SECTION 467621 - BELT FILTER PRESSES

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 specifies belt filter presses and components.

Belt filter presses are used to remove residual water from wastewater biosolids to produce a semi-solid "cake." Biosolids are conditioned with polymer and applied to the first belt, where water drains from the biosolids by gravity. Thickened biosolids are then conveyed between two tensioned belts that apply pressure to a conditioned slurry; the belts are driven by rollers that decrease in diameter as the flow proceeds downstream.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes: Belt filter presses and accessories.
          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 262923 - Variable-Frequency Motor Controllers: Execution and product requirements for variable-speed drives specified by this Section.

Division 40 - Process Integration: Valves as required by this Section.

Section 400593 - Common Motor Requirements for Process Equipment: Electric motors and accessories normally supplied as part of equipment assemblies.

Section 402600 - Liquid Polymer Piping: Polymer piping requirements.

Section 407113 - Magnetic Flow Meters: Flowmeter for use in belt wash station.

Section 407336 - Pressure and Differential Pressure Switches: Pressure switches for use in belt wash station.

Section 463333 - Polymer Blending and Feed Equipment: Polymer makeup and feed systems.

Section 464117 - Inline Static Mixers: Mixing of sludge and polymer.

* + - 1. DEFINITIONS

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

* + - * 1. HDPE: High-density polyethylene.
        2. TSS: Total suspended solids.
        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. American Bearing Manufacturers Association:

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

* + - * 1. American Gear Manufacturers Association:

AGMA 2001 - Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth.

* + - * 1. ASTM International:

ASTM A36 - Standard Specification for Carbon Structural Steel.

ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

* + - * 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 information 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.
        5. 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 of installed belt filter press equipment.
      2. MAINTENANCE MATERIAL SUBMITTALS
         1. Spare Parts:

Furnish [**one set**] <**\_\_\_\_\_\_\_\_**> [**sets**] of belts.

Furnish [**one**] <**\_\_\_\_\_\_\_\_**> of each size and type of roller bearings.

Furnish [**two**] <**\_\_\_\_\_\_\_\_**> sets of doctor blades.

Furnish [**two**] <**\_\_\_\_\_\_\_\_**> complete sets of rubber seals for gravity and wedge zones.

Furnish [**two**] <**\_\_\_\_\_\_\_\_**> complete sets of belt wash box seals.

* + - * 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 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.
        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.

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 belt filter press equipment and accessories.
        2. Furnish [**five**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for roller bearings.

1. PRODUCTS
   * + 1. BELT FILTER PRESS
          1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=13160&mf=04&src=wd):

DESIGNER TO PROVIDE TWO MANUFACTURERS AND APPROVED EQUIVALENT FOR ALL LISTED PRODUCTS.

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

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

* + - * 1. Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

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

* + - * 1. System Description:

Components: Structural frame, sludge/polymer mixer, sludge inlet assembly, gravity dewatering zone, wedge zone, pressing belts in the pressure zone, cake discharge assembly, filtrate drainage system, drive system, belt tracking and tensioning systems, belt wash station, electrical components [**, and**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Performance and Design Criteria:

Width: [**3.3**] [**4.9**] [**6.6**] <**\_\_\_\_\_\_\_\_**> feet

Filtrate Area: <**\_\_\_\_\_\_\_\_**> sq. ft

Sludge Type: [**Primary**] [**Waste activated**] [**Combined primary and waste activated**] <**\_\_\_\_\_\_\_\_**>.

Solids:

Minimum Feed TSS: [**0.2**] <**\_\_\_\_\_\_\_\_**> percent.

Minimum Dewatered Sludge TSS: [**20.0**] <**\_\_\_\_\_\_\_\_**> percent.

Minimum Solids Loading: <**\_\_\_\_\_\_\_\_**> lb./ft.-h

Minimum Hydraulic Loading: <**\_\_\_\_\_\_\_\_**> gal./m-min

Design:

Adjustments and Routine Maintenance during Operation: Possible without interrupting sludge dewatering process.

Devices Requiring Operator Interface: Located above operating platform for accessibility and visibility.

Side Skirts: Mounted on either side of belt and at inlet.

* + - * 1. Drive Assembly:

Mounting:

Drive assembly mounted beneath belt or within perimeter of structural frame will not be accepted.

Drive assembly projecting more than 24 inches beyond structural frame will not be accepted.

Coupling to Drive Rollers: [**Gears**] [**, belt**] [**, or**] [**chain**].

Electric Gear Motor:

Description: Speed reducer, electric motor, and drive controller.

Speed Reducer: Concentric shaft or right-angle helical-type gear reducer.

Comply with AGMA 2001.

Drive Roller: Coated with [**Buna-N rubber**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Belts:

Description:

Material: Polyester monofilament.

Edges: Reinforced with l/2-inch plastic band; heat-sealed edges are unacceptable.

Pre-stretch belts to limit elongation to less than three percent of total belt length.

Seams: Single, low-profile, stainless-steel zipper or alligator-pin type.

Minimum Life: [**2,000**] <**\_\_\_\_\_\_\_\_**> hours.

Support: Furnish steel grid with replaceable HDPE wear bars to support full belt width in gravity and wedge zones.

* + - * 1. Roller Assemblies:

Description:

One drainage roller located at end of wedge zone, configured to allow filtrate to be conveyed away from cake.

[**Eight**] <**\_\_\_\_\_\_\_\_**> steel rollers or drums with bushings arranged in serpentine pattern in pressure zone.

Minimum Width: 3 inches wider than belt.

Maximum Deflection: L/1920 when belt tension is 20 lb./in. of belt width, where "L" is distance between bearing centers.

Materials: Stainless steel or steel with minimum 30-milcontinuous coating of nylon, PTFE, or polyethylene.

Bearings:

Type: Roller; comply with ABMA 11.

Mounting: Split casing pillow blocks with labyrinth seals.

Bearing life is percent failure at rated hours; for example, L10 life at 800,000 hours means 10 percent of bearings may be expected to fail at 800,000 hours.

L10 Life: [**800,000**] <**\_\_\_\_\_\_\_\_**> hours.

Grease Fittings: Extend to outside face of structural frame.

* + - * 1. Gravity Drainage Zone:

Containment Barriers:

Furnish adjustable containment barriers equipped with replaceable rubber seals to prevent leakage.

Replaceable without use of tools.

Plows:

Minimum [**eight**] <**\_\_\_\_\_\_\_\_**> rows of plows (chicanes) spaced at a maximum 6 inches o.c. across width of belt.

Each plow counterweighted, capable of pivoting independently of other plows, and furnished with set collar or clamp to position plow along support rod.

Mounting: Horizontal rod or angle equipped with handle to allow plows attached to one mounting rod or angle to be lifted from belt when belt filter press is in operation.

Shoes: Adjustable and replaceable.

* + - * 1. Belt Tensioning System:

Description:

Automatically controlled adjustments while belt filter press is operating.

Tensioning system to be able to accommodate maximum belt stretching during useful life of belt.

Belt tensioning roller positioned by hydraulic actuators on each tensioning roller end or torque arm type system using one tensioning actuator.

Simultaneous and parallel movement of tensioning roller ends during adjustment.

* + - * 1. Belt Tracking System:

Description: Automatic and continuous alignment of belt position on rollers while belt filter press is operating.

Limit Switches:

Furnish on each side of each belt to detect major misalignment of belt and to relay an alarm signal.

Limit switches to control belt position adjustments are unacceptable.

Mechanically link sensing arm to pilot valve to control hydraulic tracking actuator.

* + - * 1. Sludge Feed:

Furnish retention tank for floc formation and uniform distribution of feed mixture.

Polymer Injection:

Furnish injection port upstream of retention tank.

Mixing: [**Inline static mixer as specified in Section 464117 - Inline Static Mixers**] [**Non-clog variable orifice mixer**] [**Mixing valve**].

Distribution Chute:

Design: Uniformly distribute polymer-conditioned feed sludge across entire working width of belt.

Furnish vertical adjustment for leveling and clearance from belt.

* + - * 1. Sludge Discharge Assembly:

Discharge Doctor Blade:

Material: [**UHMWPE**] [**Polypropylene**].

Minimum Width: 3 inches wider than belt width.

Mounting:

Furnish stainless-steel blade holder.

Furnish mechanism to adjust position and force of blade against belt.

Furnish quick release and lock of doctor blade for inspection and servicing.

* + - * 1. Filtrate Drainage Pans:

Description: Collect and discharge sludge filtrate from belts, without splashing and re-wetting downstream cake.

Extend minimum 3 inches beyond belt width on both sides.

Provide flushing connections to facilitate cleaning.

* + - * 1. Belt Wash Station:

Description: Clean full width of belt as it returns from discharge point to feed point.

Furnish removable spray pipe with stainless-steel spray nozzles.

Flowmeter: As specified in Section [**407113 - Magnetic Flow Meters**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

* + - * 1. Drainage Piping:

[**Schedule 40 stainless steel**] [**or**] [**Schedule 80 PVC**], routed to drain as indicated on Drawings.

Connection: [**Pipe independent of filtrate drainage piping**] [**Pipe wash water and filtrate to common drain**] [**As indicated on Drawings**].

Valves: As specified in Division 40 - Process Integration.

* + - * 1. Operation:

Electrical Characteristics:

As specified in Section 262923 - Variable-Frequency Motor Controllers.

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

Motors: As specified in Section 400593 - Common Motor Requirements for Process Equipment.

Control Panel:

Factory mounted.

Programmable logic controller (PLC) with operator interface terminal (OIT); ability to connect to plant SCADA.

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

Single-point power connection and grounding lug.

Switches: HAND-OFF-AUTO, SYSTEM START, WASHDOWN START, EMERGENCY STOP [**, and**] <**\_\_\_\_\_\_\_\_**>.

Controls:

Manual, semi-automatic, and automatic operation.

Emergency Shutdown: Yellow safety rope surrounding entire unit.

Normal Shutdown: LOW PNEUMATIC PRESSURE, GROSS BELT MISALIGNMENT, LOW BELT WASHWATER PRESSURE [**, and**] <**\_\_\_\_\_\_\_\_**>.

Belt Drive: START-STOP push button, speed control potentiometer, RUN-JOG selector switch, and FORWARD-REVERSE selector switch.

Hydraulic System: START-STOP push button.

Wash Water Solenoid Valve: OPEN-CLOSE push button.

Emergency Trip Cord System:

Encircling sides of belt filter press and supported on main frame.

Configured such that pulling on cable at any point will lock OFF switch in open position.

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

Operation Sequence: [**Automatic**] [**Batch**] [**Manual**].

* + - * 1. Materials:

Frame: [**Hot-dip galvanized steel; ASTM A123**] [**Carbon steel; ASTM A36**] [**Type 304 stainless steel**].

Belt Support Bars: [**UHMWPE**] <**\_\_\_\_\_\_\_\_**>.

Retention Tank: Type 304 stainless steel.

Distribution Chute: Type 304 stainless steel.

Discharge Doctor Blade: Type 304 stainless steel, with replaceable polypropylene or UHMWPE doctor blade.

Side Skirts: Stainless steel with rubber seals.

Ramp Assembly: Type 316L stainless steel.

Plows: HDPE.

Hydraulic Actuators: [**Type 316 stainless steel**] [**or**] [**fiberglass**].

Hydraulic Piping and Reservoir: Stainless steel.

* + - * 1. Accessories:

Odor control cover.

Hardware: Stainless steel.

* + - 1. SOURCE QUALITY CONTROL
         1. Provide shop inspection and testing of completed belt filter press.

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

* + - * 1. Director’s Inspection:

Make completed belt filter press 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 that facility, piping, and electrical Work are ready to receive belt filter press.
       2. INSTALLATION
          1. According to manufacturer instructions.
          2. Level unit to ensure that belts are level and true.
          3. After belt filter press has been set in position and shimmed to the proper elevation, grout space between bottom of the belt filter press base and concrete pier with non-shrink grout as specified in Section <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

\*\*\*\*\*\* [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. Inspect for proper operation.
         2. Testing:

Functional Testing: Prior to system startup, inspect components for proper alignment and connection and quiet and acceptable operation.

Performance Testing: Use sludge of the type(s) to be applied to belt filter press on each unit to determine actual system operating conditions, and verify that units meet minimum performance requirements as specified in this Section.

* + - * 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 operation and 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 that equipment has been properly installed and is ready for startup and testing.
      1. ADJUSTING
         1. After belt filter press has been leveled and set in position, level and align each individual roller assembly.
         2. If required, reposition roller assembly bearing housings and shim to attain proper belt tracking.
         3. Check control functions and adjust as required.
      2. CLEANING
         1. Blow systems clear of moisture and foreign matter.
      3. DEMONSTRATION
         1. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Director’s Representative.

END OF SECTION 467621