

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

INNOVATIVE WASTEWATER SYSTEM APPROVAL
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INNOVATIVE WASTEWATER SYSTEM NO: IWWS-2010-1-R3

Issued To: Infiltrator Systems, Inc.
PO Box 768
Old Saybrook, CT 06475
800-221-4436; Fax: 860-577-7001
www.infiltratorsystems.com

Contact: Dave Lentz, P.E.

For: Infiltrator Quick4 Plus Standard Low Profile (LP) Chamber, Quick4 Plus Standard Low Profile (LP) All-in-One 8 Endcap, and "BioDiffuser" Arc 36 Low Profile (LP) Chamber

Approval Dates:	May 21, 2010	Quick4 Plus Standard Low Profile approval
	April 5, 2011	Arc 36 LP approval
	November, 2012	Change of Arc 36 LP Ownership to Infiltrator Systems Inc.
	September 5, 2014	Addition of Area Credit for Endcap
	October 31, 2014	Addition of Reduced Soil Depth for Coastal Plain Physiographic Region
	May 1, 2015	Merge IWWS-2011-1-R1 Arc 36 LP specifications into IWWS-2010-1-R2; retire IWWS-2011-1-R1

In accordance with General Statute 130A-343 and 15A NCAC 18A .1969, an application by Infiltrator Systems, Inc. of Old Saybrook, CT for a revised approval of their previously approved chamber (gravel-less) nitrification trench system has been reviewed and found to meet the requirements of an 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 Infiltrator Systems, Inc. chamber nitrification trench system.
2. Infiltrator has demonstrated that the modified systems, the Infiltrator Quick4 Plus Standard LP and Arc 36 LP models with a minimum of six inches of cover, will perform in a manner equal

or superior to the system as previously approved by Innovative Wastewater System Approval No. IWWS-93-2-R11 and its successors. The Quick4 Plus Standard LP and Arc 36 LP models with a minimum of six inches of cover are therefore hereby approved with innovative status subject to the conditions contained herein.

II. System Description

- A. Minimum pretreatment by septic tank as required in 15A NCAC 18A .1952.
- B. The Quick4 Plus Standard LP unit consists of polypropylene arch-shaped injection molded chamber. The connected overall length of a Quick4 Plus Standard LP chamber is 4 feet. The chamber sidewall slope is approximately 20 degrees toward the chamber center or away from the trench sidewall. Twenty-five Quick4 Plus Standard LP chambers are approximately equal to 100 feet.
- C. The Arc 36 LP unit consists of high-density polypropylene or polyethylene arch-shaped injection molded chambers. The connected overall length of an Arc 36 LP chamber is 5 feet. The chamber sidewall slope is approximately 20 degrees toward the chamber center and away from the trench sidewall.

Table I – Infiltrator Chamber Dimensions

Model	Height (in)	Invert ¹ Height (in)
Quick4 Plus Standard LP (polypropylene)	8.0	3.3 and 9.0
Arc 36 LP (polypropylene or polyethylene)	8.0	3.8 and 8.0

¹Invert Height is for a 4-inch diameter Schedule 40 PVC Pipe

- D. Each chamber unit shall be permanently marked as applicable:
 - 1. Quick4 Plus Standard LP; or
 - 2. Arc 36 LP.
- E. Each chamber unit mechanically interlocks with the downstream chamber forming a complete nitrification trench consisting of an inlet plate or cap with a splash plate located below the inlet on the trench bottom and a solid end plate or cap to be located at the distal end of any chamber nitrification line.
- F. In addition to conventional use as an end cap, the Quick4 Plus All-in-One 8 Endcap and the Quick4 Plus Periscope pipe appurtenances can also be used as an accessory with the Quick4 Plus Standard LP chamber to decrease the turning radius of a chamber line, as a drop-box in serial distribution, and for mid-line distribution pipe entry and exit. The Quick4 Plus All-in-One 8 Endcap can be used in all applications where the Quick4 Plus Standard LP chamber may be utilized.

III. Siting Criteria

A. COASTAL PLAIN COUNTIES ONLY: The Quick4 Plus Standard LP and Arc 36 LP nitrification trench assemblies may be utilized on any site that one can use rock aggregate and pipe which meets the following criteria in the **COASTAL PLAIN COUNTIES** listed in Table II and as shown on the map in Appendix I.

1. **Group I soils**
 - a. **A minimum of 26 inches** of naturally occurring soil present above a limiting factor (saprolite, rock, parent material, expansive clay mineralogy, unsuitable soil structure, restrictive horizons, or soil wetness conditions), and
 - b. All other factors provisionally suitable or suitable.
2. **Group II, III, or IV soils**
 - a. **A minimum of 20 inches** of naturally occurring soil present above a limiting factor (saprolite, rock, parent material, expansive clay mineralogy, unsuitable soil structure, restrictive horizons, or soil wetness conditions), and
 - b. All other factors provisionally suitable or suitable.
3. The required vertical separation shall be measured from the bottom edge of the chamber.
4. Reductions in total trench bottom area shall not be granted.

Table II – Coastal Plain Counties

Beaufort	Duplin	Pamlico
Bertie	Edgecombe	Pender
Bladen	Gates	Pasquotank
Brunswick	Greene	Perquimans
Camden	Hertford	Pitt
Carteret	Hoke	Robeson
Chowan	Hyde	Sampson
Columbus	Jones	Scotland
Craven	Lenoir	Tyrrell
Cumberland	Martin	Washington
Currituck	New Hanover	Wayne
Dare	Onslow	

B. ALL COUNTIES: The Quick4 Plus Standard LP and Arc 36 LP nitrification trench assemblies may be utilized on any site that one can use rock aggregate and pipe which meets the following criteria:

1. **Group I soils**
 - a. **A minimum of 30 inches** of naturally occurring soil present above a limiting factor (saprolite, rock, parent material, expansive clay mineralogy, unsuitable soil structure, restrictive horizons, or soil wetness conditions), and
 - b. All other factors provisionally suitable or suitable.
2. **Group II, III, or IV soils**
 - a. **A minimum of 24 inches** of naturally occurring soil present above a limiting factor (saprolite, rock, parent material, expansive clay mineralogy, unsuitable soil structure, restrictive horizons, or soil wetness conditions), and
 - b. All other factors are provisionally suitable or suitable.

3. 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 chamber in an Infiltrator System extends into fill material. This reference to “fill material” applies to the site fill and not the backfill placed between the trench and the chamber sidewall.
4. The required vertical separation shall be measured from the bottom edge of the chamber.
5. Reductions in total trench bottom area shall not be granted.
6. Trench bottom depth shall not exceed 36 inches.

IV. System Sizing

- A. Reductions in total trench bottom area shall not be granted.
- B. The maximum long-term acceptance rate (LTAR) shall be as specified in Table III:

Table III – LTAR for Infiltrator Chambers

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 an LTAR of 1.0 gpd/sq ft.

- C. 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 trench bottom, whichever is deeper.
- D. To determine the total trench bottom area (ft²) required the design daily sewage flow is divided by the applicable LTAR from Table III.
- E. The minimum area (without reduction) for a bed system shall be determined as required in 15A NCAC 18A .1955(d) except that the chambers shall be placed in rows next to each other.
- F. The available space requirements of Rule .1945 shall be met, and this approved innovative system may be designated as the required replacement system.
- G. The sizing for the Quick4 Plus Standard LP end cap system shall be determined by the equivalency factors in Table IV. Equivalency factors for the Arc 36 LP end cap system do not apply.

Table IV – Equivalency Factors for Quick4 Plus Standard LP End Caps

Product	Excavated Trench Width (inches)	Approved Chamber Equivalency Factor Linear Foot Basis (sf/lf) ¹	Linear Feet of Chamber Credit per Pair when Placed at Ends of Chamber Line (lf) ²	Linear Feet of Chamber Credit per Unit when Placed as a Mid Line Connection (lf) ³
Quick4 Plus Standard LP All-in-One 8 Endcap	36	3.0	1	1

¹ Actual linear-foot equivalency rating of compatible chamber part.

² Must install two (2) end cap parts to get approved linear feet of chamber credit.

³ Single end cap part installed within chamber line receives one (1) linear foot of chamber credit.

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 details.

VII. Installation

- A. The Infiltrator chamber system used in nitrification trenches shall be installed according to the minimum and maximum dimensions in Table V.

Table V – Infiltrator Installation Requirements (depths measured from finished grade)

Model	Maximum Trench Width (in)	Maximum Trench Depth (in)	Minimum Trench Spacing (ft on center)	Minimum Soil Cover (in)
Quick4 Plus Standard LP (polypropylene)	36	36	9	6
Arc 36 LP (polypropylene or polyethylene)	36	36	9	6

- B. The inlet to the Infiltrator chamber is in the uppermost portion of the specially molded inlet panel (“end cap”). For dosed systems receiving effluent from a pump or siphon, manufacturer’s installation procedures shall be followed, including provisions to dissipate inflow rate so as to minimize soil scouring and modifications that enable the presence and effectiveness of these provisions to be field-verified.
- C. The Quick4 Plus All-in-One 8 Endcap may be used as an accessory with the Quick4 Plus Standard LP chamber to decrease the turning radius of a chamber line, as a drop-box in serial distribution, and for mid-line distribution pipe entry and exit. The number of chambers in the chamber rows extending in opposite directions from the Quick4 Plus All-in-One 8 Endcap does not need to be equal.

- D. Backfill shall be placed between the trench and chamber sidewall to a minimum compacted (carefully walked in) height that is equal to the top of the chamber louvers. Chamber systems can be installed utilizing native soil backfill (Group I, II, III, or IV). Backfill shall be free of trash or debris. The area adjacent to louvers shall be free of large (8" or greater) clods that do not break apart during the walk in procedure. The latest version of the manufacturer's installation procedure shall be followed.
- E. Infiltrator chambers may be installed with a minimum compacted cover of six inches when the following conditions are met:
1. The person installing or constructing the system is certified (documented) by Infiltrator Systems, Inc. or its authorized representative as specially trained and qualified to install Infiltrator chamber units with a minimum soil cover of 6 inches;
 2. The person installing the Quick4 Plus Standard LP or Arc 36 LP chamber system shall produce certification documentation upon request by the State or local health department.
 3. When installing the Quick4 Plus Standard LP or Arc 36 LP chambers the installer shall carefully follow the manufacturer's installation guideline for shallow placement.
 4. In Group I soils, with only six inches of cover, tracked equipment shall be used during backfill as specified by the manufacturer's installation procedures.

Vehicular traffic or construction equipment may traverse the chamber system only during system installation. The load must be bridged over the trench so as not to disturb the chambers. The load may be bridged with a minimum of six inches of compacted soil cover over the chamber.

- F. Individual chamber trenches shall be constructed with $\pm \frac{1}{2}$ inch of trench levelness from side-to-side and shall follow the contour of the ground surface elevation (uniform depth). Trenches shall be constructed with continuous interlocking chambers, without any dams, stepdowns or other water stops, with a plus or minus 1-inch tolerance of trench levelness for any linear contoured segment.
- G. Infiltrator Systems installed on a sloping site may use distribution devices or stepdowns as described in 15A NCAC 18A .1955(j) and (l) when necessary to change level nitrification line segments from upper to lower elevations. For the Quick4 Plus Standard LP chamber, the Quick4 Plus All-In-One 8 Endcap and Quick4 Plus Periscope pipe appurtenances may be used as a stepdown by making the cross-over out of one of its pre-marked 3.3- or 9.0-inch-high ports. From the end cap, effluent is conveyed through a solid pipe segment installed on a positive downhill grade down to the next lower trench in series. For the Quick4 Plus Standard LP chamber, the pre-marked port on the top of the Quick4 Plus All-In-One 8 Endcap may be used to receive effluent from an upper trench by a cross-over pipe. Infiltrator's MultiPort Invert Adapter or glued 4-inch diameter piping may also be used to change elevation between nitrification lines. Stepdown installation details shall be in accordance with the manufacturer's installation procedures.
- H. After installation of chambers in trench or bed configurations, a filter fabric barrier shall be installed to cover the chambers (except Quick4 models) if chambers are installed in uncompacted, fine or very fine uniform sand and at least one of the following conditions are present.
1. Installations are left uncovered and subject to a major rain event.
 2. Systems are subject to not being sodded (or stabilized) in a timely manner after final cover-up has occurred.
 3. The drainfield is not protected from surface drainage.

The filter fabric shall be non-woven, weight 0.35 oz./s.y. to 1 oz./s.y., have apparent opening size (AOS) 20-30 U.S. Sieve (ASTM D-4571), or alternate with equal or better performance characteristics. An alternate fabric shall be approved in writing by the manufacturer on a case-by-case basis.

- I. Manufacturer's installation instructions for the applicable Infiltrator system used in septic tank systems shall be followed except as required herein or 15A NCAC 18A .1900 et.seq.
- J. All Infiltrator chamber systems shall be installed by a contractor or installer appropriately certified in writing by the manufacturer or its authorized representative.
- K. The Quick4 Plus Standard LP chamber system shall be installed only with the Infiltrator Quick4 Plus All-in-One 8 Endcap or Quick4 Plus 8 Endcap options at the ends of each chamber row. The ends of each Arc 36 LP chamber row shall be installed only with end cap system designed for that particular chamber model.

VIII. Operation, Maintenance and Monitoring Requirements

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

IX. Permitting

Prior to the installation of the approved Infiltrator chamber nitrification trench 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 and construction authorization or amend a previously issued construction authorization allowing the use of an Infiltrator chamber 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 Infiltrator chamber systems for repairs to existing malfunctioning septic tank systems.

Approved by: _____ Date: _____

Appendix I

