SUBMERSIBLE MIXERS

DIRECT DRIVE

GEAR REDUCED

HYDRAULIC VARIABLE SPEED

AIR-O-LATOR®
Inter-Mix Direct Drive

![Image of a motor with dimensions A and B labeled]

### Dimensional Data

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<tr>
<th>MODEL</th>
<th>HP</th>
<th>FRAME</th>
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Inter-Mix Direct Drive-Horizontal Mixer Specifications

1. GENERAL
   1.1 The following specifications direct attention to certain required
       features of the design package, but do not purport to cover all
       details entering into the design, construction, and/or installation
       of the equipment.
   1.2 Furnish _______ horizontal mixers. Each mixer shall consist of
       a motor, a direct drive propeller driven at a constant speed, and a
       support structure.

2. PERFORMANCE
   2.1 Each mixer shall be capable of a direct pumping rate
       of ______ gpm.

3. SUBMERSIBLE MOTOR ASSEMBLY
   3.1 The motor shall deliver ______ horsepower at ______ r/min and
       shall be wired for _____ volts, 60 cycle, _____ phase service.
   3.2 The motor shall be a special Reliance Electric Duty Master
       Submersible AC motor designed for installation in water or
       sewage and rated for chemical duty. The high efficiency motor
       shall be designed for continuous duty and shall be capable of
       sustaining ten (10) evenly spaced starts per hour.
   3.3 All electrical parts shall be housed in an air filled, corrosion
       resistant, cast iron, Class 25 frame. All mating frame fits shall
       have rubber joints with large overlap, as well as O-ring seals of
       nitrile rubber.
   3.4 The motor shall have special Class F insulated windings rated
       for continuous duty in 25°C liquids and shall be non-hygroscopic.
       The motor shall have a 1.15 service factor and three (3) thermal
       switches in the end turns of the motor windings.
   3.5 The internal components of the motor shall be protected by heavy
       duty tandem mechanical seals Type 21. The inboard seal
       shall be of _______. The outboard seal shall be of
       _______________ for superior abrasive resistance and
       wear. Any motor using shaft lip seals or a combination of lip seal
       and mechanical seals shall not be considered equal.
   3.6 There shall be a fairwater shield to protect the outboard seal from
       fouling with stringy or filamentous objects. Mixers without this
       device will not be considered equal.
   3.7 The cable leads shall have strain relief internal to the entry
       consisting of a strain equalization plate and Buna-N grommets.
       The cable leads shall be butt spliced and epoxy sealed to prevent
       intrusion of any liquid from a damaged cable into the motor.
       Terminal boards shall not be considered equal to the leakproof
       threaded enclosure impregnated conductor epoxy seal system
       specified.
   3.8 The motor shaft shall be continuous from bottom bearing to the
       mixer’s propeller and manufactured from 18-8 stainless steel. The
       motor shaft shall be machined to a tolerance of plus or minus
       .002 T. I. R. from lower bearing to the upper end of the motor.
       The motor shaft shall be supported by two (2) single row double
       shielded anti-friction prelubricated bearings, rated for 80,000 life
       of 100,000 hours.
   3.9 All external hardware, including the motor name plate, shall be
       made of 304 stainless steel.

4. PROPELLER
   4.1 The propeller shall be a precision casting of stainless steel and
       shall be specifically designed for the application intended.
   4.2 The propeller shall run in an open bollard condition to resist
       fouling and plugging.
   4.3 The propeller shall be streamlined to prevent cavitation and
       reduce drag and shall have trailback blades to assure weedless,
       anti-fouling operation.
   4.4 The propeller shall be hydraulically balanced to assure
       equalization of load under full operation.
   4.5 The propeller shall be dynamically balanced to within 5 gram
       centimeters.

5. MOTOR MOUNT SUPPORT
   5.1 The motor mount support shall be constructed of 304 stainless
       steel.
   5.2 Motor mounting fasteners shall be type 316 stainless steel.
   5.3 Motor mounting support shall be designed in such a way as to
       furnish maximum rigidity and stability with minimum flow
       interference.

6. SUPPORT STRUCTURE
   6.1 The support and lifting structure shall be ____________
       incorporating a vertical member (guide) to facilitate vertical
       adjustment and removal of the mixer.
   6.2 The support structure shall be capable of being adjusted in a
       radial horizontal plane of 160°.

7. VIBRATION
   7.1 The propeller and motor rotor unit shall be dynamically balanced
       to a vibration level not to exceed .70 mils while hydraulically
       submerged.

8. ELECTRICAL SERVICE CABLE
   8.1 Each unit shall be furnished with _____ feet of MSHA
       approved ______ four conductor, non-wicking, round electrical
       cable, type SEOW or neoprene, depending upon water quality.
   8.2 The cable shall be four conductor cable with non-wicking fillers
       separating the individually wrapped and colored conductors.

9. HARDWARE
   9.1 The exposed nuts and bolts shall be type 18-8 stainless steel.

10. PAINT
   10.1 All mixer surfaces, other than stainless steel, will be coated with
       two (2) coats Temec Series 66 systems for 6 mils thickness.

11. QUALITY
   11.1 All mixers will be tested and verified for electrical and mechanical
       integrity.
   11.2 A statement by the mixer manufacturer attesting to the test results
       shall be furnished to the owner at his request.

12. OPERATION & MAINTENANCE MANUALS.
   12.1 Operations and maintenance manuals shall be furnished to the
       owner on a timely basis before start-up of the equipment.
Inter-Mix
Gear Reduced

DIMENSIONAL DATA

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<th>MODEL</th>
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PERFORMANCE DATA

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1. GENERAL
1.1 The following specifications direct attention to certain required features of the design package, but do not purport to cover all details entering into the design, construction and/or installation of the equipment.

1.2 Furnish _____ units. Each unit shall consist of a motor, gear reducer, propeller and appropriate mounting device.

2. PERFORMANCE
2.1 Each mixer shall be capable of high mixing rates at a minimum rate of _____ gallons per minute.

2.2 The mixer shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 131 feet.

3. SUBMERSIBLE MOTOR
3.1 The motor shall be a special Reliance Electric Duty Master Submersible AC motor designed for Class 1, Group D, Division 1, Hazardous Location (as defined by the National Electrical Code). The motor shall be UL listed for Class 1, Group D, Division 1, explosion-proof, for installation in water or sewage. Motor not having a UL listing for explosion-proof, Class 1, Group D, Division 1, for water or sewage will not be considered equal. The high efficiency motor shall be designed for continuous duty and shall be capable of sustaining ten (10) evenly-spaced starts per hour.

3.2 The motor shall deliver ______ horsepower at _____ rpm and operation on 230/460 volt, 60 hertz, 3 phase service and shall be pre-wired for ______ volts.

3.3 All electrical parts shall be housed in an air-filled, corrosion resistant, cast iron, Class 25 frame. All mating frame fits shall have rubber joints with a large overlap, as well as O-ring seals of nitrile rubber.

3.4 The motor shall have special Class F insulated windings rated for continuous duty in 40°C liquids with a 1.15 service factor and three (3) thermal switches in the end turns of the motor windings.

3.5 The internal components of the motor shall be protected by heavy duty tandem mechanical seals Type 21 of, for superior abrasive resistance and wear. The double seal design shall provide protection for the electrical parts by virtue of one seal set inbound and one seal set outboard the oil chamber. The motor shall have two (2) moisture sensing probes to detect any influx of conductive liquid past the outer seal and to provide ample warning of outer seal failure. Any motor using shaft lip seals or a combination of lip seal and mechanical seals shall not be considered equal.

3.6 The cable leads shall have strain relief internal to the entry consisting of a strain equalization plate and Buna-N grommets. The cable leads shall be butt spliced and epoxy sealed to prevent intrusion of any liquid from a damaged cable into the motor. Terminal boards shall not be considered equal to the backproof threaded enclosure impregnated conductor epoxy sealing system specified.

3.7 The motor shaft shall be continuous from lower motor bearing to upper motor bearing and manufactured from 18-8 stainless steel. The motor shaft shall be machined to a tolerance of plus or minus .002 T. I. R. from lower bearing to the upper end of the motor shaft. The motor shaft diameter shall measure ______ (in.). The motor shaft shall be supported by two (2) single row double shielded anti-friction prelubricated bearings, rated for 8-10 life of 100,000 hours.

3.8 All external hardware, including the motor name plate, shall be made of 304 stainless steel.

4. SUBMERSIBLE GEAR REDUCER
4.1 The gear reducer shall be housed in corrosive resistant Class 30 cast iron.

4.2 The output speed shall be _____ rpm.

4.3 The output shaft shall be 18-8 stainless steel.

4.4 The output shaft shall be supported by two (2) heavy duty, single row bearings, rated for 100,000 hours.

4.5 The gear reducer shall be protected from liquid intrusion by a special heavy duty Type 21 mechanical seal of converted silicon carbide. For superior corrosive resistance and wear, any combination of lip seal/mechanical seals shall not be considered equal.

4.6 The gear reducer shall be removable for routine maintenance without disturbing motor seals or draining and refilling motor oil reservoir. Oil level gauge, oil drain plug and fill plug shall be provided. Gear reducer oil reservoir shall hold not less than _______ quarts of 90W gear lube.

4.7 All external hardware shall be 304 stainless steel.

5. PROPELLER
5.1 The propeller shall be of Class 25 cast iron, dynamically balanced, three vane, non-clogging, backward curved design. The propeller shall be designed to handle solids and fibrous materials normally found in sludges.

5.2 The propeller shall be _____ inches in diameter (nominal).

5.3 Primary pumping rate is _____ gpm.

6. POWER CABLE
6.1 The unit shall be provided with ______ feet of SOW, Type A power cable, 4 conductor, and a 5 conductor control cable, UL listed for underwater use.

7. HARDWARE
7.1 The exposed nuts and bolts shall be type 304 stainless steel.

8. MOTOR MOUNT FRAME
8.1 The motor mount frame and propeller shroud shall be 3/16", type 304 stainless steel.

8.2 The motor bracket shall be provided with LPE lining affording a non-sparking contact between bracket and prop.

8.3 The motor/gear reducer shall be foot-mounted to the frame with four (4) bolts within a secondary support.

8.4 The support structure shall be capable of not only vertical adjustment, but also shall be capable of being adjusted in a radial horizontal plane of 160°.

9. PAINT-MIXER
9.1 All mixer surfaces, other than stainless steel, will be coated with two (2) coats Tnemec Series 66 system for 6 mils thickness.

10. MIXER MOUNTING
10.1 The mixer mast shall be ______

11. QUALITY
11.1 All mixers will be tested and verified for electrical and mechanical integrity.

11.2 A statement by the mixer manufacturer attesting to the test results shall be furnished to the owner at his request.

12. OPERATION & MAINTENANCE MANUALS
12.1 Operations and maintenance manuals shall be furnished to the owner on a timely basis before start-up of the equipment.
Hydra-Mix
Variable Speed
Hydraulic Mixer

PERFORMANCE DATA

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NOTE: Other horsepower and propeller speed combinations can be furnished. Consult factory.
Hydraulic Horizontal Mixer Specifications

1. GENERAL
   1.1 The following specifications direct attention to certain required features of the design package, but do not purport to cover all details entering into the design, construction and/or installation of the equipment.
   1.2 Furnish hydraulic horizontal mixers. Each mixer shall consist of a hydraulic motor, gear reducer, propeller and an appropriate mounting device. Furnish hydraulic power unit(s) to power hydraulic motor(s) at variable speeds.

2. PERFORMANCE
   2.1 At ______ horsepower per mixer unit, the mixing rate shall be a minimum of _______ gallons per minute.

3. MIXER DRIVE SYSTEM
   3.1 GENERAL
      A. Mixer drive system shall be capable of infinitely variable speed, in the range of zero to ______ rpm. No component in the system other than the electric motor shall have a service factor of less than 14.9.
   3.2 HYDRAULIC POWER UNIT
      3.2.1 ELECTRIC MOTOR
         A. GENERAL
            1. Motors are designed for continuous duty for 3 phase, 60 Hz, 230/460 volt operation, NEMA design B.
            2. Motor to be furnished with Class F insulation, 1.15 service factor, but shall be selected for operation within their full load rating without applying the service factor.

4. MECHANICAL
   4.1 Each pump shall be provided with a high security oil seal, and the motor and pump shall be of the same manufacturer.
   4.2 Motor lubrication system shall consist of a grease inlet on motor bracket with grease relief plug and grease reservoir in bracket and grease reservoir in cast iron cap.

5. ENCLOSURES
   5.1 Motor enclosure including frame with integrally cast feet, end brackets, bearings, inter-cooler, fan guard and conduit box and cover shall be cast iron, ASTM type A48, Class 25 or better.
   5.2 Corrosion resistant stainless steel nameplate shall be affixed to the motor frame with stainless steel or brass drives pins. Nameplate(s) shall include all required data on connection diagram(s) for dual voltage motors.

6. ELECTRICAL
   6.1 All motors shall successfully operate under power supply variations per NEMA MG1-14.30.
   6.2 Motor lubrication system shall be Class F minimum, utilizing materials and insulation system shall be in accordance with IEEE 117 classification test.
   6.3 Entire wound and insulated stator shall receive additional coating of epoxy on all surfaces to protect against moisture and corrosion.

7. NOISE
   7.1 The no-load sound pressure level, based on the A-weighted scale at three (3) feet when measured in accordance with IEEE std. 85 shall not exceed 85 decibels.

8. EFFICIENCY
   8.1 All motors shall be of an energy efficient design different from manufacturer's standard pump through the use of high efficiency materials, design and improved manufacturing processes that reduces motor losses approximately 40% from standard efficiency designs.
   8.2 Motor efficiency shall be determined in accordance with NEMA standard MG1-12.53A and full load efficiency labeled on motor nameplate in accordance with NEMA standard MG1-12.53B.

9. HYDRAULIC PUMP
   9.2.2 HYDRAULIC PUMP
      A. The hydraulic pump will be enclosed in the hydraulic reservoir, which will be mounted rigidly and directly to the electric motor adapter through the reservoir top and secured to the reservoir top.
      B. The hydraulic pump will be of the high pressure, variable volume, vane type.
      C. The hydraulic pump will be direct pressure and flow compensated.
      D. The hydraulic pump will have a rated pressure, continuous, of 2,000 psi.

10. FLOW CONTROL
    10.2.3 FLOW CONTROL
        A. The flow control shall be pressure compensated, adjustable flow type.
        B. The flow control shall have a maximum pressure rating of 3,000 psi.

11. PRESSURE GAUGE
    11.2.4 PRESSURE GAUGE
        A. The pressure gauge will be of the glycerin-filled, bottom mounted type, with shut-off valve.
        B. The pressure gauge will read in PSI and BAR.

12. FILTER
    12.2.5 FILTER
        A. The filter will be of the return line type and will be tank mounted for ease of service.
        B. The filter will incorporate a filter/breather assembly on the top.
        C. The filter element medium will be pleated, resin-impregnated paper, placed around a steel center tube. End caps to be metal and firmly bonded to element pleats with cured adhesive. End gaskets to be rubber grommet style.

13. HYDRAULIC RESERVOIR
    13.2.6 HYDRAULIC RESERVOIR
        A. The hydraulic reservoir will be constructed of aluminum, not less than 10 gauge.
        B. The hydraulic reservoir will incorporate a filter/breather assembly on the top. Fluid level temperature gauge is located on the front side of the reservoir.
        C. The hydraulic reservoir will incorporate a hinged top, which will be gasketed. The hinged top design will provide easy access to all hydraulic components. A drain plug will be located at or near the bottom of the reservoir.

14. QUICK DISCONNECT COUPLINGS
    14.2.7 QUICK DISCONNECT COUPLINGS
        A. The quick disconnect coupling will be poppet type withball-type locking mechanism.
        B. The O-ring seal on the poppet will permit zero leakage of the uncoupled half.

15. HYDRAULIC MOTOR
    15.4.1 HYDRAULIC MOTOR
        A. The hydraulic motor shall be of the fixed displacement type.
        B. The hydraulic motor shall be capable of withstand and thrust loads either into or out of the motor of not less than 1,000 pounds.
        C. The hydraulic motor shall be rated for a 4:10 life of not less than 100,000 hours.
        D. The hydraulic motor shall be connected to the hydraulic power unit by suitable flexible and rigid hydraulic hose of not less than 2,750 psi, continuous duty hose/pipes.

16. SUBMERSIBLE GEAR REDUCER
    16.5.1 SUBMERSIBLE GEAR REDUCER
        A. The gear reducer shall be housed in corrosion resistant Cast 30 cast iron.
        B. The output shaft shall be 18-8 stainless steel.
        C. The output shaft shall be supported by two (2) heavy duty, single row bearings, rated for 100,000 hours.
        D. The gear reducer shall be protected from liquid intrusion by a special heavy duty Type 21 mechanical seal of carbon-silicon carbides. For superior corrosion resistance and wear, any combination of lip seal/mechanical seals shall not be considered equal.
        E. The gear reducer shall be of oil level gauge, oil drain plug and fill plug. Gear reducer oil reservoir shall hold not less than _______ quarts of 90W gear lube.
        F. All external hardware shall be 304 stainless steel.

17. MOTOR MOUNT FRAME
    17.6.1 MOTOR MOUNT FRAME
        A. The motor mount frame and propeller shroud shall be 3/16", type 304 stainless steel.
        B. The motor mount frame shall be provided with ________ liner, offering a non-sparking contact between frame and mast.

18. PROPELLER
    18.7.1 PROPELLER
        A. The propeller shall be of one piece cast ________ hydrostatically and dynamically balanced, three vane, non-clogging backward curve design. The high thrust propeller shall be capable of handling solids and fibrous materials.
        B. Propeller blades shall be ________ diameter.

19. HARDWARE
    19.8.1 HARDWARE
        A. The exposed nuts and bolts shall be type 304 stainless steel.
        B. Bolts and nuts shall be American Standard. No metric tools shall be required or acceptable.

20. MIXER SUPPORT SYSTEM
    20.9.1 MIXER SUPPORT SYSTEM
        A. The support system shall consist of a mast, base plate, upper support and winch.
        B. The support system shall be used for mounting the mixer(s) during operation and as a guide for mixer installation and removal.

21. MAST
    21.9.2 MAST
        A. The upper support shall provide the most support at the backwall.
        B. The support shall be made of ________ tube.

22. BASE PLATE
    22.9.4 BASE PLATE
        A. The base plate shall be bolted to the basin floor.
        B. The plate shall be ________ thick, ________ steel plate.

23. WINCH
    23.9.5 WINCH
        A. A manual winch shall be provided to raise and lower the mixer(s).
        B. The winch shall have a rate capacity of ________ lbs.
Typical Mounting Arrangements

Bridge Mounting
Tank Wall Mounting
Suspension Side Mounting

**MIXING CALCULATIONS**

**STORM WATER RETENTION**
- Circular: 400 to 600 gpm pumpage/1000 cu. ft.
- Rectangular: 600 to 900 gpm pumpage/1000 cu. ft.

**SLUDGE STORAGE**
- Circular: 900 to 1200 gpm pumpage/1000 cu. ft.
- Rectangular: 1200 to 1500 gpm pumpage/1000 cu. ft.

**OXIDATION DITCH**
To maintain 1 Fps or greater, calculation is based on physical dimensions of ditch and expected mixed liquor characteristics. Contact factory for thrust requirements and assistance.

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**Aquarian Quantum**

Quantum Floating Aerator
S through 2.5 hp

**Aquarian Commercial**

Aquarian Commercial Aerator
available in 2 and 3-hp with removable power cord polyethylene flotation

**Font’N Aire**


**Aquarian Residential**

Aquarian Residential units, available in 1/2 and 1 hp

**Font’N Aire Platinum Floating**

Decorative Fountain improves water quality with aesthetics