Til dere som søker "Dassen's bibel" av Peggie Hall.

Den 4.okt. –05 fikk jeg mailen nedenfor fra henne, der hun ber meg fjerne artikkelen. Hun begrunner det med at det ikke er oppdatert, og at mye av det hun hadde skrevet var feilaktig. Ikke oppdatert er nok rett, men jeg misstenker damen for heller å ville selge boken sin, da hun ikke har lagt selv utdrag av den ut på nettet. Jeg lagret imidlertid artikkelen i god tid før hun fjernet den fra nettet. Så foreløpig lar jeg artikkelen ligge.

Fra: Peggie Hall [mailto:peg.hall@sbcglobal.net]
Sendt: 4. oktober 2005 17:35
Til: kapteinen@trudelutt.com
Emne: Please remove my article from your website

Hello!

While searching Google, I just "tripped over" a link to my article "marine sanitation: fact vs. folklore" on your website. I'm writing to ask you to remove it.

I haven't revised it since 1996...making quite a bit of the info in it obsolete, misleading, and in some cases downright wrong due to improvements in toilet technology. Continuing to publish it is damaging to my credibility. Every time I THINK I've gotten it off all the sites it was on, it pops up on another one!

I'd be delighted if you'd replace it with a link to my book (see my signature below), which IS current information.

Thank you for your cooperation!

--
Peggie

Peggie Hall
Specializing in marine sanitation since 1987 Author "Get Rid of Boat Odors - A Guide To Marine Sanitation Systems and Other Sources of Aggravation and Odor"
http://www.seaworthy.com/store/customer/product.php?productid=40&cat=6&page=1
http://shop.sailboatowners.com/detail.tpl?fno=400&group=327

Dermed er det er bare å bla videre til neste side, så finner dere artikkelen.

MARINE SANITATION : Fact vs. Folklore

by Peggie Hall
The Hall Group, Inc.
Atlanta, Georgia

Peggie Hall is recognized in the boating industry as one of the few experts in marine sanitation. As a member of ABYC, she was a member of a sanitation project technical committee formed to establish a standard for sanitation equipment and installation onboard from its inception in 1991 through 1996. She is often asked to speak at conferences, conduct seminars for various organizations and at major boat shows, and is a consultant to a number of state agencies.

Mrs. Hall first entered the marine business in 1987, when she formed Peal Products, which was the first company in the marine industry to focus exclusively on onboard sewage management issues and the elimination of odors on boats. Their environmentally friendly products were soon given outstanding performance ratings by Powerboat Reports and Practical Sailor. In 1999 Mrs. Hall sold Peal Products to Raritan Engineering. She is now an independent consultant for The Hall Group, Inc.

But what matters most to you is that Peggie Hall is also a boat owner who has to deal with the same sanitation laws, equipment, and issues that you do!

(Note: The information contained herein is accurate as of this date. We continually revise and update as new laws are passed, new information is learned and new equipment comes onto the market--as well as to include more answers to frequently asked questions.)

THE MARINE SANITATION SYSTEM

Let's look now at equipment, standards for installation, and fact vs. folklore.

From a standards point of view, it really Is immaterial whether a vessel is equipped with a portapotty, a manual pump type head or the most sophisticated electric system on the market. The important things are that it be well constructed, easy to maintain and fit the expected use of the boat - i.e. it doesn't make sense to equip a 50' Hatteras with 5-gallon portapotties any more than it makes sense to install a $3500 Galley Maid system on a 21' cuddy cabin day sailor.

The Portapotty

Portapotties require no plumbing; they may or may not have a reservoir for flush water. Bowl contents drain by gravity into a removable tank which is carried off the boat and dumped, although some larger models can be fitted for pumpout. Typically they hold between two and five gallons. An upgraded version is the SeaLand ''Marine Traveler,'' which is a toilet bowl atop its own 9-gallon tank which is fitted for pumpout, and uses pressurized water from the onboard system, but very little of it. Portapotties are automatically CG Certified Type III MSDs.

The Head (Marine Toilet)

While there appears to be a wide variety of heads (toilets) on the market, in fact there are only four types in common use: manual pump electric macerating, vacuum, and gravity:

Manual pump heads are just what the name implies: water is pumped in and the combination of water and sewage is pumped out of the bowl manually. Most are simple piston rod pumps designed to use ''raw'' (sea, lake or river) water for flushing. Therefore a below-waterline through-hull fitting and seacock are needed to install one. They use no current. The amount of flush water used can be controlled by the user. Periodic preventive maintenance (discussed later) is necessary. The best known are manufactured by Wilcox-Crittendon, Groco, Par, and Raritan. It's possible to add an electric motor (typically 12v DC current) to some models; the motor simply replaces your arm in activating the pump. When ''electrifying'' a manual toilet it's important the motor's drive shaft be the same length as the pump stroke; too short a stroke fails to complete flushing action, which results in clogged toilets. The list prices of manual toilets ranges from around $200 to around $500. Electric conversions average about $250.

Electric macerating heads are only a little more complex than a manual head. They are typically designed to use raw water. An impeller pump replaces the piston type found in manual heads, and there is also a discharge pump. Between the two is a device called a macerator that is not totally unlike a blender or a garbage disposal--it purees solid waste & paper. Macerating heads require more flush water than any other type of toilet - a minimum of 1 gallon to rinse urine completely out of the machinery, a minimum of 3 gallons to clear solids and paper. Insufficient flushing shortens the life of the motor and macerator, and is the biggest single cause of burned out motors. Current draw is around 35 amps. Preventive maintenance is necessary. Par and Raritan make the most popular brands. List prices range from about $850 to over $1100.

There is only one electric vacuum head on the market: the SeaLand VacuFlush. It's an extremely simple head in

principle. An electric pump creates a vacuum in the system; when the head is flushed (simply step on the pedal) the vacuum pulls the bowl contents to its destination: overboard, a CG certified MSD, or a holding tank.. The VacuFlush is designed to use pressurized fresh water from the onboard system, eliminating sea water odor. It uses only 1 -3 pints with each flush, and is the only marine toilet designed to receive and hold water for solid waste. Current draw is about 6 amps for 45 seconds following each flush. It's one of the few toilets which requires no preventive maintenance. List prices start at around $1150.

The only manual vacuum head is the Blake Lavac, made England. After use, the lid is closed, forming a seal. A separate manual pump, which must be purchased separately (typically a Whale Gusher or something similar), is used to pull in sea water and set up a vacuum in the bowl when the pedal is the depressed the sewage is sucked out. Virtually no maintenance or repair is ever needed, and therefore it's gaining in popularity among passage-making sailors. But distribution is very limited in the US and when parts ARE needed, they can be hard to find. Prices vary with the model, and the choice of pump.

A gravity head is exactly what the name implies, and can only be used where it's possible to position the toilet directly above a holding tank. Although gravity heads use very little water, they do require pressurized water. List prices start at under $300.

Although they've never been widely used in the marine industry, re-circulating heads , which work exactly as the name implies--by recirculating an initial ''charge'' of water and chemical along with new sewage till the system is full--occasionally do show up on boats. Although several manufacturers have offered them in the past, Monogram and Thetford are the only manufacturers we know of who currently offer recirculating toilets. We do not recommend them; they hold only 5 gallons - no more than a portapotty - and odor control is all but impossible. Parts are no longer available for older models.

Although their size and their price make them impractical - if not impossible - for use on most boats smaller than 40 feet, there has been so much interest in composting toilets that it wouldn't be fair not to include them in a list marine toilets. Because composting toilets are totally complete self-contained units, they are Coast Guard Certified Type III MSDs, can be a very attractive and cost-competitive alternative to a new toilet and MSD or holding tank on a houseboat or any vessel that has a head compartment large enough to accommodate their size: typically a 19'' x 23'' footprints, plus an additional 25'' required to pull out and remove the drawer to empty it, and it's 29'' height (retractable boarding step/footrest included). No plumbing is required, although sufficient power (12v or 115) to continuously run the 3.4 watt fan and evaporating plate in the evaporating chamber must be available . The compost is sanitary, identical in every way to bagged fertilizer available at garden supply stores. List prices average $1200.

Sanitation Hose:

Lots of Folklore

Sanitation hose has long been the subject of a whole lot of debate. A headline in the September -93 issue of Practical Sailor was only one of hundreds over the years to trumpet ''Hose is the key to odor control!'' It's a perfect example of the folklore that that has been a part of the marine industry forever. Some ''experts'' insist that anything less than double walled hose is unacceptable, some even recommend the use of rigid PVC. In fact, the first is an unnecessary expense, the second could be the worst thing you could do.

There have been problems with hose in the past, and there is hose on the market today that is totally unsuitable for sewage. It's impossible to determine, just by looking, whether a particular white flexible PVC hose is suitable for use in sanitation systems or not. Out of ignorance, even reputable boat yards have made incredible mistakes, even installing corrugated blower hose in the system.

SeaLand has recently introduced what they claim to be the most odor permeation-resistant hose in history - their ''Odor Safe'' brand. At a list price of over $8/ft, it's also the most expensive white flexible PVC hose in history. We're watching it closely before recommending for or against it.

Only one manufacturer (Trident) warrants its flexible smooth-wall PVC against odor permeation for three years. It's a little more expensive than some other flexible PVC, but it's a lot cheaper than double-wall, and no other hose has more than a 1-year warranty.

Hose is indeed often a source - but not the cause - of odor. If sewage stands in any hose, it will eventually permeate the material, so if possible, run your hose without any low spots where sewage can stand, and always be sure flush the head sufficiently to push all the sewage out of the hose and rinse behind it. As part of the routine of closing up the boat, close the intake seacock, flush the head dry, then pour about a quart of fresh water into the head and flush that through the system completely. If limited holding capacity makes extra flushing each time the head is used impractical, following this routine when leaving the boat will solve most odor problems.

How do you know whether your hose has permeated? Wrap a hot damp cloth around it - preferably at the lowest point in the hose run; leave it there till it cools, then smell the cloth. It you cannot smell sewage on the cloth, that section of hose is fine. Test all sections - the sea water intake line, the toilet discharge line, and the holding tank vent line. All should be plumbed with hose rated for sanitation. If there Is clear water hose anywhere, replace it with sanitation hose if it hasn't permeated, it's only a matter of time.

As for using rigid PVC - schedule 40 PVC is meant to be buried, not exposed. Yes, it's used in buildings, but buildings (except in earthquake prone areas) don't flex and torque; boats do. Just the battering from a heavy wake or a moderate chop (much less really rough seas) puts conflicting strains on a hull at anchor. Imagine the stresses boats endure in even moderate wind conditions and heavy seas! Furthermore, schedule 40 PVC becomes more brittle as the temperature drops. A windy winter day in the parts of the country where we leave boats in the water all year can cause a boat to bounce around in its slip enough to crack the pipe - which you won't discover till the first time you use the head in the spring, and you don't want to deal with that. We recommend against the use of hard pipe altogether, but If you must--use only schedule 80 or ABS, and ''soft-couple'' (use hose) all connections to installed devices to reduce stress and shock that can result not only in cracked pipe, but damaged fittings and equipment.

Sanitation hose should be flexible smooth-walled PVC with an ID (inner diameter) of 1½'' --except for the discharge from a macerator to an overboard through-hull--(installed below the waterline, please!) which is typically 1''). Since the standard fittings on holding tanks are 1½'', when coming off a macerator to a holding tank, it will be necessary to break the hose, using a 1'' to 1 ½'' adapter. The standard size of the hose from a holding tank to the deck fitting is also 1 ½'' ID.

The pump-out deck fitting

The Coast Guard standard for the deck fitting is 1½'' ID, which is causing some confusion. The male hose barbs are all 1½'', but the female threaded connection for the pump-out is 1¼'' NPT on most fittings (although some, especially on boats made in Europe, are 1 ½'' NPT). The deck plate should not have a chain linking the cap (you can't connect a pumpout with a chain in the way), and should be clearly marked ''Waste.'' Although the best quality deck plates are cast stainless steel with stainless steel caps, I very much favor color coded plastic caps - blue for water, red for fuel, black for sewage. For one thing, plastic doesn't sink to the bottom as fast when dropped overboard, and is less expensive to replace if it does; for another, one is far less likely to mistake one deck plate for another.

Holding Tanks

Still more folklore

As with all bandwagons, everyone who thinks he can make a dollar off it wants to jump on. Consequently, just about anything that will, ever has, or might hold liquid till any warranty expires is being offered for sale as a holding tank. It's an area of the boat where no one wants to spend money - in fact that's true of the whole sanitation system. Even when boat builders and boat owners aren't cutting every corner they can, they're often using the wrong materials thinking they're offering something better.

Although you'll see aluminum and stainless holding tanks, no metal of any kind should ever used to hold sewage. Urine is the most corrosive material it's possible to put next to any metal. If you doubt me, gentlemen (ladies will have to take your word for it), notice the dividers between urinal stalls in men's rooms. If that facility has been open for more than a week, no matter how clean and well-maintained it is, even though the dividers are stainless steel coated with enamel you'll see rust stains from the bolts that attach the dividers to the tile. While the walls of a metal holding tank may last a decade or more, the welds will typically begin to leak at a seam or a fitting in two to five years, and the tank will have to come out for repair or replacement.

Sailboats especially are often fitted with flexible tanks--also known as bladders. We recommend against their use for sewage holding (but not necessarily for water or diesel) as well. Bladders are invariably installed in an area of the boat that's inaccessible to install a rigid tank - stuffed down any opening into a place big enough to contain it. And only rarely are the bladders properly secured to prevent any movement. Since sailboats are typically so much more ''active'' than houseboats or cruisers, heeling side to side, bladders move and chafe till they leak. Fittings must be owner-installed, and because the tank is in an inaccessible place, it is almost impossible to install the fittings correctly. Rarely, if ever, is any holding tank checked or maintained, and especially since some aren't even vented, it isn't at all uncommon for a bladder to blow out its fittings. Furthermore (for reasons I'll explain later), it is all but impossible to control odor in a flexible tank. The very qualities that make bladders attractive to install make them undesirable for use for sewage holding.

Rotationally molded seamless polyethylene with a minimum wall thickness of ¼'' for the smallest tank is the material of choice. Holding tanks are made from linear, not cross-linked (as fuel tanks must be) polyethylene; therefore anything thinner than a ¼'' wall will permeate - and that must increase proportionately with the size of the tank walls - i.e., a 30-gallon tank should have a wall thickness of .375. Furthermore, if the wall thickness doesn't continue to increase with size, the tank walls will be too weak to support the 8.333 pounds per gallon that sewage weighs (meaning a 40-gallon tank must support 333 pounds); it will bulge and, at the very least, distort and create leaks at the fittings--if it doesn't actually crack. There are poly tanks being sold as holding tanks through most of the marine catalogs which have maximum 1/4'' walls. People buy them because of price and out of ignorance. We recommend against them, and strongly urge that you spend the extra money to do it right the first time by installing top quality tank that will last 20 years or longer.

System Installation

When installing a system all connections should be double-clamped, only materials rated for marine sanitation

should ever be used, and any below-waterline through-hulls should include a seacock that is easily accessible by the boat owner. There are one or two heads on the market which require pressurized water and call for tapping into the on-board potable water supply. While some members of the ABYC sanitation technical committee feel that allowing the sewage system to have any contact with the potable water system presents an unacceptable health hazard, there has never been a single reported problem with any toilet designed to use the onboard fresh water supply. We recommend installing vented loops in the discharge hoses to prevent backflow from establishing a siphon, especially on sailboats, and if any part of the system is below the waterline vented loops must be installed.

ODOR CONTROL

It really IS possible to have a completely odor-free system!--honest!!!

You have read or heard, over and over again, that the key to odor control is the hose, that hose permeates with sewage and causes the system to stink. That's folklore. The key to odor control is in the installation of the entire system. What very few people in the marine industry have learned is the very nature of sewage itself and how it breaks down, what creates odor and what prevents odor from forming. Once we understood proven sewage management principles and how to apply them to onboard systems, we were able to install systems that are completely odor-free and correct the ones that weren't. Once you understand it--and it's so simple!--you can do the same thing.

There are two ways to deal with holding tank odor: try to reduce it, mask it, and contain it after it's formed, by using chemicals and filters - which has never proven very successful or prevent odor from forming in the first place by applying the same principles that are used to balance and maintain sewage treatment ponds. In fact, sewage treatment ponds only stink when they've been unbalanced biologically by an overload of chemicals! Here's how it works:

Sewage contains both aerobic (need oxygen to survive and thrive), and anaerobic bacteria (thrive in an airless environment); neither can function in the other's environment. **Why is that important? Because only the anaerobic bacteria in sewage produce foul-smelling gasses!** Aerobic bacteria break sewage down, as does anaerobic bacteria--but aerobic bacteria do not generate odor. So as long as there is a sufficient supply of air to the tank, and an aerobic bacteria treatment is added to aid that which naturally occurs in sewage, the aerobic bacteria thrive and overpower the anaerobic bacteria, and the system remains odor free.

A bio-active (live aerobic bacteria) holding tank treatment such as our own ''K.O.'' works with the aerobic bacteria in sewage, eliminating odor, completely emulsifying solids & paper, and preventing sludge from forming. Enzymes do little if anything--a brief respite from odor immediately after adding them, then odor begins to build again. Chemical products only mask odor with another odor, and they kill not only odor-causing anaerobic bacteria, but beneficial aerobic bacteria as well--not good, because the aerobic bacteria are needed in the system to break down and emulsify solids and paper. Chemicals only break them UP and dissolve them into little tiny particles that settle to the bottom of the tank, along with chemical residue, to become sludge that turns to concrete. Plus, chemicals, unlike bio-active products, are also unwelcome in landside sewage treatment facilities, and are especially unappreciated by those living and working near them!

The bacteria in sewage produce a variety of sulfur monoxides and dioxides (which are the malodorous gasses), methane--which has no odor but is flammable--and carbon dioxide, which also has no odor but creates the environment in which the aerobic bacteria cannot live, but the anaerobic bacteria thrive. Carbon dioxide does not rise or fall, it is ambient--like the atmosphere. Without a sufficient flow of fresh air through the tank to allow it to dissipate, it simply lies like a blanket on top of any pool of sewage (whether inside hose or a holding tank) and builds, suffocating the aerobic bacteria and creating the perfect environment for the anaerobic bacteria to take over. The system literally ''turns septic,'' and the result: a stinking boat or at least foul gasses out the vent line every time the head is flushed.

To prevent this, let's start with the head: the discharge hose, no matter whether it goes overboard, to a Type I or II MSD, or to a holding tank, should be installed, if at all possible, with no sags or low places where sewage can stand. When a marine head is not flushed sufficiently to clear the hose of sewage and rinse the hose behind the sewage, that sewage sits in low spots in the hose or bits of it cling to the walls of the hose - getting no air, allowing the anaerobic bacteria to thrive and produce their stinking gasses. If sewage stands in a low spot which gets no air in hose which is susceptible to a high rate of water absorption, it will permeate the hose. This is what has given rise to the myth that the ''wrong'' hose causes odor. Therefore, as I've already said, flush your head thoroughly enough to clear the entire hose of sewage and rinse behind it. And when you leave your boat to go home, flush the head thoroughly one last time, this time with fresh water. Until holding tanks came along, the hose was the source of most odor, but incomplete flushing was the real cause.

In the holding tank, the key to odor control is the vent line; it must allow a free exchange of fresh air for the carbon dioxide generated by the sewage. Therefore, those bladder tanks which have no vent are all but guaranteed to stink; there's no source of air into them at all. Boat builders, boat owners and boat yard personnel who install holding tanks have always viewed the vent line only as a source of enough air to allow the tank to be pumped out without collapsing and as an exhaust for methane (Many even believe methane--which in fact is odorless--to be the source of odor.) Some take the attitude that tanks are going to stink so the thing to do is run that vent line as far from people areas - cockpits, sun decks, etc. - as possible, or make the line as small as possible, or install a filter in it. **All of the above actually create the very problem you want to solve**.

Think of the holding tank as a stuffy room which needs to be aired. You know that even if there isn't a hint of a breeze outside, just opening a window will allow the fresh air outside to exchange with stuffy air in the room. Open another window for cross-ventilation, and the air exchanges even faster. However, just opening a skylight accomplishes nothing unless there's also a mechanical means (an ''attic fan'') of pulling the air up and out--and that won't work unless another window is open to create airflow. But the only ''window'' into a holding tank is at the end of a ''hallway''--the vent line. If that ''hallway'' is too narrow and goes around corners, takes a long and curved path, or rises more than 45 degrees above horizontal, no ambient air can find its way to the tank to dissipate and exchange itself with the gasses in it.

Vent the tank with as short, as straight, and as horizontal a line as is possible, with no sags, no arches, and no bends. The minimum I.D of the hose (which is the ''standard'' size in use today, but for no reason other than being ''standard'' in fresh water and fuel tanks) is 5/8''; we recommend that it be at least ¾''. Ideally, it should be no more than 3' long. If it has to be substantially longer, or if running the vent line uphill more than 45 degrees off horizontal can't be avoided, or if it's impossible to run a vent line that does not go around a corner, increase the size of the vent line to 1'' or even larger. If, for instance on a sailboat, the line must go up to the deck, install a second vent line in order to create cross ventilation, or install some mechanical means of forcing air through the tank. We prefer to put holding tanks in the bow of sailboats--under the v-berth--because the hull just behind the point of the bow is the only place on the hull except the transom that will never be under water even when the boat is at maximum heel; it's the perfect place to install vent-line through-hulls, because the though-hull is always into the wind, forcing air into the vent line, when the boat is underway or on an anchor or mooring. The vent through-hull should not be the same type as a fuel vent through-hull (a cap with a slit in it), but should be a should be a straight open type through-hull.

On sailboats especially it's advisable to vent off the top of the tank and not the side, because heeling can cause the contents of a half-full or more tank to run into the vent line. **Because a filter blocks the flow of air into the tank**, install a vent line filter only as a last resort; the filter does trap the gasses which try to escape through the vent line, but a filter will not stop gasses from forming, and therefore from going back up the inlet hose into the boat or up the outlet hose - and eventually permeating even the best hose.

Check the vent line regularly for blockages; little insects love to build nests in them. And remember--the vent line is not an ''overflow!'' So try never to overfill the tank; bits of sewage can clog the vent line. Enough air can pass through it to allow the tank to be pumped and gasses to escape, but that doesn't mean the line is completely clear of any blockage.

Finally, the system, including the tank, should be at least nominally rinsed, through the head or back down the deck fill - with fresh or salt water - after each pump-out, and occasionally with fresh water. (If your marina doesn't have a dock water hose for this purpose, please ask them to install one. It should be separate from the potable water hose, and the two hoses should never be interchanged.)

We promise: if you install and maintain your system according to what I've said here, you will have NO odor! In fact, you can be standing next to the vent line through-hull when the head is flushed --and you won't even notice it!

FLUSH WITH SUCCESS
It starts with learning how to flush the head

Before most of us had reached the ripe old age of three, we thought our ''potty training'' was finished then we grew up and bought boats. Would you believe that most equipment failures in marine sanitation systems happen because most people don't know how flush them? They stop pumping, or pushing the button, or release the pedal the second the bowl is empty, not realizing that a marine toilet - unlike the one at home - is a mechanical device that won't continue to move the bowl content's after the pump stops pumping that it's necessary to continue flushing a marine toilet to move the contents all the way through the system and rinse the hose behind it. So paper and solids get trapped in the pump, macerator, and/or discharge line, build up, and lead to a clog. Urine (remember how corrosive it is?) rusts the system, cutting the life expectancy of any metal pumps and macerators in half then the owners claim that the brand is ''a piece of junk.''

A manual marine toilet has two settings: ''flush,'' which brings flush water in with every pump stroke, and ''dry,'' which only pushes the contents out of the bowl and on down the line to its destination. Find out how many pumpstrokes it takes to push the bowl contents all the way to its destination - holding tank, MSD, or the through-hull (when at sea) - and religiously pump it that many times plus two or three more to rinse the hose. ''But I don't want to fill up my holding tank with flush water!'' you cry. When holding tank space is at a premium, the default setting for the head should be ''dry.'' After urination only, pump that all the way to the tank, then turn the lever or knob to ''flush'' for only two or three pumpstrokes to rinse behind it, and back to ''dry'' to send that all the way to the tank. Since no manual head is designed to hold water, put a cupful or two (as much as you think appropriate) of water from the sink in the head before depositing solids and more than a sheet or two of paper and then follow the same procedure.

Never put anything into a marine sanitation system that isn't specifically marketed for that purpose. Do not use detergent, bleach, dish soap or other cleaners--especially cleaning products which contain pine oil, petroleum, or alcohol. Those substances will break down the seals, gaskets, and valves in the system, and will also break down

the walls of the hose, causing it to be more susceptible to permeation. **Above all, do not ever - as some people tell me they do - pour vegetable oil down the head to ''lubricate'' the parts;** you wouldn't put vegetable oil in your engine--why would you put it in your head? A layer of oil on the sewage will only seal the contents of the tank, keeping air out of it--and we already know what that causes! It will also combine with the animal fats present in sewage to ''gum up'' your MSD. Follow manufacturers' recommendations for periodic head maintenance and lubrication - which usually involves taking something apart.

At least once every two years, put a complete rebuild kit in your head as part of your regular spring recommissioning; if you lay your boat up every winter, we recommend doing it every year. When seals, gaskets, valves and impellers dry out they become brittle and prone to crack. By replacing them regularly you all but eliminate the possibility that you'll have to make emergency repairs to the head--and we all know those emergencies only happen at the worst possible times--and you control the conditions under which you'll take the head apart. Although it's impossible to predict someone putting something in the head that's too large to pass through, a well-sealed pump that's working to factory specifications can often push a borderline object through that a worn system can't.

Although some boat owners follow the rule, ''**nothing goes into the head that hasn't been eaten first**,'' marine toilet paper is designed to virtually dissolve in your hand. (The cheapest ''no-name'' single-ply paper at the grocery store is the same thing as ''marine'' toilet paper, and it's a whole lot cheaper!) Just don't put anything else in the head.

Like most companies, we're in business for fun and PROFIT - So whether you're starting from scratch, upgrading, replacing, looking for a hard-to-find part, or just need some trouble-shooting advice, we're here to help and we'd love to hear from you. So please feel free to e-mail or call.

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