

DIVISION 46 – WATER AND WASTEWATER EQUIPMENT
SECTION 46 51 13 – IN-TANK POTABLE WATER MECHANICAL AERATOR

Insert Project Name and Location here

Part 1 GENERAL

1. SUMMARY

A. Section includes furnishing and the installation of the following equipment:

1. Floating mechanical aerators of the vertical pump agitator style.

2. REFERENCES

A. Reference Standards:

1. Occupational Safety and Health Administration, OSHA.
2. NSF / ANSI Standard 61 and 372.
3. Underwriters Laboratories Inc., UL 508.
4. AWWA C652-11, Disinfection of Water Storage Facilities.
5. ETL – Edison Testing Laboratories (Intertek).
6. CSA – Canadian Standards Association.
7. NEC – National Electric Code.
8. NEMA – National Electrical Manufacturer’s Association.

3. SUBMITTALS

A. Shop Drawings and Product Data: Submit detailed specifications, drawings, aeration capacity rating, test results, and data covering all materials, parts, devices, and equipment. Unit anchorage details and other accessories forming part of the equipment for the complete operational system by others. Mark each submittal to show which products and options are applicable to the project.

B. Include the following information, as applicable:

1. Manufacturer catalog cut sheets.
2. NSF Certification listings for all wetted parts of the aerator, mount, and power cable placed inside of the tank.
3. Aerator oxygen transfer performance data for the aerators.

IN-TANK POTABLE WATER MECHANICAL AERATOR

Master Specification

Revision Date 12/21/2020

Revised by: JVerdouw

Approved by: TTackman

4. Installation, start-up, operation, and maintenance manuals/instructions from the equipment manufacturer.
 5. Availability and delivery time information.
- C. Manufacturer's Instructions: Furnish manufacturer's printed instruction for delivery, handling, storage, assembly, installation, start-up, wiring diagrams, and factory-recommended maintenance schedule, as appropriate.
 - D. Operations and Maintenance Data: Submit data on all parts, devices, equipment, and other accessories furnished forming the complete operational system.

4. QUALITY ASSURANCE

- A. Regulatory Requirements:
 1. All Products that may come into contact with water intended for use in a public water system shall meet ANSI/NSF International Standard 61/ANSI 372 certified to conform with new lead content requirements for "lead-free" plumbing as defined by the US Safe Drinking Water Act.
- B. Equipment shall have no visual defects and shall have high quality welds, assembly.
- C. Qualified US Manufacturer: The equipment shall be manufactured in the continental United States.
- D. The equipment manufacturer must have at least 50 continuous years' experience in the design, application, and manufacture of mechanical agitation, mixing, and aerator assemblies of similar size and capacity. All material and equipment shall be new and of the highest quality.
- E. Manufacture must have a dedicated engineering team including design, mechanical, quality, and electrical qualifications.
- F. Manufacture must have documented quality requirements and procedures which include component sampling and testing, build instructions, Hi Pot and pressure decay testing, as well as bench rotation verification.
- G. Manufacturer must have a dedicated in-house service and repair department.
- H. Manufacturer must have dedicated customer service team.
- I. Aerators, complete with motor, power cable, anchoring lines, and optional control panel shall be furnished by the manufacturer to ensure compatibility and integrity of the individual components and provide the specified warranty for all components.
- J. In order to assure uniform quality, ease of maintenance, and minimal parts storage, it is the intent of these specifications that all floating mechanical aerator assemblies and accessories called for under this section shall be supplied by a single manufacturer or authorized sales representative. The authorized sales representative shall, in addition to the Contractor, assume the responsibility for proper installation and functioning of the equipment if contracted for the installation and maintenance of the equipment.

IN-TANK POTABLE WATER MECHANICAL AERATOR

Master Specification

Revision Date 12/21/2020

Revised by: JVerdouw

Approved by: TTackman

5. FACTORY TESTING

- A. Aerators shall be factory tested as a complete unit and documentation shall be provided demonstrating the oxygen transfer of at least 1.35 pounds oxygen per horsepower hour using American Society of Civil Engineers (ASCE) Measurements of Oxygen Transfer in Clean Water Standards.
- B. Each aerator shall be tested and pass a Hi Pot test, pressure decay test, and direction of rotation check prior to shipment.

6. THIRD PARTY TESTING

- A. Aerators shall be third party tested by an accredited testing facility such as ETL, ETL-C, CSA, or UL, as a complete package assembly. Individual component testing only is not allowed.
- B. Aerators shall be certified by NSF International to NSF61 and 372 standards.

7. DELIVERY, STORAGE, AND HANDLING

- A. Delivered materials shall be stockpiled and stored at locations approved by the Owner until required for installation. Materials shall be stored in accordance with manufacturer's instructions.
- B. Contractor shall inspect materials for loss or damage in transit immediately upon delivery. Contractor shall be responsible for the replacement of damaged materials. All damaged materials shall be removed from the Site.
- C. Delivery and start-up shall be supplied by a factory trained and authorized equipment distributor representative.

2. PRODUCTS

2.1.ACCEPTABLE MANUFACTURER

- A. Approved Manufacturers:
 - 1. Kasco Marine, Inc. of Prescott, Wisconsin (Contact factory at 715-262-4488).
 - 2. Or be a pre-approved equivalent by the Engineer. To offer equipment as a pre-approved equivalent, a written application from the alternative supplier shall be submitted to the Engineer a minimum of TEN (10) days prior to the scheduled bid opening. Provide a list of at least five (5) installations of the proposed equipment in a similar application for review by the Engineer. The list shall include the contact name and phone number for each installation. Alternates must meet or exceed the oxygen transfer.

2.2.PERFORMANCE

- A. The manufacturer guarantees that the floating mechanical aerator shall provide an oxygen transfer of at least 1.35 pounds oxygen per horsepower hour using American Society of Civil Engineers (ASCE) Measurements of Oxygen Transfer in Clean Water Standards.

IN-TANK POTABLE WATER MECHANICAL AERATOR

Master Specification

Revision Date 12/21/2020

Revised by: JVerdouw

Approved by: TTackman

- B. Floating aerator units shall be designed for the following operating, performance, and design requirements:

Quantity	Model Number	Horsepower	Voltage/ Phase/ Frequency	Power Cord Length	Control Panel	Amps
1 ea.	8400 AF	2.0	208-240/1.0/60	50/100/200	CS250	9.0
1 ea.	5.1 AF	5.0	208-240/1.0/60	50/100/200	CS250	18.0

2.3.GENERAL

- A. Each floating aerator unit shall be complete with a close-coupled, high-efficiency, submersible electric motor suitable for municipal primary wastewater pond mixing and potable water aeration applications.
- B. Provide each aerator complete with float, aerator, power cable and control panel. Mounting hardware to be provided by others.
- C. The power source for the aerator shall be 208/240VAC single phase grid power to allow the unit to operate continuously, (24 hours per day, 7 days per week, 365 days per year), where necessary.

2.4.CONSTRUCTION

- A. **Stainless Steel Construction.** Metallic parts of the aerator shall be constructed of Series 300 stainless steel.
- B. The non-metallic propeller shall be protected by an aerator cage or aerator ring. The manufacturer may provide a bottom screen as an option in non-potable water applications.
- C. The motor housing shall be 300 Series stainless steel and oil-filled food grade mineral oil. The motor top shall be sealed with a double O-ring and the shaft area shall be sealed with a two-piece, carbon-ceramic seal. All fasteners and metal components exposed to the pumped liquids shall be Series 300 stainless steel.
- D. The pump and motor shall be designed so that they will operate in a fully-submerged condition in the water. Each motor shall be capable of and rated for continuous operation duty without exceeding temperature rise limits for the motor insulation system.

IN-TANK POTABLE WATER MECHANICAL AERATOR

Master Specification

Revision Date 12/21/2020

Revised by: JVerdouw

Approved by: TTackman

- E. A thermal overload shall be attached to the motor winding and shall stop the motor if motor winding temperature reaches 140 degrees C (applies only to single phase motors). Thermal overload shall reset automatically when motor cools.
- F. Stainless steel motor top upgrade shall be offered and include a double O-ring seal and both internal and external, two-piece, carbon-ceramic mechanical seals.
- G. Fully assembled equipment shall fit through a standard hatch size of 60-inch x 60-inch or larger.
- H. The motor shall be constructed with bearings providing a L-10 life of >200,000 service hours.

2.5.FEATURES

- A. Each floating mechanical aerator system shall consist of the following components regardless of the power source selected:
 - 1. Aerator:
 - a. The floating mechanical aerator(s) shall push water vertically into the air to encourage mixing and aeration in the basin. The aerator units provided under this section shall be suitable for the following service conditions:
 - i. Maximum liquid temperature: 90 degrees F.
 - ii. Aerators shall operate in depths as shallow as:
 - a) 20-inches for 2Hp
 - b) 26-inches for 5Hp
 - b. Motors shall be 1750 RPM, single speed, oil cooled, Class B insulated, continuous duty rated, with built-in thermal overload protection.
 - c. Motors shall be custom built per manufacture's specifications for use as mechanical aerators.
 - d. Propellers shall be custom, non-metallic, and designed to maximize the unit's water moving performance and operate through considerable aquatic vegetation without increasing the amp draw.
 - e. Aerators shall be self-contained units that float on the surface and are moored with parallel anchoring lines or vertical supports.
 - f. Units shall be easily installed and maintained by one or two persons.
 - g. Provide power cords with flex sleeve cord protectors and mooring lines suitable for the intended application. (Mooring lines provided by others)
 - 2. Underwater Power Cable:

IN-TANK POTABLE WATER MECHANICAL AERATOR

Master Specification

Revision Date 12/21/2020

Revised by: JVerdouw

Approved by: TTackman

- a. The power cable shall be UL, CSA, and NEC approved underwater rated, 3 conductor cable with open wires for hard wiring.
 - b. The power cable shall be available in either 50, 100, or 200 feet cord lengths.
 - c. An underwater approved, potted, O-ring sealed quick disconnect shall be available on all cables with 12 gauge or larger cables approximately 30 inches from the motor housing. The quick disconnect shall be a UL and CSA recognized and IP68 rated connector.
3. CS-250 Control Panel:
- a. Each 240VAC control panel shall be built to the following specifications:
 - i. Each mixer shall be provided with a control panel capable of disconnecting power to the mixer.
 - ii. Panel shall include a pad-lockable enclosure door.
 - iii. NEMA 4X UL Type rated control panel with integral mounting tabs.
 - iv. UL 508A Listed industrial enclosed control panel.
 - v. Exterior mounted HOA switch, "RUNNING" indicator LED pilot light, and "FAULT" indicator LED pilot light all UL Type 4X rated.
 - vi. SCADA monitoring and control interface:
 - a) Motor current: 4-20ma current transducer output to SCADA system. Transducer shall be 24VDC loop powered by others.
 - b) SCADA start/stop: Auto mode, relay shall provide interface to existing SCADA system for remote start/stop function.
 - c) Auxiliary interlock: Shall be a local low tank level inhibit. If utilized, the terminal jumper shall be replaced with a dry contact relay closure.
 - d) Automatic low water level shut-off inhibit.
 - e) Dry contacts (to SCADA) for: H-O-A in Hand, H-O-A in Auto, Mixer Running, and Mixer Fault.
 - f) GFCI 6ma trip circuit breaker.
 - g) Upgradable to stainless steel enclosure by special order.

IN-TANK POTABLE WATER MECHANICAL AERATOR

Master Specification

Revision Date 12/21/2020

Revised by: JVerdouw

Approved by: TTackman

- vii. Power source required shall be supplied by others.

3. EXECUTION

3.1.EXAMINATION AND PREPARATION

- A. Contractor shall inspect all equipment immediately upon receipt.
- B. The equipment shall not be installed, if damaged, until repairs have been made in accordance with the manufacturer's written instructions.

3.2.INSTALLATION

- A. Contractor shall furnish the unit(s) and install per manufacturer's recommendations. Coordinate work with the Electrical Contractor for all wiring and controls work to make a complete and operational system. Installation and start-up of all equipment shall be per the manufacturer's recommendations. Contractor shall:
 - 1. Ensure proper machine spatial placement in the reservoir.
 - 2. Ensure proper intake depth setting.
 - 3. Aeration system shall be installed complete with all necessary connections.
 - 4. Disinfect all wetted components prior to installing unit in water storage tank in accordance with AWWA C652-11 standards. Standard recommends spraying with a 200ppm NSF60 approved chlorine solution.
- B. Coordinate locations of each aerator with Owner and Engineer prior to installation.
- C. The aeration system shall be installed in accordance with manufacturer's procedures, unless otherwise approved in writing from the manufacturer.
- D. Systems shall be installed complete with all necessary floats, cords, mooring cables, and anchors for the intended application. Mooring cables and anchors supplied by others.
- E. Contractor shall be responsible for providing and installing a complete and functional system.

3.3.FIELD SERVICE

- A. Manufacturer's authorized representative shall check and inspect the aerator unit(s) after installation, place the aerator unit(s) in operation, and make necessary adjustments including low water inhibit feature in control panel.
- B. Manufacturer's authorized representative shall instruct designated Owner personnel in the safe and proper operation of the aerator system. This training shall reference the operations manual provided and demonstrate proper function of the equipment.

3.4.SPARE PARTS

- A. Contractor shall provide spare parts as recommended or supplied with this aerator assembly by the equipment manufacturer.

IN-TANK POTABLE WATER MECHANICAL AERATOR

Master Specification

Revision Date 12/21/2020

Revised by: JVerdouw

Approved by: TTackman

3.5.WARRANTY REQUIREMENTS

- A. Warranty: A written manufacturer's warranty shall be provided for the equipment specified in this Section. The Product shall be warranted to be substantially free from defects in material and workmanship for three (3) years from the date of delivery of all aerating equipment. This equipment warranty shall be directly from the manufacturer of the equipment to the Owner. Such warranty shall cover all defects or failures of materials or workmanship that occur as the result of normal operation and service. Optional Extended warranties up to 5 total years shall be available on 2HP and 5HP units.

END OF SECTION