Preparing Activity: USACE Superseding
UFGS-33 34 13 (April 2008)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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DRAINAGE FIELD DOSING CHAMBERS
08/18

NOTE: This guide specification covers the requirements for automatic dosing siphons for sewage.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.
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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B16.3	(2021) Malleable Iron Threaded Fittings, Classes 150 and 300
ASME B16.39	(2020) Standard for Malleable Iron Threaded Pipe Unions; Classes 150, 250, and 300

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C104/A21.4	(2022) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110/A21.10	(2021) Ductile-Iron and Gray-Iron Fittings
AWWA C111/A21.11	(2017) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C151/A21.51	(2017) Ductile-Iron Pipe, Centrifugally Cast
AWWA C153/A21.53	(2019) Ductile-Iron Compact Fittings for Water Service
AWWA C600	(2017) Installation of Ductile-Iron Mains and Their Appurtenances
AWWA C605	(2021) Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings
AWWA M55	(2020; 2nd Ed) PE Pipe - Design and Installation

ASTM INTERNATIONAL (ASTM)

ASTM A615/A615M	(2022) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM C443	(2021) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C443M	(2021) Standard Specification for Joints for Concrete Pipe and Manholes, Using

	Rubber Gaskets (Metric)
ASTM C478	(2018) Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
ASTM C478M	(2018) Standard Specification for Precast Reinforced Concrete Manhole Sections (Metric)
ASTM D883	(2020a) Standard Terminology Relating to Plastics
ASTM D3034	(2016) Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212	(2020) Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D3350	(2021) Polyethylene Plastics Pipe and Fittings Materials
ASTM D3753	(2019) Glass-Fiber-Reinforced Polyester Manholes and Wetwells
ASTM F477	(2014; R 2021) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F714	(2022) Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
ASTM F794	(2021) Standard Specification for Poly(Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F894	(2019) Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F949	(2020) Standard Specification for Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-80	(2019) Bronze Gate, Globe, Angle and Check Valves

1.2 SUBMITTALS

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NOTE: Review submittal description (SD) definitions

in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a “G” to an item, if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.
****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings; G[, [_____]]

Dosing Tank

SD-05 Design Data

Buoyancy Calculations for Fiberglass Basins

Buoyancy Calculations For Precast Concrete Structures

SD-06 Test Reports

Rapid Inflow Test

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling and in accordance with manufacturer's instructions. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets and any other ultraviolet sensitive material under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, and other accessories free of dirt and debris.

1.3.2 Handling

Handle pipe, fittings, and other accessories in accordance with manufacturer's instructions and in a manner to ensure delivery to the final installed location in sound undamaged condition. Avoid injury to coatings and linings on pipe and fittings; make repairs if coatings or linings are damaged. Clean the materials of foreign matter before being installed. Replace material found to be defective with sound material at no additional expense to the Government. Store rubber gaskets and other ultraviolet sensitive materials under cover out of direct sunlight until they are ready for installation.

Handle ductile iron pipe, fittings, and accessories in accordance with AWWA C600.

Handle PVC and PVCO pipe, fittings, and accessories in accordance with AWWA C605.

Handle PE pipe, fittings, and accessories in accordance with AWWA M55.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide a [deep seal][trapless] type dosing siphon suitable for the service required, completely automatic in operation, starting promptly when the sewage has reached the predetermined high water level, and shutting off positively at the low water level. Accomplish the starting, stopping, and alternating operations without the use of electrical or mechanical devices having moving parts. Capacities of equipment and materials must be not less than those specified or indicated. Secure the manufacturer's name, address, and catalog or model number on a plate in a conspicuous place on each siphon bell. In lieu of nameplate, cast integrally the manufacturer's name or trademark with the equipment, or standard, or otherwise permanently marked.

2.2 MATERIAL

Provide materials and equipment conforming to the publications and other requirements specified below. Provide other material and equipment as specified and as shown on the approved detail drawings. Provide products from manufacturers regularly engaged in the manufacture of such products. Material and equipment must essentially duplicate items that have been in satisfactory use at least 2 years prior to [bid opening][installation] [source selection]. Submit complete drawings and other descriptive data as the Contracting Officer may require said data to demonstrate compliance with the contract documents, not less than [_____] days before starting

installation of any material or equipment. Submit all detail drawings, catalog cutsheets, part numbers, and other material to document compliance with the specifications at one time. If departure from the contract drawings is deemed necessary, submit details of such departure, including changes in related portions of the project and the reasons therefore, with the drawings. Make approved departures at no additional cost to the Government. Submit a complete list in triplicate of parts and supplies for each different item of equipment listed, with current unit prices and sources of supply. Submit a list of parts and supplies that are either normally furnished at no extra cost with the purchase of the equipment or are specified to be furnished as a part of the contract. Submit a list of additional items recommended by the manufacturer to assure efficient operation for a period of 120 days, not later than four months prior to the date of beneficial use.

2.2.1 Pipe and Fittings

2.2.1.1 Ductile Iron Pressure Pipe and Fittings

Provide ductile-iron pipe that conforms to AWWA C151/A21.51, Thickness Class [_____]. Provide fittings that conform to AWWA C110/A21.10 or AWWA C153/A21.53. [Provide fittings with push-on joint ends that conform to the same material and operational requirements as fittings with mechanical-joint ends, except for modifying the bell design, as approved, to function as a push-on joint.] Provide fittings with a pressure rating at least equivalent to that of the pipe. Ensure the ends of the pipe and fittings provided are suitable for the joints specified hereinafter. Provide pipe and fittings with cement-mortar lining conforming to AWWA C104/A21.4, standard thickness.

2.2.1.1.1 Ductile Iron Joints and Jointing Materials

a. Joints, general: Provide [push-on joints] [or] [mechanical joints] for pipe and fittings except as otherwise specificed in this paragraph. [Supply mechanical-joints where indicated.] [Provide Flanged Joints where indicated.] [Use of sleeve-type mechnical coupling joints in lieu of push-on joint is allowable.] [Use of [grooved] [or] [shouldered] type joints in lieu of push-on joint [or flanged joint], is allowable, except where joint is buried.]

b. Push-on joints: Supply pipe ends and fitting ends, gaskets, and lubricant for joint assembly which conform to AWWA C111/A21.11.

c. Mechanical joints: Supply dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets which conform to AWWA C111/A21.11.

2.2.1.2 PVC Plastic Gravity Sewer Piping

2.2.1.2.1 PVC Plastic Gravity Pipe and Fittings

[ASTM D3034, SDR 35, or ASTM F949 with ends suitable for elastomeric gasket joints.] [ASTM F794, Series 46, for ribbed sewer pipe with smooth interior, size 200 mm 8 inch through 1200 mm 48 inch diameters.]

2.2.1.2.2 PVC Plastic Gravity Joints and Jointing Material

Provide joints conforming to ASTM D3212. Provide gaskets conforming to ASTM F477.

2.2.1.3 High Density Polyethylene Pipe (HDPE)

ASTM F894, Class 63, size 450 mm 18 inch through 3000 mm 120 inch. ASTM F714, size 100 mm 4 inch through 1200 mm 48 inch, with pipe stiffness greater than or equal to 1170/D for cohesionless material pipe trench backfills. For all PE pipes, certify that the polyethylene meets the requirements of ASTM D3350, cell Class 334433C or higher. Provide fittings for High Density Polyethylene Pipe of the same material specifications as the pipe class. Provide rubber gasket joints conforming to ASTM F477 for all HDPE meeting ASTM F894. Use fused joints on all HDPE meeting ASTM F714 per manufacturer's instructions.

2.2.1.4 Pipe Fittings

2.2.1.4.1 Ductile Iron Fittings

AWWA C110/A21.10 and AWWA C111/A21.11 [_____] kPa psi working pressure.

2.2.1.4.2 Polyvinyl Chloride (PVC) Fittings

ASTM D3034.

2.2.1.4.3 Polyethylene Fittings

ASTM D3350.

2.2.1.4.4 Malleable-Iron Fittings

ASME B16.3.

2.2.1.4.5 Malleable-Iron Unions

ASME B16.39.

2.2.2 Siphon Bells, Inlet Castings, and Similar Equipment

Supply polyvinyl chloride (PVC) or polyethylene siphon bells, air bells, inlet castings, and similar equipment. Molded or fitted siphons are acceptable. Provide siphon bells with suitable connections for the air-control piping and mount the sniff pipe over the [_____] mm inch diameter feed pipe. Supply siphons that discharge at a maximum rate of flow of [_____] L/second gpm while operating under a drawing depth of [_____] mm inches, and under the head conditions as indicated. Provide for an average rate of inflow of [_____] L/second gpm and the minimum 4-hour average rate [_____] L/second gpm.2.2.2.1 Polyvinyl Chloride (PVC)

ASTM D3034.

2.2.2.2 Polyethylene

ASTM D3350.

2.2.3 Valves

Bronze, MSS SP-80, Type [_____].

2.2.4 Dosing Tank

2.2.4.1 Dosing Tank

Provide fiberglass reinforced polyester resin basin [or] precast concrete tank. Provide with inside diameters [as indicated][of [_____] mm [_____] inch] and to the depths indicated on the drawings.

****
NOTE: Buoyancy calculations are required during design. Since design drawings typically only show one type of wet well, buoyancy calculations are required as a submittal to ensure submitted wet well basin incorporates manufacturer's recommended measures to prevent flotation.
****

2.2.4.1.1 Fiberglass Basins

a. Buoyancy Calculations for Fiberglass Basins: Submit buoyancy calculations sealed by a licensed professional engineer. Prevent flotation in accordance with manufacturer's written instructions. Include manufacturer's written instructions with submitted calculations.

b. Provide Fiberglass Reinforced Polyester (FRP) dosing tanks in accordance with ASTM D883 relating to plastics.

(1) Use commercial grade polyester resins evaluated as a laminate by test or determined by previous service to be acceptable for use in the wastewater environment.

(2) Use a commercial grade continuous strand fiberglass reinforcement material.

(3) Design FRP based on the following assumed conditions. Provide independent third party testing.

(a) Hydrostatic pressure of 305 kilogram-force/square meter 62.4 pounds/square foot with water at ground surface.

(b) Saturated soil weight of 1,922 kilogram/cubic meter 120 pounds/cubic foot.

(c) Soil modulus of 3,418 kilogram-force/square meter 700 pounds/square foot.

(d) Pipe stiffness values as specified in ASTM D3753.

(e) Provide FRP laminate with a surface hardness of 90 percent Barcol.

2.2.4.2 Precast Concrete Structures

a. Buoyancy Calculations for Precast Concrete Structures: Submit buoyancy calculations sealed by a licensed professional engineer.

b. Construct precast concrete structures in accordance with ASTM C478M ASTM C478, except as specified herein. Provide precast concrete

structures with a compressive strength of 30 MPa 4000 psi at 28 days and an air entrainment of 6 percent, plus or minus 2 percent, and a minimum wall thickness of 125 mm 5 inches. ASTM A615/A615M reinforcing bars. ASTM C443MASTM C443, Type B gaskets for joint connections.

2.2.4.3 Access Hatch Covers

Provide [aluminum][_____] access hatch covers as indicated. Include lifting mechanism, automatic hold open arm, slam lock with handle, and flush lift handle with vinyl grip. Use automatic hold open arm that locks in the 90 degree position. Use 6 mm 1/4 inch diamond plate cover with 6 mm 1/4 inch channel frame and continuous anchor flange. Use access hatch cover capable of withstanding a live load of 1500 kg/sq. meter 300 lb/sq. ft. Provide stainless steel cylinder lock with two keys per lock. Identically key the locks.

2.2.5 Cycle Counters

Provide a non-electric, mechanical cycle counter integrally mounted with the siphon that is adjustable to accurately count the fill/empty cycles for each siphon. Provide counter that operates by means of a gravity float switch.

2.2.6 Painting

[Factory powder coat][Factory paint][Field paint] all ferrous material installed under this specification. Thoroughly clean, prime, and finish painted any painted components in accordance with the recommendations of the manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

Install the Dosing Siphon System in accordance with the recommendations of the manufacturer as approved. Utilize workers experienced in the installation of this type of equipment.

3.1.1 Siphons

Install siphons in accordacne with the approved detail drawings. [Install each siphon with a seal trap in the discharge pipe of such depth to maintain an effective seal against blowing at all times.] [Discharge each siphon into an airtight piping system having a discharge point above the lowest point in the connecting pipe to form an effective seal.] [Install siphons for alternating operation from a common chamber with auxiliary equipment necessary for alteration in a predetermined sequence. Arrange and valve the air piping to permit removal of any number of the siphons from service without disturbing the alternating operation of the remaining siphons.] [Install equipment for twin dosing tanks including air bells, air-locking inflow connection, and all similar equipment that may be necessary to alternate the inflow from one tank to the other and to prevent flow into the tank when the siphon in the tank is discharging.]

3.1.2 Piping

Install piping with fittings and valves of similar material, with sufficient to facilitate maintenance or removal. [Assemble cast iron

piping using a stiff mixture of graphite and oil, or an inert filler and oil, or an approved graphite compound, applied with a brush to the male threads only.]

3.2 SYSTEM STARTUP

Perform field tests, and provide labor, equipment, and incidentals required for testing, including water as needed for field tests. Produce evidence, when required, that items of work have been constructed in accordance with Contract requirements.

3.2.1 Testing Procedure

Test piping in accordance with Section 33 30 00 SANITARY SEWERS. Test in operation all equipment to demonstrate compliance with the Contract requirements.

3.2.2 Dosing Siphon System

3.2.2.1 Normal Operation

Test system in operation and in accordance with the authority having jurisdiction over sewage system, under design conditions to ensure operation of equipment. Provide appliances, materials, water, and equipment for testing, and bear full expenses in connection with the testing. Conduct testing after equipment is installed, piping is installed, liquid is flowing, and the system is ready for operation. Correct defects discovered to the satisfaction of the Contracting Officer, and tests repeated, at the expense of the Contractor, until the equipment functions as intended and designed.

3.2.2.2 Rapid Inflow Test

Test System as outlined above, but with an inflow equal to [2][3][____] times the average daily flow for [10][30][__] minutes. Record results and submit to the Contracting Officer.

3.3 PROTECTION

Field painting is specified in Section 09 90 00 PAINTS AND COATINGS.

-- End of Section --