



Holding Tank Use and Care Guide

Keep our water clean.

 **Dometic**



Holding Tank Component Diagram

TANKWATCH® ALERT SYSTEM

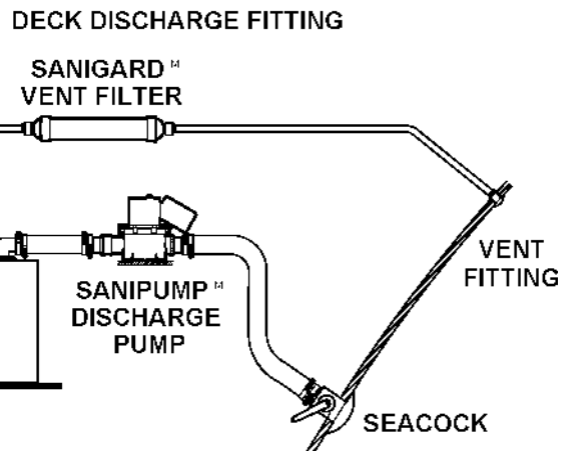
TANKSAVER® RELIEF VALVE

DISCHARGE
FROM
TOILET

HOLDING TANK

Table of Contents

Component Diagram	2-3	Deodorants 11-14
Introduction 3	Toilet Tissue Issues	... 15
Estimating Capacity	4-5	Spills and Leaks	.. 16-17
Avoiding Overfill	... 6-7	Overboard Discharge	. 18
Tank Implosion 8	Dockside Discharge	19-20
Odor Control 9-10		



Introduction

When used and maintained correctly, a holding tank should never interfere with your boating pleasure. This guide provides you with basic information about holding tank operation and routine maintenance procedures to help you – and the environment – realize the fullest benefit of your holding tank system.

Estimating Tank Capacity

How many flushes will my holding tank hold?

That's a typical question many boat owners ask about their holding tank. The answer depends on what type of toilet is being used.

But first, you need to know how much waste an adult produces. Field experience shows that, on average, an adult produces a total of 0.7 gallons (2.6 l) of waste per day, and flushes about five times a day. This means that an adult produces .14 gallons (.53 l) of waste per flush.

Next, you need to add the amount of water per flush to the waste per flush. The type of toilet you have now becomes important.

A **manual or electric toilet** can use one gallon (3.785 l) per flush. If you have one of these toilets, the total amount of effluent per flush would total 1.14 gallons (4.31 l).

A **VacuFlush® toilet**, on average, will use only 0.2 gallons (.76 l) of water per flush*. This brings the total effluent per flush to 0.34 gallons (1.29 l).

Based on this information, you can easily calculate how many flushes a holding tank will hold. The examples at the top of the next page reflect the capacity for a 20-gallon (75.7 l) holding tank:

** VacuFlush toilets use as little as 0.13 gallons of water per flush. Because we recommend adding more water when flushing solids, we conservatively estimate average water use at 0.2 gallons per flush.*

Estimating Tank Capacity (cont'd)

Manual/Electric Toilet

Tank capacity	20 gal.
Effluent/person/flush	÷ 1.14 gal.
<hr/>	
Flushes per tank	17 flushes

VacuFlush Toilet

Tank capacity	20 gal.
Effluent/person/flush	÷ 0.34 gal.
<hr/>	
Flushes per tank	58 flushes

How many days will my holding tank last?

When planning a trip for a number of people, you can now calculate how many days you can travel between pump-outs. Based on a trip with four adults, here's how long that 20-gallon tank will last:

Manual/Electric Toilet

Effluent/person/flush	1.14 gal.
Total flushes/day	x 20 (4 adults x 5 flushes)
<hr/>	
Total effluent/day	22.8 gal.
<hr/>	
Total days to fill tank	0.9 days (20 gal. capacity ÷ 22.8 gal. effluent)

VacuFlush Toilet

Effluent/person/flush	0.34 gal.
Total flushes/day	x 20 (4 adults x 5 flushes)
<hr/>	
Total effluent/day	6.8 gal.
<hr/>	
Total days to fill tank	2.9 days (20 gal. capacity ÷ 6.8 gal. effluent)

As you can see, a VacuFlush toilet can greatly extend the use of a holding tank between pump-outs as compared to manual and electric toilets.

Avoiding Overfill

While all boats have gauges for the gasoline tank, not all boats have a gauge for the waste holding tank.

If your holding tank is not equipped with a level monitor, a **SeaLand® TankWatch® Alert System** provides an easy way to avoid overfilling the holding tank. A glowing red lets you know when to stop using the toilet and pump the tank out.



To monitor the level of holding tank continuously, the **TankWatch 4 Holding Tank Monitor System** features a four-light read-out panel. It



shows when the tank is Empty, and when the levels reach Low, Mid and Full. If you have a VacuFlush or other electric toilet, this system is available with a

shut-off relay to stop power to the toilet when the tank is full. This system is available from most SeaLand product dealers and retailers.

Both TankWatch monitor systems are activated by float switches that are easily installed in the holding tank. Simply drill appropriate-size hole(s) (see directions that come with system), adjust probe lengths, and connect wires.

Avoiding Overflow (cont'd)

What can happen when an overflow occurs?

If passengers continue to use the toilet system after the holding tank reaches capacity, the contents of the tank will start to flow into the vent line. Because most vent lines are 5/8-inch (16 mm) in diameter, the line will quickly clog. When the tank is finally pumped out, paper and effluent may remain in the line and dry out, creating a solid plug. Since no air can now escape the holding tank, it can become pressurized during subsequent flushes, potentially causing damage to the holding tank or, worse yet, the surrounding boat structure.

If your boat has a vent filter in the vent line, such as the **SaniGard™ Vent Filter**, overflowing the holding tank can also clog the vent filter. When this happens, the vent filter cannot be cleaned out, and must be replaced with a new one.

In short, to avoid the inconvenience and damage that can result from an accidental overflow, make sure your holding tank is equipped with a “full tank” alert or level monitor system.

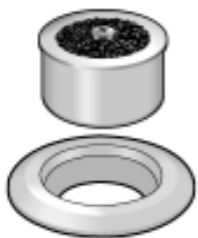
Tank Implosion

Too much pump-out suction can be a bad thing.

When U.S. Coast Guard regulations on holding tanks were originally developed, dockside pumps usually had a maximum flow rate of 20 gpm (76 lpm). In general, holding tanks could withstand this amount of vacuum without any negative effects.

Today, many pump-out facilities operate at 50 gpm (189 lpm) or greater. Without adequate tank venting, the shock of this vacuum pressure on the holding tank and hoses can rupture hose connection points if the control valve is opened quickly. To put it mildly, the resulting mess can be very unpleasant.

To prevent tank implosion from occurring, we developed the **TankSaver® Relief Valve**. It opens



automatically when the holding tank is subjected to high levels of vacuum, and otherwise remains sealed regardless of shock or vibrations. And it won't let malodors escape from the holding tank.

Using a 3-inch (76 mm) hole saw, cut a hole in the top of the holding tank and insert the TankSaver valve.

Odor Control

Where to find odors, and how to control them.

In a marine sanitation system, there are several potential sources for malodors.

Seawater flushing – If your toilet uses seawater for flushing, microscopic marine organisms which die and decompose inside the incoming water line can cause malodors, especially when the toilet has not been flushed for a long time. Our VacuFlush systems, with freshwater flushing, eliminate this occurrence.

Discharge hose odor permeation – If a discharge hose is installed so that a section may collect standing sewage, anaerobic decomposition of the sewage can begin, and the malodor created by this process can permeate the hose material (rubber hose can be especially vulnerable).

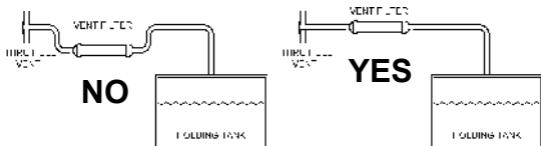
To determine if this is the odor source, use a clean cloth to wipe all suspected areas. Sniff the cloth at frequent intervals. Where molecules of malodor have permeated the hose, the odor will be transferred to the cloth. The offending section of hose will need replaced. If impossible to reposition the hose so it can readily drain, convert the hose to rigid PVC pipe.

Odor Control (cont'd)

Where hose runs are required, **SeaLand® OdorSafe® Hose** is 16 times more effective against odor permeation than other leading hoses, making it the best choice for sanitation hose.



Ventilation line – Improper installation of a vent line sometimes results in low points that can trap liquid and do not let gases escape. Rerouting the vent hose can eliminate this problem.



When a toilet is flushed, the effluent entering the holding tank displaces malodorous gases out of the holding tank, through the vent line, and out the through-hull vent fitting. To remove odors before they escape overboard, install a **SaniGard™ Vent Filter**. The charcoal media absorbs the heavy odor molecules and will last an entire boating season.



Deodorants

Effluent in the holding tank and connecting plumbing begins to decompose immediately after entering the system. Sewage decomposition can take place in two ways:

In **aerobic** decomposition, bacteria uses free oxygen to digest waste and produce carbon dioxide, water, nitrates, sulfates and phosphates – compounds that do not have offensive odors.

In **anaerobic** decomposition, where no oxygen is present, unstable, heavier-than-air, malodorous compounds are produced.

Why use holding tank deodorants?

Deodorants are designed either to inhibit the growth of anaerobic bacteria and stop production of malodorous gases, or to chemically lock onto molecules of malodorous gas and prevent them from escaping.

What types of deodorants are there?

Formaldehyde-based compounds – These are the most effective odor-controlling agents. They are effective over a wide range of temperatures and pH levels, and are also effective in hard water conditions. When handled as directed, the liquid is safe – but the area should be as well-ventilated as possible during pouring. The fumes from spilled liquid can irritate the eyes and respiratory tract, so care should be taken in storage (see pg. 16). Switching to a dry, granulated formula would eliminate the potential for spills.

Deodorants (cont'd)

Discharging formaldehyde-treated effluent into a marine environment should not be a problem if the product is used and discharged properly. Formaldehyde is naturally present in the environment as well as through man-made sources. In water, it rapidly biodegrades, and does not accumulate in aquatic organisms. It is also readily biodegradable in soil, breaking down into water and carbon dioxide.

Preservatives – Preservative compounds have the advantage of low toxicity to humans and the environment, and the disadvantage of less effectiveness and higher cost than typical formaldehyde deodorants.

Quaternary ammonium chloride (QAC) compounds – While QAC's may not have the pungent odor of formaldehyde-based formulas, they are not as effective in hard or salt water. QAC's also can lose effectiveness after repeated emptying of the holding tank without thorough cleaning after each pump-out.

Enzymes – Enzymes are naturally formed as part of a cell's normal metabolism. Deodorants which use one or a combination of enzymes control odor indirectly by accelerating the digestion of the organic material in the effluent. The main advantage of enzyme-based deodorants is that they are believed to be nontoxic to humans and the marine environment.

Deodorants (cont'd)

Enzymes are generally effective only in a narrow range of temperatures and pH levels. Like QAC's, they also require a very clean tank to begin, and residuals of other deodorants must be removed. Enzymes also require an extremely well-ventilated holding tank to achieve maximum effectiveness. Some suppliers of enzyme deodorants do not recommend them for recirculating or portable toilets.

For best odor control, regardless of which deodorant is used, the waste holding tank should be thoroughly cleaned at least once each season, depending on use.

How are SeaLand deodorants formulated?

SeaLand® Holding Tank Deodorant (blue liquid) is a formaldehyde-based product. Our

most powerful formula, it controls odors instantly, and keeps working in the most extreme temperature ranges – from arctic cold to steaming hot.

Formaldehyde-based deodorants are available in liquid and granulated formulas.



Deodorants (cont'd)

SeaLand® Environment-Friendly Holding Tank Deodorant (green liquid) is a preservative-based deodorant and cleaner that provides a highly effective, formaldehyde-free alternative. It uses two other naturally occurring ingredients to broaden its range of effectiveness.



How much deodorant should I use?

In a 40-gallon holding tank, use 8 oz. (237 ml) of either liquid deodorant. With SeaLand vitreous china toilets, open flush ball and pour slowly into sanitation system without splashing. After pouring deodorant, close flush ball and allow water to enter toilet bowl. For VacuFlush systems, flush toilet once to move deodorant all the way to holding tank.

Remember, bacterial activity doubles for every 12.2°F (10°C) increase. In high-temperature climates, increase the deodorant dosage accordingly.

Can I add other chemicals to the holding tank?

Never mix chemical compounds, even if they are household products. Never mix our holding tank deodorants with toilet bowl cleaners containing hydrochloric acid. Never mix ammonia with chlorine bleach. The chemical reactions could be harmful either to you or the sanitation system.

Toilet Tissue Issues

Most marine toilets flush with very little water (as little as one pint) as compared to a 1.6-gallon or 3.5-gallon or 5-gallon toilet in most homes. And many household toilet tissues contain adhesives (for bonding paper fibers together) that may break up well in household systems, but can quickly clog up a low-water-volume marine system.

Do all rapid-dissolving tissues really work?

The ability for toilet tissues to break apart quickly can vary widely from brand to brand.

SeaLand Rapid-Dissolving Toilet Tissues,

available in single-ply and double-ply rolls, are routinely tested for rapid-dissolving properties. Both styles are made from 100% recycled paper and are biodegradable – resulting in minimal environmental impact as well as outstanding performance.



Do your own “tissue test.”

Put one square of tissue in a glass of water. Slosh it around for five seconds. If the tissue breaks up into many pieces, it will likely work in your marine toilet system. If not, it could cause clogs in discharge lines or “ball up” in holding tanks.

Spills and Leaks

To help avoid accidental spills or leaks of liquid deodorants, keep these products in a separate plastic storage bin. Do not store them in lockers with other equipment that could shift and cause damage to bottles.

If a spill or leak occurs...

For *formaldehyde-based deodorant leaks*, immediately ventilate the area. Open doors, windows, hatches, use fans or anything to move extra fresh air into the space. When cleaning spill, work in short periods (15 minutes or less). If needed, respirators with cartridge/filters should be used.

Cover spill with generous amount of dry absorbent material such as baking soda. Allow material to soak up as much as possible, then sweep. Dispose of residue in plastic bag.

If the spill travels into an inaccessible area, mix a solution of one cup baking soda to one gallon warm water and flood the entire area. Repeat several times to dilute the residual liquid. Follow directions for removing stains if needed.

For deodorant stains...

Resolve® carpet cleaner has proven effective in cleaning stains left by liquid deodorant spills. If not readily available, mix 1/4-cup color-safe laundry bleach to one gallon cool water. Apply generously to stained area and let stand. Blot area dry. Repeat until stain is removed.

Spills and Leaks (cont'd)

For holding tank effluent...

Wear protective gloves. Blot area of the spill with paper towels. Disinfect the area with the same procedure as for cleaning deodorant stains. Residual urine odors can be removed by flooding the area with one cup vinegar to one gallon warm water. Let stand as long as possible and blot dry. When finished, wash hands with soap and hot water.

Overboard Discharge

When is it okay to discharge overboard?

The answer to this question depends on where you are boating. If you are three miles or more offshore in U.S. coastal waters, you can legally discharge untreated effluent from the holding tank.

Within three miles of shore, however, it is not legal to dump raw sewage into the water. Effluent can only be discharged if it has been treated by a Type I or II marine sanitation device (MSD), and if the waters have not been designated as a “No Discharge Zone.”

Otherwise, boats within a coastal “No Discharge Zone” must contain their waste in a Type III MSD which uses a holding tank. The waste can be discharged at dockside pump-out facilities. All rivers and freshwater lakes, including the Great Lakes, are protected by the Environmental Protection Agency as “No Discharge Zones” as well, so Type III MSDs must be used in these areas, and sewage can be discharged only at dockside pump-out facilities.

No Discharge Zones

An up-to-date list of No Discharge Zones can be located on the World Wide Web at http://www.epa.gov/owow/oceans/vessel_sewage/vsdnozone.html.

Dockside Discharge

When pumping out a holding tank, it is important to create an airtight seal between the deck's discharge fitting and the dockside suction pump discharge hose. But because deck fittings vary in thread size and internal dimensions, it is sometimes difficult to achieve this seal.

Dockside pump suppliers have tried to solve this problem by using a tapered rubber nozzle that will fit most standard size openings. But the fit is not airtight, so not enough vacuum may be achieved for complete pump-out. And the rubber abrades over time, reducing its effectiveness.

Another remedy was a cam-operated coupling. A special adapter is required for this, and marina-supplied adapters have a strange way of disappearing.

The SeaLand **NozAll™ Pump-out Adapter** works with both tapered rubber nozzle and cam-operated fittings. There are three NozAll models available to match the most popular deck fitting sizes.

1. *Tapered rubber nozzle*
2. *Cam-operated fitting*
3. *NozAll*
4. *Deck fitting*

