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

PROVISIONAL WASTEWATER SYSTEM APPROVAL

Provisional Wastewater System Approval Number: PWWS 2013-01-R1

Issued To: Orenco Systems, Inc.
814 Airway Ave.
Sutherlin, OR 97479
http://www.orenco.com/

Contact: Nicholas Noble
541-459-4449

For: Biotube® ProPak™ Pump Package Effluent Pumping Systems for Use in Combined Septic/Pump Tanks

Approval Date: October 31, 2013
May 19, 2025 Updated for 18E and renewed for 2025

In accordance with G.S. 130A-343 and 15A NCAC 18E, Section .1700, an application by Orenco Systems, Inc., for renewal of their on-site wastewater system utilizing the Biotube® ProPak™ Pump Package in combined septic/pump tanks has been reviewed and the system has been found to meet the requirements of a Provisional System the following conditions are met.

I. General

A. Scope of this Provisional Approval
1. Design, installation, use, and operation and maintenance requirements for the Biotube® ProPak™ Pump Package system to meet Domestic Strength Effluent pursuant to 15A NCAC 18E .0402(a), Table III.
2. Operation, maintenance, and monitoring requirements for the Biotube® ProPak™ Pump Package system.
3. Proposal for evaluation of this Provisional System.

B. This Provisional Approval is applicable to residential systems with daily design flows up to 720 gallons per day (six bedrooms).

II. System Description

The Biotube® ProPak™ Pump Package is a septic tank effluent pumping system that includes a pump vault with associated pumping equipment, placed in the outlet end of a two-compartment septic/pump tank with liquid levels hydraulically shared between the two compartments. The pump vault is equipped with internal effluent filter cartridges that protect downstream treatment components including the dispersal field, by preventing solids larger than 1/16-inch from leaving the tank.

Biotube ProPak pump packages feature a molded polyethylene Biotube Pump Vault Unit (PVU) that houses the 4" turbine effluent pump, and contains a Biotube filter cartridge, float switch assembly, and discharge plumbing assembly. The pump vault is designed so that the filter cartridge can be removed for cleaning without pulling the pump or vault out of the tank. Effluent enters through inlet holes around the perimeter of the PVU, then flows through the filter cartridge and down through the vault base to the pump, which resides in an external flow inducer compartment molded into the PVU. The PVU is suspended from the tank access opening on PVC support pipes or may rest on the bottom of the tank depending on the tank dimensions.

Each Biotube Propak pump vault will be equipped with a 12-inch diameter, 18-inch tall Biotube filter cartridge providing 14.5 ft^2 of total filter surface area and 4.4 ft^2 of open flow area.

III. Siting Criteria

The Orenco Biotube® ProPak™ Pump Package effluent pumping system and associated dispersal fields shall be sited and sized in accordance with the 15A NCAC 18E.

IV. Dispersal Field Sizing

The dispersal field sizing criteria shall be based upon the long-term acceptance rate (LTAR) specified in the appropriate portion of the rules or the Provisional, Innovative, or Accepted system approval for the type of dispersal system to be used.

V. Special Site Evaluation

A special site evaluation may be required based on the proposed dispersal system. Refer to 15A NCAC 18E .0510(c) for when a special site evaluation is required.

VI. Design Criteria

A. Septic/pump tanks in which effluent pumping systems are installed shall be approved by the Department for use as septic tanks pursuant to 15A NCAC 18E, Section .1400. An effluent filter shall not be required because the pump vault filter cartridge is intended to provide an equivalent function.

C. The following minimum septic tank capacities shall apply:
   1. The minimum approved septic tank capacity shall be 1,500 gallons.
   2. A minimum approved septic tank capacity of 2,000 gallons shall be used for any system designed for residences with five or six bedrooms, or with four bedrooms in Group IV soils with an LTAR of less than 0.3 gpd/ft^2 for conventional systems, less than 0.25 gpd/ft^2 for 25

percent reduction systems, less than 0.3 gpd/ft^2 with prefabricated permeable block panel systems, or less than 0.2 gpd/ft^2 for any low-pressure pipe (LPP) distribution system.

3. A minimum of 24 hours of emergency storage capacity in the septic/pump tank is required. The available freeboard space in both compartments of the tank (from the high-level alarm activation level up to the tank ceiling) shall be considered emergency storage space. Additional emergency storage may be needed in situations where operator response time may be more than 12 hours.
4. The minimum liquid capacity of the septic/pump tank (defined as the combined volume of both compartments below the pump OFF level) shall meet or exceed the requirements for septic tanks as required in 15A NCAC 18E .0801.
5. In addition to the above specified minimum emergency storage and minimum liquid capacities, the tank shall provide sufficient additional capacity to contain the minimum dose volume in accordance with 15A NCAC 18E .1101(d).

D. The pump vault inlet holes shall be positioned in the clear zone, which is typically 60 to 80 percent of the minimum liquid level.

E. The maximum drawdown during a dosing event shall not exceed 20 percent of the tank's liquid capacity.

F. The pump controls shall be set so that the pump-off level is at least eight inches above the top of the flow-through ports in the tank partition, to minimize any potential for carryover of scum to the second compartment.

G. Two watertight, approved manholes or risers, with secure cover, shall be provided in the tank top, one at the tank inlet and one providing access to the pump compartment. The tank inlet opening shall be a minimum of 17 inches in diameter or 15 inches by 15 inches; the pump tank access opening shall be a minimum of 21 inches by 21 inches or 24 inches in diameter. The openings shall extend at least six inches above finished grade. The outlet-end manhole shall be located to allow maintenance of the pump vault.

H. All systems must be equipped with a pump cycle counter, pump elapsed time meter, and high-water alarm event counter.

I. For LPP dispersal systems, the system shall conform to all design requirements of 15A NCAC 18E .0907 except that lateral lines may use 1/8-inch diameter orifices throughout the pressure distribution network. In addition, for LPP systems the design pump flow rate shall be sufficient to deliver at least five feet of pressure head at the distal end of all lateral lines. LPP system orifices shall be protected by orifice shields or other means, such as sleeving.

J. A repair area shall be set aside with sufficient space for placement of a separate pump tank if the Provisional system must be replaced with a conventional two-tank system.

K. The manufacturer will provide design guidance to aid designers in tank sizing, float settings, pump vault selection, and LPP system design to assure equal distribution of effluent in the drainfield.

VII. Installation and Testing

A. A pre-construction conference shall be required to be attended by the following, as applicable: Authorized On-Site Wastewater Evaluator (AOWE), Professional Engineer (PE), designer authorized in writing by Orenco Systems Inc. (authorized designer), installer authorized in writing by Orenco Systems, Inc. (authorized installer), Orenco manufacturer's representative, and local health department (LHD), prior to beginning installation of the Biotube® ProPak™ Pump Package effluent pumping system.

B. Biotube® ProPak™ Pump Package effluent pumping system shall be installed according to directions provided by Orenco Systems, Inc.

C. All individuals or companies installing Biotube® ProPak™ Pump Package effluent pumping system shall be in possession of all necessary permits and licenses before attempting any portion of a new or repair installation. The company or individual must be a Level II installer and authorized in writing by Orenco Systems, Inc. A higher level of installer may be required based on the proposed dispersal field. For example, LPP dispersal fields require a Level III installer.

D. Watertightness of the tanks shall be tested by either of the following protocols: 24-hour hydrostatic test or a vacuum test.
   1. Hydrostatic Test[1, 2]
      a. Temporarily seal the inlet and outlet pipes.
      b. Fill tank with clean water to a point at least two inches above the pipe connections or the seam between the tank and the riser, whichever is highest.
      c. Measure the water level.
      d. Allow the tank to sit for 24 hours.
      e. Re-measure the water level.
      f. If the water level change is ½-inch or less or one percent of the liquid tank capacity, the tank passes the leak test.
      g. If the water level change is greater than ½-inch, any visible leaks can be repaired and the tank may be topped off with water and allowed to sit for a minimum of one hour.
      h. The tank passes the leak test if there are no visible leaks (flowing water or dripping in a steady stream) and no measureable drop in water level after one hour. Otherwise, the tank fails the leak test.
   2. Vacuum Test[3]–
      a. Temporarily seal the inlet and outlet pipes.
      b. A vacuum of four inches of mercury should be pulled on the tank and held for five minutes.
      c. During the testing, the tank manufacturer or their representative can seal the tank if it is found to be leaking.

[1] Victor D'Amato and Ishwar Devkota, *Development of Prefabricated Septic and Pump Tank Construction and Installation Standards for North Carolina.*
[2] National Precast Concrete Association, *Best Practices Manual Precast Concrete On-Site Wastewater Tanks*, Second Edition, October 2005, 24.
[3] National Precast Concrete Association, *Best Practices Manual Precast Concrete On-Site Wastewater Tanks*, Second Edition, October 2005, 24.

d. If the tank is repaired, the vacuum must be brought back up to four inches and held for five minutes.

E. The authorized installer, PE, AOWE, or authorized designer, and the operator authorized in writing by Orenco Systems, Inc. (authorized operator) shall conduct a final inspection and start-up of the Biotube® ProPak™ Pump Package effluent pumping system and all associated system components. The LHD will attend and observe the final inspection and start-up.

F. Specified site preparation steps and construction specifications for the dispersal system shall be strictly adhered to, including specified depth of trenches in relation to site limiting conditions, cover material specifications if needed, trench installation method, etc.

VIII. Operation, Maintenance, Monitoring, and Reporting

A. Biotube® ProPak™ Pump Package effluent pumping systems shall be classified, at a minimum, as a Type IIIb system in accordance with 15A NCAC 18E .1301(b), Table XXXII. Management and inspection shall be in accordance with 15A NCAC 18E, Section .1300.

B. All Biotube® ProPak™ Pump Package effluent pumping systems shall be maintained in accordance with Orenco System, Inc.'s O&M manual.

C. At each Biotube® ProPak™ Pump Package effluent pumping system inspection the authorized operator shall follow the service procedure steps in the Orenco System, Inc. O&M manual and, at a minimum, observe, monitor, and record the following:
   1. Measure and record the static pressure head at the distal end of LPP laterals or at the pressure manifold as applicable.
   2. Measure and record sludge and scum levels in each compartment of the septic/pump tank.
   3. Determine whether the filter cartridges need cleaning. The determination will be made by allowing the pump to run for about 30 seconds, then observing the difference between liquid levels inside and outside the pump vault. If the difference is more than 2 (two) inches, the ORC will clean the filter cartridges. The ORC will record the observations and whether the filter cartridges required cleaning.
   4. Conduct a drawdown test to verify that the pump delivery rate is approximately the same as when originally measured at startup.
   5. Record the pump elapsed time meter, pump cycle counter, and high water alarm event counter readings at the beginning (before activating the pump) and at the conclusion of the site visit.
   6. Record any and all maintenance performed during the visit.
   7. If a water meter is present, take water meter readings. A water meter is not required to be installed for this system but is strongly encouraged.
   8. Identify if an effluent sample was taken.
   9. Fill out the Orenco ProPak Inspection Form.

D. The authorized operator shall also conduct any other measurements, monitoring, maintenance activities, and observations as specified in the Operation Permit (OP) and recommended by the manufacturer.

E. Notification and Performance of Maintenance and Repairs
   1. The authorized operator shall alert Orenco Systems, Inc., the LHD, and the system owner within 48 hours of needed maintenance or repair activities included but not limited to landscaping, tank sealing, tank pumping, pipe or control system repairs, and adjustments to any other system component.
   2. System troubleshooting and needed maintenance shall be provided to maintain the pump delivery rate and average pump run time within 25 percent of initial measurements conducted during system start-up.
   3. Tank compartments will be pumped as needed upon recommendation of the authorized operator and in accordance with the Orenco Systems, Inc., O&M manual. However, at a minimum, the septic tank will be pumped whenever the depth of both the scum and sludge is found to be more than one third of the liquid depth in any compartment.
   4. The tanks shall be pumped by a permitted septage management firm, and the septage handled in accordance with 15A NCAC 13B .0800.
   5. All maintenance activities shall be logged and recorded in the authorized operator reports provided to the system owner, Orenco Systems, Inc., and the LHD.

F. Reporting
   1. The authorized operator shall provide a completed written report to the system owner, Orenco Systems, Inc., and the LHD within 30 days of each inspection.
   2. Proposal for Evaluation and Reporting
      a. The manufacturer shall maintain a contract for evaluation of the performance of the Provisional wastewater system with an independent third-party laboratory, consultant, or other entity that has expertise in the evaluation of wastewater systems and that is approved by the Department.
      b. An annual report is due with the approval renewal by November 30th every year from the third party. The report shall include the following information at a minimum:
         i. list of all systems currently installed (including names and addresses) under the Provisional Approval;
         ii. results of all data collected from the systems; and
         iii. copies of all authorized operator inspection reports.
      c. Upon completion of the research and testing protocol, the third party shall submit a final report to the Department. This report shall be submitted in conjunction with Orenco Systems, Inc. completing an application for Innovative Approval.
      d. The final report shall contain the following information at a minimum:
         i. list of all systems currently installed (including names and addresses) during the Provisional Approval period;
         ii. results of all data collected from the systems;
         iii. copies of all authorized operator inspection reports;
         iv. assessment of system performance related to the criteria in this approval;
         v. assessment of physical and chemical properties of the materials used to construct the system in terms of strength, durability, and chemical resistance to loads and conditions experienced and showing compliance with 15A NCAC 18E .1705(a)(2);
         vi. recommended areas of applicability for the system; and
         vii. conditions and limitations related to the use of the system.

e. The final report shall be in electronic format and may be published on the On-Site Water Protection Branch's website without confidentiality. The contents of the report shall not be altered from the original document without approval from Orenco Systems, Inc.
f. The research and testing protocol is as follows:
    i. A minimum of 39 installed systems shall be evaluated.
    ii. The 39 test systems must include at least 14 systems with delivery rates less than 20 gallons/minute (gpm), 14 systems with delivery rates between 20 and 30 gpm, and 10 systems with delivery rates between 31 and 40 gpm.
    iii. Up to 11 additional systems may be installed as reserve sites, to allow for the possibility that some systems may, by mutual agreement between Orenco Systems, Inc. and the On-Site Water Protection Branch, be deemed unsuitable as test sites. This could be due to atypical usage or other anomalies. No more than three of the reserve units installed may have delivery rates greater than 30 gpm, unless authorized by the On-Site Water Protection Branch.
    iv. The Provisional study evaluation period shall start at the startup date of the 39th primary test system installed and shall run for an additional 12 months from that date, so that every primary test system is operational for a minimum of 12 months. If any reserve installation is required to be included as a substitute for a primary system, the 12-month minimum shall not apply, but any reserve installation shall be operational for a minimum of three months before sampling.
    v. The installer shall obtain written permission from the system owner prior to installation, to allow access to the system for sampling and monitoring purposes.
    vi. At startup, the installer and third party shall record the startup date, elapsed time meter readings, cycle counter readings, conduct a drawdown test to measure the pump delivery rate, and measure residual head at the distal end of each LPP lateral or at the pressure manifold.
    vii. All systems installed under this Provisional Approval shall be sampled at least once and the sample shall be analyzed for BOD_5 and TSS. Samples will be pump vault effluent samples. Samples will be collected by an authorized operator in consultation with the third party.
    viii. The third party responsible for the final report shall be notified in advance of all proposed sampling site locations and date.
    ix. Samples will be taken after the system has been in operation for at least 12 months. If any reserve installation is required to be included as a substitute for a primary system, the reserve installation shall be operational for at least three months before sampling.
    x. Chain of custody shall be documented for all samples, and analytical results will be reported to the On-Site Water Protection Branch.
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m. Effluent samples shall be pump vault effluent collected from a sampling tap on the drainfield force main. The preferred location of the tap is in the pump tank discharge assembly. The effluent sample shall be taken after the pump has run for 30 continuous

seconds through the discharge assembly. The sampling tap must also be purged prior to the sample being taken.

n. The licensed operator will record the pump elapsed time meter, pump cycle counter, and high water alarm event counter readings at the time of sample collection.
o. A total of three visits shall be made to each site of the 39 sites evaluated: at start-up, after the system has been in use for at least three months but no more than nine months, and the final visit after the system has been in operation for at least 12 months.
p. When the samples are collected during the interim visit and at the conclusion of the 1-year evaluation period, the licensed operator designated in paragraph D.2 above will visit each installed system and take the following actions:
q. The BOD_5 and TSS data from the 39 test sites will be evaluated by averaging the results and comparing with a "control" data set obtained from the On-Site Water Protection Branch, representing effluent data from septic tanks installed in North Carolina, equipped with effluent filters. The Controlled Demonstration testing will be accepted as satisfactory if the average of the collected sampling data does not exceed the control data mean plus 20% (307 mg/L for BOD and 58.6 mg/L for TSS).

IX. Responsibilities and Permitting

A. Orenco will make available a computer-based design application (ProPak Select Design Tool for North Carolina). Program will be modified to include recommendations made by the On-Site Water Protection Branch.

B. Each system design shall be reviewed and accepted by an Orenco-authorized designer, who has been trained by Orenco to use the ProPak Select Design Tool for North Carolina, and authorized by Orenco in writing on the basis of such training.

C. Orenco shall review and approve each system's tank and overall design on a project specific basis during this Controlled-Demonstration. Also, at the request of the LHD, a Regional Engineer will review the design.

D. Orenco shall identify qualified service persons for each region where systems are installed and provide contact information to homeowners to minimize response time for service calls.

E. Prior to the installation of a Biotube® ProPak™ Pump Package effluent pumping systems at a site, the owner or owner's agent shall fill out an application at the LHD for the proposed use of this system. The LHD shall issue an Improvement Permit or Authorization to Construct or amend a previously issued Authorization to Construct allowing for the use of a Biotube® ProPak™ Pump Package effluent pumping systems.

F. The Improvement Permit and Authorization to Construct shall contain all conditions the site approval is based upon, including the proposed use of the Controlled Demonstration system. The operation permit will include all conditions specified in the Improvement Permit and Authorization to Construct.

G. Training by the manufacturer shall be provided, upon request, to local health departments to

facilitate proper review, inspection, and permitting of these systems. It is recommended that local authorized environmental health practitioners attend a design training session offered by the manufacturer/authorized representative prior to permitting the system.

X. Repair of Systems

The provisions of 15A NCAC 18E .1306 shall govern the use of Biotube® ProPak™ Pump Package Effluent pumping systems for repairs to existing malfunctioning wastewater systems.

Approved by:_____ Date:_____