

**NORTH CAROLINA DEPARTMENT OF HEALTH AND HUMAN SERVICES
DIVISION OF PUBLIC HEALTH
ENVIRONMENTAL HEALTH SECTION
ON-SITE WASTEWATER BRANCH**

INNOVATIVE WASTEWATER SYSTEM APPROVAL
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INNOVATIVE WASTEWATER NO: IWWS-1995-3-R7

Issued To: EZflow, LP, a wholly owned subsidiary of Infiltrator Water Technologies, LLC
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For: EZflow Drainfield Systems (formerly Houck Drainage Systems):
EZ1003T (Formerly HDS 2003 Triangular)
EZ1003T-GEO
EZ1203T (Formerly HDS 2012 Triangular)
EZ1203T-GEO
EZ1203H (Formerly HDS 2012 Horizontal)
EZ1203H-GEO

Approval Date:	October 10, 1995	
	October 7, 1998	
	April 18, 2002	
	July 18, 2008	
	March 1, 2011	Addition of 3 foot and 7 foot bundles
	November 30, 2012	Elimination of Warranty Equivalency Factors and Reductions Exceeding 25%
	August 7, 2015	Elimination of particle density specification, update trench levelness requirements, and change company name to Infiltrator Water Technologies, LLC*

*Prior approvals were issued to Infiltrator Systems, Inc. or predecessor companies

In accordance with General Statute 130A-343 and 15A NCAC 18A .1969, an application by EZflow, LP, of Old Saybrook, CT (previously Ring Industrial Group) for a revised approval of the gravelless nitrification trench system has been reviewed, and found to meet the requirements of any innovative system when all of the following conditions are met:

I. General

A. Scope of this Innovative Approval

1. Use, design, and installation requirements for the EZflow Drainfield System.

B. The following EZflow Drainfield System trench models have been found to meet the standards of an innovative system:

- EZ1003T with 6 inch cover
- EZ1003T-GEO with 6 inch cover
- EZ1203T with 6 inch cover
- EZ1203T-GEO with 6 inch cover
- EZ1203H with 6 inch cover
- EZ1203H-GEO with 6 inch cover

II. System Description

A. Minimum pretreatment by septic tank as required in 15A NCAC 18A .1952.

B. EZflow expanded polystyrene aggregate particles (EPS) shall meet the following requirements:

1. EPS shall consist of three dimensional rectangular shapes resembling capital E's placed back-to-back (also known as the "double E") with void channels and surface area protuberances.
2. EPS shall range in size from 0.75 inches to 1.75 inches along any axis.

C. The EZflow Drainfield System units (also referred to as cylindrical units) shall meet the following general specifications:

1. EPS shall be contained in cylindrical high strength netting.
2. The physical and chemical properties of the netting shall be durable and resistive enough to retain the shape of the units and to withstand system installation, backfilling, corrosion, and loss of aggregate under intended use.
3. Cylindrical units shall be manufactured in 3-, 5-, 7-, and 10-foot long sections, +/- 2 inches.
4. The taper, or reduction in diameter, at each end of the cylindrical units shall not begin more than 3 inches from the point of enclosure, as measured along the linear axis of the unit.
5. Cylindrical units shall be able to withstand an AASHTO H-10 axle load of 16,000 pounds when covered with 12 inches of compacted soil and a shallow cover axle load of 4,000 pounds when covered with 6 inches of compacted soil without collapsing, fracturing or breaking when installed in a trench equaling the product configuration width.

D. Allowable configurations are described below:

1. EZ1003T (formerly HDS 2003 Triangular) shall meet the following description and specifications:
 - a. The product shall be comprised of three 10-inch-diameter units 3-, 5-, 7-, or 10-feet long placed in a trench 24 inches wide.
 - b. Two bottom cylinders containing aggregate only, with the netting tied off at both ends to prevent the escape of aggregate, are placed against opposite sides of the trench bottom (retaining a gap of approximately four inches between the bundles when placed in the 24-inch wide trench).
 - c. A third cylinder containing aggregate and a 4-inch diameter flexible plastic perforated pipe as is typically used in nitrification lines is centered on top of the bottom two bundles in the middle of the trench.
 - d. The pipe shall be certified as complying with ASTM F 405, Standard Specifications for Corrugated Polyethylene (PE) Tubing and Fittings, and shall be in accordance with 15A NCAC 18A .1955(f).
 - e. The 4-inch corrugated pipe is surrounded by approximately 2.5 to 3 inches of the EZflow aggregate.

- f. The netting for the central cylinder is tied off at both ends to the pipe. The pipe may be connected by an internal coupling device to allow continuous flow from one section to the next.
 - g. The pipe shall be connected by an internal coupling device to allow continuous connection from one section to the next.
 - h. The end-to-end gap distance between pipe containing cylinders, as measured from the straps fixing the netting to the pipe or from the face edges of aggregate on adjoining cylinders, shall be no greater than 3 inches.
 2. EZ1003T-GEO Drainfield System consists of the same product specifications as the EZ1003T as described above with the addition of geotextile fabric prefabricated between the netting and aggregate spanning 180 degrees +/- 15 degrees along the top of each cylinder. The geotextile shall meet the minimum average value specifications described in Table I.
 3. EZ1203T shall meet the following description and specifications:
 - a. The product shall be comprised of three 12-inch-diameter units 3-, 5-, 7-, or 10-feet long placed in a trench 30 inches wide.
 - b. Two bottom cylinders containing aggregate only, with the netting tied off at both ends to prevent the escape of aggregate, are placed against opposite sides of the trench bottom creating a gap of approximately 5 to 6 inches between the bundles.
 - c. A third cylinder containing aggregate and a 4-inch diameter perforated flexible plastic pipe as is typically used in nitrification lines is centered on top of the bottom two bundles in the middle of the trench.
 - d. The pipe shall be certified as complying with ASTM F 405, Standard Specifications for Corrugated Polyethylene (PE) Tubing and Fittings, and shall be in accordance with 15A NCAC 18A .1955(f).
 - e. The 4-inch pipe is centered or slightly offset from center towards the top of the cylinder whereby 4 to 6 inches of aggregate is located between the bottom of the pipe and the bottom of the cylinder, and 4 to 1-1/2 inches of aggregate is located between the top of the pipe and the top of the cylinder, respectively.
 - f. The netting for the central cylinder is tied off at both ends to the pipe. The pipe may be connected by an internal coupling device to allow continuous flow from one section to the next.
 - g. The end-to-end gap distance between pipe containing cylinders, as measured from the straps fixing the netting to the pipe or from the face edges of aggregate on adjoining cylinders, shall be no greater than 3 inches.
 4. EZ1203T-GEO Drainfield System consists of the same product specifications as the EZ1203T as described above with the addition of geotextile fabric prefabricated between the netting and aggregate spanning 180 degrees +/- 15 degrees along the top of each cylinder. The geotextile shall meet the minimum average value specifications described in Table I.
 5. EZ1203H (formally HDS 2012 Horizontal) shall meet the following description and specifications:
 - a. The product shall be comprised of three 12-inch-diameter units 3-, 5-, 7-, or 10-feet long placed side-by-side across the bottom of a 36-inch-wide trench.
 - b. The outer units shall contain aggregate only, with the netting tied off at both ends to prevent the escape of aggregate.
 - c. The central unit shall contain aggregate and a 4-inch-diameter perforated flexible plastic pipe as is typically used in nitrification lines.
 - d. The pipe shall be certified as complying with ASTM F 405, Standard Specifications for Corrugated Polyethylene (PE) Tubing and Fittings, and shall be in accordance with 15A NCAC 18A .1955(f).
 - e. The netting for the central unit shall be tied off at both ends of the pipe.

- f. The 4-inch pipe shall be offset from center towards the top of the unit whereby 5 to 6 inches of aggregate is located between the bottom of the pipe and the bottom of the unit, and 1 ¼- to 2 ½- inches of aggregate is located between the top of the pipe and the top of the unit.
 - g. The pipe shall be connected by an internal coupling device to allow continuous connection from one section to the next.
 - h. The end-to-end gap distance between pipe containing cylinders, as measured from the straps fixing the netting to the pipe or from the face edges of aggregate on adjoining cylinders, shall be no greater than 3 inches.
6. EZ1203H-GEO Drainfield System consists of the same product specifications as the EZ1203H as described above with the addition of geotextile fabric prefabricated between the netting and aggregate spanning 180 degrees +/- 15 degrees along the top of each cylinder. The geotextile shall meet the minimum average value specifications described in Table I.

Table I – Minimum Geotextile Filter Wrap Specifications for EZ1203H-GEO

Property	Value
Unit Weight	0.5 ounces per square yard
Tensile Strength	Cross Direction: 40 N/2.54cm +/- 20% Machine Direction: 50 N/2.54cm +/- 20%
Air Permeability	775 cubic feet per minute +/- 20%

III. Siting Criteria

EZflow Drainfield Systems may be utilized on any site that one can use rock aggregate and pipe which meet the following criteria:

- A. Sites which are classified as Suitable or Provisionally Suitable for a conventional nitrification field system in accordance with 15A NCAC 18A .1948(a) or (b).
- B. Sites which have been reclassified as Provisionally Suitable in accordance with 15A NCAC 18A .1956(2), (4), (5), (6), and (7).
- C. Sites which may be reclassified as Provisionally Suitable in accordance with 15A NCAC 18A .1956(1), except that for the triangular configurations at least 29 inches for EZ1003T and EZ1003T-GEO and at least 31 inches for EZ1203T and EZ1203T-GEO of naturally occurring soil must be present above saprolite, rock, or soil wetness conditions, and all other factors are Suitable or Provisionally Suitable.
- D. Sites which meet the criteria for new or existing fill in accordance with 15A NCAC 18A .1957(b). The provisions of Rule .1957(b) are applicable whenever any portion of the aggregate bundles in an EZflow Drainfield System extends into fill material. There shall be no reduction in trench length compared to conventional gravel trench as computed per Rule .1955 (sizing for all models shall be based on minimum excavated trench width in Table III, Section IVc of this Approval, without the application of an Equivalency Factor). This reference to "fill material" applies to the site fill and not the backfill placed between the trench and the cylinder sidewall.
- E. The required vertical separation shall be measured from the trench bottom.
- F. Where required by soil or site conditions and approved by the local health department, EZflow Drainfield Systems may be installed in lieu of conventional gravel trenches at depths deeper than

36 inches up to a maximum of 60-inches, as measured from the base of the trench. There shall be **no reduction in trench length** compared to a conventional gravel trench as computed per Rule .1955 for EZflow Drainfield Systems installed greater than three feet deep (sizing for all models shall be based on minimum excavated trench width in Table III, Section IVc of this Approval, without the application of an Equivalency Factor). Deep installation details shall be in accordance with EZflow Drainfield Systems North Carolina Design and Installation Manual, including special provisions to assure compliance with federal and state safety procedures for underground excavations.

IV. System Sizing

A. The maximum long-term acceptance rate (LTAR) shall be as follows:

Table II

Textural Group		LTAR (gpd/sq ft)	
		Natural Soil	Saprolite
Soil/Group I (Sands)	Sands	0.8-1.0*	0.6-0.8
	Loamy Sand		0.5-0.7
Soil Group II (Coarse Loams)	Sandy Loam	0.6-0.8	0.4-0.6
	Loam		0.2-0.4
Soil Group III (Fine Loams)	Silt Loam	0.3-0.6	0.1-0.3
	Other Fine Loams		NA
Soil Group IV	Clays	0.1-0.4	NA

* For sites where the LTAR exceeds 1.0 gpd/sq ft, use 1.0 gpd/sq ft.

- B. The LTAR shall be based on the most hydraulically limiting naturally occurring soil horizon within three feet of the ground surface or to a depth of one foot below the trench bottom whichever is deeper.
- C. To determine the minimum total trench bottom area (ft²) required, divide the design daily sewage flow by the applicable LTAR shown in Table II above. The minimum linear footage for EZflow Drainfield Systems shall be determined by dividing the total trench bottom area by the following equivalency factors:

Table III

Product Configuration	Excavated Trench Width	Equivalency Factor (SF/LF)
EZ1003T (2003 Triangular), EZ1003T-GEO	24-inch	3.0
EZ1203T (2012 Triangular), EZ1203T-GEO	30-inch	4.0
EZ1203H (2012 Horizontal), EZ 1203H-GEO	36-inch	4.0

Example:

Three bedroom residence with a design daily sewage flow of 360 gallons on a sandy clay loam (Group III) soil

Total computed trench bottom area is:

$$360 \text{ gpd}/0.5 \text{ LTAR} = 720 \text{ ft}^2$$

The required linear footage for EZ1203H-GEO is:

$$720 \text{ ft}^2/4.0 \text{ ft} = 180 \text{ linear ft}$$

Where 4.0 ft. is the equivalency factor for the EZ1203H-GEO system

- D. The EZ1203H and EZ1203H-GEO Horizontal Drainfield Systems may be used in a bed system with the three cylindrical bundles placed in rows next to each other. The minimum area (without reduction or equivalency factor) for a bed system shall be determined as required in 15A NCAC 18A .1955(d).
- E. The central cylinder of the EZ1203H and 1203H-GEO Horizontal Drainfield Systems which contains the off-set four-inch pipe may be used as an alternative to rock aggregate in a low pressure pipe (LPP) system, sized equivalent to LPP systems as required in 15A NCAC 18A .1957(a). The single 12-inch diameter cylinder shall be installed within a 12 to 18-inch wide trench. The LPP small diameter pressure laterals (one to two inches) shall be placed within the four-inch pipe sleeve and otherwise designed in accordance with Rule .1957(a). All orifices shall be drilled in the LPP laterals to face upward, except for a hole placed in the middle and a hole placed 25 percent from the distal end of each line, which shall face downward to allow for drainage. The minimum backfill requirement of six inches, as described below, shall also apply.
- F. The available space requirements of Rule .1945 shall be met, and this approved innovative system may be designated as the required replacement system.

V. Special Site Evaluation

A special site evaluation may be required based on the proposed ground absorption system. Refer to Rule .1970(p).

VI. Design Criteria

Refer to Siting Criteria (Section III) and Installation (Section VII) for design details.

VII. Installation

- A. The EZflow Drainfield Systems shall be configured in accordance with Section II and installed in nitrification trenches according to the minimum dimensions in Table IV.

Table IV

Product Configuration	Minimum Trench Spacing (feet)	Trench Width (Inches)	*Minimum Trench Depth (inches)	♣Minimum Pipe Depth below Grade	♣Minimum Pipe Ht. Above Trench Bottom (inches)
EZ1003T, EZ1003T-GEO	7.5	24	23	11	10
EZ1203T, EZ1203T-GEO	9.0	30	25	12	11
EZ1203H, 1203H-GEO	9.0	36	18	12	5 to 6

* On sloping lots, minimum required trench depths may be greater.

♣ Measurements for pipe height are to the pipe invert or bottom of pipe.

- B. A backfill barrier shall be placed over the EPS aggregate cylinders to prevent the infiltration of backfill material into the trench void spaces. The backfill barrier shall be 60 pound weight untreated building paper provided by the manufacturer or alternate with equal or better performance characteristics. An alternate backfill barrier shall be approved in writing by the manufacturer on a case-by-case basis. The barrier shall not be placed along the trench sidewalls below the pipe invert elevation. The barrier must be protected from becoming wet enough to tear until backfilling is completed. The EPS aggregate cylinders with the GEO suffix are prefabricated with a geotextile backfill barrier between the netting and aggregate. The GEO cylinders shall be oriented in the trench with the geotextile covering the top of the system. No additional backfill barrier material shall be required for GEO cylinders.
- C. Native soil removed from the trench excavation may be used as backfill and shall be placed along the sidewalls in the EZflow Triangular Drainfield Systems to a minimum compacted (carefully walked in) height level with the center of the top EPS cylinder. Backfill shall be free of trash or debris. The area adjacent to the cylinders shall be free of large (8" or greater) clods that do not break apart during the walk in procedure. Special attention should be given when backfilling the Triangular Systems so as not to disturb the configuration. Vehicular traffic and excavation equipment should not travel over any uncovered drainfield. The latest version of the manufacturer's installation procedures shall be followed.
- D. EZflow Drainfield System trenches shall be installed level in all directions with a plus or minus one-half-inch tolerance from side-to-side and maximum fall in a single trench bottom not exceeding one-fourth inch in 10 feet end-to-end for any continuous contoured segment. Trenches shall follow the contour of the ground surface elevation (uniform depth). Trenches shall be constructed with all continuous adjoining 3, 5, 7 or 10-foot cylindrical bundles placed end-to-end, with the central bundle distribution pipe interconnected, without any dams, stepdowns or other water stops.
- E. The 10-foot cylindrical bundles shall be used to make up the majority of the line length, with the 3, 5, and 7 foot cylindrical bundles being used only at the distal end of the trench. A maximum of three 3, 5, or 7 foot bundles may be used in any one line length. Examples: A 65 foot trench would utilize 6-10 foot bundles and 1-5 foot bundle, not 13-5 foot bundles. A 71 foot trench would utilize 6-10 foot bundles, two 3 foot bundles and one five foot bundle.
- F. EZflow Drainfield Systems installed on sloping sites may use distribution devices or step downs as described in 15A NCAC 18A .1955(j) and (l) when it is necessary to change level nitrification

line segments from upper to lower elevations. The minimum step-down height for the EZflow Triangular configurations may be reduced to be only up to the center of the pipe in the upstream trench.

G. Manufacturer's installation instructions for the EZflow Drainfield Systems shall be followed, except as required herein or by 15A NCAC 18A .1900 et. seq.

H. The system shall be installed by a contractor authorized in writing by EZflow, LP, Infiltrator Water Technologies, LLC, or either company's authorized representative for EZflow Brand Drainfield Systems.

VIII. Operation, Maintenance, and Monitoring

The EZflow Drainfield Systems shall have a minimum classification as a Type IIIg system (other non-conventional trench systems) in accordance with Table V(a) of Rule 15A NCAC 18A .1961(b).

IX. Responsibilities and Permitting

Prior to the installation of the approved EZflow Drainfield System at a site, the owner or owner's agent shall fill out an application at the local health department for the proposed use of this system. The local health department shall issue an Improvement Permit or Construction Authorization or amend a previously issued Construction Authorization allowing the use of an EZflow nitrification trench system. Use of the proposed innovative system and any conditions shall be described in the construction authorization or amended construction authorization, as applicable. Such information shall also be described on the operation permit to be issued upon the acceptable completion of the system installation.

X. Repair of Systems

The provisions of 15A NCAC 18A .1961(l) shall apply to the use of EZflow Drainfield Systems for repairs to existing malfunctioning septic tank systems.

Approved by: _____ Date: _____