



BIONEST SA-3, SA-3D, and BN-400 Wastewater Treatment Systems *Technology Fact Sheet for Bionest Technologies Inc.*

Performance Claim

The BIONEST SA-3, the BIONEST SA-3D, and BN-400 are wastewater treatment systems for household use. The BN-400 and SA-3 models are equivalent in conception differing only by size of the bioreactor.

The BIONEST SA-3 system is a submerged fixed film bioreactor using a non-biodegradable media. The BIONEST SA-3 system is a stand-alone wastewater treatment system. The system was tested in compliance with NQ 3680-910/2000-06-16 M1 (2004-09-10) at a hydraulic capacity of 1,260 L/day. The system (at influent temperature ranging between 14.2-21.4°C, pH in the range of 7.3-8.3, with an average CBOD₅ of 259 mg/L, TSS of 250.4 mg/L and Fecal coliforms of 3 161 246 CFU/100ml) was capable of reducing CBOD₅ to less than 3 mg/L, TSS to less than 4 mg/L, and fecal coliform organisms to less than 5 000 CFU/100ml.

The BIONEST SA-3 was also tested under similar conditions in compliance with NSF/ANSI Standard 40 – Residential Wastewater Treatment Systems between March 14, 2005 and August 2005 and was capable of reducing TKN and TON concentrations to less than 2 mg/L.

The BIONEST SA-3D is a stand-alone wastewater treatment system with UV disinfection. The system was tested in compliance with NQ 3680-910/2000-06-16 M1 (2004-09-10) at a hydraulic capacity of 1,260 L/day. The system (at influent temperature ranging between 14.2-21.4°C, pH in the range of 7.3-8.3, with an average CBOD₅ of 259 mg/L, TSS of 250.4 mg/L and Fecal coliforms of 3 161 246 CFU/100ml) was capable of reducing CBOD₅ to less than 3 mg/L, TSS to less than 4 mg/L, and fecal coliform organisms to less than 5 CFU/100ml.

Testing completed under NQ 3680-910/2000-06-16 M1 (2004-09-10) was conducted at the Bureau de Normalisation du Québec Laboratory based in Québec city, Québec while testing under NSF/ANSI Standard 40 - *Residential Wastewater Treatment Systems* 04/10/2015/060 was conducted at the NSF facility in Waco, Texas.

* Results presented in the Performance Claim were calculated and verified using ETV Canada General Verification Protocol - Statistical Analysis Worksheets.

Technology Application

The BIONEST SA-3, the BIONEST SA-3D the BN-400 are wastewater treatment systems for household use. The technology developed by Bionest is based on the well established principle of biological digestion of residential sewage using sequential biological reactors operated under forced aerobic conditions. The BIONEST SA-3D is a stand-alone wastewater treatment system with UV disinfection. The BIONEST SA-3 and the BN-400 systems are stand-alone wastewater treatment systems without UV disinfection. The BN-400 and the SA-3 models are equivalent in conception differing only by the size of the bioreactor. The hydraulic loading rate and the hydraulic retention time of the two models are virtually the same.

Technology Description

The Bionest system is a submerged fixed film bioreactor using a non-biodegradable media. The treatment train takes place in two tanks installed in series. The primary treatment uses a conventional two-compartment septic

Technology Description (cont'd)

tank equipped with an effluent filter. The second tank is called the "bioreactor". The wastewater flows to the bioreactor by hydraulic displacement from the primary treatment tank. Treatment in the bioreactor is achieved using a biological process of microbial culture, fixed to a synthetic media, in an aerobic condition. The media is a non-toxic polymer ribbon, engraved to facilitate the fixation of microbial culture, having a relative density of 1.04. A specific quantity of Bionest media is placed in the two compartments of the bioreactor. It is provided with a linear air pump and with fine bubble air diffusers. A recirculation pump is installed in the last compartment of the bioreactor and returns part of the effluent to the first compartment of the septic tank to provide denitrification.

Verification

Two separate experiments were conducted and data was submitted to the verification process. The first set of data was obtained between August 2004 and February 2005 when testing the system for its efficiency to treat residential sewage water to remove suspended solids, BOD5 and fecal coliform using the NSF/ANSI 40-2000 test protocol. Testing was completed at the BNQ facility in Québec City, Québec, and was intended to verify the conformity of the equipment with BNQ standard NQ3680-910/200-06016 M1 (2004-09-10).

The second experiment aimed at assessing the system's efficiency to treat residential sewage water and its conformity with NSF/ANSI 40-2004 standard. The data submitted from this experiment was obtained by conducting additional sampling not included in the NSF standard. Samples were collected and analyzed to evaluate the equipment ability to reduce TKN and TON concentrations. This portion of the testing was completed between March and August 2005 at the NSF Wastewater Technology Test Facility located in Waco, Texas under environmental conditions closer to Canadian summer conditions than to winter conditions.

The verification was completed by Centre National en Électrochimie et Technologies Environnementales Inc. (CNETE) using ETV Canada's General Verification Protocol (March, 2000).

What is the ETV Program?

The Environmental Technology Verification (ETV) Program is delivered by ETV Canada under license agreement from Environment Canada. The ETV Program is designed to support Canada's environment industry by providing credible and independent verification of technology performance claims.

For more information on BIONEST SA-3, SA-3D and BN-400 please contact:

Bionest Technologies Inc.
55, 12e rue, CP 697,
Grand-Mère (Québec)
G9T 5L4 Canada
Tel: (819) 538-5662
Fax: (819) 538-5707
Toll Free: 1 (866) 538-5662
www.bionest.ca

ETV Canada Contact Information:

ETV Canada
2070 Hadwen Road Unit 201A
Mississauga, Ontario
L5K 2C9 Canada
Tel: (905) 822-4133
Fax: (905) 822-3558
E-mail: etv@etvcanada.ca
www.etvcanada.ca



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