

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

INNOVATIVE WASTEWATER SYSTEM APPROVAL

INNOVATIVE WASTEWATER SYSTEM NO: IWWS-2009-01

ISSUED TO: Tim Wood
Infiltrator Systems, Inc.
6 Business Park Road, P.O. Box 768
Old Saybrook, CT 06475
800-718-2754 Fax: 860-577-7001
<http://www.infiltratorsystems.com/>

FOR: Aquaworx Pressure Bell Assembly and accompanying IPC-Series Control Panels

MODEL: Pressure Bell complete assembly: Part numbers TRN-40, TRN-80,
TRN-120, TRN-120, TRN-180, TRN-240, and TRN-300

APPROVAL DATES: February 23, 2009

In accordance with NCGS 130A-343 and 15A NCAC 18A.1969, an application by Aquaworx by Infiltrator Systems Inc., Old Saybrook, CT for approval of their Aquaworx Pressure Bell Assembly for use with the accompanying IPC-Series Control Panels and accessory components, has been reviewed and found to meet the standards of an innovative system (component) when all of the conditions specified herein are met, and is approved for use subject to the conditions of this innovative approval.

A. DESCRIPTION/SPECIFICATIONS

1. This Innovative System Approval is for a proprietary submersible Pressure Bell designed to replace mercury and mechanical floats and their wires in a wastewater system pump tank. It is also for the companion IPC-Series control panel that controls the pump and alarm function in response to varying water levels in the pump tank as sensed by the Pressure Bell. The control panel is connected to the Pressure Bell by the transducer signal line made of UL recognized industrial tray cable which may be installed by direct bury or through a electrical conduit between the pump tank and the panel.
2. The Pressure Bell apparatus includes a transducer that reads changes in air pressure by way of a differential pressure transducer. The Pressure Bell is fixed in place by connection with a 1-inch PVC stand pipe to a mounting bracket installed in the pump tank riser. A pressure reference snorkel tube made of ¼ inch polyurethane tubing is also installed in the 1-inch PVC pipe and is brought into the riser assembly to form an inverted J.
3. The controller is responsive to the transducer and selectable effluent level thresholds to activate

the pump for adjusting the level of the fluid in the tank, or to activate the alarms. It also features a patented autoclear feature that is used to automatically replenish the air pocket in the pressure bell housing, thereby protecting the transducer from water-logging and maintaining accurate dose tank liquid level readings.

4. The control panel includes built in high level, and transducers failure alarms (audible and visible). It also includes a manual (HOA) hand run operation mode; and an optional circuit breaker assembly. The required method of installation utilizes a disconnect external to the control panel as per the National Electrical Code or local electrical codes.
5. The Pressure Bell Assembly and Panels have been demonstrated to perform equal or superior to a control system as described in Rule .1952(c)(5) and (6), and to be constructed of materials equal or superior in physical properties and chemical durability, compared to materials used for similar proposed components specifically described in this Rule, as required by statute and rule for innovative approval.
6. If operation of the Pressure Bell Assembly is affected by grease or floating debris or in any other way fails to operate as described, this approval may be amended or revoked.

B. ADDITIONAL DESIGN CRITERIA

1. The pressure bell housing shall be of one-piece molded construction. It shall be molded of black ABS or PVC plastic. The Differential Pressure Transducer assembly and PVC mounting fitting shall be bonded to the pressure bell housing using dielectric epoxy and shall be factory installed into the pressure bell housing at the Aquaworx factory with no user field replacement of the internal parts approved.
2. Printed circuit boards are manufactured for Aquaworx and provide a data logging with a date/time clock backup.
3. The transducer assembly works on the principal that an increasing liquid level in the dosing tank compresses the air inside of the pressure bell housing. That pressure exerts a force on the transducer, which converts the pressure into an electrical signal. That electrical signal is transmitted through industrial tray cable back to the control panel where the circuit board microchip programming interprets the signal and accurately determines real time liquid levels. End users can read the depth through the use of the MARC controller display, palm pilot or laptop computer.
4. The Control Panel is UL listed as an Industrial Control Panel (508A) and includes the standard features of a NEMA 4X enclosure; separate alarm and control circuits, grounding lugs, adjustable Pump-Off, Pump-On and High Level Alarm; alarm test/silence pushbutton; and pump hand-run pushbutton. It also includes as optional features: lockable latches and circuit breakers for control and motor circuits that are accessible inside the panel door.
5. The panel utilizes a removable MARC or other controller, which shall enable the operator to set and display elapsed run time and cycle counter for each pump. Users can also use the MARC controller to access up to 4000 stored data logged events such as dose events, manual run events, power failure events, and several alarm conditions. This is imperative when trouble shooting a system to assure proper system settings. The MARC/HUI controller is used to precisely adjust

pump on/off and alarm activation levels based on the real time liquid level setting in the panel.

6. Except as provided for herein, all other applicable requirements of 15A NCAC 18A .1952 shall be met.

C. INSTALLATION

1. The control system shall be installed in accordance with manufacturer specifications. Aquaworx shall supply as a complete package:
 - the pressure bell with cabling length as required
 - the control panel
 - polyurethane tubing pressure reference snorkel tubing of sufficient length to install into the dosing tank riser without splicing
2. The Pressure Bell shall be securely mounted with a bracket or method approved by Aquaworx, Inc. and readily removable for adjustment or maintenance. The pressure bell shall be attached to a section of 1-inch stand pipe secured inside of pump-tank riser, with mounting bracket within 12-inches of the top of the riser. The bottom of Pressure Bell shall be located at approximately one dose above the top of the pump to prevent exposure of the pump during the autoclear cycle. The support pipe shall be secured in the mounting bracket so that there is adequate length of pipe above the bracket, to allow for the lowering of the bell to the system designers specification. An alternate means of securing the pressure bell meeting performance requirements as specified herein may be proposed by the authorized installer if concurred with by the manufacturer and approved by the local health department.
3. The pressure reference snorkel tube shall be extended up through the 1-inch bell-securing pipe into the riser, and out to form an inverted J. The transducer signal line wire shall be connected to the control panel through sealed conduit (one half-inch, minimum). A junction box inside the dosing tank may only be used to serve as a wire pull-through and collection point for connection to the conduit to the control panel. **No splices shall be made in either the poly-tubing or pump wire. Splices in the wire may be allowed for repairs using a method approved by Aquaworx.**
4. The control panel shall be securely mounted within 300 feet of the pump tank and at a height to allow the Owner/Operator to readily adjust and observe the liquid depth through the display on the MARC controller. It must be in "Line of Sight" to meet NEC.
5. Pump off, on and high water alarm activation levels are set by using the button settings on the face of the MARC controller. Precise adjustments can be made using the MARC controller setup instructions per manufacturer's manual.

D. OPERATION AND MAINTENANCE

1. An audible and visible alarm shall activate if any of the following conditions arise:
 - the Pressure Bell is disconnected from the controller for any reason;
 - the effluent level rises above the programmed pump-on level to the alarm level.

The 1.5-volt battery back-up system will keep the internal clock functioning in the event of a power failure at the controller. Repairs/replacement of malfunctioning components shall be completed in accordance with manufacturer's recommendations.

2. The 1.5-volt battery shall be replaced at least once every five years

E. RESPONSIBILITIES

1. The Aquaworx installers shall be authorized in writing by the manufacturer to install this control system. The installer shall be at least a Level II or higher (if otherwise required by the type of system being installed).
2. Training by the manufacturer shall also be provided, upon request, to local health departments to facilitate proper inspection and permitting of these systems.
3. Wiring to the Panel and pump shall be completed by a licensed electrician (incoming power only).
4. Duplex systems and grinder pump systems shall be designed by a registered professional engineer if required by Rule 15A NCAC 18A .1938(d).

F. LITERATURE

The manufacturer shall furnish with each control panel:

- A complete Owner/Operator Manual which includes Operation and setup of the control panel, complete Pressure Bell installation instructions, liquid level adjustments, and troubleshooting .
- The Operating instructions for the MARC controller will be provided with the panel. i.e., programming and data retrieval instructions.
- Each panel will come with a complete wiring diagram and easy to use wire hook-up instruction.

G. MAINTAINING APPROVAL STATUS

The approval status is governed by Rule .1969

Approved by: _____ Date: _____