
Acetone	22	80	80	80

GENERAL INFORMATION

This product is not recommended for use in pure oxygen and/or oxygen rich systems and should not be selected as a sealant for chlorine or other strong oxidizing materials.

For safe handling information on this product, consult the Material Safety Data Sheet (MSDS).

Where aqueous washing systems are used to clean the surfaces before bonding, it is important to check for compatibility of the washing solution with the adhesive. In some cases these aqueous washes can affect the cure and performance of the adhesive.

This product is not normally recommended for use on plastics (particularly thermoplastic materials where stress cracking of the plastic could result). Users are recommended to confirm compatibility of the product with such substrates.

Directions for use

For Assembly

1. For best results, clean all surfaces (external and internal) with a Loctite cleaning solvent and allow to dry.
2. If the material is an inactive metal or the cure speed is to slow, spray with Activator 7471 or 7649 and allow to dry.
3. **For Slip Fitted Assemblies**, apply adhesive around the leading edge of the pin and the inside of the collar and use a rotating motion during assembly to ensure good coverage.
4. **For Press Fitted Assemblies**, apply adhesive thoroughly to both bond surfaces and assemble at high press on rates.
5. **For Shrink Fitted Assemblies** the adhesive should be coated onto the pin, the collar should then be heated to create sufficient clearance for free assembly.
6. Parts should not be disturbed until sufficient handling strength is achieved.

For Disassembly

1. Apply localized heat to the assembly to approximately 250 °C. Disassemble while hot.

For Cleanup

1. Cured product can be removed with a combination of soaking in a Loctite solvent and mechanical abrasion such as a wire brush.

Henkel Loctite Americas
+860.571.5100

Henkel Loctite Europe
+49.89.9268.0

Henkel Loctite Asia Pacific
+81.45.758.1810

For the most direct access to local sales and technical support visit: www.loctite.com

Loctite Material Specification[LMS]
LMS dated September 1, 1995. Test reports for each batch are available for the indicated properties. LMS test reports include selected QC test parameters considered appropriate to specifications for customer use. Additionally, comprehensive controls are in place to assure product quality and consistency. Special customer specification requirements may be coordinated through Henkel Loctite Quality.

Storage
Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.
Optimal Storage: 8 °C to 21 °C. Storage below 8 °C or greater than 28 °C can adversely affect product properties. Material removed from containers may be contaminated during use. Do not return product to the original container. Henkel Corporation cannot assume responsibility for product which has been contaminated or stored under conditions other than those previously indicated. If additional information is required, please contact your local Technical Service Center or Customer Service Representative.

Conversions
(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
N x 0.225 = lb
N/mm x 5.71 = lb/in
N/mm^2 x 145 = psi
MPa x 145 = psi
N·m x 8.851 = lb.in
N·mm x 0.142 = oz.in
mPa·s = cP

Note
The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Henkel Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

Trademark usage
LOCTITE is a trademark of Henkel Corporation

Reference 0.3

Henkel Loctite Americas
+860.571.5100

Henkel Loctite Europe
+49.89.9268.0

Henkel Loctite Asia Pacific
+81.45.758.1810

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LOCTITE® 271™

July 2008

PRODUCT DESCRIPTION

LOCTITE® 271™ provides the following product characteristics:

Technology	Acrylic
Chemical Type	Dimethacrylate ester
Appearance (uncured)	Red LMS
Fluorescence	Positive under UV light LMS
Components	One component - requires no mixing
Viscosity	Low
Cure	Anaerobic
Secondary Cure	Activator
Application	Threadlocking
Strength	High

LOCTITE® 271™ is designed for the permanent locking and sealing of threaded fasteners. The product cures when confined in the absence of air between close fitting metal surfaces and prevents loosening and leakage from shock and vibration. Typical applications include the locking and sealing of large bolts and studs (M25 and larger).

Mil-S-46163A

LOCTITE® 271™ is tested to the lot requirements of Military Specification Mil-S-46163A.

ASTM D5363

Each lot of adhesive produced in North America is tested to the general requirements defined in paragraphs 5.1.1 and 5.1.2 and to the Detail Requirements defined in section 5.2.

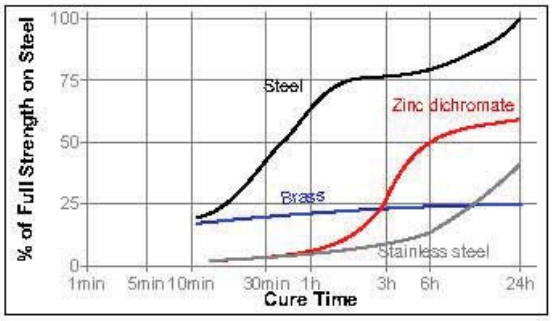
TYPICAL PROPERTIES OF UNCURED MATERIAL

Specific Gravity @ 25 °C	1.1
Flash Point - See MSDS	
Viscosity, Brookfield - RVT, 25 °C, mPa·s (cP)	
Spindle 1, speed 10 rpm	400 to 600 LMS

TYPICAL CURING PERFORMANCE

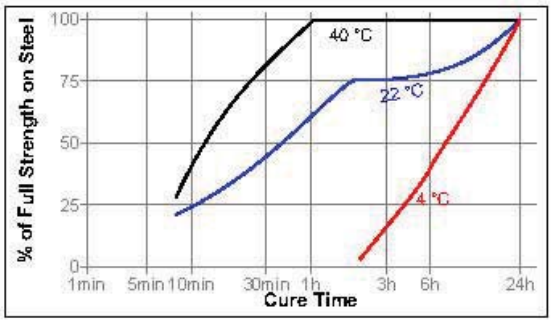
Cure Speed vs. Substrate

The rate of cure will depend on the substrate used.The graph below shows the breakaway strength developed with time on M10 steel nuts and bolts compared to different materials and tested according to ISO 10964.



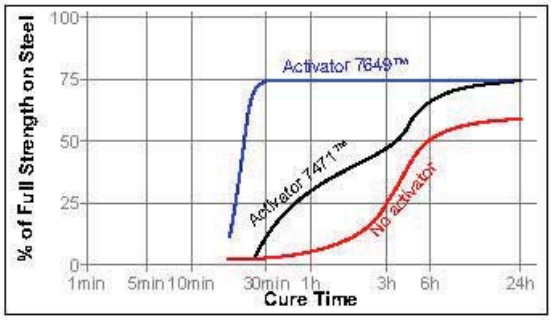
Cure Speed vs. Temperature

The rate of cure will depend on the temperature. The graph below shows the breakaway strength developed with time at different temperatures on M10 steel nuts and bolts and tested according to ISO 10964.



Cure Speed vs. Activator

Where cure speed is unacceptably long, or large gaps are present, applying activator to the surface will improve cure speed. The graph below shows the breakaway strength developed with time on M10 zinc dichromate steel nuts and bolts using Activator 7471™ and 7649™ and tested according to ISO 10964.



TYPICAL PERFORMANCE OF CURED MATERIAL

Adhesive Properties

After 90 minutes @ 22 °C		
Breakaway Torque, ISO 10964:		
3/8 x 16 steel nuts (grade 2) and bolts (grade 5)	N·m (lb.in.)	8.5 to 25.4[LMS] (75 to 225)
Prevail Torque, ISO 10964:		
3/8 x 16 steel nuts (grade 2) and bolts (grade 5)	N·m (lb.in.)	16.9 to 34[LMS] (150 to 300)
After 24 hours @ 22 °C		
Breakaway Torque, ISO 10964:		
3/8 x 16 steel nuts (grade 2) and bolts (grade 5)	N·m (lb.in.)	16.9 to 34[LMS] (150 to 300)
3/8 x 16 cadmium nuts and bolts	N·m (lb.in.)	4.5 to 14.1[LMS] (40 to 125)
3/8 x 16 zinc nuts and bolts	N·m (lb.in.)	4.5 to 14.1[LMS] (40 to 125)
M10 steel nuts and bolts	N·m (lb.in.)	17 to 40 (150 to 350)
Prevail Torque, ISO 10964:		
3/8 x 16 steel nuts (grade 2) and bolts (grade 5)	N·m (lb.in.)	22.6 to 40[LMS] (200 to 355)
3/8 x 16 cadmium nuts and bolts	N·m (lb.in.)	16.9 to 34[LMS] (150 to 300)
3/8 x 16 zinc nuts and bolts	N·m (lb.in.)	16.9 to 34[LMS] (150 to 300)
M10 steel nuts and bolts	N·m (lb.in.)	23 to 40 (200 to 350)

TYPICAL ENVIRONMENTAL RESISTANCE

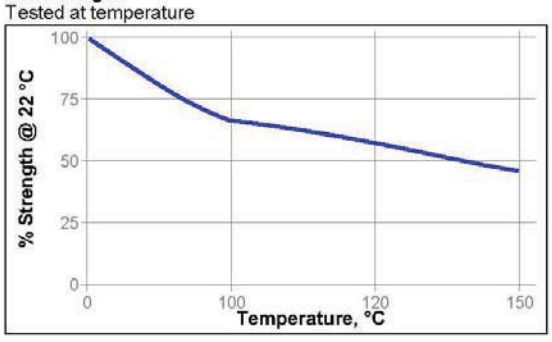
Cured for 24 hours @ 22 °C

Breakaway Torque, ISO 10964:

M10 steel nuts and bolts

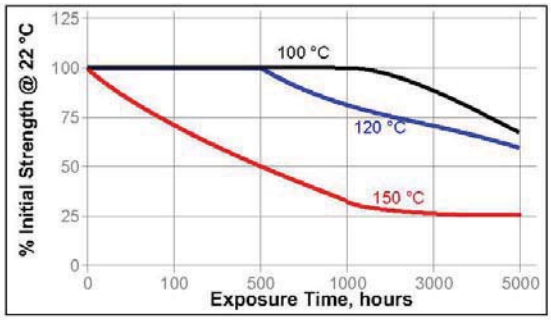
Hot Strength

Tested at temperature



Heat Aging

Aged at temperature indicated and tested @ 22 °C



Chemical/Solvent Resistance

Aged under conditions indicated and tested @ 22 °C.

		% of initial strength		
Environment	**°C**	**100 h**	**500 h**	**1000 h**
Motor oil (MIL-L-46152)	125	85	85	75
Unleaded gasoline	22	100	100	95
Leaded Gasoline I	22	100	100	100
Brake fluid	22	100	100	100
Ethanol	22	95	95	95
Acetone	22	95	95	95
1,1,1 Trichloroethane	22	100	95	95
Water/glycol 50/50	87	100	85	85

GENERAL INFORMATION

This product is not recommended for use in pure oxygen and/or oxygen rich systems and should not be selected as a sealant for chlorine or other strong oxidizing materials

For safe handling information on this product, consult the Material Safety Data Sheet (MSDS).

Where aqueous washing systems are used to clean the surfaces before bonding, it is important to check for compatibility of the washing solution with the adhesive. In some cases these aqueous washes can affect the cure and performance of the adhesive.

This product is not normally recommended for use on plastics (particularly thermoplastic materials where stress cracking of the plastic could result). Users are recommended to confirm compatibility of the product with such substrates.

Directions for use:

For Assembly

1. For best results, clean all surfaces (external and internal) with a LOCTITE® cleaning solvent and allow to dry.
2. If the material is an inactive metal or the cure speed is too slow, spray all threads with Activator 7471™ or 7649™ and allow to dry.
3. Shake the product thoroughly before use.
4. To prevent the product from clogging in the nozzle, do not allow the tip to touch metal surfaces during application.

Henkel Americas
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5. **For Thru Holes**, apply several drops of the product onto the bolt at the nut engagement area.
6. **For Blind Holes**, apply several drops of the product down the internal threads to the bottom of the hole.
7. **For Sealing Applications**, apply a 360° bead of product to the leading threads of the male fitting, leaving the first thread free. Force the material into the threads to thouroughly fill the voids. For bigger threads and voids, adjust product amount accordingly and apply a 360° bead of product on the female threads also.
8. Assemble and tighten as required.

For Disassembly

1. Apply localized heat to nut or bolt to approximately 250 °C. Disassemble while hot.

For Cleanup

1. Cured product can be removed with a combination of soaking in a Loctite solvent and mechanical abrasion such as a wire brush.

Loctite Material Specification[LMS]

LMS dated August 23, 1999. Test reports for each batch are available for the indicated properties. LMS test reports include selected QC test parameters considered appropriate to specifications for customer use. Additionally, comprehensive controls are in place to assure product quality and consistency. Special customer specification requirements may be coordinated through Henkel Quality.

Storage

Store product in the unopened container in a dry location. Storage information may be indicated on the product container labeling.
Optimal Storage: 8 °C to 21 °C. Storage below 8 °C or greater than 28 °C can adversely affect product properties. Material removed from containers may be contaminated during use. Do not return product to the original container. Henkel Corporation cannot assume responsibility for product which has been contaminated or stored under conditions other than those previously indicated. If additional information is required, please contact your local Technical Service Center or Customer Service Representative.

Conversions

(°C x 1.8) + 32 = °F
kV/mm x 25.4 = V/mil
mm / 25.4 = inches
µm / 25.4 = mil
N x 0.225 = lb
N/mm x 5.71 = lb/in
N/mm^2 x 145 = psi
MPa x 145 = psi
N·m x 8.851 = lb·in
N·m x 0.738 = lb·ft
N·mm x 0.142 = oz·in
mPa·s = cP

Note

The data contained herein are furnished for information only and are believed to be reliable. We cannot assume responsibility for the results obtained by others over whose methods we have no control. It is the user's responsibility to determine suitability for the user's purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. In light of the foregoing, **Henkel Corporation specifically disclaims all warranties expressed or implied, including warranties of merchantability or fitness for a particular purpose, arising from sale or use of Henkel Corporation's products. Henkel Corporation specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.** The discussion herein of various processes or compositions is not to be interpreted as representation that they are free from domination of patents owned by others or as a license under any Henkel Corporation patents that may cover such processes or compositions. We recommend that each prospective user test his proposed application before repetitive use, using this data as a guide. This product may be covered by one or more United States or foreign patents or patent applications.

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Reference 1.3

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Cleaning and Maintenance of Aqua-Jet® Aerators

Types of Cleaning Agents and Cleaning Methods

When cleaning an Aqua-Jet® Aerator, power washing will remove most dirt, debris, and/or grease that may have accumulated on the unit. This method of cleaning is the first line of defense for cleaning the unit.

If the unit cannot be cleaned using a power washer, a "light" degreaser or trisodium phosphate (anhydrous) can be used; however, **the manufacturer's recommendation and appropriate safety precautions must be observed.**

⚠ CAUTION

Trisodium phosphate (TSP) can burn unprotected skin, cause eye damage, and irritate or burn the respiratory tract. Anyone using TSP should wear protective clothing and eye protection or a face shield. Self-contained breathing apparatus is also recommended. Surrounding items and foliage should be thoroughly protected prior to cleaning the aerator.

A diluted mixture of TSP can be applied to the unit using a scrub brush or sponge or it can be sprayed on. As TSP can cause stains on metals and/or cause damage to paint and coatings, the aerator should be rinsed off thoroughly.

Cleaning Agents and Methods that can be Detrimental

When cleaning an Aqua-Jet® Aerator, do **not:**

- Submerge the unit.
- Use salt water to clean the motor.

Doing either of the above can cause serious damage to the unit. Aqua-Aerobic Systems, Inc. assumes no liability or responsibility for any damage resulting from improper cleaning techniques.

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

Aqua-Jet® Surface Mechanical Aerator

Operation & Maintenance Instruction Manual

Aeration & Mixing | Biological Processes | Filtration | Membranes | Process Control & Monitoring | Aftermarket Parts & Services

6306 N. Alpine Rd. Loves Park, IL 61111-7655 p 815.654.2501 f 815.654.2508 www.aqua-aerobic.com

 2017-12-11

Assembly and Installation

General

In general, Aqua-Jet® Aerator sizes through 25 HP (18.5KW) are generally shipped pre-assembled. Aqua-Jet® sizes 30 HP (22KW) and larger will generally be shipped in three (3) major subassemblies as follows:

a) Power Section
b) Float Assembly
c) Intake Cone /Anti-Vortex Cross Assembly

For details of the components refer to the Equipment Diagrams and Parts Lists at the end of this manual.

The intake cone / anti-vortex cross assembly should be bolted to the underside of the float assembly and securely tightened at all bolt locations of the bolting flange. Jam nuts should then be installed to lock the regular nuts into position.

It is then necessary to place the float assembly in an upright (normal) position and the power section should be lowered onto the float assembly, making sure to center the propeller in the volute. The power section should be slowly lowered until it sits flush on the parting surface of the float assembly so that the machined male index engages the inner diameter of the diffusion head flange. When this fit is made, the power section is perfectly aligned with the volute and the float assembly. The drilled head bolts should be placed in the holes and securely tightened. Using the stainless steel wire provided, these bolts should be safety wired in place.

Once the unit is assembled, it is handled in the same manner as a pre-assembled unit. The units should be lifted in and out of the water by the motor lift eyes only. Once they are in the water, they can be floated into place and moored.

NOTICE

Wherever the equipment is arranged to accommodate safety wiring (bolts with holes drilled through them), safety wire must be used. In addition, whenever the use of jam nuts is required, they must be used to lock the regular nuts into position.

Remove any obstruction to motor condensate drains.

Electrical Cable

The power cable for the Aqua-Jet® Direct-drive Aerator should be factory attached and sealed into the junction box. However, excessive cable lengths are shipped unwired to prevent damage to cable. For units that are field wired, a good grade of jacketed cable should be used. Some wastewater conditions require the use of special cable jackets because of chemicals and solvents. However, in most applications, electrical cable which is rated for wet-duty service is acceptable. A good quality copper stranded 4-conductor cable (or 3-conductor with insulated ground) should be used for the power supply. When selecting a cable, the line loss should be carefully checked to assure the full voltage requirements at the motor. Low voltage can severely shorten the life of the motor.

To prevent unnecessary pull on the motor terminal box, a strain relief fitting can be used, or the power cable can be attached to a mooring cable for a distance of 15 to 20 feet (4.5 to 6.0 meter) from the aerator. Heavier cables may tend to cause the aerator to "list" (tip) to one side and if this occurs, cable floats should be used to relieve the excess weight.

The power cable should be protected from friction wear damage to the cable jacket, which can cause a ground short. This is normally caused by the cable rubbing against the float. A spiral wrap type electrical cable abrasion protection sleeve should be used to protect the electrical cable from rubbing on the side of the float assembly. Also, care must be taken to prevent the electrical power cable from being drawn into the suction of the mixer, or propeller as this will cause damage to the cable.

Wiring Instructions

Proper wiring of the Aqua-Jet® is essential in the installation of the unit. Faulty wiring will cause premature failure of the unit.

Aqua-Jet® units shipped from our factory prewired is warranted in accordance with the terms described elsewhere in this manual. Units wired in the field must be wired in accordance with these instructions, or the warranty of the unit is void. Aqua-Aerobic Systems, Inc. will assume no responsibility in regard to liability for personal or property damage resulting from improper wiring done in the field. (See the motor manufacturer's nameplate for proper wiring diagram).

Field Wiring the Motor

When wiring an Aerator motor, always wire in accordance with the motor nameplate. Select a cable suitable to the National Electrical Manufacturers Association (NEMA) ratings for voltage, amperage, and environmental conditions that exist or may arise. Remember, undersized cables and the resultant voltage drop may shorten the life of a motor considerably.

On the Aerator, the color green is used to indicate the ground or "neutral" conductor of the conduit. If, for any reason, any other color is used for ground, it should be clearly marked in the control panel at the motor starter and in the junction box of the motor frame.

The junction box is threaded to receive an N.P.T. fitting for a watertight connector. All Aqua-Jet Aerator units that are prewired at the factory are fitted with taper-lock fittings. Field-wired units must also be fitted with watertight fittings to seal the cable entrance to the disconnect / junction box. Without fittings of this type, no warranty will be extended by Aqua-Aerobic Systems.

Power Cable Removal and Replacement

Power Cable Removal

If provisions are included for electrical cables to be removed at a junction box outside reservoir, this is recommended over disconnecting the electrical cable at the junction box on the motor.

For connecting power supply cable to the motor, Aqua-Aerobic Systems always uses crimp-on type closed-eye connectors to provide "bolt and nut" connections from the motor leads to the power supply leads. This is followed by rubber insulating tape and plastic insulating tape (3M's Scotch Vinyl Electrical Tape 33 or equal).

To disconnect the power supply cable from the motor:

- Remove the junction box cover.
- Cut away the plastic tape and rubber insulating compound from each motor lead connection to expose each bolt and nut lead connection.
- Disassemble each bolt and nut connection to separate the power supply cable from each of the motor leads.
- Loosen the ground lead from the internal ground lug.
- Loosen and remove the securing nut from the cord grip and pull the cable with the sealing gland from the junction box.

Power Supply Cable Replacement

The junction box is threaded to receive an N.P.T. (National Pipe Thread) fitting. All units are fitted at the factory with a stainless steel sealing type cord grip. Any unit being field-wired must also be fitted with the same fitting to seal the cable entrance to the junction box. Securely tighten the fitting into the junction box leaving the sealing gland and nut loose. The cable jacket should be stripped back to expose approximately six (6) inches of insulated conductors. Thread the power cable through the sealing gland and into the junction box. Tighten the sealing gland nut until cable is secured.

Use crimp-on type closed eye connectors on all power supplies. Refer to the following instructions titled **Prepare Cable**. Following the wiring diagram included within Section-4 on the manual, connect the power supply leads to the motor leads using a "bolt and nut" type connection. A secure connection is important at this point. Following this, rubber insulating tape should be used to wrap each set of leads. Refer to the following instructions titled **Applying Insulating Tape**. After several wraps of rubber insulating tape, several wraps of plastic insulating tape (Plymouth type-122, Scotch 3M type-33, or equal) should be applied. After wrapping the leads with the two (2) types of tape, push the leads back into the junction box.

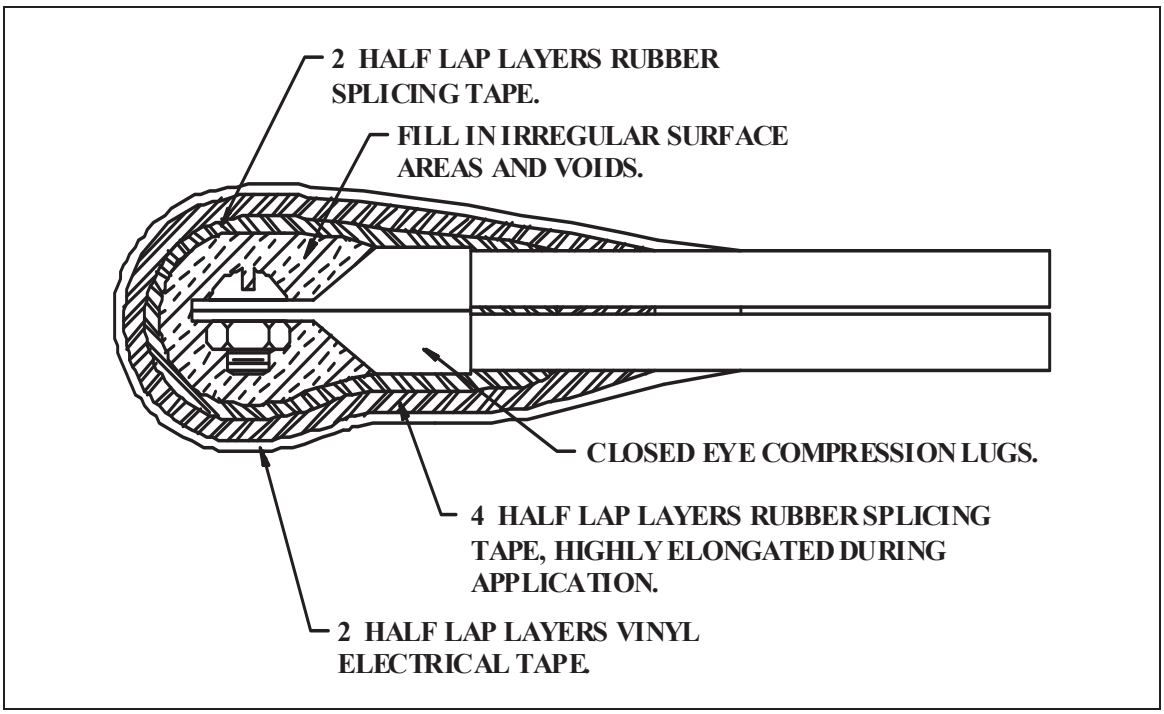
The lid should be bolted evenly in place, and all screws or bolts should be firmly secured. Be careful not to pinch any of the wires between the lid and the base of the junction box. The box lid should be flush along all parting lines.

Prepare Cable

- "STA-KON" closed-eye compression lug connectors are recommended to provide “bolt and nut” type connections from the motor leads to the power supply leads. Follow lug manufacturers procedures for preparation and installation. When removing insulation from wire, take care not to damage conductor stranding. A secure connection is important at this point.
- Following the motor wiring diagram for the stated supply voltage, connect the motor leads to the power supply leads.
- Thoroughly clean the insulation 3 inches beyond compression lugs to remove all contaminants.

Apply Insulating Tape

- Pad, fill, and round out connection with rubber splicing tape, pressing the tape into crevices.
- Apply 2 half-lapped layers of rubber insulating / splicing tape (such as; Plymouth 122 Rubber Tape Splicing compound, 3M’s Scotch® Vinyl Electrical Tape Type 33, or equal) over the entire connection and 1 inch onto conductor insulation. Stretch tape to 3/4 of its original width during application.
- Apply 4 half-lapped layers of rubber splicing tape over the entire connection, extending just beyond the previous layer. Highly elongate tape during application, a minimum of 3/4 of its original width. Refer to the following Pigtail Splice detail below.



Apply Outer Seal

- Apply 2 half-lapped layers of vinyl electrical tape over entire connection extending a minimum of 1 inch beyond previously applied rubber splicing tape.

After wrapping the leads with the two types of tape, the leads should be pushed back into the junction box. Silicone type sealer should be applied to the parting lines of the junction box.

The junction box cover should be bolted evenly in place, and all screws or bolts should be firmly secured. The box lid should be flush along all the parting lines. After the box lid is in place, a layer of sealer should be placed around the parting line of the box. For boxes with gaskets, the same type sealer should be applied to both sides of the gasket and sealed in the same manner as previously described. Any time the junction box seal is broken, resealing is mandatory prior to starting the unit again.

Installation

After the unit is uncrated and ready to place in the basin, it should be carefully hoisted into the basin by the motor lifting eyes. As described in Section 1.2, a vertical pull must be applied to the lift eyes. Do not allow the lift eyes to pull inward. (Lifting with a short chain or cable can put a cross shear on the lift eyes, breaking them off or otherwise damaging the motor.) They are designed for tensile (vertical lift) loading only. Do NOT lift the entire unit by the float mooring eyes.

When the unit is in the basin, it should be moored into position as described in the appropriate Mooring Installation Manual.

Electrical Connection At The Control Panel

The electrical connection in the control panel should be made to the proper starter. Also, the ground lead must be firmly connected to a good ground lug. Finally, the heaters and fuses should be checked for proper sizes and application. All safety precautions must be observed.

Start-Up

Prior to starting up, confirm motor condensate drains are free of any obstructions. After all necessary wiring and mooring are finished, the unit should be started. Immediately observe the flow of the unit. If a good continuous discharge is noticed, the unit can be checked for running amperage. If a sloshing and splashing are noticed, but little or no flow is produced, stop the unit at once. It is operating in reverse. To correct this stop the unit with the control switch, simply throw the main disconnect in the starter box, and reverse any two of the three power leads - NOT THE GROUND. Restart the unit, and check the amperage.

Motor Amps (Power Consumption)

The full load current required by electric motors varies slightly from one manufacturer to another. When installing the Aqua-Jet® units, read the nameplate current (amps) at the corresponding voltage, and write it inside the starter control panel door. Using an accurately calibrated amprobe, check all three phases of the unit. Normal mixer power draw will usually be about 90% of full load amps shown on the nameplate. However, special propeller pitches for specific liquid viscosity can cause variations.

Anything other than normal should be reported to the factory at once. If the unit is pulling normal current, recheck it 30 minutes after it has been started. This will allow the motor sufficient warm-up time. The reading you obtain should be the reading of the unit's normal operating range. The unit **must not** be operated above the full load amps shown on the motor nameplate.

NOTICE

On older basins that have been used for settling ponds, or oxidation ponds that have been converted to aerated lagoons, it is possible to experience abnormally high current readings on start-up. Sometimes the heater elements will disengage the starter due to overload.

Allow the unit to cool for approximately five minutes, reset the starter, and restart the unit. If it drops out again, repeat. The previous condition is due to past buildup of sludge or fibrous concentrations that change the characteristics of the liquid being pumped. This problem will solve itself after a few hours of operation, as the solids and/or fibers will be dispersed and their concentration will be lowered.

Power Supply (Voltage)

Today's power suppliers offer 230/460 volt (380, 400, or 415 volt) service as standard. It is unlikely that your voltage will be exactly one or the other. Motor manufacturers allow a ±10% variation* in the operation of their motors. Motor manufacturers and/or Aqua-Aerobic Systems, Inc. will not be responsible for motor failure due to voltage more or less than the allowable tolerances. Also, neither will be responsible for motor failure due to unbalanced voltage of the three phases. If a high, low, or unbalanced voltage problem exists make sure it is corrected before connecting any motors to it. Specially wound motors are available, if the power source cannot be corrected.

*10% variation can be tolerated on all voltage variations at the rated frequency or 10% variation of sum of voltage and frequency, with frequency not exceeding 5% variation.

Environmental Debris

The Aqua-Jet® is a powerful, high-volume pump. It has great suction capacity and will ingest any waterlogged or submerged materials that get near its intake. Its rugged construction allows most material to pass through its non-clog design. However, a large growth of aquatic plants (such as rushes or seaweed), logs, tree stumps and branches, bed sheets, wire, rope, burlap and plastic sacks, and similar objects can cause problems. They may even clog or damage the unit. These are environmental problems in the system. They should be kept out of the system. Damage resulting from abnormal operational hazards such as above is not covered in the warranty on Aqua-Jet® equipment. Also, abnormal parts wear caused by abrasive materials are not considered warrantable.

Effects Of Ambient Temperature On Control Panel

The heating elements in the motor starter are set to trip out at approximately 15% above the full-load amperage. Normal running of the motor generates heat in the conductor strips or alloy in the heater. When ambient temperature is high, especially when a panel is placed in direct sunlight, the additional temperature can be enough to exceed the 15% extra of the heater element and it will trip out at this point. To correct this problem, ambient compensating heaters can be used. It is also advisable to place a cover over the panel to minimize the amount of heat due to sunlight. Before using ambient compensating heaters, be certain the location of the motor is taken into consideration, because motors in high temperature locations can overheat also.

Maintenance

Very little maintenance will be required with the Aqua-Jet® equipment. The simplicity of the unit's design eliminates the need for extensive maintenance programs. However, preventative maintenance is suggested as follows.

Motor Lubrication

Lubrication for the small 1 HP (0.7KW) and 2 HP (1.5KW) Non-Endura motors is required, as that size motor is not available in the Endura® Series. These motors must be re-lubricated every six (6) months with the Chevron Black Pearl EP 2 grease or an approved equivalent lubricant. 1 HP (0.7KW) and 2 HP (1.5KW) motors are provided with a standard 1/8" NPT grease zerk at both the top and bottom motor bearings. These motors will not include relief vents as described with the alternate lubrication fittings listed below. All Non-Endura motors (1 & 2 HP) must be regularly lubricated with the Chevron Black Pearl EP 2 grease upon placing into operation or with the approved equivalent lubricant.

Endura® Series Maintenance-Free Products

No motor re-lubrication is necessary for the initial first three (3) years of operation for Endura® Series motors; refer to the document titled "**Endura® Series Lubrication Procedure**" within this Section-3 of the manual for details.

The Endura® Series motor is provided with a combination of proprietary design features and a lubricant specifically formulated for extra long life in harsh environments. If it should become necessary to re-lubricate the motor due to repair or rebuild, contact Aqua-Aerobic Systems, Inc.

After the initial first three (3) years of operation, the Endura® Series motor must be re-lubricated with **Chevron Black Pearl EP 2** grease. Before greasing the motor, be sure that the grease vent (usually located on the opposite side of the motor) is open and clear. Follow the lubricating instructions outlined below.

The different type and frame size motors used on the Aqua-Jet® are not lubricated identically. This is due to the various casting and production techniques utilized by the different electric motor manufacturers. However, three basic types of lubrication fittings and techniques are employed.

Three types of Lubrication Fittings

Type A

Normal alemite fittings are provided for grease-through type lubrication on WEG Aerator motors. These fittings are found on the outer frame of the motor at both the top and bottom motor bearings. When lubricating the WEG motors, snap the grease gun onto the zerk fitting and begin pumping the grease. After several strokes, grease should begin to appear at the relief points. Stop pumping in grease and wipe off the excess.

Type B

The second type of fitting used is called a keystone fitting. This is a fitting which relieves itself at the same location where it is greased. This fitting will be found on the outer frame near the top and

bottom bearings and is identified by its "hex" appearance. The outer perimeter of the hex has three (3) holes for relief, with the grease fitting inserted (threaded) into the center of the hex.

Type C

The third type of grease fitting used is called a button type fitting. This fitting is found on the outer frame of the motor at both the top and bottom motor bearings. Just opposite, the grease fittings are the relief vents. These relief vents are a spring-loaded pressure relief type that does not require removing before greasing.

When lubricating either type fitting, snap the grease gun onto the zerk fitting and begin pumping the grease. After several strokes, grease should begin to appear at the relief points. Stop pumping in grease and wipe off the excess.

NOTICE

Under no circumstances should you add more grease than indicated in the following Table. The average number of pumps from a standard hand grease gun have been listed below based on unit frame size:

Unit HP (KW)	Frame Size	Amount	Hand Gun
1 (0.75) & 2 (1.5)	143 thru 184	.57 cu. in. (9ml)	7 pumps
3 (2.2) & 5 (3.7)	180 thru 215	.75 cu. in. (12 ml)	9 pumps
7.5 (5.6)	250 thru 254	1.5 cu. in. (25 ml)	18 pumps
10 (7.5) & 15 (11)	280 thru 286	1.5 cu. in. (25 ml)	18 pumps
20 (15) & 25 (18.6)	320 thru 324	2.0 cu. in. (33 ml)	24 pumps
30 (22.4) to 50 (37)	360 thru 365	2.0 cu. in. (33 ml)	24 pumps
60 (44) thru 150 (111)	404 thru 449	3.0 cu. in. (50 ml)	36 pumps

Motors from 1 HP through 15 HP should be lubricated once every six (6) months.
20 HP and larger motors should be lubricated once every four (4) months.

⚠ WARNING

If you re-lubricate units in position, a floating platform of sufficient stability should be used to access the motor. In addition, you must be certain to lock-out / tag-out electrical power from all sources, use adequate personal flotation devices and safety lines, and work in groups of two or more.

The **Chevron Black Pearl EP 2** grease should be used to lubricate all Aerator motor bearings. Use only **Chevron Black Pearl EP 2** lubricant, (AASI #2608275), or the approved alternate grease Polyrex EM by Exxon/Mobil (AASI #2600956-001). Contact Aqua-Aerobic Systems, Inc. Customer Service Department at (877) 271-1946 for prices and delivery of the Chevron Black Pearl EP 2 grease.

General

The only other preventative maintenance that is advised is a periodic check to see that the mooring system is secure and an amperage reading check of the motors to see that they are running normally. A check of all securing hardware should be conducted any time a unit trips out due to ingestion of foreign debris.

Repair and Service

The Aqua-Jet® is relatively simple to service. Should it become necessary to repair or replace worn or damaged parts, service work should be done with care. Aqua-Aerobic Systems, Inc. maintains a competent repair facility to repair or recondition your equipment should it become necessary. Contact our plant in Loves Park, Illinois to make arrangements to return your unit or power section to the factory for service by telephoning (815) 654-2501 and asking for Customer Service.

⚠ CAUTION

The Aqua-Jet® Aerator control system contains controls and devices for high voltage equipment. All electrical service should be performed by an experienced and certified electrician. Before proceeding with any repair work, all power must be removed from the equipment under repair and locked out / tagged out.

Removing The Unit From The Basin

When removing the unit from the basin (or tank), all power must be disconnected and locked out prior to disassembly. Refer to the procedures titled "Transport and Handling" in Section-1, and *if applicable* the "Basin Cable Mooring Instructions" in Section-2 as a guide.

Disassembly Of The Unit

Once the unit has been removed from the basin, it can be disassembled into the three (3) main component sub-assemblies as listed below.

a) Power Section
b) Float Assembly
c) Intake Cone/Anti-Vortex Cross Assembly

Refer to the Equipment Diagrams and Parts List at the end of this document, and the document titled "Aqua-Jet Aerator Component Assembly" number EP-10451 located in section-2 for details. After stabilizing the unit, cut the safety wire from the bolts attaching the motor base to the float. Remove the bolts, and lift the power section from the float assembly (as vertically as possible).

Propeller Removal

Refer to the document titled "Propeller Removal, Installation, and Balancing Instructions Manual located in this section details.

Motor Service

For motor service work, contact Aqua-Aerobic Systems, Inc. as it will probably be necessary to take the motor to a factory-authorized motor service shop. Aqua-Aerobic Systems, Inc. will see that you are directed to a motor service shop near you that can rebuild the motor to its original condition. Always provide the motor horsepower rating, voltage, model, and serial numbers, when requesting service information. This data is found on the stainless steel nameplate on the motor frame. It may be necessary to remove the electrical power cable before sending the motor to a repair shop. Refer to the previous section titled **Power Cable Remove** for proper instructions to remove electrical cable.

NOTICE
Repairs not authorized by Aqua-Aerobic Systems, Inc. via our P.O. number will be at your expense.

Reassembly Of The Unit

To reassemble the unit, follow the same unit assembly diagrams and parts list located at the end of this manual. **Don't force any fits.**

NOTICE
Threads on all fasteners should be coated with anti-seize compound to prevent galling.

Before reassembling the power section, check the lab seal guard and fluid deflector. If they are loose or worn, they must be replaced. Also the anti-deflection insert in the diffusion head should be replaced if it appears worn or damaged. Aqua-Aerobic Systems uses and recommends Chevron's Black Pearl EP2 lubricating grease for all Endura Series motors.

When lowering the extended shaft of the motor into the diffusion head, slowly and carefully align the shaft in the bore of the anti-deflection portion of the diffusion head. Once the shaft has cleared the bore, lower the motor onto the support pads. Be certain the motor is down flush on all pads. Refer to the document titled "Bolt Torque Specification Sheet" in Section-2 of this manual for torques ratings for bolt threads. Refer to the following Safety Wiring Instructions prior to safety wiring all bolts in place.

NOTICE
The motor end bell and the bosses on the diffusion head must be flush at the parting surface. If they are not flush check to see if something is under the motor end bell or if the pilot is off center. You can now bolt the motor to the diffusion head. Also be sure the safety wire is affixed in place.

AASI recommends the use of Thread-Eze Ultra™ (AASI Part No. 2610904) to prevent thread seizure caused by excessive heat, torque, and rusting, and it provides superior lubrication and sealing up to 2,300° F (1260° C). Thread-Eze Ultra allows easy disassembly of parts by decreasing seizure, corrosion, pitting, rusting, and galling of metal parts. It can also act as a sealant by reducing friction and making tighter joints possible. It resists water washout, salt spray, and weathering. It maintains proper consistency and will not harden, melt, or evaporate.

NOTE: Thread-Eze Ultra™ is a registered trademark of Chemsearch.

When reassembling the propeller onto the shaft, refer back to the Propeller Removal and Installation Instructions Manual in Section-3 on this manual.

⚠ CAUTION

A new pin is required every time the propeller is removed from the motor shaft. These pins are special 17-4 PH stainless steel and carried in stock at Aqua-Aerobic Systems, Inc.

After the power section has been completely reassembled you should consider reattaching the electrical cable and all wire connections. If the electrical cable shows any signs of cuts or damage it is recommended that it be replaced. Refer to the previous section tilted **Power Supply Cable Replacement** for proper field wiring instructions.

The power section may now be reassembled to the float assembly by following the equipment assembly procedures and the diagrams at the end of this manual. Torque all bolts of the power section to the float volute assembly, and safety wire all bolts in place.

NOTICE

It is essential that all fastening devices such as nuts, jam nuts, and safety wiring be checked for installation and proper tension before installation into the basin.

Safety Wiring Instructions

Safety wiring (lock wiring) is still the most reliable method of securing any stainless steel bolt applied to a blind hole tap. This includes diffusion head, motor and motor base bolts. Other methods of fastening include lock washers and the use of locking compounds. Stainless steel lock washers tend to relax over time, losing their locking ability, and since an anti-seize compound should always be used with stainless fasteners to prevent galling, the use of a locking compound is impractical. The best method is still the safety wire, but in order to be effective, it must be installed correctly.

The important points to remember when safety wiring is:

1. Check bolted connections to insure that they are tight before safety wiring. Refer to the document titled "**Bolt Torque Specification Sheet**" EP-1057 in Section-2 of this manual.
2. The wire MUST be installed in the direction that will not allow the bolt to loosen. When wiring bolt to bolt, the wire must be oriented such that for any bolt to loosen, the adjacent bolts must be tightened.
3. The wire must be tight, without sags or kinks, and pulled low around the bolt head so as not to slip up over the top.
4. A good grade of annealed (soft tempered) stainless steel safety wire should be used. We use and recommend a .050" (1.3 mm) diameter wire. A pair of safety wire twisting pliers will aid in the installation however, it can be done with a good pair of locking pliers, and a wire cutter.
5. Any time the safety wire is removed, it must be replaced before putting the unit back into service. Failure to do so may allow the bolts to loosen and back out.
6. When working with stainless steel bolts always coat the threads with a good grade of anti-seize compound before assembly to prevent galling.

Safety Wiring Procedures

Start the wiring by cutting an appropriate length of wire sufficient to complete the job. When wiring bolt to bolt, such as motor bolts and mixer motor base bolts, it is best to work from left to right.

(**Fig 1**) Insert the wire through each bolt head, pulling the wire tight as you go. It may be necessary on some bolts to wrap the bolt head with the wire. This wrap should fit under the opposing wire.

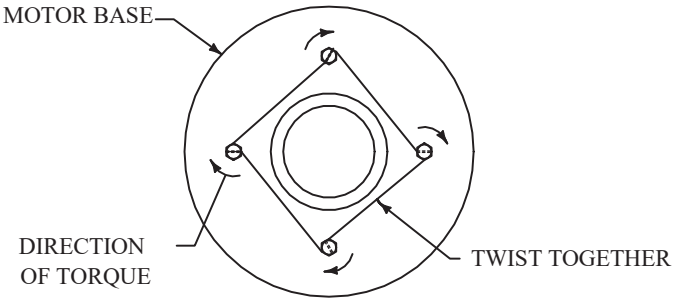


Fig. 1 Safety Wire Example

(**Fig. 2**) The actual position of the wire hole will dictate the exact routing of the wire. Remember, the wire MUST prevent the bolt from loosening.

After traversing around the bolt pattern and each head of bolt as pictured in Figure 2, making sure each length of wire between bolts is pulled tight; clamp the two ends together with a pair of locking pliers. Twist the ends together until the wire is tight and the twisted braid is at least 1/2" long. Cut away the excess wire and push the twisted braid back out of the way.

The unit can now be placed back into service following the suggested **Transport and Handling** instructions as recommended in Section-1 of this manual.

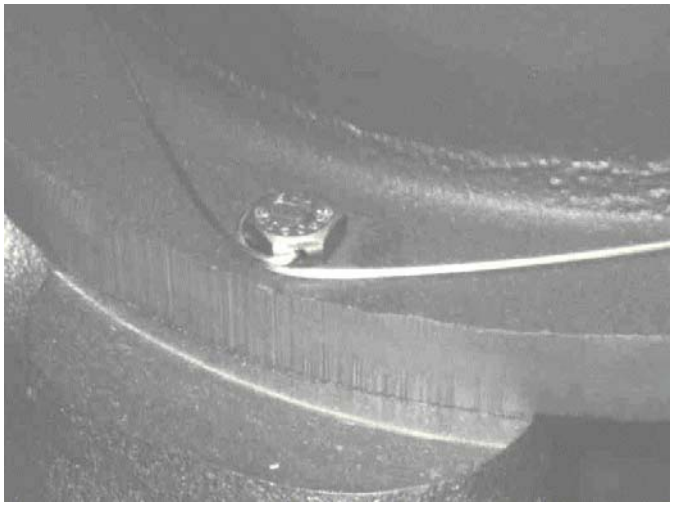


Fig. 2

Factory Service Procedure

All factory service inquiries should be directed to Aqua-Aerobic Systems, Inc. Customer Service Department at (815) 654-2501.

Storage

For extended storage periods of the unit, it is recommended that some method of space heating be utilized at all times to prevent condensation of moisture on the windings when the motors are not running. Refer to the document titled "**Short & Long Term Storage Procedures**" located within Section-1 of this manual for all storage recommendations, and protection from extremes in temperature, humidity, and corrosive atmosphere.

Trouble Shooting

Refer to the document titled "**Trouble Shooting Guide**" located within Section-3 of this manual.

⚠ CAUTION

The Aqua-Jet® control system contains controls and devices for high voltage equipment. All electrical service should be performed by an experienced and certified electrician. Before proceeding with any repair work, all power must be removed from the equipment under repair and locked out / tagged out.

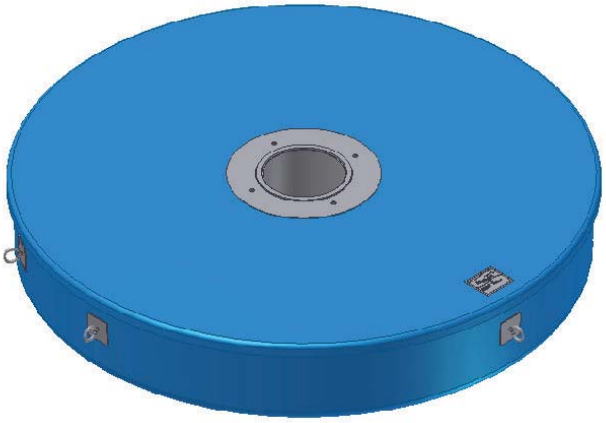
Equipment Diagrams and Parts Lists

Sub-Assembly Identification

The Aqua-Jet® sizes 1 HP (0.75KW) through 25 HP (18.5KW) are shipped pre-assembled and will require no additional assembly. Aqua-Jet® sizes 30 HP (22KW) and larger will generally be shipped in three (3) major subassemblies that can be identified by the following parts.

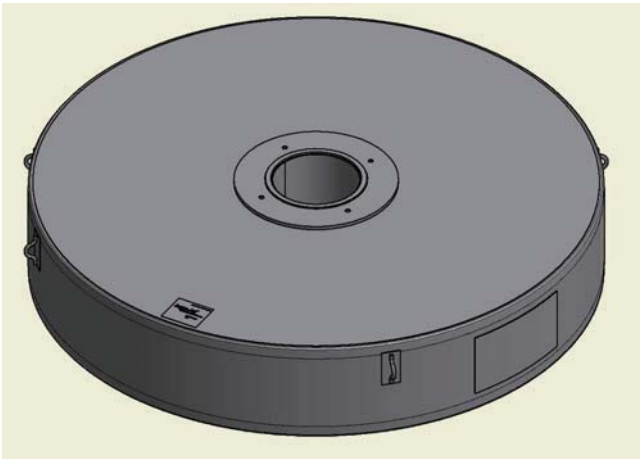
A) Power Section

B) Float Assembly



Fiberglass Float Assembly

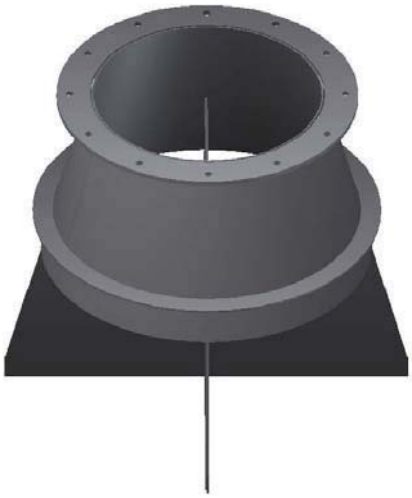
or optional:



Stainless Steel Float Assembly

C) Intake Cone/Anti-Vortex Cross Assembly

Aerators 1 HP (0.7KW) through 25 HP (18.5KW), come with their Intake Cones welded to the bottom of the float assembly as standard. Units 1 HP (0.7KW) through 15 HP (11KW) do not include the Anti-Vortex Crosses.



The Anti-Vortex Cross is standard on all 20 HP (15 KW) through 150 HP (112KW) units. The top Intake Cone / Volute Flange, and the side Stiffener Ring as pictured at right are standard on 30 HP (22 KW) through 150 HP (112KW). The various different Intake Cones / Anti-Vortex Crosses are shown in more detail at the end of this manual.

Assembly Procedure

For detailed component assembly procedures refer to the Aerator Component Assembly document EP-10451 located in Section-2. Lift and set the Power Section onto the Float and Intake Cone / Anti-Vortex Cross Assembly aligning the holes. Fasten with the drilled head bolts provided and secure all bolts by the appropriate size torque specifications as outlined in the Bolt Torque Specification Sheet ES-1057 found in Section-2. All bolts must be tethered together with the stainless steel safety wire. Remove any obstructions from the motor condensate drains.

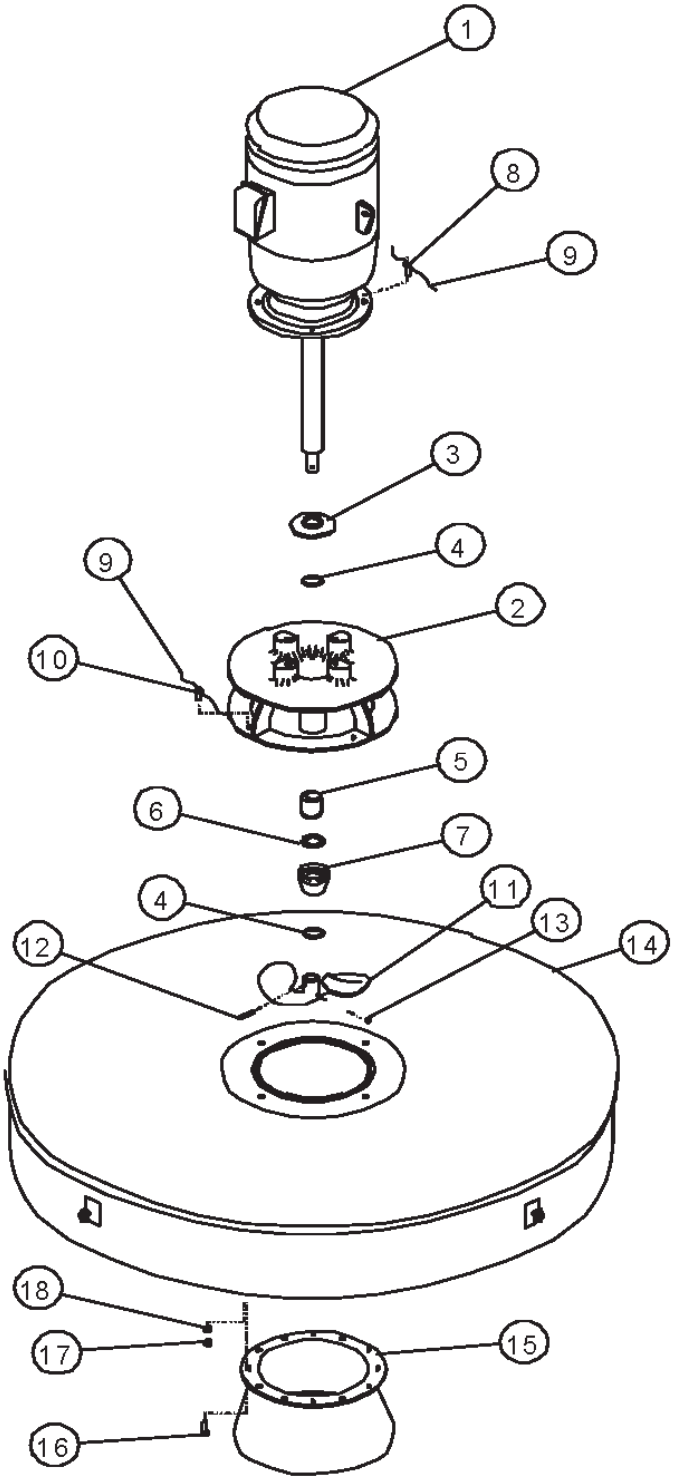
Parts List

AQUA-AEROBIC SYSTEMS, INC.
Aqua-Jet® Direct-drive Aerator Assembly

ITEM	QTY	DESCRIPTION
		POWER SECTION ASSEMBLY
1	1	Motor, TEFC, with one piece shaft
2	1	Diffusion Head
3	1	Labyrinth Seal Guard
4	2	Hose Clamp
5	1	Anti-Deflection Insert
6	1	Thrust Washer
7	1	Fluid Deflector
8	4	Motor Bolt, with drilled head
9	8 ft	Safety Wire
10	4	Diffusion Head Bolt, with drilled head
11	1	Propeller
12	1	Propeller Pin
13	2	Set Screw
		UNIT ASSEMBLY
14	1	Float Assembly
15	1 *	Intake Cone/Anti-Vortex Cross Assembly
16	12	* Intake Cone Bolt
17	12	* Intake Cone Nut
18	12	* Intake Cone Jam Nut

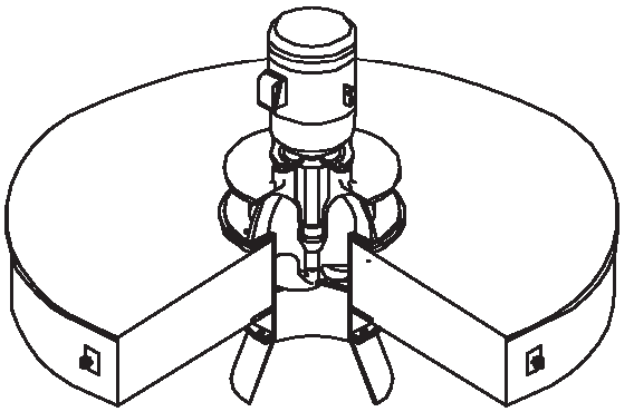
*NOTES: These items apply only to Fiberglass Float Assembly units 30 HP (22KW) through 75 HP (56KW). 1 HP (0.7KW) through 25 HP (18.5KW) FRP units has their Intake Cones welded to the FRP Float Assembly, and units 1 HP (0.7KW) through 15 HP (11KW) do not have Anti-Vortex Crosses.

These items also apply to the Stainless Steel Float Assembly units 30 HP (22KW) through 150 HP (112KW). 1 HP (0.7KW) through 25 HP (18.5KW) SS units have their Intake Cones welded to the SS Float Assembly, and units 1 HP (0.7KW) through 15 HP (11KW) do not have Anti-Vortex Crosses.



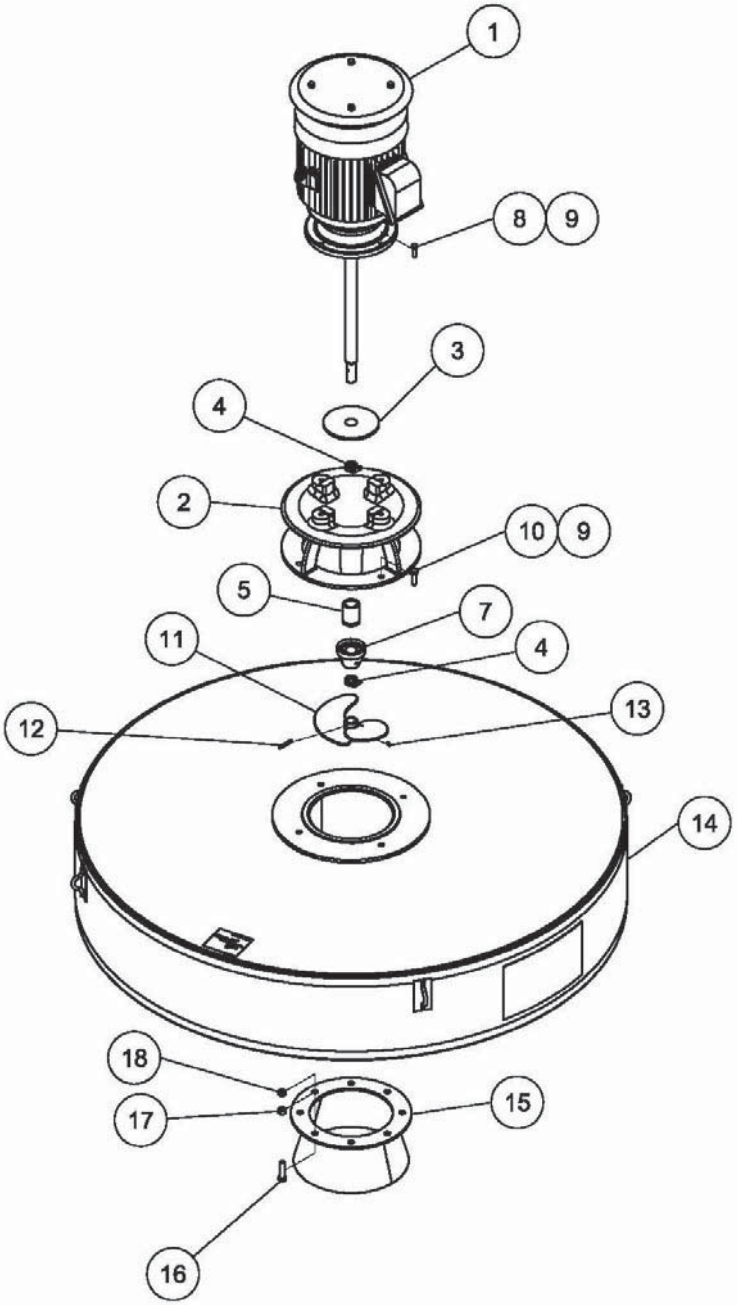
FSS

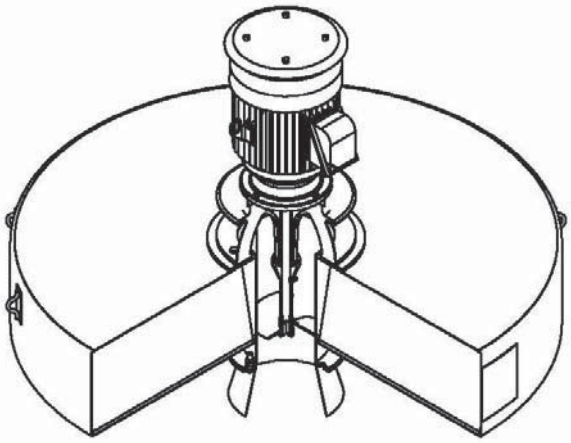
1 HP (0.7KW) THRU
75 HP (56KW)



SS

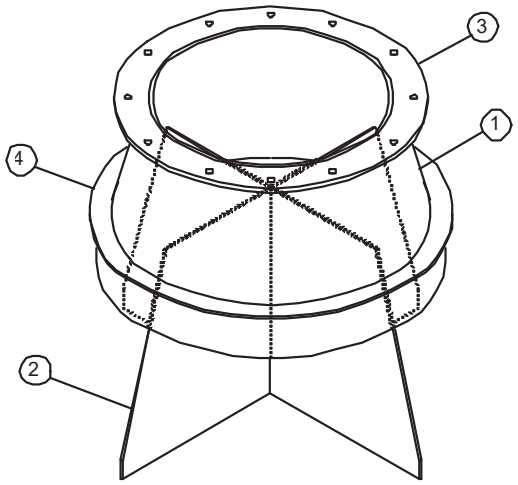
1 HP (0.7KW) THRU
150 HP (112 KW)





INTAKE CONE / ANTI-VORTEX CROSS ASSEMBLY, 1 HP (0.7KW) - 50 HP (37 KW) UNITS

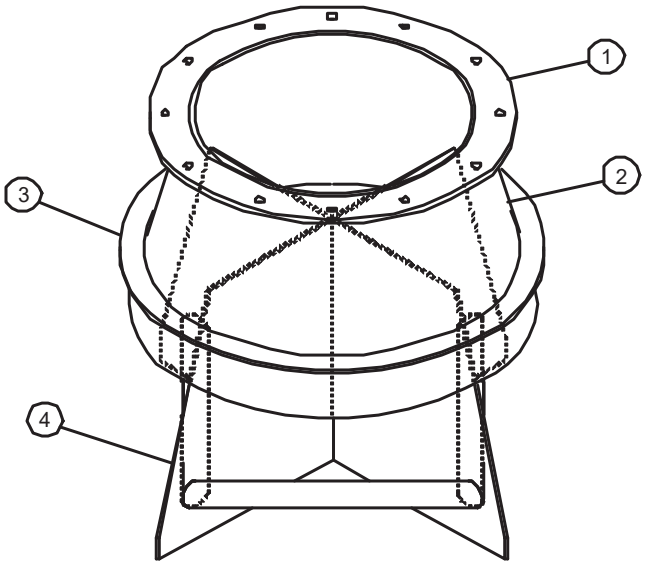
ITEM	DESCRIPTION
1	Intake Cone
2	Anti-Vortex Cross
3	Intake Cone/Volute Flange
4	Stiffener Ring



Note: Aerators 1 HP (0.7KW) - 25 HP (18.5KW) units with Fiberglass Float Assemblies come with their Intake Cones welded to the FRP float assembly, and units 1 HP (0.7KW) - 15 HP (11KW) come without Anti-Vortex Crosses. Item number 2 is standard on 20 HP (15 KW) -50 HP (37 KW) units only, and are welded to the intake cone. Item numbers 3 & 4 are standard on 30 HP (22 KW) - 50 HP (37 KW) units only are provided with a mounting flange as detailed for field assembly.

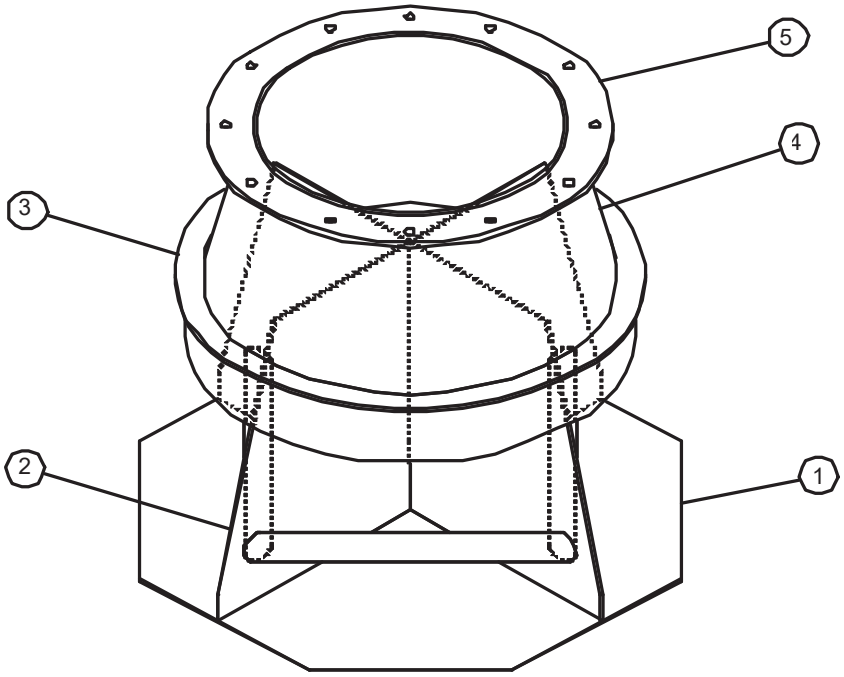
INTAKE CONE / ANTI-VORTEX CROSS ASSEMBLY FOR 60 HP (45 KW) -75 HP (56 KW) FRP UNITS and 60 hp (45 KW) - 150 HP (112KW) STAINLESS STEEL UNITS

ITEM	DESCRIPTION
1	Intake Cone/Volute Flange
2	Intake Cone
3	Stiffener Ring
4	Anti-Vortex Cross with Brace



OPTIONAL

ANTI-EROSION PLATE WITH INTAKE CONE AND ANTI-VORTEX CROSS



ITEM	DESCRIPTION
1	Anti-Erosion Plate
2	Anti-Vortex Cross
3	Stiffener Ring, [30 HP (22KW) -150 HP (112KW) only]
4	Intake Cone
5	Intake Cone/Volute Flange, [30 HP (22KW) – 150 HP 112KW) only]

Aqua-Jet® Surface Mechanical Aerator
Troubleshooting Guide

⚠ CAUTION

The Aqua-Jet® Aerator motor contains devices for high voltage equipment. All electrical service should be performed by an experienced and certified electrician. Before proceeding with any repair work, all power must be removed from the equipment under repair and tagged or locked out.

PROBLEM	POSSIBLE CAUSE	SUGGESTED PROCEDURE
Unit fails to start.	1. Faulty wiring at motor junction box or loose connections. 2. Faulty wiring at control panel or loose connections. 3. Improper fuses or heaters.	1. Check wiring diagram on motor nameplate against connection in junction box and connectors. 2. Check wiring in control panel. 3. Check fuses and heater for proper sizes.
Motor starts but appears to have reduced or no spray pattern affect.	1. Wired incorrectly, either at panel or most likely at motor. 2. Wrong direction of rotation. 3. Something affecting propeller, such as debris; or possibly inlet or outlet obstructions.	1. Check wiring at motor and panel. 2. Reverse any two of the three phases—not ground. 3. Check unit physically and remove any debris. KEEP BASIN CLEAN AND FREE FROM DEBRIS.
Motor heater trips out.	1. Faulty wiring. 2. Wrong heaters in starter. 3. Debris affecting propeller. 4. Overheated control panel. 5. Bearing going bad.	1. Check all wiring for shorts and loose connections. 2. Check for proper sizing. 3. Proceed as in above section. 4. Apply ambient compensating heaters and ventilate panels. Protect panel from direct sunlight in non-ventilated area. 5. Check motor bearings
Unit not floating level.	1. Uneven tension on mooring cables. 2. Unnecessary pull on power cable.	1. Adjust mooring cables so that all cables are evenly tensioned. 2. Reduce pull by adjusting cable location as required. Install cable floats to relieve excess pull due to weight of cable.
Unit moving around in its location.	1. Mooring line too loose.	1. Adjust mooring lines to proper tension (just snug—not taut).