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| Version | Date | Description of Revisions |
| 1 | November 1, 2011 | Standard Specification Release |
| 2 | April 20, 2015 | General Formatting |
| 3 | September 7, 2016 | Updated to include new part #’s for E + H meter |
| 4 | March 1, 2017 | Updated reference to NSF 372. (AV) |
| 5 | November 8, 2019 | 3.1 Revised Second Named Manufacturer details (BM) |
| 6 | June 13, 2022 | 1.5 Added tagging requirement (BM) |
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NOTE:

This is a CONTROLLED Document. Any documents appearing in paper form are not controlled and should be checked against the on-line file version prior to use.

**Notice:** This Document hardcopy must be used for reference purpose only.

**The on-line copy is the current version of the document.**

# GENERAL

## General

### This Section defines additional requirements to those set forth in Section 13105 – General Instrumentation Requirements. Where a conflict exists, the more stringent requirement ad determined by the consultant is to be provided and approved by the Region.

### The Contractor shall clearly identify on the shop drawings any deviation from the Specification Sections.

### The flow meters shall deploy the following basic design principles:

#### General Application: Pulsed DC powered flow tube coils.

#### Solids over 5%: AC powered flow tube coils and low noise electrodes. Use these meters only with prior approval from the Region.

### The Contractor shall provide the following O&M documentation: manufacturers’ printed recommendations; installation instructions; specifications; operation manuals, including electrical drawings, and plumbing diagrams; sales literature; materials; and training materials as applicable.

### The Contractor shall furnish copies of the manufacturer’s warranties to the consultant.

### Flowmeter shall have a maximum measured error of +/- 0.2%.

### Instrumentation supplier shall provide electronic and hardcopies of the factory Calibration Certificates.

### Instrument supplier shall provide electronic and hardcopies of field Verification/Calibration report including parameter list.

### The Contractor shall provide, through its instrumentation supplier, magnetic flow meters, complete and operable, in accordance with the Contract Documents.

### Instrumentation supplier shall configure the flowmeter for HART Communications Protocol to communicate information directly to the PAC and SCADA system.

## Measurement and Payment

### The work outlined in this section shall be included in the lump sum price for Section 13120 – Magnetic Flow Meters as indicated in the Bid Form.

## Sensor (Primary Element)

### NSF certification shall be provided for drinking water applications. The NSF 61 and NSF 372 certificate(s) shall be provided to the Consultant and Region.

### Empty pipe detection (EPD) required.

### Liners and electrode are to be reviewed with the manufacturer on an application-by-application basis. If the manufacturer recommends a different combination to be superior to what is listed in the following table for a particular application, the Region shall be provided with the option to select either the materials listed or those recommended by the manufacturer at no additional cost to the Region.

|  |  |  |  |
| --- | --- | --- | --- |
| **Application** | **Liner** | **Electrode** | **Max Fluid Temp** |
| Chemical Systems - Corrosive | Kynar PVDF or Ceramic Capacitive | Platinum /Coupled | 180˚C |
| Chemical Systems – Dilute Polymer | Ceramic | Platinum | 150˚C |
| Chemical Systems - Low Cond. | Ceramic Capacitive | Coupled | 150˚C |
| High Temp (>110C) | Teflon PFA | Hastalloy C-22 | 250˚C |
| Sewage - Influent (Raw) | Polyurethane | Hastalloy C-276 |  |
| Sewage - Mixed Liquor | Teflon ETFE | Hastalloy C-276 |  |
| Sewage - Settled (primary overflow) | Polyurethane | Hastalloy C-276 |  |
| Sewage - Final Effluent | Hard Rubber | Hastalloy C-276 |  |
| Sludge - Activated | Polyurethane | Hastalloy C-276 |  |
| Sludge - Digester Supernatant | Polyurethane | Hastalloy C-276 |  |
| Sludge - Primary | Neoprene | Hastalloy C-276 |  |
| Sludge - Thickened | Teflon ETFE | Hastalloy C-276 |  |
| Sludge - Waste (Digester) | Polyurethane | Hastalloy C-276 W |  |
| Water- Potable | Hard Rubber | Hastalloy C-276 |  |

## Compact vs. Remote

### If the environment in which the sensor is to be located has any possibility of being submerged or where the application requires the sensor to be mounted above 1.8m or the sensor is not easily accessible (as determined by the Consultant), then the housing type shall be a remote type, otherwise a compact version (sensor and transmitter in same housing) shall be used as approved by the Consultant and the Region.

## Transmitter / Sensor

### Tagging: Equipment tag wired to transmitter and to sensor (if remote) in accordance with Section 01080 – Process Equipment Location Tagging.

# INSTALLATION

## General

### The following installation requirements are in addition to or deviations from the requirements set forth for instrumentation in Section 13105 – General Instrumentation Requirements.

#### Install meters upstream from control valves.

#### Never install a meter within ten pipe diameters of a double change in planes (for example, a tee and an elbow). Installation must conform to manufacturer’s installation specifications for stated highest level of instrument accuracy.

#### Never install a meter where gas can collect or a line can self-drain when flow stops.

#### Install meters where the pipe remains full at all times.

#### Where potential for air in the pipe line exists, suitable air valves will be installed upstream of the mag meter.

#### Install meters in vertical pipes where flow is upward where possible.

#### Install meters so that there is the preferred ten pipe diameters upstream and five pipe diameters downstream or at the very least a minimum of five pipe diameters upstream and two pipe diameters downstream of straight pipe run of the same diameter as the flow meter to obtain rated accuracy or in accordance with the manufacturer’s requirements.

#### Never support meter directly under the flow tube – support as per manufacturer’s recommendations.

#### Never install a flowmeter transmitter in an environment in which the transmitter shall be located has any possibility of being submerged or in an area classified as a confined space.

#### When flow sensor is installed in an environment with risk of flooding, ratings of the flow sensor is to be maintained through potting with dialect gel, plugging of conduit port openings and appropriately rated conduit and conduit glands.

#### Install separate conduits for signal and power wiring to the meter and between the transmitter and control panel.

#### For remote transmitter application, signal cable shall be installed in separate rigid steel conduit. Cable shall be cut to length with ferrules installed.

#### Ground the meter in accordance with the manufacturer's instructions. Grounding with ground rings shall be used for metal pipelines with internal coating or non-conductive pipelines

#### Transmitter unit shall be mounted at grade in a readily accessible location to facilitate maintenance and calibration. Remote transmitter unit shall be mounted at 1.8m off the floor for ease of reading.

#### Transmitter/Electronics not mounted/installed indoors must be installed within a fibreglass enclosure with viewing window, thermostat and heater. Panel heater shall be powered from separate circuit than instrument.

#### All flowmeters must have the ability to connect an external “Verification Unit”. This will provide the functional verification through simulation of the Flow Transmitter as well as the Flow Tube and provide an electronic report.

# ACCEPTABLE MANUFACTURERS

### Acceptable manufacturers are listed in the following table in order of preference. The design has been completed around the first named supplier. The contractor is responsible for all costs associated with any changes required to the design to accommodate one of the other manufacturers.

|  |  |  |
| --- | --- | --- |
| Preference | Manufacturer | Model |
| 1 | Endress & Hauser Canada Ltd. | ProMag 400 W |
| 2 | Siemens Canada Ltd. | FM Magflo MAG6000 |
| 3 | Approved Equivalent |  |

### The Contractor shall select the appropriate options to suit the application and the requirements of the Section.

### Where second and/or third named manufacturers are provided, the chosen manufacturer will meet the performance specifications of the first named manufacturer.

## Magnetic Flow Meters

First Named Manufacturer:

|  |  |
| --- | --- |
| **Service:** | General |
| **Process:** |  |
| Tag name: | xx-xx |
| Installation Drawing: | 13120x |
| Fluid: | Raw Water |
| Velocity min/max: | 0.3 - 10 m/sec |
| Temp min/max: | 0 to 25 °C |
| Press min/max: | 0 - 300 kPa |
| Flow min/max: | 0 - 14 L/s |
| Up/Down Stream Pipe Diameters: | 10/5 Preferred, 5/2 Minimum |
| Bi-directional Flow: | YES |
| **Device Data:** |  |
| Nominal Diameter: | 100 mm (4") |
| Liner: | Polyurethane (NSF 61 and NSF 372 for drinking water applications) |
| Process Connection: | Class 150, carbon steel, flange ASME B16.5 |
| Electrodes/Material: | Alloy C-22, bullet nose |
| Calibration: | 0.2% |
| Certificates: | Standard |
| Approvals: | NSF61, NSF 372, CSA C/US NI Cl.I Div.2 Gr. ABCD |
| Housing: | NEMA 4X (IP 67) Remote Aluminum Coated |
| Cable for Remote: | Coil and signal cable, specify length: XXm |
| Cable Entries: | 13 mm (½”) NPT |
| Power Supply/Display: | 85 – 260 VAC, with display, push button operation (Language: English) |
| Software: | Standard Software |
| Outputs/Inputs: | 4-20mA HART, pulse/freq./switch output |
| Manufacturer: | Endress & Hauser Canada Ltd. |
| Part Number: | Promag 400 W 5W4C1H-C6ALIP2DUA1KHB+AACBEBL4 |
| **Accessories:** |  |
|  | *Additional accessories to be added by the Contractor as necessary* |

Second Named Manufacturer:

|  |  |
| --- | --- |
| **Service:** | General |
| **Process:** |  |
| Tag name: | xx-xx |
| Installation DWG: | 13120x |
| Fluid: | Raw Water |
| Velocity min/max: | 0.3 - 10 m/sec |
| Temp min/max: | 0 to 25 °C |
| Press min/max: | 0 - 300 kPa |
| Flow min/max: | 0 - 14 L/s |
| Up/Down Stream Pipe Diameters: | 10/5 preferred, 5/2 Minimum |
| Bi-directional Flow: | YES |
| **Flow Tube:** |  |
| Diameter: | 100 mm (4") |
| Flange Norm & Pressure Rating | ANSI B16.5: Class 150 |
| Liner Material: | Ebonite Hard Rubber (NSF 61 and NSF 372 for drinking water applications) |
| Electrodes/Material: | Hastelloy C-276 |
| Transmitter: | Sensor for Remote Transmitter |
| Cable Glands/Termination Box: | 13 mm (½”) NPT/Polyamide terminal or 6000 I Compact |
| Manufacturer: | Siemens Canada Ltd. |
| Part Number: | Sensor SITRANS F M MAG 5100W 7ME6520-3TJ13-2AA2 |
| **Transmitter:** |  |
| Mounting: | Remote Wall Mounting |
| Housing: | IP 67/NEMA 4X/6, Fibre Glass Reinforced Polyamide reinforced polyamide |
| Power Supply: | 115 – 230 VAC, 50/60 Hz |
| Manufacturer: | Siemens Canada Ltd. |
| Part Number: | Transmitter for MAG 6000 7ME6920-1AA10-1AA0 |
| Communication Modules: | HART |
| Part Number: | FDK-085U0226 |
| **Accessories:** |  |
| Signal Cable: Cable Kit with Standard Coil Cable with shield PVC and electrode cable double shielded, 10m | A5E01181647 |
| Wall Mount Kit: 4 x 13 mm (½”) NPT Cable Glands | FDK-085U1053 |
|  | *Additional accessories to be added by the Contractor as necessary* |

**END OF SECTION**