

SANITATION GUIDE: WINTERING AND MAINTENANCE OF BLACK AND GREY WATER

El sistema de gestión de calidad de DAHLBERG S.A. obtuvo su aprobación original ISO 9001 el 18 de octubre 2003, el cual se ha mantenido en vigor hasta la fecha, aprobado por **Lloyd's Register Quality Assurance España S.L.U.**, de acuerdo con la Norma de Sistema de Gestión de Calidad **ISO 9001:2015**. Esta certificación está avalada por **UKAS Management Systems**.

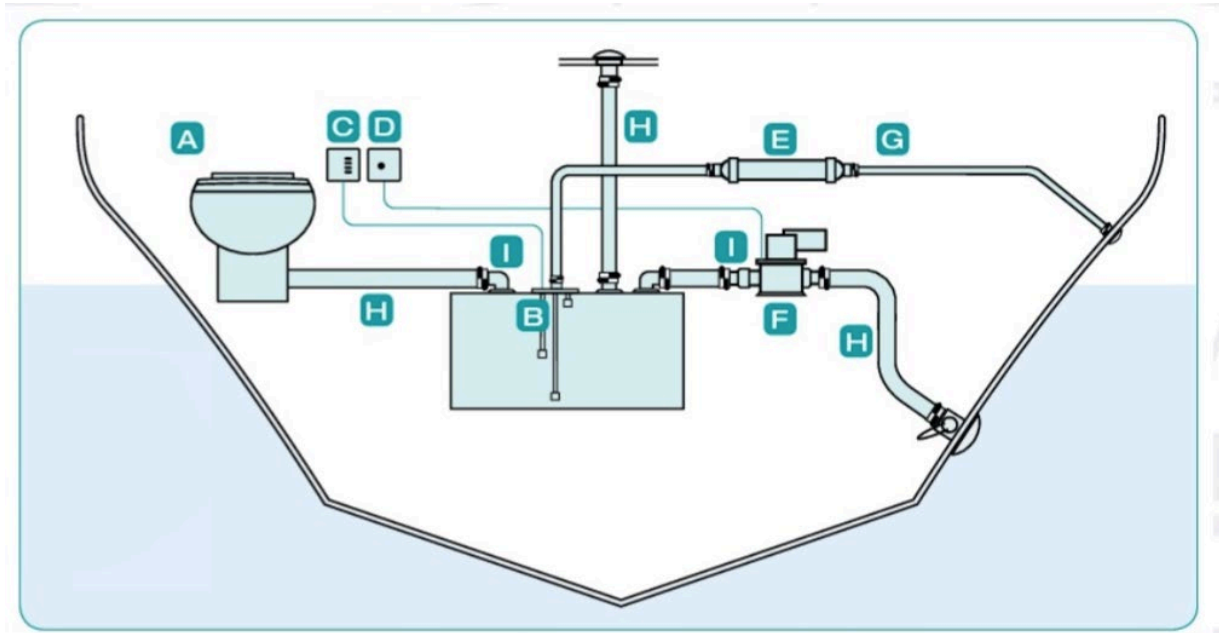




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1. INTRODUCTION



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| A. Toilet | F. Discharge pump |
| B. Black water tank | G. MaxFlex sanitation hoses |
| C. Tank level indicators | H. OdorSafe Plus sanitation hoses |
| D. Tank discharge control | I. Accessories for the installation |
| E. Ventilation filter | |

By carrying out some simple and economical maintenance tasks onboard you will obtain the following benefits:

- Avoid unpleasant smells when returning to the boat
- Save time and money with commissioning repairs
- Get the boat ready smoothly for the new season

Additionally, winterizing the boat correctly will allow you to take the boat out to sea any moment you like, without carrying out excessive and costly preparations. Proper winterizing also helps to conserve the equipment longer, as good care will lengthen the lifespan of most consumable spares, which are the pieces that wear out the most.

2. WINTERIZING: THINGS TO CHECK IN THE BLACK WATER SYSTEM

If you are not going to use your boat for an extended period of time, you will find this guide very useful. Nobody wants to have a boat with bad smells, therefore now is the time to winterize the toilets and the black water system. DAHLBERG S.A recommends you to perform the inspection and cleaning of the following parts of your black water system:

1. Toilet bowl
2. Holding tank
3. Hose assembly
4. Level sensors
5. Grey water system and drains

3. WINTERIZING: The toilet bowl

The toilet bowl: in case there are dark stains or signs calcification, use a descaling product or a stain remover in order to leave the bowl impeccable.

Use a product that doesn't damage the seals or other parts of the toilet. Never use hydrochloric acid (sulfumán). Bleach should be used in moderation as it dries the rubber seals



Our technicians use a product called **Adinet Cisternas**, which is very effective against the incrustations of calcium and doesn't damage the rubber seals.



If you have a vacuum toilet type Vacuflush, bear in mind that mineral deposits may have accumulated under the edge of the rubber bowl seal, which might compromise the watertightness of the system. In order to clean the system, always disconnect the electrical power and water supply to the toilet first..

Open the flush ball and with a non-abrasive cleaner, like **Adinet WC Nautic**, scrub under and around the seal and top of the flush ball surface. Use brush and water to rinse away the loosened deposits.

To finish off, extend the product in the bowl and leave it for 5 minutes in order to eliminate any persistent stains and rests of calcium.



Remember not to use products with caustic components, as they can cause irreparable damage in the rubber seals.

a) ¿ Salt or fresh water?

If you use salt water, close the sea water intake to the toilet in order to avoid leaks or inundations. Never leave any traces of salt water in the pump or in the toilet, as it will rot, smell bad and create layers of calcium. To eliminate salt water from the system, throw a couple of bucketfuls of fresh water in the toilet and flush.

If you use fresh water, use the fresh water hose from the dock and run water through the toilet until the water that comes to the holding tank is completely clean.

b) Should the toilet bowl be left dry or with some water?

Whether your toilet is electrical or manual, it is better to leave it completely dry, without even a drop of water inside the system.

However, if you have a Vacuflush system, leave a couple of inches of water in the bowl, to prevent the seals from drying and hardening.



Full maintenance and winterizing:

- In manual toilets, dismantle the pump mechanism in order to clean the rubber seals and to rub them with some vaseline before putting them back together.
- In electrical toilets, dismantle the motor, remove the rubber cap of the turbine and clean all the parts that are in contact with salt/fresh water, including the water intake pipe.
- In the Vacuflush toilets, simply assure that the interior of the toilet is clean and without residues by flushing several times and following the same process as with the hose assembly.

4. WINTERIZING: the holding tank and the hose assembly

To empty the holding tank might seem obvious, but it is often forgotten and undesired bad waste water smells greet the owner upon return to the boat after a long winter.

To avoid this unpleasant surprise, we recommend the following: after having emptied the tank first time, fill it again with fresh water and add a dosis of **Adinet WC Nautic**, in proportion of 250 ml per 80 l of water, and leave it to work for 8 hours (the dosis can be increased depending on how dirty the tank is). The tank can be left full of the water/Adinet mixture until the next season. That way the disinfection and cleanliness of the tank is assured, resulting in a pleasant smell in the boat.



Another option to clean tanks with “rebellious” dirt, or when there are a lot of incrustations, we recommend the use of **Tank Cleaner from Dometic** which are effervescent tablets. First the tank needs to be filled up and emptied completely at least once. Thereafter fill the tank again until about 6 cm from the top and add the tablets according to the recommended proportion on the packet. Leave them to work at least 8 hours and empty the tank.

CLEANING OF THE HOLDING TANK



5. WINTERIZING: Hose assembly



During the long period of non-use of the toilet, the bacteria can be multiplying in the toilet bowl, in the pipes and in the holding tank.

To stop this and to disinfect the system, we recommend you to take full advantage of the **Adinet WC Nautic** by pouring 100 ml indiluted product directly in the toilet bowl, having previously flushed the toilet several times in order to empty the system of any load. You need to leave the product to work at least ½ hour for it to be effective.



It is also a good option is to leave the product to work in the hoses or in the tank for a few days



By using **Adinet WC Nautic** it is possible to get rid of rests of paper and other residues in the hose assembly leaving the system disinfected and without smells.

Do not use products that contain formaldehyde as they are very contaminating.

c) Watertightness of the hose assembly

During the winterizing of the Vacuflush system it is important to check that all the hose clamps and seals are properly tightened, to avoid any leaks. It is also a good moment to confirm that all the cable connections in the vacuum pump installation are correct.

6. WINTERIZING: Level sensors

Access the sensors, loosen any rests stuck to them and clean with a descaling agent.



7. WINTERIZING: What about the grey water system?

Also the water passing through the drains of the bathroom and galley sinks contains substances with bacteria that causes bad smells (rests of soap, detergent, grease and food).

This residue sticks on the inside of the tubes and on the walls of the grey water tank. To avoid this and to leave them clean during the winter, we recommend pouring 50 ml of undiluted **Adinet Tank** in every drain (shower, bathroom sink etc).

We recommend doubling the dosis and pouring 100 ml in the galley drains, as there is likely to be more grease and more smells.

This treatment prevents the grease from the oils and soaps from sticking to the inside of the drain resulting in bad smells. When the ambient temperaturas are high, it is recommended to increase the dosage to make the treatment more effective.

Leave the product to work at least ½ hour, Depending on the degree of dirtiness and bad smells, you may leave the product to work for a whole week in the tank and in the pipes.



8. OTHER USEFUL ADVICE

a) Avoid overfilling

Even if all boats have a level indicator for the fuel tanks, not all of them have it for the waste water tanks. If your holding tank doesn't have a level indicator, the **Dometic Tank Monitor System – DTM®** provides a good solution against overfilling the holding tank. A red indicator light turns on when the toilet can't be used anymore and the holding tank has to be emptied.



To control the level in the holding tank continuously, the **Dometic Multi-level Tank Monitor DTM04** indicates when the tank is **Empty**, and monitors **Low**, **Mid** and **Full** levels of the contents in the tank.

If the boat is equipped with a Vacuflush or other electric toilet, this system is available with a full tank shutdown relay, which prevents flushing when the holding tank is full.



Both of these control systems by Dometic get activated by floating switches which are easy to install in the tank.

It is enough to drill a correct size opening (read the instructions that come with the equipment), adjust the length of the rod and connect the cables.

➤ What can happen in the case of overfilling?

If the toilets are being used after the holding tank has reached the maximum capacity, the contents of the tank start to pour in the ventilation system, which will get blocked. When the tank will eventually get emptied, it is possible that rests of paper and dried waste will remain in the system, creating a solid blockage.



The air can't escape from the tank which can get pressurized with the successive flushes, possibly causing damage to the tank, or in the worst case scenario, to the surrounding structure of the boat.

If the boat has a filter in the ventilation circuit, like **Dometic DVF Filter™**, overfilling the tank can block the filter as well. If this happens, the filter can't be cleaned but has to be replaced by a new one.

To summarize, to avoid any trouble and damage that can be caused by an accidental overfilling, make sure that your holding tank has a device for a full tank alert, or a system for level control.

If you suspect that the capacity of your tank is not sufficient because you have constant problems of overfilling, you can see on our website how to calculate *the optimum tank capacity*.

See below a detailed table of malfunctions and what to do about them:

| SYMPTOM | PROBLEM | SOLUTION |
|--|---|--|
| Spilling tank through joint. | Dirt and bad smells. | Empty the tank, fill it with water from a hose, add a cleaning product to clean and disinfect. |
| Ventilation hose and connection obstructed. | The discharge pump heats up and can't pump out the residue and empty the tank. | Disconnect the ventilation hose. Clean the output connection of the tank and the hose. |
| The ventilation filter is wet or full of dirt. | The active carbon of the filter has become wet and the bad smells of the tank get through it. | Substitute the filter. |
| Dirty level sensors. | They do not indicate the tank level. | Remove the sensors from the tank and clean thoroughly with a descaling product. |

b) Collapse of the tank

Nowadays many waste water evacuation systems in the ports suck between 100 and 189 litres per minute. Without a sufficient ventilation of the tank, the shock of this vacuum pressure in the tank itself and in the hoses can lead to a rupture in the connection points of the hoses, specially if the suction control is opened abruptly. The result of the incident can be very unpleasant, to put it mildly.

To avoid the collapse of the tank, you can install a **Tanksaver® Security Valve** from Sealand. This valve opens automatically in case the holding tank is subjected to high vacuum pressure. In normal circumstances the valve stays sealed despite bumps and vibrations, and won't let bad smells escape from the holding tank.

Mediante una corona de 76 mm, cortar un orificio en el tope del tanque de almacenamiento e insertar la válvula TankSaver (requisito mínimo del grosor de las paredes del tanque 6mm).



c) Smell control

There are several potential sources of bad smells in the marine waste treatment system.

- **Flushing with sea water:** if sea water is used in the toilet for flushing, the microscopic marine organisms will die and decompose in the sea water intake system, which can cause bad smells, specially when the toilet hasn't been flushed for a while. Our **Vacuflush** systems eliminate this problema, by using fresh water for flushing.
- **Permeation of smells from the discharge hose:** if a discharge hose has been installed so that waste can accumulate in a section that is insufficiently drained, that waste can decompose and the consequent bad smell is capable of permeating the material of the hose. Rubber hoses are particularly prone to this.

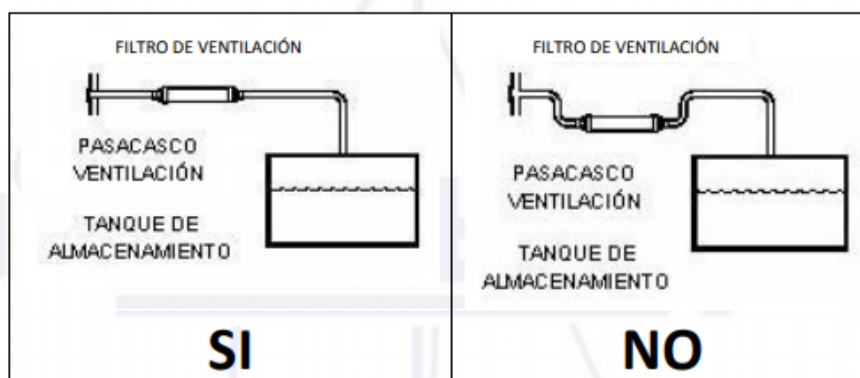


To find out whether this is the cause of the bad smell, rub a clean cloth frequently in the suspicious areas and sniff the cloth – where the smell molecules have permeated the hose, the smell will pass to the cloth.

The faulty section of the hose will have to be changed. In case it is imposible to change the hose to enable a correct draining, susbtitute the hose for a rigid PVC pipe.

Designed for hose assemblies, the **Sealand® Odorsafe®** hose is 16 times more effective against permeating smells than other hoses on the market – it is the best alternative for a waste treatment hose.

- **Ventilation system:** incorrect installation of the ventilation system sometimes causes bends that can accumulate liquids and prevent gases from escaping. A better design of the ventilation system and the route of the hose can solve the problem.



When using the toilet, the liquid residue enters the holding tank and pushes bad smelling gases outside through the ventilation circuit and he through hull ventilation outlets.

To eliminate the smells before they escape outside the boat, it is recommended to install a **Dometic DVF Filter™**. The carbon filter absorbs the heavy smell molecules. One filter will last for a whole season.



d) Why use deodorizers in the holding tank?

The effluent in the holding tank and in the connections will start to decompose immediately after entering in the system. The decomposition of the residues can take place in two ways:

- **In aerobic decomposition**, the bacteria uses available oxygen to digest the residue and to produce carbon dioxide, water, nitrates, sulphates and phosphates – these compounds don't smell.
- **In anaerobic decomposition**, where oxygen is not present, instable and bad smelling compounds are produced. They are heavier than air.



The deodorizers are conceived to inhibit the growth of anaerobic bacteria and stop the production of bad smelling gases, or alternatively chemically attach themselves in the bad smelling gas molecules and prevent them from escaping in the atmosphere.

➤ **What type of deodorizers are there?**

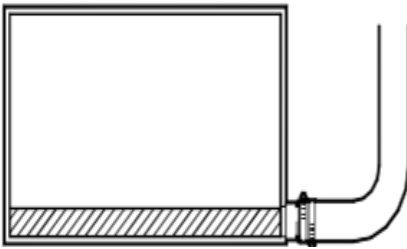
- **Formaldehyde compounds** are powerful controllers of the agents that produce bad smells. They are mainly used for preservation of tissue, for example in the process of embalming. Because a prolonged exposition can cause sensitisation of the skin and produce symptoms like asthma, and possibly even cancer, we don't recommend this product.
- **Preservatives:** The compounds are usually odourless, colourless, non-irritant and deodorizing. They can also have a cleaning effect and are good disinfectants. They are effective against bacteria and also have some effect against mould and viruses.
- **Enzymes:** They are formed as a part of a normal metabolism of a cell. The deodorizers that use a single enzyme or a compound of several, control the smells indirectly, accelerating the process of decomposition/dissolution of the organic materia in the waste water. The efficiency of the enzymes is reduced due to the limited margins of temperature and levels of pH. In any case, before using them, it is important to clean the tank thoroughly and to make sure any rests of other deodorizers are eliminated. To get the enzymes to work correctly, a good ventilation of the tank is another important factor to bear in mind. Their use is not recommended in portable or chemical toilets.

➤ **What is the composition of the deodorizers from Dahlberg?**

The range of **ADINET** liquid products is made of quaternary ammonium and other alcohols. Our formula controls the smells instantly and is effective even in extreme temperatures, from the freezing arctic to steaming hot tropics. The products are made in Spain and the ingredients that make up the compound adapt to the current legislation on environmental protection, this making the products an ecological choice.

To maintain the system odourless, squirt some of the product in the toilet in every use.

➤ **How can I eliminate stagnant liquid to the max in the discharge circuit of my tank?**

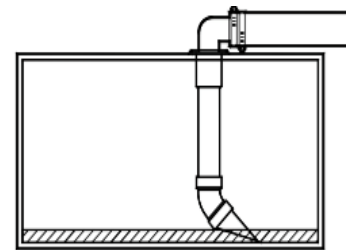


Traditional discharge

The discharge pipes include angled suction devices, also called dip tubes, which reduce the possibility of blockages, commonplace with the traditional discharge pipes, where also rests of effluent lying in the pipes might permeate the walls and cause bad smells. A dip tube offers access to lowest level of liquid, allowing to empty the tank to the maximum.

They are also a space saving alternative, as all the connections are on top of the tank and no pipework is required on the lateral walls of the the tank, thus allowing installation of larger tanks.

It is recommended to install two separate discharge tubes in one tank in order to have the option of discharging in a port or overboard (where permitted).



Discharge with dip tube

e) What toilet paper is the most suitable?

Most marine toilets are flushed with very little water (sometimes only as little as ½ litre), compared to the household toilets that can use from 6 to 20 litres of water in every flush.

Many ordinary toilet papers contain adhesives (to stick the layers of fibre together), which dissolve without problems in the household toilets, but can quickly lead to blockages in marine toilets because of the smaller volumen of water.

➤ **Do the toilet papers of rapid dissolution really work?**

The capacity of quick degradation of these toilet papers can vary a lot from one brand to another. The Fast Dissolving Toilet Paper by **Dometic**, available in rolls of two layers, is subjected to constant testing to maintain it capacity to dissolve rapidly. This product is made 100% of recycled, biodegradable paper, thus giving optimal performance while minimizing the environmental impact.



➤ **Perform the “Paper Test” yourself**

Put a sample piece of paper in a glass of water and stir it for 5 seconds. If the paper tissue dissolves in numerous small pieces, it is likely to work well in your marine toilet. In the opposite case, it may block the discharge hoses or form lumps in the holding tank.

f) Discharge of waste water in the sea

According to the article 24 of the Law on Discharge of Waste (Order FOM/1144/1999), any discharge of wastewater from recreational boats is prohibited in the following areas under Spanish jurisdiction:

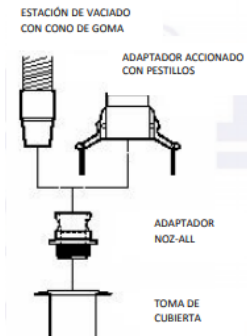
| ZONE | DISCHARGE OPTION |
|--|---|
| Port areas, protected zones, coastal inlets, bays, etc | No discharge is allowed, not even treated waste |
| Up to 4 nautical miles | Discharge of treated waste is allowed, but no solids nor discoloration |
| From 4 to 12 nautical miles | Macerated and disinfected waste discharge is allowed. While discharging the tank, the velocity of the vessel must be more than 4 knots. |
| More than 12 nautical miles | Any waste discharge is allowed. While discharging the tank, the velocity of the vessel must be more than 4 knots. |

➤ **Discharge in the port**

For effective discharge of the holding tank, it is necessary to create a hermetically sealed connection between the deck discharge fitting and the shoreside pump-out hose. Complete sealing is not always possible as the fitting on deck can be of different size on different boats.



The port evacuation stations have tried to solve this problem by using a conical rubber adapter, which fits the most deck fittings and interior dimensions of the shoreside suction probes. However, this option might not provide complete sealing either, which means that sufficient vacuum is not created.

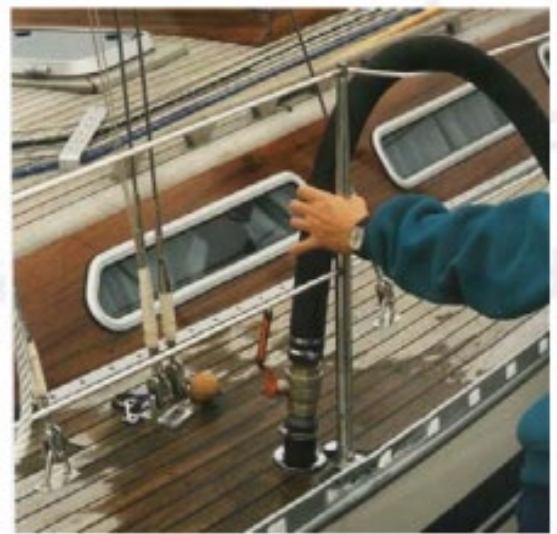


Another solution is provided by the use of latch operated adapters. Unfortunately these special adapters tend to mysteriously disappear in the ports.

Sealand has developed a pump-out adapter NozAll, which will fit both hoses with conical rubber probes and adapters operated with latches. NozAll is available in three different sizes which will fit most of the hoses used at the port pump-out stations.

➤ Useful tips for discharging in the port

- Unroll the pump-out hose completely so that it lays as straight as possible to maximize the efficiency of the discharge.
- Use rubber or latex gloves at all times, including when handling water.
- Wash your hands with warm water and soap.
- Clean and disinfect the area with **Naturwind Clean**.
- Store the hose appropriately after every use.
- Leave the area clean and tidy for the next user.
- If it is not possible to create a hermetic seal between the deck discharge fitting and the shoreside pump-out hose, keep rinsing the connection continuously with fresh water during the discharge of the tank.





Fuentes:

- DAHLBERG S.A.
- Dometic
- Adinet

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