SECTION 464363 - DISSOLVED AIR FLOTATION EQUIPMENT FOR WATER AND WASTEWATER TREATMENT

Note that this section has only been edited for NYSOGS standardization and has not been technically edited. The designer shall make all technical edits specific to the project for this section.

This Section includes dissolved air flotation (DAF) equipment and accessories for water treatment facilities.

DAF can accommodate many types of contaminants in waste streams, including oils, fuels, BOD, and suspended solids. The DAF process also may be considered for treating surface water for drinking or industrial use, as pretreatment of wastewater prior to bioreactor systems, or for thickening wastewater biosolids.

As specified in this Section, the DAF process typically starts with the saturation of a portion of the effluent discharge with air under higher than atmospheric pressure. When the supersaturated stream is released at atmospheric pressure, it mixes with all or part of the influent waste stream. The sudden pressure drop causes small bubbles to form and attach to the suspended contaminants in the waste stream, thereby increasing their buoyancy and floating them to the water surface where they can be skimmed from the water.

A common variation for oil removal systems includes recycle-flow pressure filtration (a pressurized part of the effluent stream is recycled to the air flotation tank) and coagulation/flocculation.

Piping, valves, and accessories are specified in appropriate SpecText Sections of Division 40 - Process Integration.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes:

Dissolved air flotation (DAF) equipment.

Settled solids removal system.

Floating solids removal system.

Air saturation system.

Recycle pump.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 262923 - Variable-Frequency Motor Controllers: Drive for surface float skimmer.

Section 460548 - Vibration and Seismic Controls for Water and Wastewater Equipment: Requirements for vibration and seismic control for equipment specified in this Section.

Section 460553 - Identification for Water and Wastewater Equipment: Nameplates for equipment specified in this Section.

* + - 1. DEFINITIONS

Limit list of definitions to terms unique to this Section and not provided elsewhere.

* + - * 1. FRP: Fiberglass-reinforced plastic.
        2. PVC: Polyvinyl chloride.
        3. UHMWPE: Ultra-high-molecular-weight polyethylene.
      1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

* + - * 1. ASTM International:

ASTM A36 - Standard Specification for Carbon Structural Steel.

ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

* + - * 1. National Electrical Manufacturers Association:

NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

* + - 1. PREINSTALLATION MEETINGS
         1. Convene minimum [**one week**] [**<\_\_\_\_\_\_\_\_> weeks**] prior to commencing Work of this Section.
      2. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        2. Manufacturer’s installation instructions shall be provided along with product data.
        3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
        4. Product Data: Submit manufacturer's Product Data for system materials and component equipment, including electrical characteristics.
        5. Shop Drawings:

Indicate system materials and component equipment.

Submit wiring and control diagrams, installation and anchoring requirements, fasteners, and other details.

* + - * 1. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate Paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
        2. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
        3. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        4. Manufacturer Reports:

Certify that equipment has been installed according to manufacturer instructions.

Indicate activities on Site, adverse findings, and recommendations.

* + - * 1. Qualifications Statement:

Coordinate following Subparagraph with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer.

* + - 1. CLOSEOUT SUBMITTALS
         1. Project Record Documents: Record actual locations of installed dissolved air flotation equipment and components.
      2. MAINTENANCE MATERIAL SUBMITTALS
         1. Spare Parts:

Furnish [**one set**] [**two sets**] of manufacturer's recommended spare parts.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Furnish [**two**] <**\_\_\_\_\_\_\_\_**> of <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Tools: Furnish special [**wrenches**] <**\_\_\_\_\_\_\_\_**> and other devices required for Director’s Representative to maintain and calibrate equipment.
      1. QUALITY ASSURANCE

Include this Article to specify compliance with overall reference standards affecting products and installation included in this Section.

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Perform Work according to <**\_\_\_\_\_\_\_\_**> standards.

Include following Paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain <**\_\_\_\_\_\_\_\_**> [**copy**] [**copies**] of each standard affecting the Work of this Section on Site.
      1. QUALIFICATIONS

Coordinate following Paragraph with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
      1. DELIVERY, STORAGE, AND HANDLING
         1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
         2. Store materials according to manufacturer instructions.
         3. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
         1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

* + - 1. WARRANTY

This Article extends warranty period beyond one year. Extended warranties may increase construction costs and Owner enforcement responsibilities. Specify warranties with caution.

* + - * 1. Furnish [**five**] [**10**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for dissolved air flotation equipment and accessories.

1. PRODUCTS
   * + 1. DISSOLVED AIR FLOTATION EQUIPMENT
          1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=11974&mf=04&src=wd):

DESIGNER TO PROVIDE TWO MANUFACTURER’S AND APPROVED EQUIVALENT FOR ALL LISTED PRODUCTS.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Subparagraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Performance and Design Criteria:

Maximum Raw Water Flow Rate: <**\_\_\_\_\_\_\_\_**> MGD.

Recycle Flow Rate: <**\_\_\_\_\_\_\_\_**> gpm

Hydraulic Loading Rate: [**20**] [**26**] <**\_\_\_\_\_\_\_\_**> ft./h

Solids Loading Rate: <**\_\_\_\_\_\_\_\_**> psf/h

Air-to-Solids Ratio: [**0.025**] <**\_\_\_\_\_\_\_\_**> lb. air/lb. solids

Recycle System Pressure: [**65**] <**\_\_\_\_\_\_\_\_**> psig

Influent Total Suspended Solids Concentration: <**\_\_\_\_\_\_\_\_**> mg/L.

Sludge Volume: <**\_\_\_\_\_\_\_\_**> gal.

Bottom Configuration: [**V-shaped hopper**] [**Flat**].

* + - * 1. Settled Solids Removal System:

An augur is typically provided in a hopper-bottom tank, whereas a chain and flight removal system is typically provided in a flat-bottom tank.

Auger:

Type: Screw.

Shafts: Stainless steel.

Screw Auger: Coated steel.

Drive Assembly: Gear motor.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Chain and Flight Scraper System:

Flights: FRP.

Chain Material: [**High-strength polymer**] [**Glass-reinforced nylon**] [**Welded steel**] [**Stainless steel**].

Sprockets: [**Molded polyurethane**] [**UHMWPE**].

Shafts: Full-width, cold-rolled solid steel.

Bearings: Split, self-aligning, [**polyethylene**] [**polyurethane**].

Drive assembly: Motor, flexible coupling, output shaft speed reducer.

* + - * 1. Floating Solids Removal System:

Skimmer:

Flights: [**Type 304 stainless steel**] <**\_\_\_\_\_\_\_\_**>.

Wiper Blades: [**Neoprene**] [**Buna-N**] <**\_\_\_\_\_\_\_\_**>.

Flight Chain, Sprockets, and Chain Guide: [**Carbon steel**] <**\_\_\_\_\_\_\_\_**>.

Wear Bars: [**UHMWPE**] <**\_\_\_\_\_\_\_\_**>.

Drive Guard: Occupational Safety and Health Administration (OSHA) approved.

Controls: <**\_\_\_\_\_\_\_\_**>.

Operation Sequences: <**\_\_\_\_\_\_\_\_**>.

Dewatering Beach:

Description: Steel plate extended full width of flotation tank.

Slope: 1:4.

High Point: Minimum 3 inches above normal water surface, to prevent liquid from entering collection trough when skimmer system is not operating.

Retention Baffle:

Description: Baffle extending below front edge of beach to provide quiescent zone for thickened floating solids.

Material: [**Stainless steel, 1/8 inch thick**] [**or**] [**FRP, 3/8 inch thick**].

In a typical design, floating solids are skimmed off to one end of DAF tank and clear effluent flows over effluent weir on opposite end of DAF tank.

Effluent Weir:

Description: Weir plate at effluent end of DAF tank.

Vertical Travel: [**Equal to rise of inclined portion of dewatering beach**] [**or**] [**minimum 6 inches**].

Material: [**Stainless steel**] [**or**] [**FRP**].

* + - * 1. Air Saturation System:

Description: Recycle pump, saturation tank, compressed air source, and inlet distribution system.

Recycle Pump:

Type: Centrifugal.

Material: [**Coated cast iron**] [**Stainless steel**] <**\_\_\_\_\_\_\_\_**>.

Maximum Operating Pressure: [**100**] <**\_\_\_\_\_\_\_\_**> psig .

Controls: [**ON-OFF switch in control panel**] <**\_\_\_\_\_\_\_\_**>.

Operation Sequences: <**\_\_\_\_\_\_\_\_**>.

Saturation Tank:

Material: Stainless steel.

Size: Suitable for efficient saturation of pressurized flow with air and separation of large bubbles.

Furnish safety relief valve set for [**100**] <**\_\_\_\_\_\_\_\_**> psig

Furnish pressure gage with [**zero-to-150**] <**\_\_\_\_\_\_\_\_**> to <**\_\_\_\_\_\_\_\_**> psi).

Compressed Air Source: [**120**] <**\_\_\_\_\_\_\_\_**> psig

The inlet distribution system introduces saturated recycle flow to influent. It facilitates mixing of influent and recycled pressurization water from air saturation vessel and distributes the mixed flow evenly across width of tank.

Inlet Distribution System:

Description: Fabricated stainless steel manifold for inlet mixing and distribution inside flotation tank.

Piping: [**PVC, Schedule 80**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Operation:

Electrical Characteristics:

[**<\_\_\_\_\_\_\_\_> hp**] [**<\_\_\_\_\_\_\_\_> RLA**].

Voltage: <**\_\_\_\_\_\_\_\_**> V, [**single**] [**three**] phase, 60 Hz.

Maximum [**Fuse Size**] [**Circuit Breaker Size**] [**Overcurrent Protection**]: <**\_\_\_\_\_\_\_\_**> A.

Minimum Circuit Ampacity: <**\_\_\_\_\_\_\_\_**>.

Minimum Power Factor: <**\_\_\_\_\_\_\_\_**> percent at rated load.

Control Panel:

Factory mounted.

NEMA 250 [**Type 4**] <**\_\_\_\_\_\_\_\_**>.

Single point power connection and grounding lug.

Disconnect Switch: Factory-mounted [**in control panel**] [**on equipment**].

* + - 1. MATERIALS
         1. Tanks and Components: [**Steel, ASTM A36**] [**Type 304 stainless steel**] [**Type 316 stainless steel**] <**\_\_\_\_\_\_\_\_**>.
         2. Effluent Chamber Weir Plate: [**Type 304 stainless steel**] <**\_\_\_\_\_\_\_\_**>.
         3. Internal Piping: [**Black steel, ASTM A53**] <**\_\_\_\_\_\_\_\_**>.
         4. Hardware:

Wetted: [**Type 316 stainless steel**] <**\_\_\_\_\_\_\_\_**>.

Non-wetted: [**Zinc-plated steel**] <**\_\_\_\_\_\_\_\_**>.

* + - 1. FINISHES
         1. Surface Preparation:
         2. Coatings:

Finish Color: [**Green**]<\_\_\_\_\_\_\_\_>.

* + - 1. ACCESSORIES
         1. Recycle Pump Accessories:

Air-metering valve.

Rotameter.

Discharge control valve and suction control valve.

Discharge and suction pressure gages.

* + - * 1. Connections:

[**Threaded, NPT**] [**Flanged**].

Inlet: <**\_\_\_\_\_\_\_\_**> inches

Outlet: <**\_\_\_\_\_\_\_\_**> inches

Settled Solids Outlet: <**\_\_\_\_\_\_\_\_**> inches

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Connections:

As indicated on Drawings.

* + - * 1. Lifting lugs.
      1. SOURCE QUALITY CONTROL
         1. Provide shop inspection and testing of completed assembly.

Include one or both of following Paragraphs to require Director's inspection or witnessing of test at factory.

* + - * 1. Director’s Inspection: Make completed DAF equipment available for inspection at manufacturer's factory prior to packaging for shipment. Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspection is allowed.
        2. Director’s Witnessing: Allow witnessing of factory inspections and test at manufacturer's test facility. Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspections and tests are scheduled.

Include following Paragraph if reliance on fabricator's approved quality-control program is sufficient for Project requirements.

* + - * 1. Certificate of Compliance: If fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.

Specified shop tests are not required for Work performed by approved fabricator.

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify that facilities are ready to receive DAF equipment.
       2. INSTALLATION
          1. Install DAF equipment according to manufacturer instructions.
          2. Weir Plates: Mount weir plates against double bead of sealant.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Installation Standards: Install Work according to <**\_\_\_\_\_\_\_\_**> standards.
      1. FIELD QUALITY CONTROL
         1. Dry Startup: Run equipment without liquid in basins and inspect for the following:

Alignment of sprockets, chain, flights, and wearing surfaces.

Binding and excessive heat buildup in drive units.

* + - * 1. Wet Startup: Run equipment with water or wastewater and verify proper operation.
        2. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than <**\_\_\_\_\_\_\_\_**> days on Site for installation, inspection, field testing, and instructing Director’s Representative in maintenance of equipment.
        3. Equipment Acceptance:

Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

Make final adjustments to equipment under direction of manufacturer's representative.

* + - * 1. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.
      1. ADJUSTING
         1. Check control functions and adjust as required.
      2. DEMONSTRATION
         1. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Director’s Representative.

END OF SECTION 464363