

SECTION 44 42 48.04
AUTOMATIC COMPOSITE SAMPLER
(REFRIGERATED, PERISTALTIC TYPE)

EQUIPMENT AND COMPONENT NUMBER(S)

SAM-2014: Influent Sampler.
SAM-3201: Effluent Sampler.

PART 1 GENERAL

1.01 SUMMARY

- A. Contractor shall furnish two automatic composite samplers. The Influent Sampler shall be provided along with a prefabricated parshall flume flow metering manhole, flow monitoring device and heated enclosure as specified.
- B. All equipment called for under this section shall be provided by a single supplier.
- C. Contractor shall coordinate all details of the equipment with other related parts of the Work. Contractor shall verify that all structures, piping, wiring, and equipment components are compatible. Contractor shall be responsible for all structural and other alterations required to accommodate equipment differing in dimensions or other characteristics from these Specifications and Drawings.
- D. Equipment will be installed in outdoors and exposed to temperatures and humidity per Section 01 67 00, Product Requirements.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
 - 1. National Electrical Manufacturer's Association (NEMA):
 - 2. National Fire Protection Association (NFPA): 70, National Electrical Code.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings:
 - a. Manufacturer's complete catalog information, descriptive literature, specifications, and identification of materials of construction.

- b. Detailed structural, mechanical, and electrical drawings showing equipment fabrications and interface with other items. Include dimensions, size, and details of anchorages and of connections to other work, and weights of associated equipment.
- c. Wiring and Control Diagrams: Point-to-point wiring and control schematic diagrams shall conform to format and content requirements contained in Section 40 90 11, Instruments and Panels Subsystem (IPS), Article Submittals.
- d. Motor Data: See Section 26 20 00, Low-Voltage AC Induction Motors, for motor submittal requirements.

B. Informational Submittals:

- 1. Factory Functional Test Reports and Log.
- 2. Manufacturer's Certificate of Compliance.
- 3. Special shipping, storage and protection, and handling instructions.
- 4. Manufacturer's written/printed installation instructions.
- 5. Routine maintenance requirements prior to plant startup.
- 6. Suggested spare parts list to maintain the equipment in service for a period of 1 year and 5 years. Include a list of special tools required for checking, testing, parts replacement, and maintenance with current price information.
- 7. List special tools, materials, and supplies furnished with equipment for use prior to and during startup and for future maintenance.
- 8. Operation and Maintenance Data as specified in Section 01 78 23, Operation and Maintenance Data.
- 9. Manufacturer's Certificate of Proper Installation, in accordance with Section 01 43 33, Manufacturers' Field Services.
- 10. Factory Test Reports.
- 11. Service records for maintenance performed during construction.

1.04 EXTRA MATERIALS

A. Provide the following spare parts as a minimum per each sampler unit:

Item	Quantity
Pump Tubing	2 replacements
Desiccant Bags	2 bags
Large Sampling Bottle	2 bottles
Small Sampling Bottle	48 bottles

B. Delivery: In accordance with Section 01 61 00, Common Product Requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Materials, equipment, and accessories specified in this section shall be products of:

1. ISCO; Model 6712FR.
2. Or equal.

2.02 EQUIPMENT

A. General:

1. Physical Characteristics:
 - a. Sampler shall be a refrigerated, self-contained unit, designed for continuous, time composite, flow paced, and flow paced split sampling of process streams.
 - b. Influent Sampler:
 - 1) Influent Sampler (SAM-2014) shall be installed in a heated enclosure located outside adjacent to the Parshall Flume as shown.
 - 2) Sampler to be located approximately 6 feet to 8 feet above water surface level.
 - 3) Maximum Length of Sample Suction Tubing/Pipe: 16 feet.
 - c. Effluent Sampler:
 - 1) Effluent Sampler (SAM-3201) shall be installed in the UV Room in Facility 32 as shown.
 - 2) Sampled flow stream is pressurized 20 psig.
 - 3) Maximum Length of Sample Suction Tubing/Pipe: 12 feet.
2. Functional Characteristics:
 - a. The influent sampler shall sample unscreened raw sewage.
 - b. The effluent sampler shall sample filtered disinfected recycled water.
3. Performance Characteristics: None.

B. Sample Pump:

1. Physical Characteristics: Sampled fluid shall only contact strainer, pump tubing, and sample container.
2. Functional Characteristics: Shall air purge sample line before and after each sample is collected. Purging shall be automatically controlled without adjustment.
3. Performance Characteristics: Peristaltic type having a capacity to maintain 2 feet per second velocity at 15 feet of head through a 3/8-inch PTFE intake tubing.

C. Sampler:

1. Physical Characteristics:
 - a. Sampler shall be designed for continuous operation and shall be rated for installation in Class 1 Division 1 space per the NFPA 820 classification of the space.
 - b. Sample Size: 10 mL to 999 mL (adjustable in 1 mL increments).
2. Functional Characteristics:
 - a. Operate in either of two modes:
 - 1) Time Composite Mode: Interval between samples shall be 1 minute to 9,999 minutes, selectable to within 1 minute.
 - 2) Flow Composite Mode: Interval between samples shall be 1 flow pulse to 9,999 flow pulses.
 - b. Adjustable weight-activated or level sensing mechanism shall automatically terminate sampling and energize indicator light when container is filled to predetermined level.
3. Performance Characteristics:
 - a. Refrigerated Sample Temperature: 4 degrees C.
 - b. Clean Water Suction Lift: Minimum 20 feet.
 - c. Ambient Temperatures: 0 degree F to 120 degrees F.

D. Refrigerator:

1. Physical Characteristics:
 - a. Self-defrosting type.
 - b. Copper refrigeration lines shall be protected with polyester tubing.
 - c. Condenser coil shall be coated with polyurethane.
 - d. Evaporator plate shall be aluminum with a food grade epoxy coating for corrosion protection.
 - e. Power supply and solid state electronic thermostat shall be contained in a sealed NEMA 4 aluminum enclosure inside refrigerator base.
2. Functional Characteristics: Use forced air condensing coil with filtered front ventilation.
3. Performance Characteristics: None.

E. Enclosure:

1. Physical Characteristics:
 - a. Enclose sample pump and controller as well as refrigerator.
 - b. Controller cover, exterior and base of refrigerator, and enclosure shall be constructed of fiberglass reinforced plastic with a UV-resistant gel coat and Type 304 stainless steel hardware.

2. Functional Characteristics: Provide each unit with heater and thermostat capable of maintaining temperature above 32 degrees F when ambient temperature is minus 20 degrees F.
3. Performance Characteristics: None.

F. Electrical Equipment:

1. Physical Characteristics: Provide junction boxes on back side of each sampler for field connection.
2. Functional Characteristics: Operate on 120-volt, 60-Hz, single-phase hardwired power supply.
3. Performance Characteristics: None.

G. Bottles and Bottle Filling Equipment:

1. Physical Characteristics:
 - a. Provide each sampler with components necessary to accommodate:
 - 1) Composite sampling into a single large container.
 - 2) Discrete or composite sampling into 24 smaller containers.
 - b. Large container for composite sampling shall be a 6-gallon polyethylene bottle.
 - c. Smaller containers for discrete sampling shall be 1-liter polyethylene bottles.
2. Functional Characteristics: None.
3. Performance Characteristics: None.

H. Tubing and Strainer:

1. Physical Characteristics:
 - a. Intake Tubing and Strainer: Provide 50 feet of 3/8-inch ID PTFE-lined intake tubing with removable, weighted PTFE trainer.
2. Functional Characteristics: None.
3. Performance Characteristics: None.

I. Additional Components for Influent Sampler:

1. Heated Enclosure:
 - a. General:
 - 1) Applicable to Influent Sampler only, as shown.
 - 2) Supplier: Gemini Equipment Enclosure, or equal.
 - b. Physical Characteristics: As shown on the Drawings.
 - c. Functional Characteristics:
 - 1) Insulated sides and top, integral floor and Gullwing door.
 - 2) Panel encapsulated OSB mounting panel.
 - 3) Vent with fiberglass insect screen.

- 4) Heater sized by supplier suitable to maintain 32 degrees F inside enclosure when ambient temperature is 0 degrees F.
 - 5) Load Center: 125A main lug, NEMA 4X.
 - 6) Outlet: 20A duplex GFCI with weather cover.
 - d. Performance Characteristics: None.
- 2. Parshall Flume:
 - a. General:
 - 1) Applicable to Influent Sampler only, as shown.
 - 2) Supplier: Open Channel Flow, or equal.
 - b. Physical Characteristics: Prefabricated fiberglass Parshall flume flow metering manhole dimensioned and sized as shown on the Drawings.
 - c. Functional Characteristics:
 - 1) Domed top for manhole suitable for non-traffic areas.
 - 2) Manhole barrel shall be fabricated to ASTM D3753 and AASHTO H-20.
 - 3) Provide integral rigid sample tube inside manhole down to liquid level for connection to flexible sample tube from composite sampler.
 - 4) Provide ultrasonic level flow monitoring instrument meeting the requirements of Section 40 91 00, Instrumentation and Control Components, which will be mounted inside heated enclosure.
 - 5) Flow meter shall communicate with sampler for flow paced sampling and provide output to plant SCADA.
 - d. Performance Characteristics: Accurately monitor flow rate of raw sewage from 0 mgd to 2 mgd.

2.03 ELECTRICAL

- A. General: Provide all necessary electrical components and wiring for a complete, functional system in accordance with Division 26, Electrical, including Section 26 05 05, Conductors.
- B. Wiring:
 - 1. Physical Characteristics:
 - a. The Drawings and Specifications indicate the anticipated wiring for the equipment provided under this section.
 - b. If additional wiring is required, or if required wiring does not match what is indicated, make the necessary modifications to electrical wiring and documentation.
 - c. Insulation shall be rated 600 volts, minimum. Low voltage (24 volts) signals shall be run in twisted, shielded pair cable.
 - 2. Functional Characteristics: None.

3. Performance Characteristics: Wiring shall meet the requirements of Section 26 05 05, Conductors, and NFPA 70.

2.04 INSTRUMENTATION AND CONTROLS

A. General: In accordance with Section 40 99 90, Package Control Systems.

B. Sampler Controller:

1. Physical Characteristics:
 - a. Sampler controller shall consist of a microprocessor linked to Programmable Read Only Memory (PROM) and supporting electronics.
 - b. The service voltage for the controller panel shall be 120V ac, single-phase, 60-Hz, 20 amps for control.
2. Functional Characteristics:
 - a. Sampling programs shall be entered via a keypad.
 - b. A liquid crystal display (LCD) shall display status of sampler and prompt user through programming sequence.
 - c. Program parameters shall be maintained through a power loss by a lithium battery.
 - d. At a minimum, the controller operator interfaces shall provide the following functions:
 - 1) Control Panel: 17-key membrane switch keypad with four multiple function soft keys; four-line by 20-character alphanumeric, liquid crystal graphics display.
 - 2) Internal Clock:
 - a) Indicates real time and date.
 - b) 0.007 percent time base accuracy.
 - 3) Diagnostics: Tests keypad, display, ROM, pump, and distributor.
 - 4) Flash Memory: Permits embedded software upgrades in field.
 - 5) Program Delay:
 - a) Three Formats:
 - (1) 1 minute to 9,999 minutes or flow pulses in one-unit increments.
 - (2) Programmable start time/day.
 - (3) Programmable start time/day/week.
 - 6) Manual Sample: Initiates sample collection independent of program in progress.
 - 7) Intake Rinse: Intake line automatically rinsed with source liquid prior to each sample, from one to three rinses.
 - 8) Intake Fault: Sample collection cycle automatically repeated from one to three times if sample not obtained on initial attempt.

- 9) Multiple Programs: Stores minimum of three sampling programs.
 - 10) Data Logger:
 - a) Provide integral to controller.
 - b) Records program start time and date, stores a minimum of 400 sample collection times/dates, program entries, operational status including number of minutes or pulses to next sample, bottle number, number of samples collected, number remaining, sample identification number, and all logged data (such as level, flow, pH, stream temperature, ORP, rainfall, and any externally logged data, up to seven external channels).
 - 11) Automatic Shutdown:
 - a) Multiple Bottle Mode: After complete revolution of distributor arm (unless continuous mode selected).
 - b) Composite Mode: After preset number of samples have been delivered to composite container, from 1 sample to 999 samples, or upon full container.
 - 12) Program Lock: Access code protection precludes tampering.
 - 13) Status Outputs: Four user-assignable alarm relays to alert operator of selected conditions and/or potential problems such as low memory power, plugged intake, jammed distributor arm (if applicable), sample collected, and purge failure.
- e. The controller external interfaces shall provide the following:
- 1) Discrete Outputs from Sampler Control Panel to Plant Control System: Provide the following maintained contact outputs which will be used as discrete inputs by the plant control system. Contacts shall be noble metal or hermetically sealed, and suitable for 3 amps at 120V ac.
 - a) Provide a common FAIL alarm which is normally open and closes in alarm state. The common FAIL alarm shall be activated if any of the following conditions occur:
 - (1) Low memory power.
 - (2) Plugged intake.
 - (3) Jammed distributor arm.
 - (4) Purge failure.
 - b) Provide a status which is normally open and closes upon full sample container.
 - c) Provide two additional contacts for future use.
- f. Discrete Inputs: Accept a dry contact closure rated for 3 amps at 120V ac continuous, which shall be used for flow composite mode of sampling. Influent Sampler shall receive this input directly

from the Parshall Flume instrumentation, not the plant control system.

- g. Analog Inputs from PICS: Accept a 4 mA to 20 mA signal representing process flow to be used in flow pace mode. Influent Sampler shall receive this input directly from the Parshall Flume instrumentation, not the plant control system.
- 3. Performance Characteristics: Controller internal battery shall maintain program logic and real clock time for 5 years.

2.05 ACCESSORIES

A. Physical Characteristics:

- 1. Lifting Lugs: Equipment weighing over 100 pounds shall be furnished with lifting lugs to permit easy handling.
- 2. Equipment Identification Plates:
 - a. Furnish laminated plastic identification plate, securely mounted on front of each sampler in readily visible location.
 - b. Plate shall indicate in 3/8-inch die-stamped letters the process flow being sampled and equipment tag number.
- 3. Control Nameplates: Engraved laminated plastic nameplates, clearly describing function of each switch, pushbutton, timer, and other devices on sampler instrument panel.

B. Functional Characteristics: None.

C. Performance Characteristics: None.

2.06 SOURCE QUALITY CONTROL

- A. Test units at factory to verify all control functionality.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Refer to Section 01 88 15, Anchorage and Bracing, for additional requirements that apply to mechanical equipment and the installation of mechanical equipment and materials.

3.02 FIELD TESTING AND FACILITY STARTUP

- A. Field Testing and Facility Startup shall be in accordance with the requirements of Section 01 91 14, Equipment Testing and Facility Startup.

- B. Facility startup specifies the order and prerequisites for the following tests of the equipment:
 - 1. Field functional testing.
 - 2. Software operational testing.
 - 3. Performance testing.
 - 4. Demonstration testing.
- C. All Field Testing and Facility Startup shall be performed using a qualified representative provided by the Manufacturer as specified in Section 01 91 14, Equipment Testing and Facility Startup, Section 01 43 33, Manufacturers' Field Services, and as elaborated upon in this section.

3.03 TESTS AND INSPECTIONS

- A. Functional Test: Perform manufacturer's standard functional tests on clean water for a minimum of 2 hours. During testing verify all controls functionality.
- B. Performance Test: Perform on process fluid for a minimum of a 24-hour cycle.

3.04 MANUFACTURER'S SERVICES

- A. Manufacturer's Representative: Present at Site or classroom designated by Contracting Officer, for minimum person-days listed below, travel time excluded:
 - 1. 1/2 person-day for installation assistance and inspection.
 - 2. 1 person-day for functional and performance testing and completion of Manufacturer's Certificate of Proper Installation.
 - 3. 1 person-day for prestartup classroom or Site training.

END OF SECTION