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 2015-01-R2

Issued To:	Orenco Systems, Inc 814 Airway Ave Sutherlin, OR 97479 www.orenco.com
Contact:	Nicholas Noble 800-348-9843
For:	AdvanTex® AX-RT Treatment Systems Models AX20-RT and AX25-RT
Approval Date:	April 24, 2015 June 15, 2015 Sampling Revisions December 31, 2024 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 a renewal of the approval for their advanced pretreatment system, AX20-RT and AX25-RT, 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
   1. Design, installation, use, and operation and maintenance requirements for AdvanTex AX-RT Treatment systems meeting TS-I and TS-II effluent standards pursuant to 15A NCAC 18E .1201(a), Table XXV.
   2. Operation, maintenance, and monitoring requirements for AdvanTex AX-RT Treatment systems and associated dispersal systems to ensure the treatment performance standards are met.

B. This Innovative Approval is applicable to wastewater systems treating domestic strength effluent, as defined in 15A NCAC 18E .0402(a), Table III, utilizing AdvanTex AX-RT Treatment systems that have a design daily flow less than or equal to 3,000 gallons per day (gpd).

Use of AdvanTex AX-RT Treatment systems for facilities with high strength effluent, as defined in 15A NCAC 18E .0402(a), Table III or industrial process wastewater, shall be proposed by Orenco Systems, Inc, and a North Carolina Professional Engineer (PE) to the Department for review and approval on a case-by-case basis, prior to permitting by the local health department (LHD). The system design shall include the proposed untreated wastewater strength in BOD_5, COD, TN, TSS, and fats, oils, and grease, the expected organic loading rate in pounds of BOD or N, the hydraulic loading rate on the pretreatment system, and the calculations, references, and any other needed information to support the proposed design.

C. Any site utilizing these systems shall have wastewater with sufficient alkalinity to facilitate biological treatment processes. The influent shall not have a pH or toxins that significantly inhibit microbial growth.

D. Use of AdvanTex AX-RT Treatment systems that have a design daily flow greater than 3,000 gpd may be permitted after approval by the Department on a case-by-case basis in accordance with 15A NCAC 18E .0302(e) or in accordance with G.S. 130A-336.1.

II. System Description

The AdvanTex AX-RT series uses the same recirculating textile filter technology as the AX20 and AX100, combining the textile filter media and recirculation/processing tank into a single, complete, self-contained multi-compartment unit. The recirculating treatment tank receives filtered effluent from the primary septic tank and is topped with a standard AX20 lid and hinge assembly. Textile media is suspended from the top of the treatment unit, with typically 60 percent positioned over the recirculation/blend chamber and the remaining 40 percent positioned over a final filtrate chamber separated from the recirculation/blend chamber by a baffle wall. Filtrate is either recirculated back to the recirculation-blend chamber through a low-level equalization swing-check valve in the baffle wall or discharged by controlled-dosing using a discharge pump, or by gravity.

Both the AX20-RT and AX25-RT utilize the same single multi-compartment unit. The AX20-RT has 524 square feet of textile filter media, and the AX25-RT has 624 square feet of media.

III. Siting Criteria

The AdvanTex AX-RT Treatment systems and associated dispersal fields shall be sited and sized in accordance with 15A NCAC 18E, Section .1200 for TS-I and TS-II systems. Drip irrigation systems used with AdvanTex AX-RT Treatment systems shall be sited and sized in accordance with 15A NCAC 18E .1204 and the manufacturer specific drip approval. The AdvanTex AX-RT Treatment systems and associated dispersal fields shall meet all applicable horizontal setback requirements in accordance with 15A NCAC 18E Section .0600 or .1202 and be located to prevent surface and subsurface water inflow and infiltration.

IV. Dispersal Field System Sizing

The dispersal field system sizing criteria shall be based upon the long-term acceptance rate 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. The system consists of a septic tank and an AdvanTex AX-RT fixed-film media treatment system as specified in Table I below.

Table I – AX-RT System and Septic Tank Volume		
Design Daily Flow (gpd)	Minimum Septic Tank Volume (gallons)	AdvanTex AX-RT
≤ 500	1,000	AX20-RT
501-600	1500	AX25-RT

A single-bulb UV system shall be provided for TS-II systems. AX20-RT TS-II systems may be configured with an integrated UV and pumping chamber. AX25-RT TS-II systems require the UV unit to be installed after the RT unit and a separate approved pump tank. See Attachment A for example drawings of unit configurations.

1. All tanks shall be approved by the Department and Orenco Systems, Inc, specifically for use with AdvanTex Treatment systems. All tanks, septic and recirculating, will have an inlet sanitary tee that is visible and accessible from the riser opening. The inlet tee shall have an inner diameter not less than 4 inches. An access riser not less than 20 inches in diameter will be provided to access the inlet tee. The top of the riser shall be a minimum of two inches above finished grade and water shall be diverted away from the riser as necessary to prevent water from accumulation.
2. The septic tank shall be equipped with a Department approved Orenco effluent filter on the outlet end.
3. The recirculating pumps are Orenco 4-inch turbine effluent pumps. Specifications for the pumps that accompany the different configurations are listed in Table II.

Table II – AX-RT Recirculating Pump Specifications				
AdvanTex Filter Unit	Number of Recirculation Pumps	Flow Rate (gpm)	Pump Nominal Horse Power	Voltage
AX20-RT	1	15	1/2	115V or 230V
AX25-RT	1	30	1/2	115V or 230V

4. The discharge pumps with some AX-RT and AX20-RT-UV configurations are Orenco 4-inch turbine effluent pumps. Pump specifications for the different configurations are listed in Table III.

Table III – AX-RT Discharge Pump Specifications		
Model	Pump	Pump Nominal Flow Rate (gpm)
AX20-RT	Bottom Intake	10, 20, 30, 50
AX20-RT-UV	Bottom Intake	10, 20, 30, 50
AX25-RT	Bottom Intake	10, 20, 30, 50

Possible float settings for AX-RT's with integrated field dosing pumps are listed in Table IV.

Table IV – AX-RT Float Settings and Dose Volumes			
		AX20-RT or AX25-RT	AX20 RT UV+
On Float*	Off Float*	Dose Vol (gal)	Dose Vol (gal)
35	24	117	49
35	20	159	66
35	18	180	75
35	16	202	84
35	12	244	102
35	10	265	111
35	8	286	119

*Floats measured in inches from bottom of RT
+AX25-RT for TS-II requires UV unit in separate chamber or separate dosing tank.

5. The AdvanTex AX-RT is equipped with a set of vertical geotextile sheets with low-pressure pipe wastewater distribution spin nozzles above the sheets. The low-pressure pipe distribution spin nozzles operate at 4 psi and are designed to operate at a flow rate of 6 gpm. One air vent for the RT is required and is located on the pod and ultimately connected to the building sewer.
6. Filtrate from the AdvanTex AX-RT percolates through the geotextile by gravity into either the recirculation tank or the discharge chamber and ultimately through the ultraviolet (UV) disinfection system dependent upon the recirculation tank level.
7. To enhance nitrogen removal a portion of the nitrified wastewater shall be diverted back to the septic tank where conditions are most optimal for denitrification. The daily volume of nitrified wastewater delivered back to the septic tank shall be determined on a case-by-case basis by the designer authorized in writing by Orenco Systems Inc. and shall not exceed 50% of the daily volume pumped to the AdvanTex filters. Diverting wastewater back to the inlet riser of the septic tank shall be accomplished by installing a stub connection at the recirculating pump hose and valve assembly to divert a portion of each dose to the septic tank inlet riser. A flow control disk with appropriately sized orifice is installed by the manufacturer in a union in the septic tank return line to control the proportion of flow returned to the septic tank. A ball valve followed by an elbow to direct flow down into the tank shall be placed on the return line inside of the septic tank inlet riser. This ball valve allows the denitrification return line to be shut off for any operational reasons.

8. The UV system shall be rated for the appropriate discharge rate from the AdvanTex unit. Audible and visible alarms for bulb failure will be provided.
9. The UV disinfection system will be one of the following:
   a. The Orenco UV Unit, or
   b. Other UV systems specifically approved by the Department and Orenco Systems, Inc.
10. AdvanTex Treatment systems will utilize the TCOM or VeriComm® Telemetry Control Panel. The control panel is in a NEMA 4X enclosure and shall be located within 30 feet and in line of sight of the recirculation tank. Separate control and alarm circuits shall be provided. The Telemetry Control Panel shall be connected to an active phone line capable of dialing a 1-800 number or be equipped with a wireless bridge connecting it to a wireless internet router and shall remain active for the life of the Advanced Treatment System. The operator authorized in writing by Orenco Systems, Inc, (authorized operator) must be able to access the panel directly on site and shall be available to the LHD with 24-hour notice in the event that the LHD needs to access the control panel.
11. All access riser hatches shall be secured by approved tamper-resistant stainless-steel bolts supplied by the manufacturer. Riser construction, attachment to tanks and security systems shall be pre-approved by the Department in accordance with the Orenco Systems, Inc. approvals for septic tank and pump tank risers, as applicable.
12. The instructions for anti-floatation in the AdvanTex AX-RT Treatment System Installation Manuals shall be followed. Orenco Systems, Inc, can submit a pre-engineered anti-buoyancy design by a PE for approval by the Department that could be used instead of site specific anti-buoyancy designs for sites that meet the limitations of the pre-engineered design.
13. The panel controlling the dispersal field dosing pumps shall be provided by Orenco Systems, Inc. and designed to meet the daily, 7-day, and 30-day monitoring requirements of 15A NCAC 18E .1702(a)(2)(I), unless the dispersal field panel is provided by a distribution system manufacturer other than Orenco Systems, Inc. The other manufacturer's panel shall meet these same monitoring requirements, and its alternate use for this purpose shall have the written concurrence of Orenco Systems, Inc. and the designer authorized in writing by Orenco Systems, Inc.
14. A spigot or sampling port shall be placed on the force main from the final dosing tank to provide for effluent sampling. In the event a system is installed using a gravity trench, a sampling basin shall be installed between the final treatment device and the dispersal field.
15. The 7-day and 30-day readings will be stored in the VeriComm control panel records. The authorized operator will be able to access this information when they are at the site. The VeriComm panel, TCOMM Telemetry control panel, or approved equal shall be used for pressure manifolds, LPP systems, and drip irrigation systems.

B. AdvanTex AX-RT Treatment systems shall be designed by a designer authorized in writing by Orenco Systems, Inc (authorized designer), Authorized On-Site Wastewater Evaluator (AOWE), or a PE. Systems over 1,000 gpd shall be designed by a PE.

VII. Installation and Testing

A. A preconstruction conference shall be required to be attended by the following, as applicable: authorized designer, Authorized On-Site Wastewater Evaluator (AOWE), PE, installer authorized

in writing by Orenco Systems, Inc (authorized installer), Orenco Systems, Inc licensed distributor, and LHD prior to beginning installation of the AdvanTex AX-RT Treatment system.

B. AdvanTex AX-RT Treatment systems shall be installed according to directions provided by Orenco Systems, Inc.

C. All individuals or companies installing AdvanTex AX-RT Treatment systems 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 IV installer and authorized in writing by Orenco Systems, Inc.

D. Watertightness of the septic and pump tanks shall be demonstrated by a leak test in accordance with one of the following:
   1. 24-hour water leak test conducted at the installation site. A water level change of one-half inch or more over twenty-four hours, or visual observation of leakage shall be cause for failure of the watertightness test; or
   2. one of the testing methods in 15A NCAC 18E .0805(b).

E. The authorized installer, PE, AOWE, or authorized designer, and the authorized operator, shall conduct a final inspection and start-up of the AdvanTex AX-RT Treatment 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. AdvanTex AX-RT Treatment systems shall be classified, at a minimum, as a Type Va 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 AdvanTex AX-RT Treatment systems require an operation and maintenance agreement between the system owner and Orenco Systems, Inc, its authorized representative, or with an authorized operator in accordance with 15A NCAC 18E .1302(c). The authorized operator must have proper equipment and training to access and program the control panels on site. The authorized operator shall be:
   1. a North Carolina certified subsurface operator (Operator in Responsible Charge); and
   2. either an employee of Orenco Systems, Inc, or authorized in writing by Orenco Systems, Inc.

C. All AdvanTex AX-RT Treatment systems shall be operated and maintained according to the latest version of Orenco Systems, Inc O&M manual.

1. At each AdvanTex AX-RT Treatment system inspection, the authorized operator shall follow service procedure steps identified in the Orenco Systems, Inc, O&M Manual and, at a minimum, observe, monitor, and record the following:
2. Wastewater level in all the tanks.
3. Sludge, scum, and grease levels in all tanks.
4. Clogging of effluent filter in Biotube® pump package.
5. Watertightness of tanks, risers and pipe penetrations at the tanks.
6. Operation of pumps, floats, valves, electrical controls, and alarms.
7. Dispersal field pump delivery rate (drawdown test), determination of the average pump run time, and dispersal field dosing volume.
8. Any structural damage, accessibility issues, adequate ventilation, excess odors, ponding of effluent, insect infestations, vegetative growth over the dispersal field, or surfacing of effluent in the dispersal field area.
9. Sample of AdvanTex AX-RT Treatment system effluent collected from the sampling point to check for effluent clarity and odor and a sample of influent, as required.
10. Readings from pump cycle counters and run time meters and any water meter readings.
11. Current operational set up for TS-II nitrogen removal enhancement (percent returned to septic tank) and recommendation for modifications (if needed).
12. System operating conditions, from the review of VeriComm or TCOMM stored data for indication of 7-day and 30-day flows and flow variances, clogging of filter distribution system, or other abnormal conditions.

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

E. Sampling
   1. All sampling shall be done in accordance with 15A NCAC 18E .1302 and .1709. AdvanTex AX-RT Treatment systems shall be sampled annually when the design daily flow is less than or equal to 1,500 gpd. Systems with design daily flows greater than 1,500 gpd and less than or equal to 3,000 gpd shall be sampled twice a year.
   2. Effluent for all systems shall be tested for BOD_5, TSS, and NH_3. Systems designed to meet the TS-II standard shall also have the effluent analyzed for TN (TKN and NO_3-N). Sampling is not required for fecal coliforms when the site is found to be compliant with all other constituents in Table XXV of 15A NCAC 18E .1201(a).
   3. Influent samples, if needed, shall be taken from the influent chamber of the treatment system.
   4. Effluent samples shall be collected from the disinfection unit inside the third compartment of the unit or a tap on the dispersal field force main. The tap should be located before the spin filter for drip systems.

F. 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 including, but not limited to landscaping, tank sealing, tank pumping, pipe or control system repairs, media or aerator replacement, and/or adjustments to any other system component.

2. The authorized operator shall notify the system owner, Orenco Systems, Inc, and the LHD whenever the pump delivery rate efficiency or average pump run times are not within 25 percent of the initial measurements conducted prior to system start-up.
3. 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.
4. Tank compartments will be pumped as needed upon recommendation of the authorized operator and in accordance with the AdvanTex AX-RT Treatment system Operation and Maintenance instructions.
5. The tanks shall be pumped by a permitted septage management firm, and the septage handled in accordance with 15A NCAC 13B .0800.
6. All maintenance activities shall be logged Orenco Systems, Inc, and the LHD.

G. Reporting

The authorized operator shall provide a written report to the system owner, Orenco Systems, Inc, and the LHD within 30 days of each inspection. At a minimum, this report shall specify:

1. The date and time of inspection;
2. System operating conditions measured and observed according to VIII.D and VIII.E;
3. Results from laboratory analyses of effluent samples, and influent samples as needed;
4. Maintenance activities performed since the last inspection report;
5. An assessment of overall system performance;
6. A list of any improvements or maintenance needed;
7. 7- and 30-day readings as required in 15A NCAC 18E .1702(a)(2)(I);
8. A determination of whether the system is malfunctioning, and the specific nature of the malfunction; and
9. Any changes made in system settings based on recommendations of the manufacturer.

IX. Responsibilities and Permitting Procedures

A. Prior to the installation of a AdvanTex AX-RT Treatment system at a site, the owner shall submit an application or Notice of Intent (NOI) to the LHD for the proposed use of this system. 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 Authorized On-Site Wastewater Evaluator (AOWE). The NOI shall include a soil and site evaluation conducted by an LSS.

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

C. When a special site evaluation is required pursuant to 15A NCA 18E .0510, an evaluation and written, sealed report from a Licensed Soil Scientist (LSS) regarding the site shall be provided to the LHD. The report shall contain the information specified in 15A NCAC 18E .0510(d). The LHD may request the assistance of their Regional Soil Scientist in evaluating this report prior to permit issuance.

D. AdvanTex AX-RT Treatment systems shall be designed by either an authorized designer, AOWE, or a PE. Systems over 1,000 gpd, or as required in accordance with 15A NCAC 18E .0303(a) shall be designed by a PE.

E. Prior to the LHD issuing a CA for a AdvanTex AX-RT Treatment system, a design submittal prepared by an authorized designer, AOWE, or PE shall be submitted. The design submittal shall include the information required in 15A NCAC 18E .0305.

F. It is recommended that local authorized environmental health specialists attend a design training session offered by the manufacturer or the authorized representative prior to permitting the system. Also, at the request of the LHD, a Regional Engineer will review designs.

G. For sites required to be evaluated by an LSS or Licensed Geologist (LG), see Section V and IX.C, the LHD, AOWE, or PE may specify as a condition of the IP and CA that an LSS or LG oversee critical phases of the dispersal field installation and certify in writing that the installation was in accordance with their specified site and installation requirements prior to the OP or ATO issuance.

H. The authorized operator shall be present during the final inspection of the system prior to the issuance of the OP or ATO.

I. The LHD shall issue the OP after the following:
   1. Field verification of installation completion;
   2. Receipt of written documentation from the authorized designer, AOWE, 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.

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

X. Repair of Systems

The provisions of 15A NCAC 18E .1302 shall govern the use of the AdvanTex AX-RT Treatment system for repairs to existing malfunctioning wastewater systems.

Approved By: _____ Date: _____