SECTION 464134 - VERTICAL TURBINE FLOCCULATION EQUIPMENT

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 vertical turbine flocculator for water treatment systems.

Vertical turbine flocculators produce either an axial flow pattern or a radial flow pattern, depending on the impeller. These flow regimes may lead to greater efficiency and reduced incidental settling. Typically, each impeller is driven separately, resulting in a greater variety of mixing speeds and directions.

Vertical reel flocculation equipment is specified in Section 464131, and horizontal reel flocculation equipment is specified in Section 464133.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes: Vertical turbine flocculators.
          2. 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 055000 - Metal Fabrications: Miscellaneous metalwork and fasteners as required by this Section.

Section 262923 - Variable-Frequency Motor Controllers: Three-phase variable-frequency motor controllers of pulse-width-modulated design, for variable-speed drives.

* + - 1. DEFINITIONS

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

* + - * 1. Floc: A tuft-like mass that forms in a liquid as a result of precipitation or the aggregation of suspended particles. Coagulation chemicals are generally added to the water being treated in order to enhance the development of floc.
        2. Flocculator: A slow-rotating mixer used to induce flocculation, the process to enhance agglomeration of smaller floc particles into larger, more easily settleable or filterable particles (floc).
      1. REFERENCE STANDARDS

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

* + - * 1. American Bearing Manufacturers Association:

ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

* + - * 1. National Electrical Manufacturers Association:

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

* + - * 1. National Sanitation Foundation:

NSF 61 - Drinking Water System Components - Health Effects.

NSF 372 - Drinking Water System Components - Lead Content.

* + - 1. COORDINATION
         1. Coordinate Work of this Section with construction of flocculation tank.
      2. PREINSTALLATION MEETINGS
         1. Convene minimum [**one week**] <**\_\_\_\_\_\_\_\_**> [**weeks**] prior to commencing Work of this Section.
      3. 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 and connection requirements.

* + - * 1. 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. Test and Evaluation Reports: Submit installation certificate from equipment manufacturer's representative, as described in PART 3.
        2. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
        3. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
        4. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        5. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.
        6. Qualifications Statements:

Coordinate following Subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and installer.

Submit manufacturer's approval of installer.

* + - 1. CLOSEOUT SUBMITTALS
         1. Project Record Documents: Record actual locations and final orientation of equipment and accessories.
         2. Operation and Maintenance Data: Submit maintenance instructions for equipment and accessories.
      2. MAINTENANCE MATERIAL SUBMITTALS
         1. Spare Parts:

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

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

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

* + - * 1. Materials in Contact with Potable Water: Certified to NSF 61 and NSF 372.

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 Paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
        2. Installer: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience [**and approved by manufacturer**].
      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.

Protect piping and equipment from entry of foreign materials by using temporary covers.

Provide additional protection according to manufacturer instructions.

* + - 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**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for flocculation equipment.

1. PRODUCTS
   * + 1. VERTICAL TURBINE FLOCCULATORS
          1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12089&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. Description: Motorized impeller with variable-speed drive and vertical shaft.

Drive: [**Gear reducer**] [**Direct**] <**\_\_\_\_\_\_\_\_**>.

Bearing life is percent failure at rated hours; for example, L-10 life at 100,000 hours means 10 percent of bearings may be expected to fail at 100,000 hours.

Bearings: Minimum L-10 life of [**100,000 hours**] <**\_\_\_\_\_\_\_\_**>, according to [**ABMA 9**] [**ABMA 11**].

Impeller Configuration:

Number of Blades: [**Two**] [**Three**] [**Four**] <**\_\_\_\_\_\_\_\_**>.

Flow Regime: [**Axial**] [**Radial**].

Flat.

Constant Attack Angle: <**\_\_\_\_\_\_\_\_**> degrees.

Variable Attack Angle: <**\_\_\_\_\_\_\_\_**> degrees.

Outer Diameter: <**\_\_\_\_\_\_\_\_**> inches

Length: <**\_\_\_\_\_\_\_\_**> inches

Rotational Speed: Variable from [**5**] <**\_\_\_\_\_\_\_\_**> to [**20**] <**\_\_\_\_\_\_\_\_**> rpm.

Impeller Installed Depth: [**2/3**] <**\_\_\_\_\_\_\_\_\_**> of water depth.

* + - * 1. Performance and Design Criteria:

Maximum G-Value Range: [**10**] <**\_\_\_\_\_\_\_\_**> to [**75**] <**\_\_\_\_\_\_\_\_**>/s.

Maximum Impeller Tip Speed: [**3**] <**\_\_\_\_\_\_\_\_**> fps).

Ratio of Impeller Diameter to Tank Diameter: [**0.4**] [**0.5**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Operation:

Electrical Characteristics: According to Section [**262923 - Variable-Frequency Motor Controllers**] and following:

[**<\_\_\_\_\_\_\_\_> 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.

Electrical Enclosure: NEMA 250 Type [**4X**] [**7**] <**\_\_\_\_\_\_\_\_**>; [**fiberglass**] [**sheet steel**] <**\_\_\_\_\_\_\_\_**>.

Motors:

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

* + - * 1. Materials:

Drive Housing: [**Cast iron**] <**\_\_\_\_\_\_\_\_**>.

Shaft: [**Carbon steel**] [**Type 304 stainless steel**] [**Type 316 stainless steel**] <**\_\_\_\_\_\_\_\_**>.

Impeller: [**Carbon steel**] [**Stainless steel**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Accessories:

Impeller peripheral blades to reduce shear.

Split bearings to facilitate shaft removal.

* + - 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 vertical turbine flocculator available for inspection at manufacturer's factory prior to packaging for shipment.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspection is allowed.

* + - * 1. 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 layout and orientation of equipment and accessories.
          2. Verify that tankage and peripheral equipment are ready for installation of flocculators.
       2. INSTALLATION
          1. According to manufacturer instructions and as indicated on [**Shop Drawings**] [**Drawings**].

\*\*\*\*\*\* [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. 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, startup, field testing, and instructing Director’s Representative in maintenance of equipment.
         2. 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 equipment has been properly installed and is ready for startup and testing.
      1. DEMONSTRATION
         1. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Director’s Representative.

END OF SECTION 464134