SECTION 407123.36 - PITOT TUBE AND AVERAGING PITOT TUBE FLOW METERS

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 pitot tube flow meters, including transmitters, indicators, recorders, and integrators.

In a typical pitot tube flow meter, a differential pressure (DP) is generated by flow across the annubar, which is a tube with a series of upstream and downstream holes, and inserted into the flow stream. The DP is transformed into an electrical output current proportional to the flow rate. An "averaging pitot tube flow meter" generates an averaged DP signal proportional to the square of the flow rate.

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

Pitot tube flow meters.

Transmitters.

Indicators.

Recorders.

Integrators.

* + - 1. REFERENCE STANDARDS

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

* + - * 1. American Water Works Association:

AWWA M6 - Water Meters - Selection, Installation, Testing, and Maintenance.

* + - * 1. ASME International:

ASME PTC 19.5 - Flow Measurement.

* + - * 1. National Electrical Manufacturers Association:

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

* + - * 1. NSF International:

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 [**piping Work**] <**\_\_\_\_\_\_\_\_**>.
			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 information for system materials and component equipment, including connection requirements.
				5. Shop Drawings:

Indicate system materials and component equipment.

Submit installation requirements and other details.

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

Include separate Paragraphs for additional certifications.

* + - * 1. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
				2. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
				3. Manufacturer Reports: Certify that equipment has been installed according to manufacturer instructions.
				4. 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 and final orientation of equipment and accessories.
			2. QUALITY ASSURANCE

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

* + - * 1. Ensure that materials of construction of wetted parts are compatible with process liquid.
				2. Materials in Contact with Potable Water: Certified to NSF Standards 61 and 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 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 equipment 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. WARRANTY

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

* + - * 1. Furnish [**five**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for pitot tube flow meters and appurtenant devices.
1. PRODUCTS
	* + 1. DESCRIPTION
				1. Furnish sensors, field preamplifiers, signal conditioners, offset and span adjustments, amplifiers, transducers, transmitters, control devices, interconnecting cables, and unit conversions and algorithms as required for application.
			2. PITOT TUBE FLOW METERS
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12703&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. Description:

Type: [**Insertion**] [**Hot tap**] [**Between-flange mounting**].

Comply with ASME PTC 19.5.

* + - * 1. Performance and Design Criteria:

Process Fluid: [**Potable water**] <**\_\_\_\_\_\_\_\_**>.

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

Maximum Operating Temperature: <**\_\_\_\_\_\_\_\_**> degrees F

Maximum Operating Pressure: <**\_\_\_\_\_\_\_\_**> psig

Accuracy: Plus or minus [**1.0**] <**\_\_\_\_\_\_\_\_**> percent of full-scale flow rate.

Repeatability: [**0.1**] <**\_\_\_\_\_\_\_\_**> percent of full scale.

Minimum Reynolds Number (Re): 12,000.

Process Pipe Size: <**\_\_\_\_\_\_\_\_**> inches

* + - 1. TRANSMITTERS
				1. Transmitter Output:

4 to 20 mA dc analog signal.

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

4 to 20 mA dc analog signal proportional to square of flow rate.

Accuracy: Plus or minus <**\_\_\_\_\_\_\_\_**> percent of full scale.

* + - * 1. Housing Material: Cast aluminum.
				2. HMI:

Touch-screen programming, functioning through enclosure window without opening enclosure.

Display:

Size: Four lines by 16 characters.

Type: Backlit digital display.

User-selectable engineering units.

Readout of diagnostic error messages.

* + - * 1. Mounting:

Integral or remote mounting up to <**\_\_\_\_\_\_\_\_**> feet from meter.

Mounting Locations Less Than 4 Feet above Grade: Provide stainless-steel mounting posts.

* + - * 1. Transmitter Communication Interface: [**PROFIBUS**] <**\_\_\_\_\_\_\_\_**>.
				2. Communication Firmware and Software: <\_\_\_\_\_\_\_\_>.
				3. Accessories:

Current signal output simulation.

Empty pipe detection.

Self-diagnostics.

Automatic zero adjustment.

Stainless-steel sunshield.

Signal Cable: Provided by flow meter manufacturer.

* + - 1. INDICATORS

If indicators are not included as part of flow meter manufacturer's system, provide separate indicator as specified below.

* + - * 1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12700&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. Description:

Integrally mounted in transmitter housing.

Scale: Graduated.

Length: [**<\_\_\_\_\_\_\_\_> inches**] [**As indicated on Drawings**].

Units: <**\_\_\_\_\_\_\_\_**> gpm

Mounting: [**Wall**] [**Panel**].

* + - 1. RECORDERS
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=12701&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. Description:

Minimum Diameter: 10 inches

Rotation Cycle: Once per [**day**] [**week**] [**month**].

Drive Mechanism:

Synchronous motor.

<**\_\_\_\_\_\_\_\_**> V ac, <**\_\_\_\_\_\_\_\_**> Hz.

* + - 1. INTEGRATORS

If integrators are not included as part of flow meter manufacturer's system, provide separate integrator as specified below.

* + - * 1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=11946&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. Description:

Totalize flow in specified units.

Interface with specified flow meter assembly.

Accuracy: Plus or minus 0.25 percent of full scale.

* + - 1. OPERATION
				1. Control Power:

120 V ac, single phase, 60 Hz.

Furnish local transformers as required.

* + - * 1. Enclosures: NEMA 250 Type [**4**] [**4X**] [**As indicated on Drawings**] <**\_\_\_\_\_\_\_\_**>.
			1. SOURCE QUALITY CONTROL
				1. Provide shop inspection and testing of meters according to AWWA M6.

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

* + - * 1. Director’s Inspection:

Make completed flow meter 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 tests 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 manufacturer's approved quality-control program is sufficient for Project requirements.

* + - * 1. Certificate of Compliance:

If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

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

1. EXECUTION
	* + 1. EXAMINATION
				1. Verify that items provided by other Sections of Work are ready to receive Work of this Section.
			2. INSTALLATION
				1. Coordinate location and orientation of flow meter with final equipment installations.
				2. Ensure that instruments are located to be easily accessible for maintenance.

\*\*\*\*\*\* [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. Testing:

Test and calibrate flow meter to demonstrate that it meets specified accuracy requirements.

Comply with AWWA M6.

* + - * 1. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than <**\_\_\_\_\_\_\_\_**> [**days**] [**hours**] on Site for installation, inspection, startup, field testing, and instructing Director’s Representative in 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. DEMONSTRATION
				1. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Director’s Representative.
			2. ATTACHMENTS

When relying on separate schedules, tables, illustrations, or forms to specify product requirements, include list of each attachment. Include identical list of attachments in Project Manual table of contents.

Insert attachments following END OF SECTION. Consider following example when developing Project schedule.

* + - * 1. Flow Meter Schedule:

FE/FIT-463:

Location: <**\_\_\_\_\_\_\_\_**>.

Process Liquid: <**\_\_\_\_\_\_\_\_**>.

[**Manufacturer: <\_\_\_\_\_\_\_\_>.**]

[**Model: <\_\_\_\_\_\_\_\_>.**]

Type: <**\_\_\_\_\_\_\_\_**>.

Size: <**\_\_\_\_\_\_\_\_**>.

Flow Rate Range: <**\_\_\_\_\_\_\_\_**> to <**\_\_\_\_\_\_\_\_**>.

Output Signal: <**\_\_\_\_\_\_\_\_**>.

Accessories: <**\_\_\_\_\_\_\_\_**>.

FE/FIT-512:

Location: <**\_\_\_\_\_\_\_\_**>.

Process Liquid: <**\_\_\_\_\_\_\_\_**>.

[**Manufacturer: <\_\_\_\_\_\_\_\_>.**]

[**Model: <\_\_\_\_\_\_\_\_>.**]

Type: <**\_\_\_\_\_\_\_\_**>.

Size: <**\_\_\_\_\_\_\_\_**>.

Flow Rate Range: <**\_\_\_\_\_\_\_\_**> to <**\_\_\_\_\_\_\_\_**>.

Output Signal: <**\_\_\_\_\_\_\_\_**>.

Accessories: <**\_\_\_\_\_\_\_\_**>.

END OF SECTION 407123.36