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

# INNOVATIVE WASTEWATER SYSTEM APPROVAL

Innovative Wastewater System Approval Number: IWWS-1993-2-R19

| | |
|---|---|
| Issued To: | Infiltrator Water Technologies, LLC<br>PO Box 768<br>Old Saybrook, CT 06475<br>www.infiltratorwater.com |
| Contact: | Dave Lentz, PE<br>800-221-4436 |
| For: | Infiltrator Standard, Standard SideWinder, Standard SC, Equalizer 36, High Capacity, Contour Wedge, Standard Contour Swivel, Quick4 Standard, Quick4 Standard-W, Quick4 Equalizer 36, Quick4 High Capacity and Quick4 Equalizer 24, Quick4 Standard MultiPort Endcap, Quick4 EQ 24 MultiPort Endcap, Quick4 EQ 36 MultiPort Endcap, Quick4 High Capacity MultiPort Endcap, and Quick4 Plus Standard All-in-One 12 Endcap, as well as BioDiffuser Standard Model 11" High Unit, Angle Chamber Section, Bio 3, Arc 36, Arc 36HC, and Arc 24 Models, Arc 36 Side Port Coupler (SPC) Unit, Arc 24 Side Port Coupler (SPC) Unit, Arc 36HC Side Port Coupler (SPC) Unit, Arc 36 SPC Endcap, and Arc 36HC SPC Endcap chamber effluent dispersal systems |

| Approval Dates: | | |
|---|---|---|
| | August 25, 1994 | Infiltrator Standard Chamber Approval |
| | March 21, 1997 | BioDiffuser 12-Inch Cover H-10 Load Design* |
| | April 26, 1999 | Infiltrator SC (Shallow or 6-inch cover) Load Design and High Capacity Chamber |
| | August 10, 2000 | BioDiffuser 6-Inch Cover (Shallow Placement) Design |
| | January 17, 2001 | Standard SideWinder and Contour Wedge |
| | July 25, 2001 | BioDiffuser Class IV Cover |
| | October 4, 2001 | Equalizer 36 and Standard SideWinder SC (Shallow or 6 inch cover) Load Design |
| | October 5, 2001 | BioDiffuser Angle Chamber Section |
| | April 18, 2002 | Infiltrator High Capacity SideWinder and Revised Equivalency Factors |
| | November 4, 2002 | BioDiffuser Warranty System with Revised Equivalency Factors |
| | March 20, 2003 | Equalizer 36 Swivel and Standard Contour Swivel |
| | April 8, 2003 | Revised (Warranty) Equivalency Factors |
| | April 9, 2003 | Bio 3 |
| | December 19, 2003 | Quick4 Standard Chamber |
| | April 7, 2004 | Minor Revisions/Edits |

| | |
|---|---|
| September 29, 2004 | Quick4 Standard-W Chamber |
| November 1, 2005 | Quick4 Equalizer 36 Chamber |
| March 10, 2006 | Arc 36 |
| December 21, 2006 | Quick4 High Capacity Chamber and Quick4 Equalizer 24 Chamber and Deep Installation Approval |
| April 28, 2008 | Arc 24 and Arc 36 Side Port Coupler (SPC) |
| July 18, 2008 | Addition of Hancor, Inc. |
| February 25, 2010 | Arc 36HC, Arc 24 Side Port Coupler (SPC), Arc 36HC Side Port Coupler (SPC), and Deep Installation Approval |
| March 1, 2011 | Addition of Quick4 Plus Standard |
| November 30, 2012 | Elimination of Warranty Equivalency Factors and Reductions Exceeding 25% |
| November 30, 2012 | Change of BioDiffuser and Arc Ownership to Infiltrator Systems Inc.* |
| September 5, 2014 | Addition of Area Sizing Credit for End Cap Parts |
| May 1, 2015 | Merge IWWS-1997-2-R11 BioDiffuser model specifications into IWWS-1993-2-R15; retire IWWS-1997-2-R11 |
| August 7, 2015 | Update trench levelness requirements and change company name to Infiltrator Water Technologies, LLC** |
| February 8, 2019 | Addition of Bed-in-fill system specifications*** |
| November 21, 2022 | Addition of modified Arc 36 and Arc 36 HC |
| December 31, 2024 | Updated for 18E and Renewed for 2025 |

*The March 21, 1997 innovative approval was issued to Advanced Drainage Systems, Inc. and transferred to Infiltrator Systems, Inc. on November 30, 2012.
**Prior approvals were issued to Infiltrator Systems, Inc. or predecessor companies.
***Refer to Section VIII for Bed-in-fill siting, sizing, special site assessment, design, installation criteria, and permitting.

In accordance with G.S. 130A-343 and 15A NCAC 18E Section .1700, an application by Infiltrator Water Technologies, LLC or its predecessor of Old Saybrook, CT for a renewal of their chamber trench, bed, or Bed-in-fill system has been reviewed and found to meet the requirements of an Innovative system when the following conditions are met.

I. General

A. Scope of this Innovative Approval
Use, design, and installation requirements for the Infiltrator Water Technologies, LLC chamber trench, bed, and Bed-in-fill systems, inclusive of Quick4, Arc, and BioDiffuser models as well as respective predecessor designs.

B. The following chamber system models have been found to meet the standards of an innovative system:
- Infiltrator Standard and Standard SideWinder (polyethylene) with 12-inch cover
- Infiltrator High Capacity (polyethylene) with 12-inch cover

- Quick4 Plus Standard, Quick4 Standard, Quick4 Standard-W, Standard SC and Standard SideWinder SC (polypropylene) Models with 6-inch cover
- Equalizer 36 with 6-inch cover
- Quick4 Equalizer 36 with 6-inch cover
- Quick4 High Capacity with 6-inch cover
- Quick4 Equalizer 24 with 6-inch cover
- High Capacity SideWinder (polypropylene) with 12-inch cover
- Contour Wedge
- EQ36 Swivel
- Contour Swivel – Standard
- Quick4 Standard MultiPort Endcap with 6-inch cover
- Quick4 EQ 24 MultiPort Endcap with 6-inch cover
- Quick4 EQ 36 MultiPort Endcap with 6-inch cover
- Quick4 High Capacity MultiPort Endcap with 6-inch cover
- Quick4 Plus Standard All-in-One12 Endcap with 6-inch cover
- BioDiffuser Standard Model with 6-inch cover
- Angle Chamber section with 6-inch cover
- Bio 3 with 6-inch cover
- Arc 36 with 6-inch cover
- Arc 24 with 6-inch cover
- Arc 36HC with 6-inch cover
- Arc 24 Side Port Coupler (SPC) with 6-inch cover
- Arc 36 Side Port Coupler (SPC) with 6-inch cover
- Arc 36HC Side Port Coupler (SPC) with 6-inch cover
- Arc 36 SPC Endcap with 6-inch cover
- Arc 36HC SPC End Cap with 6-inch cover

II. System Description

A. Minimum pretreatment by septic tank as required in 15A NCAC 18E .0801.

B. The chambers must meet the following requirements as specified, including the chamber dimensions identified in Table I.
   1. Infiltrator Standard and Standard SideWinder chamber units (including High Capacity Model) consist of a high-density polyethylene arch-shaped injection molded chambers.
   2. The Quick4 Plus Standard, Quick4 Standard, Standard SC and Standard SideWinder SC units consist of polypropylene arch-shaped injection molded chambers.
   3. Sixteen Infiltrator Standard or High Capacity chambers are approximately equal to 100 linear feet.
   4. Twenty-five Quick4 Plus Standard, Quick4 Standard, Quick4 Standard-W, Quick4 Equalizer 36, Quick4 High Capacity chambers, and Quick4 Equalizer 24 are approximately equal to 100 feet.
   5. Twelve Equalizer 36 chambers are approximately equal to 100 linear feet.
   6. BioDiffuser units consist of high-density polyethylene arch-shaped injection molded chambers.

7. Arc units consist of polypropylene or high-density polyethylene arch-shaped injection molded chambers.
8. Sixteen BioDiffuser Standard chamber units are approximately equal to 100 linear feet.
9. Fourteen BioDiffuser Bio 3 chamber units are approximately equal to 100 linear feet.
10. Twenty Arc 36, Arc 36HC, and Arc 24 units are each equal to 100 linear feet.
11. The chamber sidewall slope is approximately 20 degrees toward the chamber center or away from the trench or bed sidewall.

Table I – Chamber Dimensions

| Model | Height (in) | Invert[1] Height (in) |
|---|---|---|
| Standard and Standard SideWinder | 12.3 | 6.9 |
| Standard SC and Standard SideWinder SC | 12.3 | 6.9 |
| Quick4 Standard | 12.5 | 8.0 |
| Quick4 Plus Standard | 12.0 | 5.3 or 8.0 |
| Quick4 Standard-W | 12.5 | 8.0 |
| High Capacity and High Capacity SideWinder | 15.9 | 10.2 |
| Quick4 High Capacity | 15.9 | 11.5 |
| Equalizer 36 | 13.6 | 6.0 or 9.0 |
| Quick4 Equalizer 36 | 12.5 | 1.25, 6.0, 9.0, or 10 |
| Quick4 Equalizer 24 | 11.0 | 1.25, 6.0, 9.0, or10.0 |
| Standard | 11 | 6 |
| Arc 36 | 13 | 6 |
| Bio 3 | 12.38 | 6 or 11.75 |
| Arc 24 | 12 | 6 or 12 |
| Arc 36HC | 16 | 10.5 |

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

C. Each chamber unit shall be properly and permanently marked in compliance with the appropriate standard, and conditions of this approval as follows:
   - Standard or Standard SideWinder
   - Quick4 Plus Standard, Quick4 Standard, Quick4 Standard-W, Standard SC or Standard SideWinder SC
   - High Capacity, High Capacity SideWinder or Quick4 High Capacity
   - Equalizer 36 or Quick4 Equalizer 36
   - Contour Wedge
   - Quick4 Equalizer 24
   - EQ36 Swivel
   - Contour Swivel – Standard
   - Bio 3

- Arc 36
- Arc 24
- Arc 36HC

D. Each chamber unit mechanically interlocks with the downstream chamber forming a complete trench consisting of an inlet plate with a splash plate located below the inlet on the trench bottom and a solid end plate to be located at the distal end of any chamber trench line.

E. The contour wedge, EQ 36 swivel, or standard swivel can be utilized as accessories to achieve turns as necessary in all applications including, but not limited to, shallow cover with six inches of soil, or with 12 inches of soil with the standard and high capacity units.

F. The Angle Chamber Section may be utilized as an accessory for the BioDiffuser Standard and the Bio 3 models to achieve turns as necessary in all applications including, but not limited to, shallow cover with six inches of soil.

G. The Side Port Coupler (SPC) may be utilized as an accessory for the Arc 24, Arc 36, and Arc 36HC model chambers. The SPC may be used 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 in all applications where the Arc 24, Arc 36, and Arc 36HC model chambers may be utilized. A maximum of three consecutive SPC units can be used in series.

III. Siting Criteria *(Refer to Section VIII for Bed-in-fill siting criteria.)*

Chambers may be utilized on any site on which a conventional wastewater system can be installed, and which meets the following criteria:

A. Sites which are classified as Suitable for a conventional wastewater system in accordance with 15A NCAC 18E .0509(a) through (c).

B. Sites which meet the criteria for new or existing fill in accordance with 15A NCAC 18E .0909. The provisions of 15A NCAC 18E .0909 are applicable whenever any portion of the chamber trench extends into fill material. There shall be no reduction in trench length compared to a conventional gravel trench. This reference to fill material applies to the site fill and not the backfill placed between the trench and the chamber sidewall.

C. The required vertical separation shall be measured from the bottom edge of the chamber.

D. Where required by soil or site conditions and approved by the local health department (LHD), chamber 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 15A NCAC 18E .0901(c) for chamber systems if any part of the system is installed greater than 36 inches deep. Sizing for all models shall be based on the minimum excavated trench width in Table III, Section IV.C of this approval, without the application of an equivalency factor. Deep installation details shall be in accordance with the manufacturer's specifications and applicable federal and state safety procedures for underground excavations.

IV. Dispersal Field System Sizing *(Refer to Section VIII for Bed-in-fill sizing criteria.)*

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

Table II – LTAR for Chambers

| Textural Group | | LTAR (gpd/sq ft) | |
|---|---|---|---|
| | | Natural Soil | Saprolite |
| Soil/Group I | Sands | 0.8-1.0* | 0.6-0.8 |
| | Loamy Sand | | 0.5-0.7 |
| Soil Group II | Sandy Loam | 0.6-0.8 | 0.4-0.6 |
| | Loam | | 0.2-0.4 |
| Soil Group III | 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 to a depth of one foot below trench bottom.

C. The total trench bottom area ($ft^2$) required shall be determined by dividing the design daily flow by the applicable LTAR shown in Table II. The minimum linear footage for chamber systems shall be determined by dividing the total trench bottom area by the equivalency factors in Table III.

Table III – Chamber Trench Width and Equivalency Factors

| Product | Excavated Trench Width (inches) | Equivalency Factor*, ** (SF/LF) |
|---|---|---|
| Quick4 Standard | 36 | 3.80 |
| Quick4 Plus Standard | 36 | 4.00 |
| Quick4 Standard-W | 36 | 4.00 |
| Standard | 36 | 4.00 |
| Standard SC | 36 | 4.00 |
| Standard Sidewinder | 36 | 4.00 |
| Standard Sidewinder SC | 36 | 4.00 |
| High Capacity | 36 | 4.00 |
| High Capacity SideWinder | 36 | 4.00 |
| Quick4 High Capacity | 36 | 4.00 |
| Equalizer 36 | 24 | 3.00 |
| Quick4 Equalizer 36 | 24 | 3.00 |
| Quick4 Equalizer 24 | 18-24 | 2.00 |
| Standard | 36 | 4.00 |
| Arc 36 | 36 | 4.00 |
| Arc 36HC | 36 | 4.00 |
| Bio 3 | 24 | 3.00 |

| | | |
|---|---|---|
| Arc 24 | 24 | 3.00 |

* Reductions in trench length allowed by use of these Equivalency Factors, as compared to sizing requirements delineated in 15A NCAC 18E .0901(c) for conventional systems, apply only to dispersal fields receiving effluent of domestic strength or better quality. Any proposed use of the system for facilities producing higher strength wastewater shall be sized in adherence with conditions set forth in 15A NCAC 18E .1711(5).

** When advanced pretreatment pursuant to 15A NCAC 18E, Section .1200 is used to gain a trench length reduction or LTAR increase, system sizing shall be initially based on the minimum excavated trench width in this Table without use of an Equivalency Factor.

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 gpd/0.5 gpd/ft$^2$ = 720 ft$^2$

The required linear footage for Infiltrator Standard chamber system is:

720 ft$^2$/4.0 ft = 180 linear ft

Where 4.0 ft is the equivalency factor for the Infiltrator Standard chamber system

D. The sizing for the chamber end cap and mid-line connection systems for trenches shall be determined by the equivalency factors in Table IV.

Table IV – Trench Equivalency Factors for End Cap Systems and Mid-Line Connections

| Product | Excavated Trench Width (inches) | Approved Chamber Trench Equivalency Factor Linear Foot Basis[1,2] (sf/lf) | Linear Feet of Chamber Credit per Pair when Placed at Ends of Chamber Line (lf) [2,3] | Linear Feet of Chamber Credit per Unit when Placed as a Mid-Line Connection (lf) |
|---|---|---|---|---|
| Quick4 Standard MultiPort Endcap | 36 | 4.0 | 1 | NA |
| Quick4 Plus Standard All-in-One 12 Endcap | 36 | 4.0 | 2 | 1[4] |
| Quick4 HC MultiPort Endcap | 36 | 4.0 | 2 | NA |
| Quick4 EQ 36 MultiPort Endcap | 24 | 3.0 | 1 | NA |
| Quick4 EQ 24 MultiPort Endcap | 18-24 | 2.0 | 1 | NA |
| Arc 36 SPC and SPC Endcap | 36 | 4.0 | 2 | 1[5] |
| Arc 36HC SPC and SPC Endcap | 36 | 4.0 | 2 | 1[5] |

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

[2] Only end cap models listed qualify for bed bottom area credit.

[3] Must install two end cap parts to get approved linear feet of chamber credit.
[4] Single end cap part installed within chamber line receives one linear foot of chamber credit.
[5] Single Side Port Coupler installed within chamber line receives one linear foot of chamber credit.

The minimum area (without reduction or equivalency factor) for a bed system in natural soil shall be determined as required in 15A NCAC 18E .0903, except that the chambers shall be placed in rows next to each other. The requirements of 15A NCAC 18E .0903 shall be met for the installation of a bed system.

E. The available space requirements of 15A NCAC 18E .0508 shall be met, and this approved innovative system may be designated as the required repair system.

V. Special Site Evaluation *(Refer to Section VIII for Bed-in-fill special site evaluation criteria.)*

A special site evaluation may be required based on the proposed dispersal field. Refer to 15A NCAC 18E .0510.

VI. Design Criteria *(Refer to Section VIII for Bed-in-fill design criteria.)*

Refer to Siting Criteria in Section III and Installation information in Section VII for installation details.

VII. Installation *(Refer to Section VIII for Bed-in-fill installation criteria.)*

A. Chamber systems used in trenches shall be installed according to the minimum and maximum dimensions in Table V.

Table V – Trench Installation Requirements

| Model | Maximum Trench Width (in) | Minimum Trench Depth (in) | Minimum Trench Spacing (ft on center) | Minimum Soil Cover (in) |
|---|---|---|---|---|
| Standard | 36 | 24 | 9 | 12 |
| Standard SideWinder | 36 | 24 | 9 | 12 |
| Quick4 Plus Standard, Quick4 Standard, Quick4 Standard-W, and Standard SC | 36 | 18 | 9 | 6 |
| Standard SideWinder SC | 36 | 18 | 9 | 6 |
| High Capacity and High Capacity SideWinder | 36 | 30 | 9 | 12 |
| Quick4 High Capacity | 36 | 22 | 9 | 6 |
| Equalizer 36 | 24 | 19.5 | 7 | 6 |
| Quick4 Equalizer 36 | 24 | 18.5 | 7 | 6 |
| Quick4 Equalizer 24 | 24 | 17 | 6 | 6 |
| Quick4 Equalizer 24 | 18 | 17 | 5 | 6 |
| Standard | 36 | 17 | 9 | 6 |
| Arc 36 | 36 | 19 | 9 | 6 |

| | | | | |
|---|---|---|---|---|
| Arc 36HC | 36 | 22 | 9 | 6 |
| Bio 3 | 24 | 18.4 | 7 | 6 |
| Arc 24 | 24 | 18 | 7 | 6 |

B. The inlet to the chamber shall be in the uppermost portion of the 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. Modifications that enable the presence and effectiveness of these provisions shall be field verified.

C. 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. Backfill shall be free of trash or debris. The area adjacent to louvers shall be free of large (eight inches 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. The Standard, Standard SideWinder, High Capacity, High Capacity SideWinder and Quick4 Equalizer 24 chamber models require additional soil backfill (Group I, II, III, or IV) to a minimum compacted cover of 12 inches above the chamber. The Quick4 Standard, Quick4 Plus Standard, Quick4 Standard-W, Standard SC, Standard SideWinder SC, Equalizer 36, Quick4 Equalizer 36, Quick4 High Capacity, Quick4 Equalizer 24, BioDiffuser Standard, Arc 36, Arc 36HC, Bio 3, and Arc 24 chamber models may be installed with a minimum compacted cover of six inches when the following conditions are met:
   1. Quick4 Standard, Quick4 Plus Standard, Quick4 Standard-W, Standard SC, Standard SideWinder SC, Quick4 High Capacity, Quick4 Equalizer 24, Equalizer 36, Quick4 Equalizer 36, BioDiffuser Standard, Arc 36, Arc 36HC, Bio 3, or Arc 24 chamber units are used;
   2. The person installing the system is authorized in writing by Infiltrator Water Technologies, LLC or its authorized representative as trained and qualified to install chamber units;
   3. The person installing the chamber system shall produce certification documentation upon request by the State or LHD;
   4. When installing the chambers with six inches of soil cover in Group I soils (including specially constructed Infiltrator Contour Wedge and Swivel units), the installer shall carefully follow the manufacturer's installation guideline for shallow placement.

   Vehicular traffic or construction equipment may traverse the chamber system only when the load is 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 shallow chamber models (Quick4 Standard, Quick4 Standard-W, Standard SC, Standard SideWinder SC, Quick4 High Capacity, Equalizer 36, Quick4 Equalizer 36, Quick4 Equalizer 24, BioDiffuser Standard, Arc 36, Arc 36HC, Bio 3, and Arc 24) and a minimum of 12 inches of compacted soil cover over other chamber models.

D. EQ36 Swivel and Standard Contour Swivel shall be installed on undisturbed soil which is level with the adjacent dispersal field trench bottoms. The installer shall be responsible for compacting the trench bottom beneath the Swivel units according to the manufacturer's guidelines when the units are installed in Group I sands. Backfill for the Swivel units shall be hand-compacted (carefully walked in) up to the top of the adjacent chamber units. Backfill shall be native soil. Backfill for the Swivel units shall be free of trash or debris and clods larger than

three inches which do not break apart during the hand-compaction procedure.

E. Chamber trenches shall be constructed level in all directions with 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 continuous interlocking chambers, including appurtenances, without any dams, stepdowns or other water stops.

F. Chamber systems installed on a sloping site may use distribution devices or stepdowns as described in 15A NCAC 18E .0901(g)(9) and (11) when it is necessary to change level line segments from upper to lower elevations. The Multi-Port end cap of the Quick4 model chambers may be used as a stepdown by making the cross-over out of one of its upper pre-marked ports (eight inches above the bottom of the end cap) and conveying effluent through a solid pipe segment installed on a positive downhill grade down to the next lower trench in series. The pre-marked ports on the top of chambers may be used to receive effluent from an upper trench by a cross-over pipe. Stepdown installation details shall be in accordance with Infiltrator's North Carolina Design and Installation Manual.

G. After installation of chambers in trench or bed configuration, a filter fabric barrier shall be installed to cover the chambers (except Quick4 and Arc Chamber 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 dispersal field 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.

H. Manufacturer's installation instructions for the applicable chamber system used in septic tank systems shall be followed except as required herein or 15A NCAC 18E.

I. All chamber systems shall be installed by an installer authorized in writing by the manufacturer or its authorized representative.

J. All chamber systems shall be installed with compatible end caps at the inlet and distal ends of each chamber row.

K. For low-pressure pipe (LPP) applications, sleeving the pressurized pipe within a larger-diameter pipe is not required or recommended, nor is it prohibited.

VIII. Bed Systems Installed in Fill (Bed-in-fill System)

A. For chamber systems installed in a bed configuration in fill (Bed-in-fill), all Section VIII requirements apply.
   1. Chamber models approved for use in a Bed-in-fill system include those listed in Table VI

Table VI – Allowable Bed-in-fill Chamber Models

| Product |
|---|
| Quick4 Standard |
| Quick4 Plus Standard |
| Quick4 Standard-W |
| Standard |
| Standard SC |
| Standard Sidewinder |
| Standard Sidewinder SC |
| Standard |
| Arc 36 |

   2. End caps shall be compatible with the chamber model to be used and sized using the Bed-in-fill equivalency factors in Table VII.

Table VII – Bed-in-fill Equivalency Factors for End Cap Systems

| Product[1] | Engaged Length of Single End Cap at End of a Chamber Line (ft) | Approved Chamber Bed-in-fill System Equivalency Factor Linear Foot Basis[2] (sf/lf) |
|---|---|---|
| Quick4 Standard MultiPort Endcap | 1.0 | 3.0 |
| Quick4 Plus Standard All-in-One 12 Endcap | 1.5 | 3.0 |
| Arc 36 SPC and SPC Endcap | 1.2 | 3.0 |

[1]End cap models used must be compatible with chamber product and only models listed qualify for equivalency factors.
[2]Linear-foot equivalency factor of compatible chamber part.

B. Bed-in-fill Siting criteria
   1. A Bed-in-fill system may be installed on sites where at least the first 36 inches below the naturally occurring soil surface consist of sand or loamy sand (Soil Group I).
   2. A Bed-in-fill system shall only be used when the LHD determines that there is inadequate space to install a gravity flow trench-type system as required in 15A NCAC 18E .0909. The site shall have a uniform slope not exceeding two percent.
   3. No soil wetness condition shall exist within the first 12 inches below the naturally occurring soil surface. Artificial drainage shall not be used to meet this requirement.
   4. The horizontal setbacks of 15A NCAC 18E .0601 shall apply as measured from a point five feet from the nearest edge of the bed sidewall.
   5. Refer to Table I for chamber dimensions.
   6. The required vertical separation shall be measured from the bed bottom.

C. Bed-in-fill System sizing
   1. The maximum daily sewage flow shall not exceed 480 gpd.
   2. The LTAR shall not exceed 1.0 gpd/sq ft. For sites where the LTAR exceeds 1.0 gpd/sq ft, use 1.0 gpd/sq ft.
   3. The minimum required bed bottom area (sq ft) shall be determined based upon the design daily flow divided by the applicable LTAR. The resulting area value shall be increased by 50 percent in accordance with 15A NCAC 18E .0903.
   4. The minimum required bed bottom area shall contain a combination of chambers and end caps (placed on 3-foot centers) and the distribution device and piping such that their combined outside perimeter area is equal to or greater than the minimum bed bottom area required under Section VIII.C.3. Chambers and end caps shall cover the bed bottom as described in Section VIII.E. The maximum spacing between opposing end caps adjacent to the distribution device and piping shall be six feet or in accordance with the manufacturer's installation instructions. End cap bed bottom sizing shall be determined per the bed equivalency factors in Table VII.

      Example:
      Three-bedroom residence with a design daily sewage flow of 360 gallons on a sand (Group I) soil having a LTAR equal to 0.9 gpd/sq ft

      Total minimum required Bed-in-fill system bed bottom area is:

      360 gpd/0.9 gpd/sq ft LTAR x 1.5 bed upsizing factor = 600 sq ft

      For a center-fed Quick4 Plus Standard chamber with Quick4 Plus All-in-One 12 Endcap bed system constructed using five chambers and two end caps for each of four laterals on each side of the bed, the area provided to satisfy the minimum required bed bottom area is calculated as follows:

      Chamber area = 2 sides of bed x 4 laterals x 5 chambers x 3 sq ft/ft x 4 ft/chamber = 480 sq ft

      End cap area = 2 sides of bed x 4 laterals x 3 sq ft/lf of end cap x 1.5 ft long x 2 end caps = 72 sq ft

      Distribution device area = 4 laterals x 3 ft wide/lateral x 6 ft long = 72 sq ft

      Total chamber, end cap, and distribution device area provided = 624 sq ft

      This example results in a bed with a footprint of 12 ft x 52 ft minus any buffer and toe slope, and requires 40 chambers, 16 end caps, and a distribution box with at least four outlets on each side. Six feet of separation is allowed in the center of the bed for the distribution box and piping.

   5. No industrial process wastewater shall discharge to a Bed-in-fill system.
   6. The available space requirements of 15A NCAC 18E .0508 shall be met, and an approved innovative system may be designated as the required replacement system.

D. Bed-in-fill Special Site Evaluation

A special site evaluation may be required based on the proposed dispersal field. Refer to 15A NCAC 18E .0510.

E. Bed-in-fill Installation
1. Fill material shall be sand or loamy sand (Group I soil), containing not more than 10 percent debris, and shall be approved prior to placement by the LHD.
2. Prior to fill placement, the site shall be void of a vegetative cover, organic litter, and debris.
3. Fill shall be placed in six inch lifts, with each fill layer mixed with the underlying layer of natural soil or sandy fill material.
4. The sideslope of the fill shall not exceed a rise to run ratio of 1:3.
5. The system shall be constructed as an elongated berm with the long axis parallel to the ground elevation contours of the slope.
6. The bottom of the bed shall be excavated level (± ¼") in all directions.
7. Chamber rows shall be placed three feet on-center.
8. The edge of the bed shall be located 1 ½ feet from the centerline of the outermost chamber row.
9. For each chamber row, the outer end caps shall extend at least to the end of the required bed footprint.
10. Allowable effluent distribution includes gravity flow, pressure-dosed gravity, or LPP.
11. For gravity and pressure-dosed gravity distribution, the following requirements apply:
    a. The bed bottom shall have a minimum separation of 24 inches from any soil wetness condition.
    b. The bed bottom shall have a minimum separation of 30 inches from any soil horizon unsuitable as to soil structure, clay mineralogy, organic soil, restrictive horizon, rock, or saprolite.
    c. The distribution device shall be placed in the center of the bed and is eligible for sizing credit if underlain by Group I fill material or 12 inches or less of gravel.
    d. The bed bottom area shall include the area bounded by the edges of the outmost chamber rows and end caps located at ends of the chamber rows. The bed bottom area includes the area between chamber rows where the distribution device and piping are located.
    e. Each line of chambers shall be connected to a distribution box or pressure manifold.
    f. A maximum of 16 chamber lines are allowed, with no more than eight on each side of the distribution device.
    g. The bed width shall be constructed in a multiple of three feet up to a maximum of 24 feet.
    h. Group I fill material shall be placed to the top of the chambers.
    i. The final six inches of soil cover placed over the bed and side slopes shall be classified as a Group II or III soil.
12. For LPP distribution, the following requirements apply:
    a. The bed bottom shall have a minimum separation of 18 inches from any soil wetness condition.
    b. The bed width shall be constructed in a multiple of three feet up to a maximum of 24 feet.

c. Laterals shall be installed in each chamber line per the manufacturer's installation instructions using uniform spacing between laterals. Sleeving of the lateral in a larger-diameter pipe is not required or recommended, nor is it prohibited.
d. The bed bottom area shall include the area bounded by the edges of the outmost chamber rows and end caps located at ends of the chamber rows.
e. Except as described herein, the provisions of 15A NCAC 18E .0907 shall apply.
f. Group I fill material shall be placed to the top of the chambers.
g. The final four inches of soil cover over the bed and side slopes shall be classified as Group II or III soil.

13. For approved Residential Wastewater Treatment Systems (RWTS) or approved innovative advanced pretreatment systems, the following requirements apply:
    a. The RWTS shall be approved in accordance with the provisions of 15A NCAC 18E, Section .1500.
    b. The bed bottom shall have a minimum separation of 18 inches from any soil wetness condition.
    c. The bed system may utilize a gravity distribution as described in Section VIII.E.11.
    d. If LPP distribution is utilized, the requirements of Section VIII.E.12 shall apply except that the bed bottom shall have a minimum separation of 12 inches from any soil wetness condition.
14. The latest version of the manufacturer's installation procedure shall be followed.
15. The person installing the system shall be authorized in writing by Infiltrator Water Technologies, LLC or its authorized representative as trained and qualified to install chamber units.
16. The person installing the chamber system shall produce written authorization documentation upon the request by the State or LHD.
17. The inlet to the chamber shall be in the uppermost portion of the 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. Modifications that enable the presence and effectiveness of these provisions shall be field verified.
18. After installation of chambers in trench or bed configuration, a filter fabric barrier shall be installed to cover the chambers if chambers are installed in uncompacted, fine or very fine uniform sand and at least one of the following conditions are present.
    a. Installations are left uncovered and subject to a major rain event.
    b. Systems are subject to not being sodded (or stabilized) in a timely manner after final cover-up has occurred.
    c. The dispersal field 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.
19. Manufacturer's installation instructions for the applicable chamber system used in septic tank systems shall be followed except as required herein or 15A NCAC 18E.
20. All chamber systems shall be installed by an installer authorized in writing by the manufacturer or its authorized representative.
21. All chamber systems shall be installed with compatible end caps at the inlet and distal ends of each chamber row.

IX. Operation, Maintenance, and Monitoring

Chamber systems shall have a minimum classification as a Type IIIg system in accordance with 15A NCAC 18E .1301(b), Table XXXII.

X. Responsibilities and Permitting

A. An owner may submit an application or Notice of Intent (NOI) to the local health department (LHD) requesting the use of this approved product or may submit a request in writing to the LHD to use this product on a site for which an improvement permit and/or construction authorization has been previously issued. The LHD shall confirm the installation of the approved chamber is contained within the approved soil area and meets site conditions. The LHD shall include the change in system on the operation permit.

B. Improvement Permits (IP) or Construction Authorizations (CA) issued by the LHD shall have a soil and site evaluation conducted either by the LHD, LSS, or AOWE. The NOI shall include a soil and site evaluation conducted by an LSS.

C. The IP, CA, and NOI shall contain all the conditions the site approval is based upon, including the proposed use of the Innovative system. The OP will include all the conditions specified in the IP and the CA. The Authorization to Operate (ATO) should include all the conditions specified in the NOI.

D. The LHD shall issue the OP after the following:
   1. Field verification that the installation has been completed;
   2. Receipt of written documentation from the authorized designer or PE that the system has been designed, installed, and is operating in accordance with the approved plans; and
   3. All necessary legal documents have been completed, including the contract between the system owner and the authorized operator.

   The LHD shall issue the OP for an (a2) and (a5) application after all necessary legal documents have been completed, including the contract between the system owner and the authorized operator if required.

   The ATO shall be submitted to the LHD in accordance with G.S. 130A-336.1 and G.S. 130A-336.2.

XI. Repair of Systems

The provisions of 15A NCAC 18E .1306 shall apply to the use of chamber systems for repairs to existing malfunctioning septic tank systems.

Approved by:_____Date:_____