**DIVISION 46 – WATER AND WASTEWATER SECONDARY TREATMENT EQUIPMENT**

**SECTION 51 – FLEXIBLE MEMBRANE TUBE DIFFUSERS**

1. GENERAL
   1. Summary
      1. Section includes furnishing and the installation of the following equipment:
         1. Diffused aeration equipment.
   2. REFERENCES
      1. Reference Standards:

1. ETL – Edison Testing Laboratories (Intertek).

2. UL – Underwriters Laboratory.

3. CSA – Canadian Standards Association.

4. NEC – National Electrical Code.

5. NEMA – National Electrical Manufacturer’s Association.

* 1. SUBMITTALS
     1. Shop Drawings and Product Data: Submit detailed specifications, drawings, unit anchorage details, thrust results, and data covering all materials, parts, devices, equipment, and other accessories forming part of the equipment for the complete operational system. Mark each submittal to show which products and options are applicable to the project.
     2. Include the following information, as applicable:
        1. Manufacturer catalog cut sheets.
        2. Installation, start-up, operation, and maintenance manuals/instructions from the equipment manufacturer.
        3. Notation of coordination requirements.
        4. Availability and delivery time information.
     3. 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.
     4. Operations and Maintenance Data: Submit data on all parts, devices, equipment, and other accessories furnished forming the complete operational system.
  2. quality assurance
     1. 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.

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* + 1. Manufacture must have a dedicated engineering team including design, mechanical, quality, and electrical qualifications.
    2. Manufacturer must have documented quality requirements and procedures which include component sampling and testing and build instructions.
    3. Manufacturer must have dedicated service and repair department in house.
    4. Manufacturer must have dedicated customer service team with at least 4 employees.
    5. Diffuser systems, complete with compressor, cabinet or mount, diffuser heads, and self-weighted tubing shall be furnished by the diffuser manufacturer to ensure compatibility and integrity of the individual components and provide the specified warranty for all components.
    6. In order to assure uniform quality, ease of maintenance, and minimal parts storage, it is the intent of these specifications that all diffuser 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 aerators.
  1. factory testing

A. Each diffused aeration system is tested for:

1. Proper function of compressor

2. Proper orientation and function of cooling fans

3. Proper function of pressure relief valve

4. Proper function of cabinet lock.

1.06 THIRD PARTY TESTING

1. Diffuser heads shall be independently tested at an accredited testing facility to move no less than 927 GPM with 1.5 CFM of air being delivered to the diffuser head in 6.5’ of water.

1.07 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.

* + 1. Contractor shall inspect materials upon delivery for loss or damage in transit. 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.

1. Products
   1. acceptable Manufacturer
      1. 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.

2.02 PERFORMANCE

1. Diffuser units shall be designed for the following operating, performance, and design requirements:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Quantity | Model Number | Compressor Horsepower | Voltage/  Phase/  Frequency | # of Diffuser Heads | Amount of 3/8” Tubing | Amount of 5/8” Tubing | Cabinet Option |
|  |  |  |  |  |  |  |  |

2.03 GENERAL

A. Each diffuser system shall be complete with a rocking piston, oil-less compressor, enclosed cabinet or mounting bracket, diffuser heads, and self-weighted tubing.

1. Provide each diffuser system complete with all accessories and appurtenances, as required, for a complete operational system.

C. The power source for the diffuser system shall be 120VAC or 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.

2.04 FEATURES

Each diffuser system shall consist of the following components regardless of the power source selected:

A. Compressor(s):

1. Compressors shall be available in ¼, ½, and ¾ HP sizes, 120Vac or 208-240Vac.

2. Compressors shall be rocking piston style, oil-less and continuous duty rated.

3. Compressors shall include intake air filter assembly, 40 PSI pressure relief valve, and ramped reed valve.

4. Compressor shall be serviceable.

5. Compressor shall be able to operate in up to 50’ of water depth.

B. No Cabinet Mount (Optional):

1. Shall consist of galvanized steel mounting to attach to compressor feet with steel hardware.

2. Shall have 16” on center mounting positions.

3. Shall include a 110 CFM, 120V or 208-240V cooling fan.

4. Shall allow attachment of ¼, ½, or ¾ HP compressors.

5. Shall include a Patent Pending noise cancelling design to dramatically reduce compressor sound.

6. Shall include an inlet air filter visual maintenance indicator.

C. Post Mount Cabinet (Optional):

1. Shall be coated aluminum construction with integral mounting openings to attach to a 4”x4” post or exterior wall.

2. Shall be weather resistant, lockable, and include sound dampening foam.

3. Shall have a hinged top and front cover to open out and down for easy access to internal parts.

4. Shall include a 110 CFM cooling fan with guard.

5. Shall accommodate one ¼ or one ½ HP compressor.

6. Shall be available in 120Vac or 208-240Vac options.

7. Shall include a Patent Pending noise cancelling design to dramatically reduce compressor sound.

8. Shall include an inlet air filter visual maintenance indicator.

D. Large Cabinet (Optional):

1. Shall be coated aluminum construction with mounting feet to set on customer supplied base or pad.

2. Shall be weather resistant, lockable, and include sound dampening foam.

3. Shall have a hinged top cover allowing for easy access to internal parts.

4. Shall include a 110 CFM cooling fan for each compressor.

5. Shall accommodate one or two of each of the following sizes of compressors; ¼, ½, or ¾ HP.

6. Shall be available in 120Vac or 208-240Vac options.

7. Shall include a Patent Pending noise cancelling design to dramatically reduce compressor sound.

8. Shall include an inlet air filter visual maintenance indicator.

E. Diffuser Head:

1. Shall be self-weighted, stainless steel construction with integral strain relief for weighted tubing and rope tie-offs.

2. Shall include molded plastic edge guards.

3. Shall be tumbled during manufacture to remove sharp edges.

4. Shall include two oval diffuser sections made from a proprietary linear low-density polyethylene and rubber hose material.

5. Diffuser material shall sit 6” above bottom of stainless steel substrate.

6. Shall include a polypropylene check valve with viton seals and Hastelloy spring.

F. Weighted Tubing:

1. Shall be self-weighted, PVC tubing available in 3/8” or 5/8” ID sizes.

2. Each size shall be available in 100’ or 500’ lengths.

3. 100’ rolls of either size shall include all fitting kits.

G. Remote Manifold (Optional):

1. Shall include plastic valve box to be installed at waters edge.

2. Shall include PVC fittings and manifold valves.

1. Execution
   1. EXAMINATION AND PREPARATION
      1. Contractor shall inspect all equipment immediately upon receipt.
      2. The equipment shall not be installed, if damaged, until repairs have been made in accordance with the manufacturer’s written instructions.
   2. INSTALLATION
      1. 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, start-up, and on-site water testing 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. Diffused aeration system shall be installed complete with all necessary connections.

* + 1. Coordinate locations of each diffuser with Owner and Engineer prior to installation.
    2. The diffuser system shall be installed in accordance with manufacturer’s procedures, including outlined “slow start procedure”, unless otherwise approved in writing from the manufacturer.
    3. Contractor shall be responsible for providing and installing a complete and functional system.

3.03 FIELD SERVICE

## A. Contractor (or a representative of the manufacturer) shall check and inspect the diffuser system(s) after installation, place the diffuser unit(s) in operation, and make necessary adjustments.

## B. The diffuser system manufacturer (or their representative) shall instruct designated Owner personnel in the safe and proper operation of the diffuser system. This training shall reference the operations manual provided and demonstrate proper function of the equipment.

3.04 SPARE PARTS

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

3.05 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: two (2) years for compressors, five (5) years for diffuser heads and cabinets, and ten (10) years for weighted tubing; from the date of delivery. 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.

END OF SECTION