



FOOD WASTE MANAGEMENT
of a
1,000 TEU CONTAINER VESSEL
with a
RETROFITTED FOOD WASTE GRINDING SYSTEM

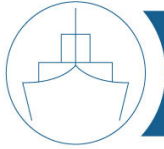


TABLE OF CONTENTS

1. REQUIREMENTS REGARDING FOOD WASTE MANAGEMENT	3
2. INSTALLATION OF A FOOD WASTE GRINDING SYSTEM	3
3. IMPLEMENTATION OF A FOOD WASTE GGRINDING SYSTEM ...	4
3.1. Connection to Galley Discharge Line / Sewage Treatment Unit	4
3.2. Connection to Sewage Holding Tank	4
3.3. Connection to Separate Holding Tank	5
4. CONCLUSION	6



1. REQUIREMENTS REGARDING FOOD WASTE MANAGEMENT

The regulations for the prevention of pollution by garbage from ships, clarified in the MARPOL Annex V, was revised and entered into force on January 1st, 2013. This Annex applies to all ships.

The main changes in the revised MARPOL Annex V regarding discharge of food waste are as follows:

- Discharge for comminuted or ground food waste is allowed for distances greater than three (3) nautical miles from nearest land outside special areas
- Discharge for food waste (not comminuted) is allowed for distances greater than twelve (12) nautical miles from nearest land outside special areas
- Discharge for comminuted or ground food waste allowed for distances greater than twelve (12) nautical miles from nearest land inside special areas

Those "special areas" are - according to MARPOL rules - most European waters such as Baltic Sea, North Sea or Mediterranean Sea.

The comminuted or ground food waste has to be able to pass through a screen with openings not greater than 25 mm.
To fulfill this requirement, the installation of a food waste grinder will be necessary.

2. INSTALLATION OF A FOOD WASTE GRINDING SYSTEM

Food waste grinders are simple to operate. Just push the food waste into the opening while running water. The grinder cuts up coarse slices, comminutes slices to the required size and mixes it with water so that this medium can easily flow into the drainage system.

According to the MARPOL regulations, it is generally permitted to mix waste or waste water with sewage covered by other annexes (see MARPOL Annex IV, regulation 11 C, paragraph 4). The requirements of those Annexes shall be complied with in addition to the requirements of Annex V. When food waste is mixed with other substances having different discharge requirements, the more stringent requirements shall apply.



3. IMPLEMENTATION OF A FOOD WASTE GGRINDING SYSTEM

To demonstrate how a food waste grinding system can be retrofitted into existing vessels, the 1,000 TEU vessel type "SSW 1,000" is chosen as example, trading in special areas.

3.1. Connection to Galley Discharge Line / Sewage Treatment Unit

The easiest solution for retrofitting a food waste grinder to ship's discharge system is the installation of the grinder inside the galley, drain directly connected with the galley discharge line.

For most vessels as well as for the "SSW 1,000", the galley discharge line is directly connected to the sewage treatment unit.

A sewage treatment unit is not able to handle food waste, neither comminuted nor not comminuted, so that this solution for retrofitting is not possible.

3.2. Connection to Sewage Holding Tank

Another solution for an easy connection of a food waste grinder to the ship's discharge system is the connection of drain of food waste grinder to the vessel's sewage holding tank, in case that direct discharge from sewage tank overboard is possible.

Inside special areas, the discharge of untreated sewage as well as the discharge of comminuted food waste is permitted for distances greater than twelve (12) nautical miles from nearest land.

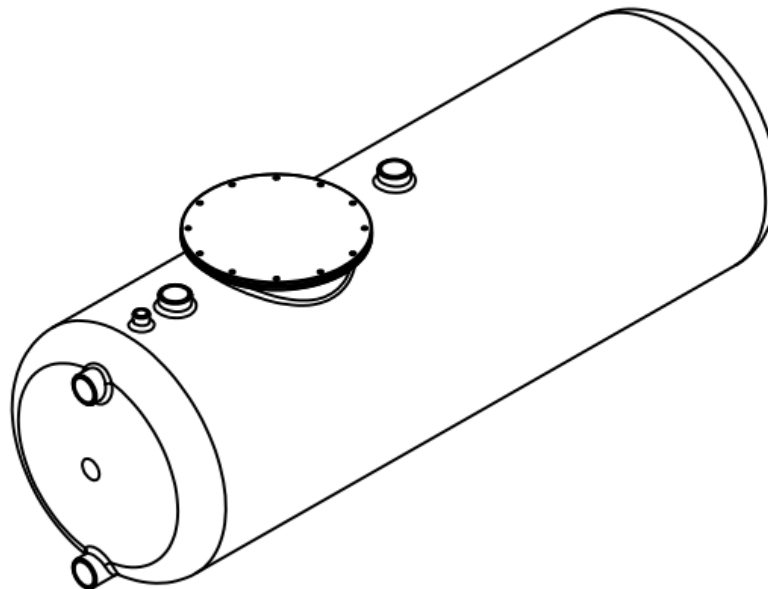
This solution might be possible for several vessel types. Although a direct discharge of sewage holding tank overboard without passing through sewage treatment unit is possible for "SSW 1,000", this solution is also not practicable for the vessel. The sewage holding tank will be discharged by means of pump attached to sewage treatment unit, and the capacity of this pump is not enough for discharge of comminuted food waste.



3.3. Connection to Separate Holding Tank

In case that connection to the ship's sewage holding tank or black water tank as mentioned above will not be possible, the only solution for retrofitting a food waste grinder will be the connection of drain of food waste grinder to a separate waste water holding tank. The drainage of waste water holding tank to be directly connected to overboard discharge line.

A possible tank design will be an cylindrical tank with the possibility of inspection and flushing as well as drained by means of an ejector as shown below.



This solution requires the connection to seawater or freshwater system for flushing, connection to vessel's discharge line as well as space for installation, which has to be checked individually for each vessel.

The size of the waste water holding tank has also be chosen individually for each type of vessel. As per rules, each person onboard produces food waste of about 3 liters per day, which entails an amount of about 9 liters waste water per day from food waste grinder.

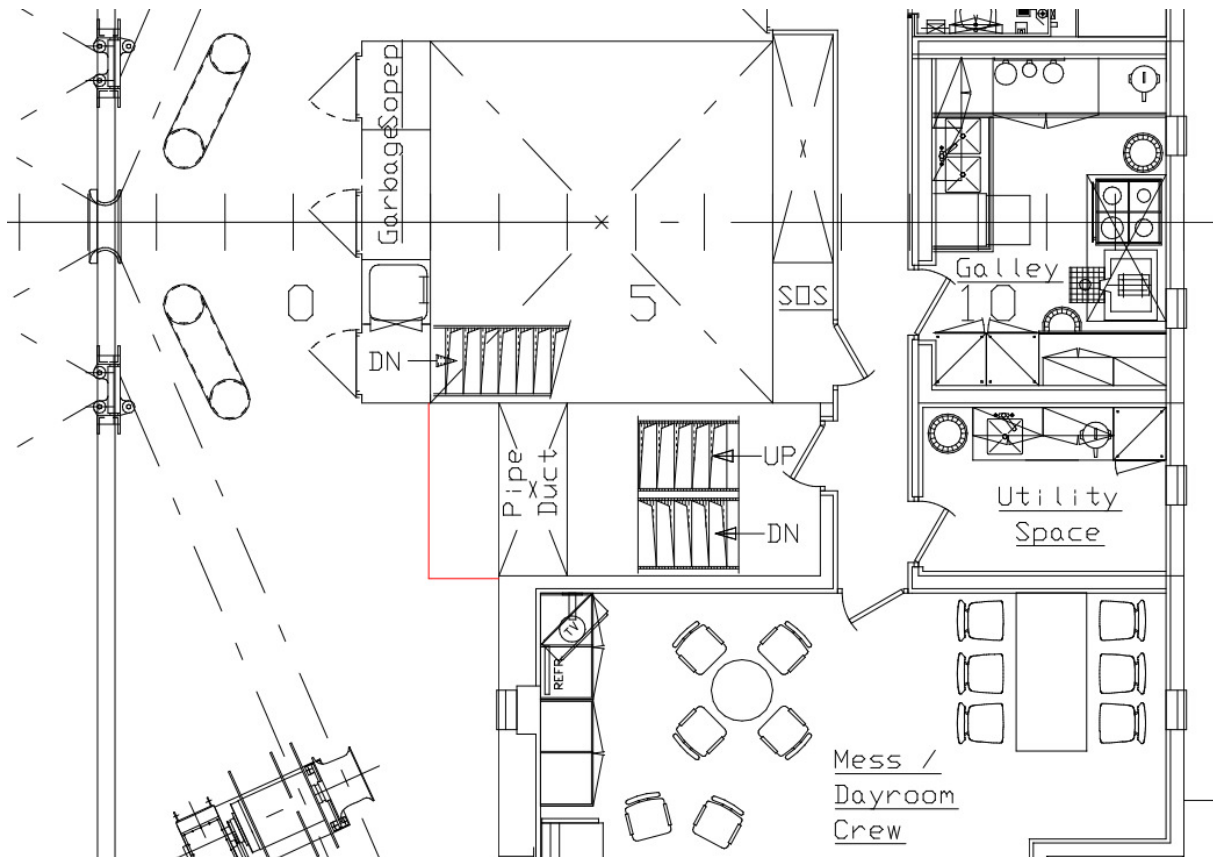
For the "SSW 1,000" with 16 crew members, this will cause an amount of 144 liters waste water per day. Assuming that the vessel will operate in harbor or with distance of less than twelve (12) miles from nearest land for three (3) days, the waste water holding tank should have an capacity of at least 430 liters.

The above shown holding tank with a capacity of 500 liters requires large installation space due to tank length of about 2 meter.

For retrofitting such system, it might be difficult to find sufficient space to locate the tank inside accommodation area or engine room and has to be checked in detail, but



to locate a waste water tank compartment outside on poop deck level in vicinity of galley as well as mess room to be possible as marked in red (see below).



Inside this compartment would also be enough space to locate the food waste grinder itself, so that no additional space inside galley / accommodation area will be needed.

4. CONCLUSION

A later installation of additional systems onboard existing vessels always causes some troubles, but as shown for the vessel type "SSW 1,000", also for other vessels a practicable solution for retrofitting a food waste grinding system can be elaborated, so that expensive discharge to shore can be avoided.