

## Neptumatic MOC

**The compact, high-capacity, three (3)-stage Sewage (Black) and Waste (Grey) water treatment system**



### Highlights of the Neptumatic MOC technology

The **Neptumatic** system combines *both* oxidation *and* chemical treatment of black and grey water.

The **Neptumatic** system combines high capacity with small outside dimensions.

The **Neptumatic** has a quick start-up time, therefore the unit can be closed down when the vessel is on non-restricted areas (reduced operation costs).

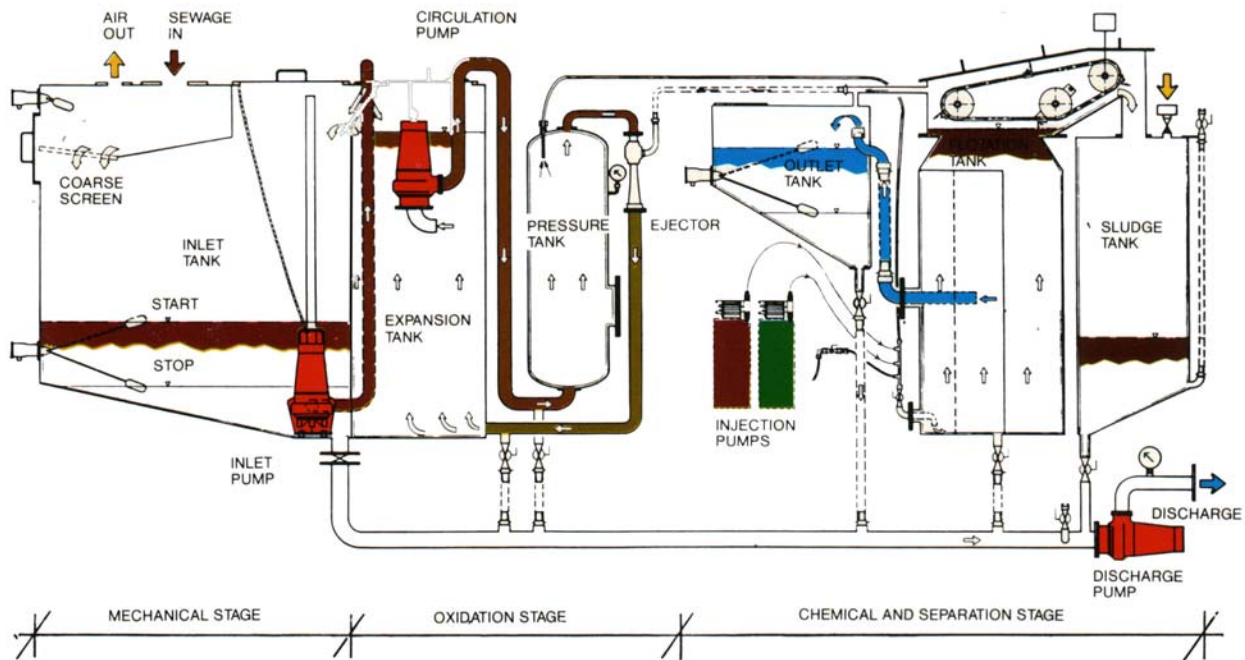
The **Neptumatic** system has proven its reliability since the 1970ies.  
The reference list include > 400 units.

The **Neptumatic MOC** is a flexible system. It can be installed for treatment of Black Water (Toilet) only or together with Grey Water (Shower/Wash Basin). A joint pipe system for Black- and Grey Water resulting in requirement for high capacity is therefore no problem.

The **Neptumatic MOC** unit is naturally fulfilling the IMO MARPOL regulations.

# Neptumatic MOC

## Process Description



The fluid is first diverted to **the mechanical stage** where coarse solids are separated and soft solids are disintegrated by a recycling communicator (inlet) pump.

In the next step, **the oxidation stage**, the water is circulated through a pressurised tank, an ejector and back to an expansion tank. Air is continuously drawn into the water by the ejector, causing an intensive mixing of air and polluted water, which in combination with the highly oxygenated pressurised environment causes a rapid degradation of the organic pollutants, achieving a considerable reduction of the BOD.

In the final step, the **chemical and separation stage**, a flocculent is injected to the water, creating a rapid transformation of the pollutants into flocs. The flocs are lifted to the water surface by micro air-bubbles released from the water after the depressurisation. The sludge thus produced and now floating at the water surface, will be transported to a sludge storage tank by a conveyor.

A disinfectant is also injected to the water for reduction of the coliform bacteria count.

The purified water is diverted by gravity to an outlet tank from where it is automatically pumped overboard.

### Data for Neptumatic MOC

Model		MOC-12	MOC-20
Capacity	m <sup>3</sup> /24 hrs	0-12	0-20
Capacity	m <sup>3</sup> /hr	0.6	0.9
Length	mm	2 800	3 150
Width	mm	1 250	1 250
Height	mm	1 950	1 950
Weight, dry	Kgs	1 900	2 000
Weight, wet	Kgs	5 500	6 300
Power	kW	6	6

Discharge pump standard 380 V/50 Hz/440 V /60 Hz. 50 lit./min. at 6/9 m.w.g.  
Non std. 380 V/50 Hz/440 V /60 Hz. 50 lit./min. at /15 m.w.g

*We reserve our selves the right to make modifications*

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# **MARINFLOC**

## **Neptumatic MOC & Retro**

### **Basic Principle and advantages**

**Neptumatic MOC & Retro** Sewage Treatment Plants operate uses a chemical and physical principle. This is superior to the aerobic principle in all respects.

#### **Treatment time and dimensions**

For a chemical unit, the retention time is 2 – 4 hours and for a biological unit it is 20-24 hrs. This means 5 to 12 times more space is required for a biological unit to treat the same amount of waste water as for our Neptumatic.

#### **Less power consumption**

More power is often used for chemical units; but they only operate when there is incoming water to treat. Biological units must run 24 hrs a day to keep the biological micro organism alive.

#### **Short start up time**

Chemical units start up immediately, whereas biological units typically require 8 – 14 days to produce an active biological culture.

#### **Sensitivities**

Chemical activities are resistant to cleaning agents, acids, grease and other toxins that might be present, and which will kill biological micro-organisms. Chemical floatation sludge is less sensitive to vibrations than biological sedimentation sludge that might be dispersed with the cleaned outlet water, which then would be contaminated by the sludge.

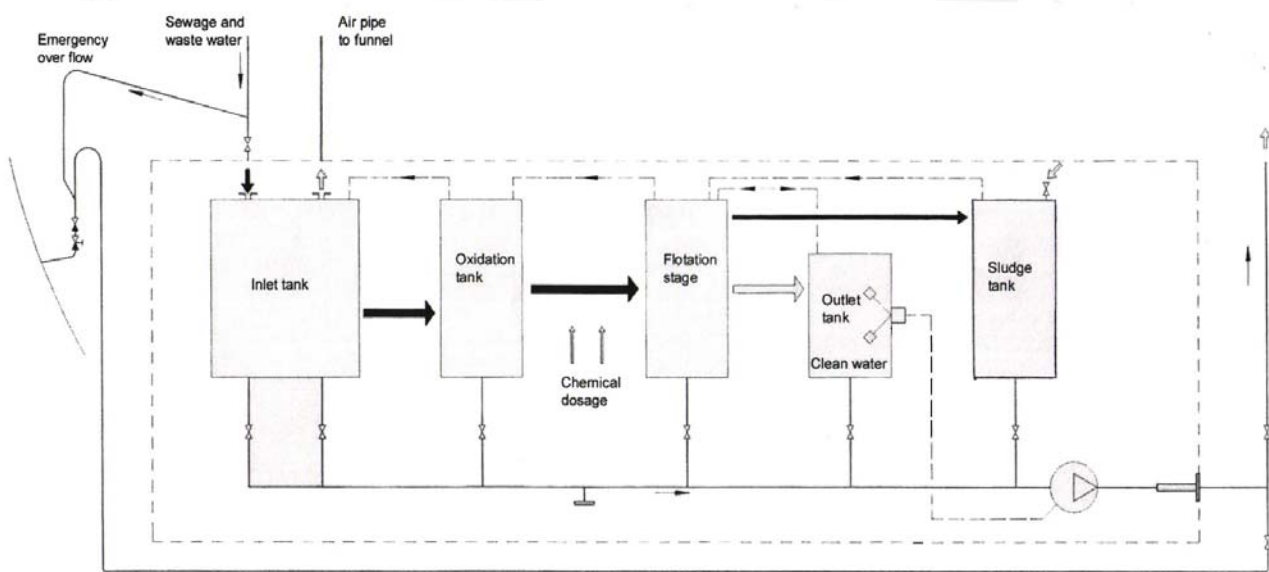
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## Neptumatic MOC & Retro

### General Description of the Neptumatic MOC principle

The **Neptumatic MOC & Retro** Sewage and Waste Water Treatment Units are intended for the treatment of **Black, Galley** and/or **Grey** water produced on ships.

The operation is based on chemical treatment, combined with an oxidation process giving high efficiency and minimised external dimensions. The unit starts operating automatically when there is an inflow of water to the unit, otherwise it is on stand-by requiring minimal power:



### The water treatment process is divided into 5 stages:

1. Coarse Screen and Pre-Treatment
2. Oxidation and Circulation
3. Flotation (Separation) including Chlorinating/UV
4. Effluent Discharge
5. Sludge Storage

# MARINFLOC Neptumatic MOC

## Process description

The **Neptumatic MOC** Sewage Treatment system processes all water in one common process to achieve an effluent standard in accordance with the IMO and US Coast Guard regulations.

To guarantee effectively steady contamination reduction, the **Neptumatic MOC** operates with constant flow as incoming peaks are collected in an inlet tank. All water is passed through a self-cleaning screen. (MOC 12 and MOC 20 to be cleaned manually)

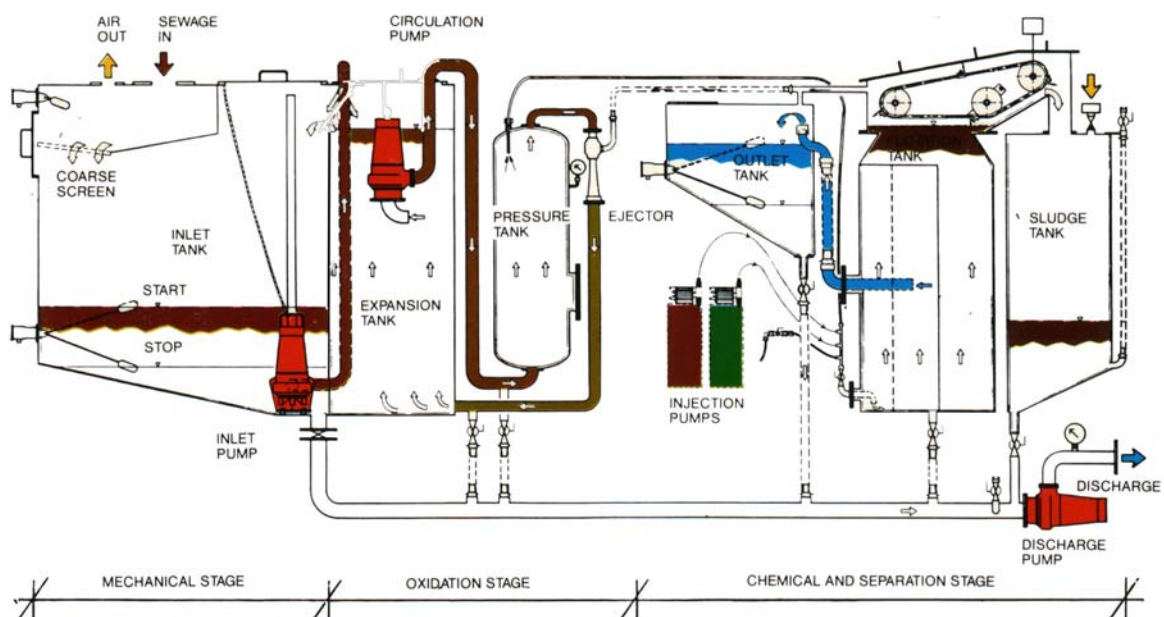
In the oxidation stage, the polluted water is circulated a number of times under high pressure as air is drawn into the system. The intensive mixing of air and polluted water causes a highly oxygenated pressurised environment – resulting in rapid degradation of organic pollutants.

The flocculent agent is continuously injected into the flow, forcing the impurities to combine and build up large aggregates/flocs.

In the floatation tank, the flocs are carried to the surface of the floatation tank by micro air bubbles. A scraper conveyor transfers the resulting sludge to the sludge storage tank.

A disinfectant is also added to the fluid, minimising the faecal coli bacteria content.

Purified water is automatically discharged overboard via the outlet tank.



# MARINFLOC Neptumatic Retro

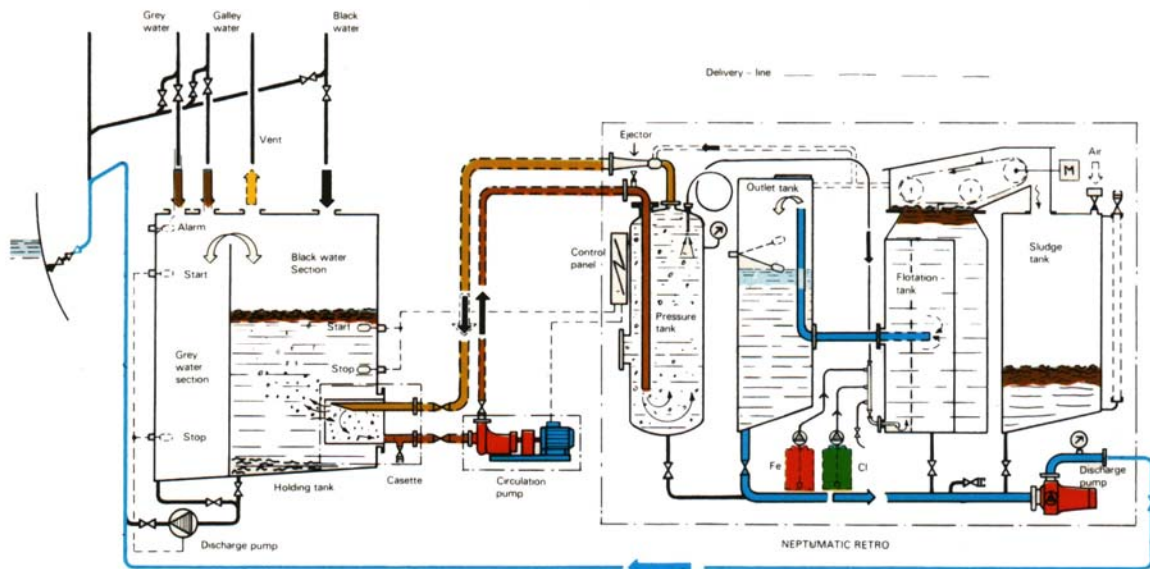
## General Characteristics of the Neptumatic Retro

- High Capacity, Compact Dimensions
- Suitable for full treatment of Black Water or Black + Grey Water
- Delivered as ready mounted package, consisting of separate tanks, for easily retrofit installation
- Meets IMO and US Coast Guard Requirements

The **Neptumatic-Retro** works with constant water flow through the unit to guarantee a good and steady purification.

The **Neptumatic-Retro** is connected to an external collecting tank by means of a cassette, included in the standard installation or to an existing tank onboard, which can be converted to a collecting tank.

The **Neptumatic-Retro** is suitable for installation on vessels with various loads. During the day when there is no water to treat, the unit is on stand-by.



## Installation

The **Neptumatic-Retro** is installed with a collecting tank with a minimum holding capacity of three (3) times the hourly inflow.

The collecting tank to be equipped with:

- Two level switches (Not included in our standard delivery)
- One cassette

The circulation pump used for diversion of the water to/from the process stage to be installed close to the collecting tank. All other equipment, including control panel/s, is integrated in the process stage.

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## Neptumatic MOC & Retro

### Type/Capacity Scenarios & Guidelines

Neptumatic MOC & Retro models were designed using the following wastewater scenarios and capacity assumptions:

Wastewater on ships originates from the following activities and installations:

- Flushing Toilets and Urinals (**Black Water/Sewage**)
- Food Preparation and Ware-washing in Galleys and Pantries (**Galley/grey water**)
- Laundry Operations (**Grey water**)
- Cleaning, Scuppers, Washbasins, Showers, etc. (**Grey water**)

Volume of wastewater is influenced by:

- Type of flushing system, save flushing (vacuum) or conventional system
- Type and size of the ship
- Number of water using devices installed
- Geographic trade of the ship
- Annual season
- Ship's mission profile.

Type and Volume of Water Produced:

The volume of water to be treated varies to a great extent from ship to ship. Outlined below are estimated figures of **production on a per person/per day** basis:

<u>Type</u>	<u>Volume (per person/per day)</u>
All Black (Conventional), Grey and galley water to be treated:	250 litres
All Black (Vacuum), Grey and Galley water to be treated:	195 litres
All Black (Conventional) and Galley water to be treated:	130 litres
All Black (Vacuum) and Galley water to be treated:	75 litres
All Black (Conventional) water to be treated:	70 litres
All Black*(Vacuum) water to be treated:	15 litres
* <b>Note!</b> In this case the Black water has to be diluted by min. 25 litres of grey water.	
Black water (Conventional) production:	70 litres
Black water ( vacuum) production:	15 litres
Grey water:	120 litres
Galley water:	60 litres

To be cont.

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## Neptumatic MOC & Retro

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### Guidelines

In order to facilitate the selection of the appropriate size of **Neptumatic MOC & Retro**, the following guidelines have been prepared:

#### A

**All water (Black(conventional flush), galley and grey) to be treated.  
250 lit./person/day**

<u>Number of persons onboard</u>	<u>Suggested Model</u>
49 persons	<b>MOC 12</b>
81 persons	<b>MOC 20</b>
121 persons	<b>Retro 30</b>
181 persons	<b>Retro 45</b>
201 persons	<b>MOC 50</b>
301 persons	<b>MOC 75</b>
401 persons	<b>MOC 100</b>
531 persons	<b>Retro 130</b>
612 persons	<b>Retro 150</b>

#### B.

**Black conventional flush or black water vacuum system + galley water to be treated:  
75 lit./person/day**

<u>Number of persons onboard</u>	<u>Suggested Model</u>
171 persons	<b>MOC 12</b>
286 persons	<b>MOC 20</b>
429 persons	<b>Retro 30*</b>
642 persons	<b>Retro 45*</b>
715 persons	<b>MOC 50</b>
1,071 persons	<b>MOC 75</b>
1,430 persons	<b>MOC 100</b>
1,844 persons	<b>Retro 130*</b>
2,127 persons	<b>Retro 150*</b>

\* For ships with an existing holding tank, the **Retro** model would be a suitable alternative considering its compact dimensions. Optional to the use of an existing tank, a combination tank with automatic coarse screen can be installed for a complete system.

There are also other alternatives for treating of Black, Galley & Grey water than those provided above. We at **MARINFLOC AB** are always at your service in helping you to find a suitable solution to your wastewater needs.

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## Neptumatic MOC & Retro

### Questionnaire

To assist us or any one of our Agents/Representatives, in understanding your specific situation and requirements, the information supplied by completing this questionnaire proves invaluable:

1. Vessel Name: \_\_\_\_\_
2. Type of Vessel: \_\_\_\_\_
3. Number of Persons Onboard:  
Passenger Capacity: \_\_\_\_\_  
Crew \_\_\_\_\_
4. Classification Society: \_\_\_\_\_
5. Is a vacuum system used onboard: Yes  No  Manufacturer: \_\_\_\_\_
6. Do you expect the Neptumatic MOC or Retro system to have enough capacity so as to treat all waste water? Yes  No   
If NO:  
a) Shall the system treat only Black Water? Yes  No   
b) Shall the system have enough capacity to treat clack and galley water? Yes  No   
c) Shall the system operate from a one pipe system? Yes  No
7. Are there any holding tanks onboard, which can be used as inlet tanks?  
Yes  Capacity: \_\_\_\_\_ m<sup>3</sup>  
No
8. Voltage: \_\_\_\_\_ V \_\_\_\_\_ Hz

*Thank you for taking the time to complete this Questionnaire.*