TECHNOLOGY SHEET

ZERO LIQUID DISCHARGE SEPTIC TREATMENT SYSTEM

NextGen Septic Zero Discharge system works in conjunction with the NextGen septic system in applications where any water discharge, even for treated water, is impossible. This situation arises where sufficient land for soil percolation is unavailable, there is no access to a sewer line, the soil does not percolate sufficiently, or the land is situated near a lake, river, or ocean, where there is more sand than soil.

Treated water from the NextGen septic system has passed through a proprietary membrane filter system with pores of 0.05 microns, producing clear water for the zero-discharge addition. An Infiltrator IM-540 tank is typically installed at the same depth as the NextGen system and connected directly to the NextGen system outlet flow. The pump from the NextGen system pumps the treated water through the ozone disinfection system. This disinfected, clear water flow enters the zero-discharge tank with a 552-gallon maximum water holding capacity. A submersible pump inside the zero-discharge tank pumps the treated water through a high-pressure nozzle, creating a water mist with an average drop diameter of less than 10 microns. This mist is injected in ambient air, wherein the airflow evaporates the tiny droplets faster than they can freeze in the wintertime. The total flow of amplified air is about 500 acfm. The high-pressure pump, nozzle spray, air flow blower, and other controls are housed inside a separate box, which is installed close to the house so that the evaporated water and air can be emitted via a stack supported by the side of the house, as shown in the photograph on the right.

The water mist suspended in the airflow flows out of the stack and allows it to diffuse into the surrounding air. This is mainly due to the very high surface area of the water mist droplets, which produces a huge surface area for the evaporation of the water.

In the wintertime, when ambient temperatures can be below freezing, the size of the water droplet is small enough that its rate of cooling by heat loss to the ambient air is less than its evaporation into the air, especially in the winter when the ambient humidity is very low. This allows the water droplet to evaporate rapidly and convert entirely to water vapor before it can freeze.

The Zero Liquid Discharge system typically operates at night, when ambient humidity is lower than during the day. It is designed to automatically operate when the ambient humidity is below a critical value, which can be set based on the system's location.

The maximum amount of water that can be misted into the air is 600 GPD. The system must be scaled up for higher capacities (> 600 GPD) with additional nozzles and airflow capacity.

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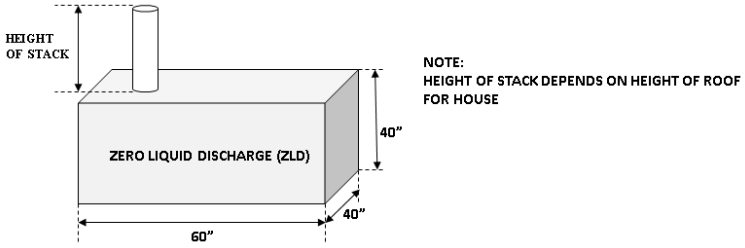
Treated, disinfected water from the NextGen Septic system is pumped into an intermediate storage tank, typically 552 gallons in capacity. We use a standard 500-gallon septic tank (IM-540) from Infiltrator Technologies, the dimensions of which are shown on the next page. The capacity of this intermediate storage tank will be greater in places where the ambient humidity is generally high since the capability of the ZLD system to evaporate the water depends on the length of time ambient humidity is lower than 100%.

The dimensions of the Zero Liquid Discharge system, installed above ground on a concrete pad, are shown below:



The Zero Liquid Discharge (ZLD) process relies on the small water droplet size (typically less than 50 microns) created by the atomizer and the high interfacial area of these small water droplets with the ambient air. The table below shows the surface area of the water droplets of various sizes.

Droplet Size (micron)	Time to fall 10 ft (seconds)	Distance moved in 4,583 ft/min air flow** (feet)	Number of Water Droplets in 1 gallon	Surface Area of 1 gallon of water* (ft^2)
10	1,020	68,000	7.23 trillion	24,450
40	64	4,200	113 billion	6,113
100	11	720	7.23 billion	2,445

For water droplets in the range of 30-40 microns in diameter, the time it takes to reach the ground from a distance of 10 ft is about 39 seconds, and this is considered free fall due to gravity. In actual practice, due to the air velocity through the stack, 8 inches in diameter, and an airflow rate of 4,200 acfm, the air velocity is 12,034 ft/min (200 ft/sec). This allows the water droplets to travel about 6,000 ft above the stack before they free fall to the ground. The number of water droplets formed from 1 gallon of water will be 57.8 billion. The surface area of the water droplets is about 4,887 ft^2.

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FEATURES & BENEFITS

- **The 552-gallon Zero Liquid Discharge feed tank is manufactured with robust, injection-molded polypropylene construction.**
- **Structurally reinforced access ports eliminate distortion during installation.**
- **Can be installed with 6” to 48” of cover.**
- **No particular installation, backfill, or water-filling procedures are required.**
- **Is only used in conjunction with NextGen septic system to ensure treated water quality and level of disinfection.**
- **The misting system creates water droplets with an average diameter of 10 microns, allowing water to evaporate effectively after leaving the system.**
- **It can be installed like a conventional septic tank, except 110V, and single-phase electrical power is required for the system.**
- **A small, quiet air compressor is used in conjunction to produce the airflow for the mist.**
- **Power consumption is less than 1 kW, and yearly electrical cost is about $200; and**
- **NextGen Zero Discharge system is shipped fully assembled.**

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