

**GUIDELINES FOR STATE-APPROVED
RESIDENTIAL WASTEWATER TREATMENT SYSTEMS
WHICH MEET NSF STANDARD 40 FOR CLASS I SYSTEMS**

**NORTH CAROLINA DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH
ON-SITE WATER PROTECTION SECTION**

October 2006

1. Introduction

The North Carolina General Statutes and wastewater systems rules provided for the approval of residential wastewater treatment systems (“RWTS”, formerly termed “ATUs”), which have been approved and listed in accordance with standards adopted by NSF International for Class I systems, that are constructed in accordance with plans that have been approved by the Division of Environmental Health prior to their usage in subsurface on-site sewage systems. The following guidelines are provided as an aid to the preparation of plans and specifications of individual wastewater treatment systems to be submitted for approval by the State. Plans and specifications shall be reviewed and approved in accordance with the appropriate sections of the General Statutes (G.S. 130A-342) and the Laws and Rules for Sewage Treatment and Disposal Systems, 15A NCAC 18A .1900 et. seq., as adopted by the Commission for Health Services, which should be reviewed by all interested parties. G.S. 130A-342 and Rule .1957(c) are appended to these guidelines.

Applicants are also advised to review Rule .1970 which includes criteria for RWTS performance, siting, sizing, installation, operation, monitoring, maintenance and reporting requirements. A manufacturer of an RWTS who desires consideration for approval as an Experimental, Controlled Demonstration, Innovative or Accepted System that meets higher standards (TS-I or TS-II as described in Rule .1970) shall apply separately pursuant to Rule .1969.

2. Application

Application must be submitted to the On-Site Wastewater Section, Division of Environmental Health, 1642 Mail Service Center, Raleigh, N.C. 27699-1642 and must include the following for each proposed unit to be approved:

1. Manufacturer’s name, address, phone number, plant location(s).
2. Verification of current approval and listing as a Class I system (NSF Standard 40) by the National Sanitation Foundation or other ANSI - accredited third party certification program [.1957(c)(1)(B)]
3. At least three legible copies of plans and specifications and information required

to evaluate any tanks as required pursuant to .1953.

4. List of manufacturer's licensed distributors in North Carolina (name, address and phone number) and current service areas (please update when needed).
 5. Manufacturer's identifying name or logo; listed model number, and treatment capacity (in gallons per day) to be imprinted on unit. [.1957 (c)(3)(F)].
 6. Fee of \$1500, as required by G.S. 130A-343(k)(6)
3. General Design and Construction Requirements

Residential Wastewater Treatment Systems must be designed as sound, watertight, corrosion resistant structures, with all components needing to be routinely maintained easily accessible to the system operator. Units constructed of precast reinforced concrete shall meet similar construction requirements as state-approved, precast reinforced concrete septic tanks and pump tanks (.1954). Units may also be constructed of fiberglass reinforced plastic or other materials, with comparable substantiating information on material resistance to corrosion, structural properties, and watertightness [.1957(c)(3)(D)].

While all rules must be adhered to, the following items are of particular concern:

1. Access openings shall be provided for cleaning or rodding out the inlet pipe, for clearing or cleaning air or gas passage spaces, and for pumping out, sampling and providing necessary access as needed for any compartment or component [.1957(c)(3)(B)].
2. Opening risers must be sealed to the top of the system, and extended to at least six inches above finished grade. Access lids must weigh no more than 150 pounds to allow for removal and access. Plastic or fiberglass risers proposed to be used shall be cast-in-place during the construction of the tank.
3. Concrete tanks must contain steel reinforcement in all sides, top, bottom and baffle walls. Reinforcement must be bent and lapped at least four inches at all edges. Reinforcement must be tied or placed at or near mid-thickness in each face [.1954(a)(9 & 11)].
4. The outlet pipe penetration of the tank shall be through a resilient, watertight, sealed, non-corrosive and flexible connective sleeve. The outlet pipe penetration shall be precast to be compatible with the connective sleeve. No pipe penetration points or openings shall be permitted below the tank liquid level.
5. Documentation must be provided that each proposed model of fiberglass

reinforced plastic system meets specified physical properties and passes a vacuum test (.1957(c)(3)(D)].

6. Electrical controls must meet comparable requirements for pump tanks (.1952). Plans must show location of disconnects, control panels, and alarms, and provide component and wire connection specifications. An audible and visible alarm is required which warns of unit malfunction or a high water condition, supplied ahead of any other system electrical control circuit overload and short circuit protective device. Panels must be in NEMA 4X, or equivalent, enclosures accessible by the operator. No junction boxes or panels may be installed inside the unit subject to exposure to a wastewater atmosphere [.1957(c)(3)(H)].
6. Blower location must be shown and specification/drawing provided of proposed corrosion-resistance blower enclosure to be provided [.1957(c)(3)(H)].
7. Documentation must be provided on how the design, construction and operation of the system shall prevent bypass of wastewater [.1957(c)(3)(G)].
8. A settling tank shall be required prior to or as an integral part of the design of the residential wastewater treatment system. The liquid capacity of the settling tank shall be at least equal to half of the design daily flow of the residential wastewater treatment system, or as otherwise specified by the manufacturer, whichever is larger. The settling tank may either be an integral chamber of the residential wastewater treatment system tank, an approved prefabricated septic tank or another tank specially designed for a specific individual system [.1957 (c)(4)].
9. An effluent sampling point must be identified, with location and any special methods of sampling recommended by the manufacturer indicated.
10. An influent to the residential wastewater treatment system sampling point must be identified, with location and any special methods of sampling recommended by the manufacturer indicated.
11. The design must include a means to measure and record daily wastewater flows. The recording device shall provide a means for determining at least the last 30 days of wastewater flow to the system.

4. Plans and Specifications

Plans and specifications must clearly show and satisfy the following requirements:

1. Liquid or working capacity: 1500 GPD, maximum
2. Difference between inlet and

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| 3. | outlet inverts:
Blockout size: | 2 inches, minimum
4 inches, minimum, 6 inches maximum |
| 4. | Access cover locations: | Over inlet and outlet, air or gas passages,
and other compartments requiring pump-out
or maintenance |
| 5. | Access manhole height: | 6 inches above finished grade, minimum |
| 6. | Imprint information: | Place of manufacturer logo, working
capacity, NSF seal (or equivalent), model
number, North Carolina serial number |
| 7. | Imprint location: | Right of outlet pipe blockout or opening |

Concrete Plants

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| 8. | Concrete compressive strength: | 3,500 psi minimum @ 28 days |
| 9. | Thickness of sides, top, bottom
and baffle walls: | 2.5 inches minimum |
| 10. | Blockout thickness: | 1 inch minimum |
| 11. | Reinforcement: | 6-inch by 6-inch, 10-gauge, welded wire
mesh, minimum |
| 12. | Joint detail: | Tongue-in-groove or equivalent |
| 13. | Method of sealing joint: | Mastic, butyl rubber or equivalent, 1-inch
nominal diameter |

Fiberglass Plants

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| 14. | Minimum physical properties: | Ultimate tensile strength: 12,000 psi;
flexural strength: 19,000 psi; flexural
modulus of elasticity: 800,000 psi |
| 15. | Composition: | 30 percent, minimum, fiberglass
reinforcement, by weight. UV protected for
all exposed fiberglass |
| 16. | Wall thickness: | ¼-inch, minimum |

17. Wall quality: No exposed fibers (interior or exterior) blister, pores or indentations

18. Vacuum test: Withstand 2.5 psi negative pressure, minimum

5. Approval

Applications will be considered on a first-come, first-served basis. If the information provided is incomplete, approval will be withheld pending the receipt of all required plans, specifications, and other information. Upon approval, the manufacturer will be notified in writing of the approved tank serial number and identifying data to be imprinted on the tank. At the same time, the local health departments will be informed of the approval, and the approval information shall be posted on the Section's Homepage (http://www.deh.enr.state.nc.us/osww_new//index.htm).

Tanks must be manufactured to meet all minimum requirements in accordance with the approved plans and specifications. Failure to do so shall result in the rejection of the tanks at the plant or job site.

Approvals are subject to suspension or revocation upon a finding that the information submitted is falsified, the product has been subsequently altered, or subsequent experience with the product results in altered conclusions about its design or performance.

Appendix: G.S. 130A-342 and 343(k).

130A-342. Residential wastewater treatment systems.

(a) Individual residential wastewater treatment systems that are approved and listed in accordance with the standards adopted by the National Sanitation Foundation, Inc. for Class I residential wastewater treatment systems, as set out in Standard 40 of the National Sanitation Foundation, Inc., (as approved 13 January 2001) as amended, shall be permitted under rules adopted by the Commission. The Commission may establish standards in addition to those set by the National Sanitation Foundation, Inc.

(b) A permitted system shall be operated and maintained by a certified wastewater treatment facility operator.

(c) Each county, in which one or more residential wastewater treatment systems permitted pursuant to this section are in use, shall document the performance of each system and report the results to the Department annually. (1989, c. 727, s. 223(b); c. 764, s. 9; 1989 (Reg. Sess., 1990), c. 1004, ss. 12, 37; 1991 (Reg. Sess., 1992), c. 944, s. 8; 1995, c. 285, 1; 1997-443, ss. 11A.84, 11A.119(a); 2001-505,2.1)

130A-343(k). Fees.

(k) Fees. –The Department shall collect the following fees under this section:

(1) Review of an alternative protocol under Subsection (d) of this section	\$1,000.00
(2) Review of an experimental system	\$3,000.00
(3) Review of a controlled demonstration system	\$3,000.00
(4) Review of an innovative system	\$3,000.00
(5) Review of an accepted system	\$3,000.00
(6) Review of a residential wastewater system treatment system pursuant to G.S. 130A-342	\$1,500.00
(7) Review of a component of a system	\$100.00
(8) Modification to approved innovative system	\$1,000.00

Rule 15A 18A NCAC .1957(c)

(c) Residential Wastewater Treatment Systems (RWTS) that comply with the National Sanitation Foundation (NSF) Standard 40 for Class I residential wastewater treatment systems shall be designed and constructed and installed in accordance with this Rule to serve a facility with a design daily flow rate of up to 1500 gallons per day, as determined in Rule .1949(a) or .1949(b) of this Section. RWTS shall not be used, however, where wastes contain high amounts of fats, grease and oil (30 mg/l or more), including restaurants and food service facilities, and the strength of the influent wastewater shall be similar to domestic wastewater with raw influent Biological Oxygen Demand (BOD) and suspended solids not to exceed 350 parts per million. RWTS performance, siting, sizing, installation, operation, monitoring, maintenance and reporting requirements shall comply with G.S. 130A-342 and 15A NCAC 18A .1970. NSF Standard 40 for Class I residential wastewater treatment systems is hereby incorporated by reference including any subsequent amendments and editions. Copies of the standards may be inspected at the On-Site Wastewater Section Central Office, located at 2728 Capital Blvd., Raleigh, NC in the Parker Lincoln Building, and copies may be obtained on-line at <http://www.techstreet.com/nsfgate.html> at a cost of ninety-five dollars (\$95.00), or by mail from Techstreet, 777 East Eisenhower Parkway, Ann Arbor, MI 48108 at a cost of ninety-five dollars (\$95.00) plus shipping and handling. RWTS shall bear the NSF mark and the NSF listed model number or shall bear the certification mark and listed model number of a third party certification program accredited by the American National Standards Institute (ANSI), pursuant to ANSI Policy and Procedures for Accreditation of Certification Programs to certify residential wastewater treatment systems in accordance with NSF Standard Number 40. The following conditions for approval, design, construction and installation of RWTS shall be met:

- (1) An application shall be submitted in writing to the State for an RWTS, which shall include the following, as applicable:

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- (A) manufacturer's name, address, phone number, plant location(s), and contact information for manufacturer's licensed distributors in North Carolina and their current service areas;
 - (B) verification of current approval and listing of a NSF Standard 40 Class I system by the National Sanitation Foundation or other ANSI-accredited third party certification program;
 - (C) manufacturer's identifying name or logo, listed model number(s) and treatment capacity (in gallons per day) to be imprinted on unit;
 - (D) three legible copies of plans and specifications, and information required to evaluate any tanks as required pursuant to 15A NCAC 18A .1953; and
 - (E) fee payment as required by G.S. 130A-343(k)(6), by corporate check, money order or cashier's check made payable to: North Carolina On-Site Wastewater System Account or NC OSWW System Account, and mailed to the On-Site Wastewater Section, 1642 Mail Service Center, Raleigh, NC 27699-1642 or hand delivered to Rm. 1A-245, Parker Lincoln Building, 2728 Capital Blvd., Raleigh, NC.
- (2) The rated capacity of RWTS listed as complying with NSF Standard 40 shall not be less than the design daily flow as determined by Rule .1949(a) or .1949(b) of this Section.
- (3) The following are minimum standards of design and construction of RWTS:
- (A) No blockouts or openings shall be permitted below the liquid level of the RWTS.
 - (B) RWTS shall be resilient, watertight, corrosion resistant structures, with all components needing to be routinely maintained easily accessible to the system operator. Access openings shall be provided in the RWTS top. Access shall be provided for:
 - (i) cleaning or rodding out the inlet pipe,
 - (ii) cleaning or clearing the air or gas passage space above the partition,
 - (iii) pumping of each compartment required to be pumped,
 - (iv) sampling the effluent, and
 - (v) repairing any system components or maintaining system component requiring repair or maintenance.
 - (C) Tanks used in RWTS designed to hold sewage or effluent shall comply with the same design and construction requirements as septic tanks and pump tanks pursuant to 15A NCAC 18A .1954, as applicable.
 - (D) Fiberglass reinforced plastic tanks used in RWTS designed to hold sewage or effluent shall be constructed with materials capable of resisting corrosion from sewage and sewage gases, and the active and passive loads on the unit walls. Except as required by the rules of this Section, fiberglass tanks shall comply with IAPMO PS 1-2004, Standard for Prefabrication Septic Tanks, and CSA International B66-05, Standard for Design, Material, and Manufacturing Requirements for Prefabricated Septic Tanks and Sewage Holding Tanks, as applicable. IAPMO PS 1-2004 and CSA International B66-05 are hereby incorporated by reference including any subsequent amendments and editions. Copies of these standards may be inspected at the On-Site Wastewater Section Central Office, located at 2728 Capital Blvd., Raleigh, NC in the Parker-Lincoln Building, and copies may be obtained from the ANSI On-Line Store at <http://webstore.ansi.org/ansidocstore> at a cost of forty-nine dollars and ninety five cents (\$49.95), and from the Canadian Standards Association, at 5060 Spectrum Way, Suite 100, Mississauga, Ontario, L4W 5N6 Canada at a cost of one hundred dollars (\$100.00) plus shipping and handling, respectively. Documentation shall be provided that at least one of each size tank in each model meets specified physical properties set forth in IAPMO PS 1-2004 and CSA International B66-05, as applicable. At least one of each size of fiberglass reinforced plastic tank used in an RWTS shall be subjected to a vacuum test by an independent testing laboratory. Test unit must withstand negative pressure of 2.5 pounds per square inch (69.3 inches of water) without leakage or failure. Test results shall be included with the specifications that are provided to the state for approval.
 - (E) Prefabricated tanks used in RWTS other than precast reinforced concrete or fiberglass reinforced plastic units shall be approved on an individual basis by the State based on

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information furnished by the designer which indicates the unit will provide effectiveness equivalent to reinforced concrete or fiberglass reinforced plastic units.

- (F) RWTS shall bear an imprint identifying the manufacturer, the RWTS serial number assigned to the manufacturer's model approved by the State, and the liquid or working capacity of the unit. The imprint shall be located to the right of the outlet opening pipe penetration point.
- (G) The design, construction, and operation of RWTS shall prevent bypass of wastewater.
- (H) Electrical circuits to the RWTS shall be provided with manual circuit disconnects within

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watertight, corrosion-resistant, outside enclosure (NEMA 4X or equivalent) adjacent to the RWTS securely mounted at least 12 inches above the finished grade. Control panels provided by the manufacturer shall be installed in a watertight, corrosion-resistant enclosure (NEMA 4X or equivalent) mounted at least 12 inches above finished grade and located adjacent to the RWTS or in view of the RWTS on the side of the facility. The control panel shall not be located more than 50 feet from the RWTS components controlled by the panel. The control panel shall remain accessible at all times to the system operator (ORC). Conductors shall be conveyed to the disconnect enclosure and control panel through waterproof, gasproof, and corrosion-resistant conduits. Splices and wire junctions, if needed, shall be made outside the RWTS in a watertight, corrosion-resistant enclosure (NEMA 4X or equivalent) securely mounted adjacent to the unit at least 12 inches above the finished grade. Wire grips, duct seal, or other similar materials shall be used to seal around wire and wire conduit openings inside the RWTS and disconnect enclosure that shall prevent the transfer of liquid or gas into the RWTS or into the enclosure. The RWTS shall have an alarm device or devices to warn the user or operator of a unit malfunction or a high water condition. The alarm shall be audible and visible by system users and securely mounted adjacent to the RWTS, at least 12 inches above finished grade or in view of the RWTS on the side of the facility. The alarm shall not be located more than 50 feet from the RWTS component triggering the alarm condition. The alarm shall remain accessible at all times to the system operator (ORC). The alarm shall meet NEMA 4X standards or otherwise be equivalently watertight and corrosion resistant. The alarm circuit or circuits shall be supplied ahead of any RWTS electrical control circuit overload and short circuit protective devices. Blower location shall be shown on plans and plans and specifications shall detail proposed corrosion resistant blower enclosure, if applicable.

- (4) A settling tank shall be required prior to or as an integral part of the design of the RWTS. The liquid capacity of the settling tank shall be at least equal to half of the design daily flow of the RWTS, or as otherwise specified by the manufacturer, whichever is larger. The settling tank may either be an integral chamber of the RWTS tank, an approved prefabricated septic tank or another tank specially designed for a specific individual system and approved by the State as a part of the plans for the RWTS.
- (5) A manufacturer of an RWTS who desires consideration for approval as an Experimental, Controlled Demonstration, Innovative or Accepted system shall apply separately pursuant to Rule .1969 of this Section.