

Marine Sanitation Device

U.S. Coast Guard Certified, Type II

Installation/Service Manual
P/N 24159



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Marine Sanitation Devices

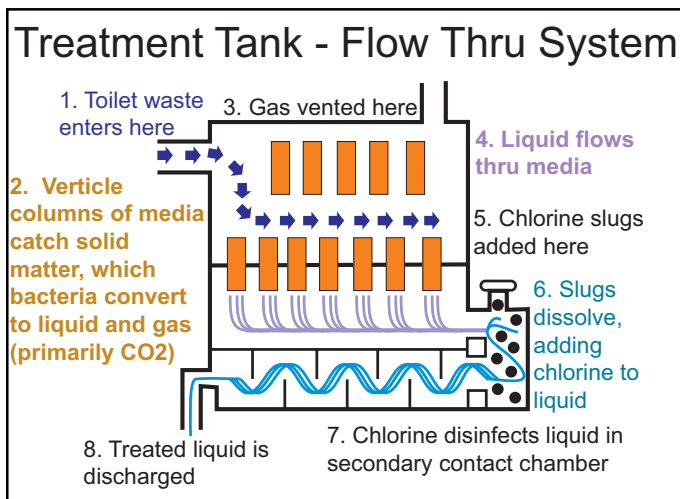
Following the procedures outlined within this guide will insure that your Microphor® Marine Sanitation Device (MSD) will provide years of trouble free service. See Schematic on pages 4 and 5.

The “M” Series (designed for use with Microflush® One or Two Quart Toilets) and “MC” Series (for use with standard flush toilets, not to exceed 5 gallons per flush), are United States Coast Guard certified (159.15/1025) for direct overboard discharge use on both inspected and uninspected vessels. Options for IMO Certification are available. **Some macerator and other toilets which grind or break up solids may not be suitable for use with the Microphor® MSD.** Contact factory for details.

Note: M-8, M-10, and M-14 models are designed for intermittent service.

How the System Works

Human waste and toilet paper only are flushed down the toilet and enter the MSD containing filter columns. The solid material is retained over the filters and digested by bacteria, while the liquid passes through the filters, is disinfected and discharged overboard.



To insure environmental protection, Microphor® uses the simplest, safest and most effective disinfection system possible. The chlorine compound that is recommended for disinfection is held in contact with the liquid waste until harmful organisms are killed. Discharge of this disinfected effluent into the environment is sanctioned by many environmental protection groups.

Synthetic Media
U.S. Patent No. 6,875,353

MSD Installation Instructions

Check to see that the total shipment has been received.

Shipment should consist of:

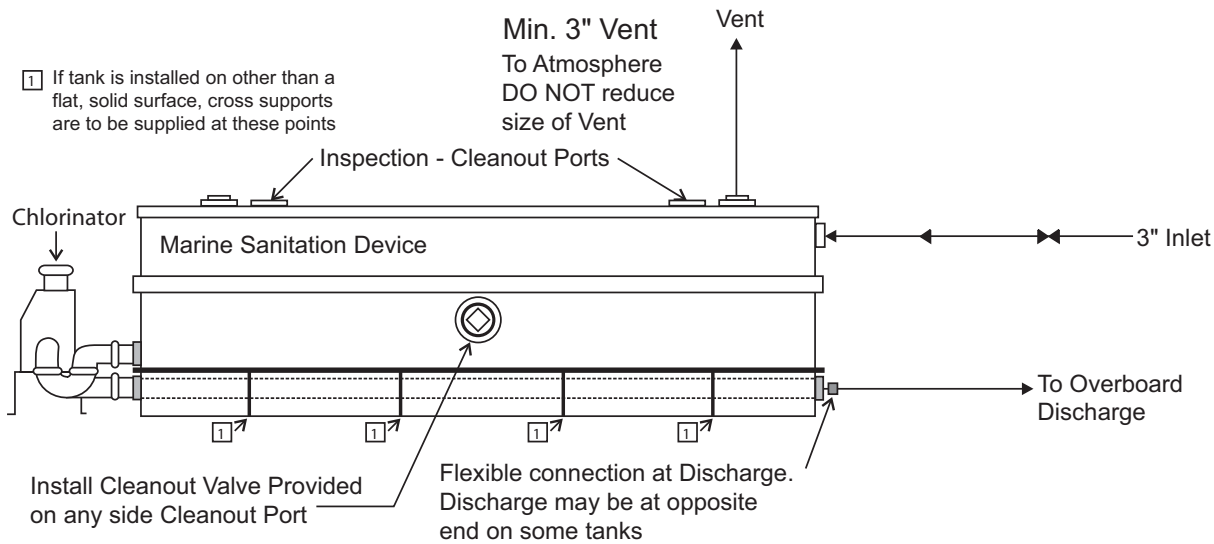
- A. Treatment Tank.
- B. Boxed Chlorinator, short nipple and gate valve or slide valve.

When determining the location of where the MSD is to be installed, it is required that the discharge port of the MSD be at least 47" above loaded water line for a direct gravity overboard flow. If less than 47", discharge from MSD must gravity flow into Sump/ Pump unit and the effluent pumped overboard.

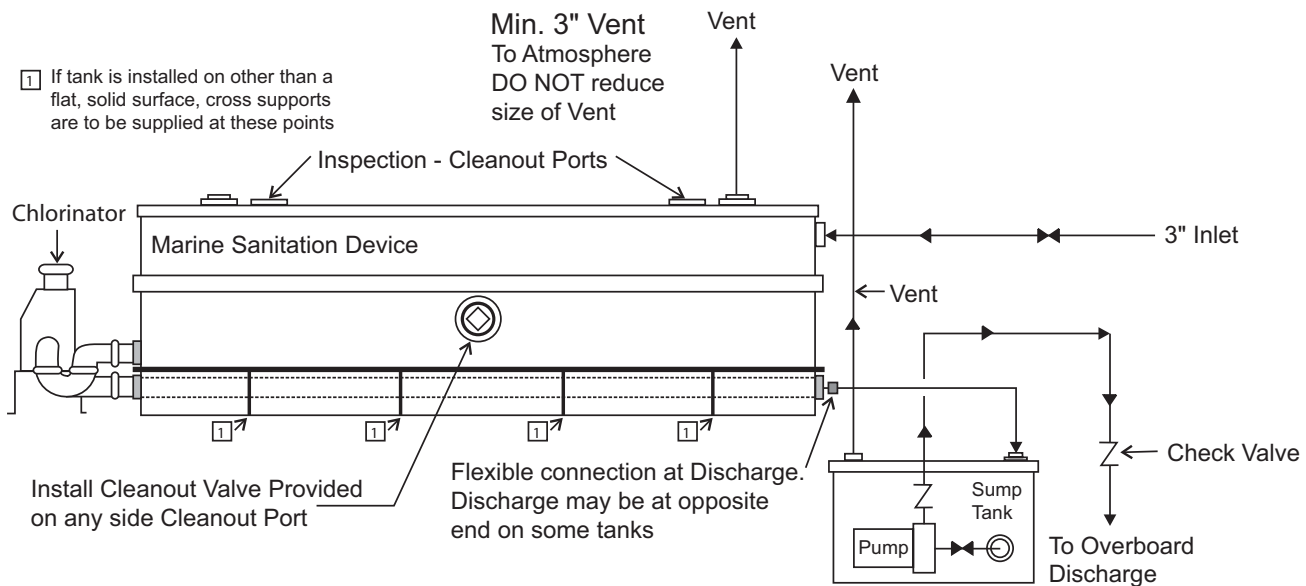
1. Treatment system to be secured and supported by a continuous, rigid, level surface, which is free from protrusions. Bolt or weld bottom angle, if so equipped, on the MSD to deck or stand. Weld only on outer edge of angle. MSD must be mounted on a solid deck or if mounted on a stand, cross supports must be installed on stand to match gussets on lower tank section. On large units, shipping skids must be removed before mounting. Do not weld on tanks as this will damage interior coating. **Note: MSD must be level when boat is loaded and operational in the water.**
2. Tanks should be mounted in areas with an ambient temperature under 120°F.
3. All piping supplied by the customer is to conform to Coast Guard requirements related to water tight decks and bulkheads (46CF56.60)
4. Only black water waste lines are to be connected to MSD. Waste lines must slope so waste drains into MSD. Do not allow waste to stand in waste lines. For M-8, M-10, M-14, plug ports not used.
5. When using Microflush® Toilets with Microphor® “M” or “MC” Series MSDs, certain piping limitations must be considered:
 - A. When using a 1-1/2" discharge line from the toilet, a vertical lift of 38" can be achieved in single head applications. The vertical rise must be at the toilet. This vertical application is not advised for commercial, high use applications. Please contact Microphor for more information.
 - B. The maximum horizontal run from the toilet cannot exceed 30 feet and must slope a minimum of 1/8" per foot towards the MSD. If more than three 1-1/2" 90 ells are used, the horizontal run must be shortened accordingly (approximately 2' per each ell).

- C. When using a 1-1/2" discharge line(s), each toilet must go individually to the MSD. Do not connect more than one toilet to a 1-1/2" discharge line.
 - D. When using more than one toilet to a single inlet port, use a gravity 3" vented waste line to the MSD and connect 1-1/2" lines to 3" waste line.
6. All MSD's must be vented to atmosphere. Terminate vent at highest point possible and away from fresh air intakes (blowers, port holes, hatches, etc.). Consider adding an axial fan to move air over filter columns and up the vent. Contact Microphor® for details.
 7. **Do not reduce vent size smaller than tank vent size.** Slope all vents back to MSD. Do not pipe so condensate can cause trap in vent.
 8. Access and cleanout ports must be accessible. The short nipples and gate valve (or slide valve) supplied with the unit must be installed on one of the cleanout ports on the side of the tank.
 9. Install the Chlorinator (supplied with each system) on the MSD, making sure it is accessible for refilling. See Chlorinator Mounting Instructions on supplied blueprint.
 10. Use only Microphor® Chlorine, P/N 94135.
 11. Be sure to remove chlorine slugs from plastic bag before inserting into chlorinator. Lay slugs flat, one on top of the other, in chlorinator.
 12. After filling, make sure chlorinator top is replaced.
 13. **DO NOT AT ANY TIME place chlorine slugs into toilet and flush into system.**
 14. Use of other types of chlorine or chemicals may cause a potential explosion hazard and also reduce the efficiency of the bacteriological kill of the discharge effluent.
 15. The recommended discharge piping from the MSD to overboard, or to the Sump/Pump assembly and then overboard, is plastic PVC or ABS pipe because of the corrosive characteristics of chlorine. When using plastic pipe, Teflon tape should be used on all threaded connections. If pipe dope is used, be sure to use a type compatible with ABS or PVC pipe.
 16. A flexible connection must be installed at the discharge of the MSD. The discharge fitting from the MSD is plastic and must not be piped solid to ship's piping.
 17. **Do not use ozone in conjunction with MSD.**
- ### Sump/Pump Installation Instructions
1. Microphor® Sump/Pump assembly must be lower than MSD for a gravity flow into the sump. Also the following procedures must be used.
 2. If so equipped, bolt or weld only outer edge of bottom angle of sump to deck or stand. Do not weld on tank, as this will damage interior coating.
 3. Standard Sump/Pump is rated for 20 foot total head. If higher head is required, consult Microphor. If discharge line from pump to overboard is over 40 foot in length, increase discharge pipe one size.
 4. Sump tank must be vented. Vent can be connected to MSD vent, but must intersect MSD vent at point no less than 3 feet above top of MSD.
 5. If Sump/Pump is vented separately, vent must extend to the highest point possible (minimum 10 feet above the water deck). Terminate vent as far as possible from air intakes (blowers, port holes, hatches, etc.)
 6. Supply disconnect switch at Sump/Pump assembly.
 7. Electric power must be supplied to Sump/Pump at all times.
- If you feel that you have unusual installation problems, contact Microphor®.

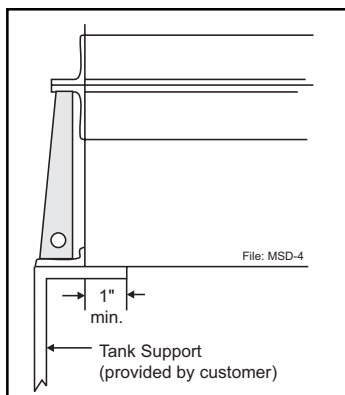
Note: Tank may be constructed of mild steel, stainless steel, polyethylene, or polystyrene.
 Microphor Marine Sanitation Device installed above waterline
 (must be a minimum of 47" above loaded water line)



Microphor Marine Sanitation Device with Sump Tank installed below waterline



File: MSD-3a



End View of Metal Tank and Secondary

Continuous perimeter tank support must extend a minimum of one (1) inch under tank. Also, tank must be cross supported in note [1].

IMPORTANT!

Only black water sewage lines are to be connected to the Microphor® Marine Sanitation Device.

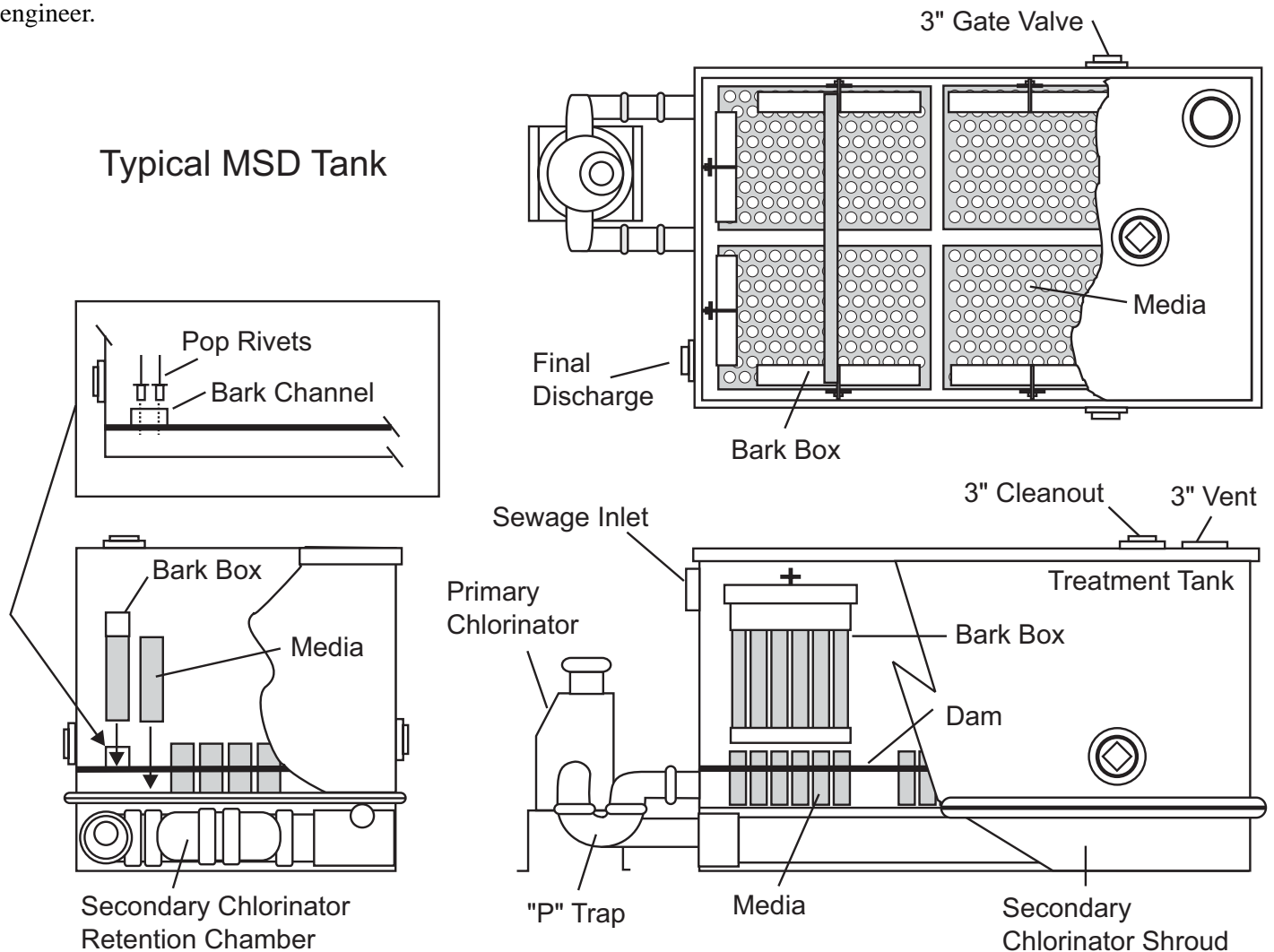
Vent to highest possible location. Vent must terminate to the outside atmosphere. Do not reduce size of vent. Vent must be sloped toward MSD on all horizontal runs to prevent moisture from reducing vent size. An axial fan will assist venting.

A flexible pipe coupling must be between the MSD outlet port and the ship's piping.

When the MSD is supported by a stand, the stand must be constructed to support the MSD plus a full head of liquid in the MSD and any other stresses due to vibration and shock as determined by the owner or the ship's engineer.

DO NOT WELD on the metal Microphor® MSD tank. Welding will damage interior protective coatings. When securing to deck or stand, weld or bolt at mounting angles only.

NOTE: MSD MUST BE LEVEL WHEN BOAT IS LOADED AND OPERATIONAL IN THE WATER. DO NOT USE OZONE WITH YOUR MICROPHOR MSD.



File: MSD-1

OPERATION INSTRUCTIONS

Microphor® MSD's are biological digesters and are specially designed for the disposal of toilet waste and toilet tissue only.

The MSD will start automatically upon input of human waste. No other additive is required. Microphor recommends adding MicroCulture P/N 24825 or 24826 regularly. See dosage chart for details. Keep all other material out of the system. A good rule of thumb might be, "If you haven't eaten it first, don't put it in the system" (paper excepted).

When cleaning toilet bowls, use a nonabrasive, biodegradable neutral pH cleaner such as **MicroClean**, P/N 24542, or **MicroScrub**, P/N 24827; both are recommended to clean the Microphor® toilet hopper and are available from your dealer. Sanitizers like Lysol, Pine-Sol, Hexol or Ammonia base products *should never be used*. These sanitizers when flushed into the treatment system can stop the biological action in the system. **Never use any anti-bacterial product in the Microphor® system.**

When unit is in use, add Microphor® Chlorine as needed to the chlorine holder. Several slugs should be visible in chlorine holder. Use only Microphor® Chlorine, P/N 94135. Chlorine slugs must be laid flat on top of one another in the chlorinator.

Make sure top of chlorinator is replaced and gasket is not damaged. Occasionally a small amount of silicone lubricant should be applied to the gasket.

If winterizing of a system is desired, turn off water to toilets and flush until water is removed. If anti-freeze is used, use only propylene glycol. The treatment tank itself will continue to break down solid waste and drain liquids until empty.

When system is to be reactivated, simply using the toilets normally and discharging into the MSD is the only requirement. No additives are needed.

If draining into a Sump/Pump assembly, make sure electrical power is supplied to Sump/Pump motor at all times.

CHLORINATOR FILLING INSTRUCTIONS

Maintenance and Safety Procedures

Read Carefully Before You Start (Refer to MSDS)

1. Microphor® recommends using gloves, safety glasses, and respirators before opening or cleaning tanks or chlorinators. (Refer to MSDS.)
2. Inspect chlorinator for Chlorine Slugs by pressing downward on cap while turning counterclockwise 1/4 turn and then lift cap off very slowly. If water is seen coming out around the cap, replace cap immediately.
3. If chlorine supply is adequate (1/2 to 2/3 full), replace cap by placing on the chlorinator body and while pressing down turn clockwise until locking lugs on cap engage chlorinator and it is sealed.
4. If chlorine must be added, make sure that any residual chlorine at bottom is not blocking discharge hole on lower portion of chlorinator. If residual chlorine is present, carefully probe with a screw driver or similar tool to break this up.
5. Add slugs until chlorinator is full. Do not over fill as this will put undue pressure on cap and possibly cause damage or packing of slugs. Lay slugs flat, one on top of another, not on their edges.
6. Remember the chlorinator unit is designed to hold slugs and seal off chlorine odors. Inspect the unit carefully to make sure rubber cap seal or o-ring on chlorinator body is in place and is lubricated with silicone lubricant only. Inspect hoses, clamps, etc. to make sure they are tight and in good condition.
7. Highly corrosive. Causes skin and eye damage. May be fatal if swallowed. Irritating to nose and throat. Wear goggles or face shield and rubber gloves when handling. Avoid breathing dust or vapor. Remove and wash contaminated clothing and shoes before use.
8. **ENVIRONMENTAL HAZARDS:** This product is toxic to fish. Do not dispose into lakes, ponds, streams, estuaries, oceans or public waters unless this product is identified and addressed in a NPDES Permit. For guidance, contact the regional office of the EPA.
9. **PHYSICAL AND CHEMICAL HAZARDS:** Strong oxidizing agent! Mix only with water. Use only a clean, dry utensil made of metal or plastic each time material is taken from the container. Do not add this product to any dispensing device containing remnants of any other product. Such use may cause violent reaction leading to fire or explosion. In the event of contamination or decomposition do not reseal container. If possible, isolate container in open air or well ventilated area. Flood with large volumes of water if necessary.

10. STORAGE AND DISPOSAL: Keep this product dry in a tightly closed container when not in use. Store in a cool, dry, well ventilated area away from heat or open flame. In case of decomposition, isolate container (if possible) and flood area with large amounts of water to dissolve all materials before discarding container. Do not reuse empty container, but place in trash collection. Do not contaminate food or feed by storage or disposal, or cleaning of equipment. Residual wastes are acutely hazardous. Improper disposal of excess material is a violation of Federal Law. If these wastes cannot be disposed of according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

11. PRACTICAL TREATMENT (FIRST AID): *Eye/Skin Contact* - Flush with plenty of water for at least 15 minutes, while removing contaminated clothing and shoes. For eye contact, seek immediate medical attention. If skin irritation occurs, seek medical attention. *Inhalation* - Relocate to fresh air. If signs of irritation or discomfort occur, take immediately to a hospital or physician. *Swallowing* - If conscious, drink large quantities of water. **Do not** induce vomiting. Take immediately to a hospital or physician. If vomiting occurs, administer additional water. If unconscious, or in convulsions, take immediately to a hospital. **Do not** attempt to induce vomiting or give anything by mouth to an unconscious person.

Maintenance Instructions

If a Microphor® Sump/Pump assembly is used, it is necessary to have electric power to the Sump/ Pump at all times.

Probes or level switches should be removed and cleaned every four to six months. If chlorine residue build-up is heavy, cleaning will have to be done more often.

At frequent intervals, a push-to-test button (if so equipped) should be operated to assure that the pump or pumps are operating.

It is recommended that every two to three months the sump be flushed with salt or fresh water. This will cause any heavy material that has accumulated at the bottom of the sump to be agitated and pumped overboard.

When cleaning the MSD, the following procedures must be followed:

1. Open inspection ports.
2. Provide some method of disposing of sewage when cleanout valve is opened, such as draining into a container or have a sewage tank truck pump out the MSD.
3. When pumping out the MSD with a pump, use extreme care not to dislodge filter columns. To prevent this, it is recommended that the suction hose end be cut at a 45 degree angle to skim off the waste and liquid.
4. After a disposal method has been set up, flush upper section of the MSD with either salt or fresh water. Do not use high pressure as this could damage filter columns. Continue flushing until flush water runs clear.
5. Remove chlorine slug holder. Using salt or fresh water, flush out lower section of upper tank. Continue to flush until flush water runs clean.
6. With salt or fresh water, flush out chlorine retention section. This will flush out any sediment that might have accumulated.
7. If carbolic, creosote or acid base cleaners have been used, this could have killed the biological treatment action and could cause plugging of the MSD. If this has happened, the upper section of the MSD must be flushed until substances have been diluted. This could take several hours of flushing.
8. When the MSD has been cleaned, it is recommended that, if possible, the inspection ports and cleanout valves be left open and the unit not be used for several days.
9. In cases where the intake water is extremely silty, it may be necessary to flush the top section of the MSD on a regular basis.
10. The main reasons for the MSD to fail include, but are not limited to: Harsh cleaners, high hydraulic load caused by overuse, leaking toilet valves, drains other than black water connected to MSD, paper hand towels, paint rags, and/or improper installation.

Note: MSDs fitted with synthetic media can be cleaned more aggressively. Please contact your distributor or Microphor for details.

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All sales of merchandise by Microphor are subject to the General Terms and Conditions as provided herein and on invoices issued by Microphor.

PRICES: All goods and products sold by Microphor will be billed to its customers according to the price lists contained in the current bulletins and price lists issued by Microphor. All prices are subject to change without notice and supersede all prior price lists. Microphor assumes no obligation to sell to anyone at any price or at any of the terms listed herein.

TERMS: Customer orders will be accepted subject to credit investigation, and approval, and delivery may be withheld on accepted orders, other than cash in advance, without any liability on the part of Microphor if, in its opinion, there is doubt concerning the ability of the customer to pay for merchandise ordered under the terms and conditions contained in current bulletins and price lists issued by Microphor. After delivery of merchandise, should Microphor, at its sole discretion, institute legal action for collection, customer agrees to pay all attorney fees and costs incurred by Microphor by reason of such action.

FREIGHT AND DELIVERY: PRICES ARE F.O.B. FACTORY: Delivery to the initial carrier shall constitute delivery to the customer. Microphor's responsibility ceases upon delivery in good order to the carrier and all goods are shipped at the customer's risk. Customer shall be responsible for filing a claim with carrier. Microphor shall not be liable for any delay or failure in the delivery or shipment of merchandise against an accepted order or for any damages suffered by reason thereof when such a delay or failure is, directly or indirectly, due to accident (in manufacture or otherwise) fire, flood, riot, war, embargo, labor stoppage, delays in transportation, inadequate transportation, shortage of materials or supplies, regulation by Government authority or any like or dissimilar cause or causes beyond the control of Microphor. Shipping weights and freight estimates given are approximate, for customer's convenience only, and are not guaranteed.

SHORTAGES OR VARIANCES: No claims for variances from or shortages in orders will be honored unless presented within fifteen (15) days after customer's receipt of order.

CANCELLATION OF ORDERS: After a purchase order has been provided by customer, written or oral, an order may be modified canceled only upon written confirmation by Microphor. Additional costs incurred by Microphor as the result of modification or cancellation will be billed to customer. Orders for merchandise requiring special manufacturing or supervision, or articles of a special nature, will not be canceled after production is commenced.

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MICROPHOR SHALL NOT BE RESPONSIBLE FOR LOSS OF USE OF PRODUCT OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES INCURRED BY PURCHASER INCLUDING BUT NOT LIMITED TO PERSONAL INJURY AND PROPERTY DAMAGE.

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