

YWC-Type 15ppm Bilge Separator Manual



Contents

1 Application

2 Specifications

3 Principle

4 Installation

5 System flow

6 Operation

7 Maintenance

8 Cleaning of the membrane

9 Troubleshooting

10 Spare parts

11 Warning

12 Contact us

Annex:

Figure 1: system drawing of oily water separator

Figure 2: base drawing of oily water separator

Figure 3: outline and external connecting pipes drawing of oily water separator

Figure 4: Electric box drawings of oily water separator

Caution: The instruction book is only for your reference; please take the material object as standard, our company retains the final right to explain!

This product is China patent item, which is provided with independent intellectual property rights.

1 Application

This device can be used to treat oily bilge water in order to make it reach the requirements of IMO.MEPC.107 (49) resolution, which is also called 15ppm bilge separator. **It contains type approved 15ppm bilge water separator, 15ppm bilge alarm and Automatic shut down Device.**

2 Technical Specifications:

| Type Technical Specifications | | YWC- | | | | | | | | |
|--|------------|--|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 0.25 | 0.50 | 1.00 | 1.50 | 2.00 | 2.50 | 3.00 | 4.00 | 5.00 |
| Rated capacity (m ³ /h) | | 0.25 | 0.50 | 1.00 | 1.50 | 2.00 | 2.50 | 3.00 | 4.00 | 5.00 |
| Oil content of the discharged water | | ≧15ppm | | | | | | | | |
| Power of the electric heater (kw) | | 1kw | 3kw | 6 | 6 | 6 | 6 | 6 | 12 | 12 |
| Electrical System | | AC 380V/50Hz/3φ, AC 415V/50Hz/3φ, AC 440/60Hz/3φ, AC 480V/60HZ/3φ (optional) | | | | | | | | |
| Power of the electric motor | | 0.37kw | 0.55kw | 0.75kw | 1.1kw | 1.1kw | 1.5kw | 1.5kw | 2.2kw | 2.2kw |
| Suction head | | ≧6m-H ₂ O | | | | | | | | |
| Pressure of the discharged water | | 5-10m-H ₂ O | | | | | | | | |
| Outline Dimension (Length×Width×Height) (mm) | | 1000×600 ×1250 | 1100×690 ×1460 | 1050×1000 ×1620 | 1100×1130 ×1650 | 1900×1120 ×1700 | 1900×1120 ×1900 | 1700×1500 ×1900 | 2280×1700 ×1900 | 2590×2000 ×1900 |
| base | | 5# | 6# | 6# | 6# | 8# | 8# | 8# | 10# | 10# |
| Weight | Dry Weight | 400 | 600 | 800 | 1060 | 1260 | 1500 | 1800 | 2100 | 2500 |
| | Wet Weight | 550 | 900 | 1200 | 1650 | 2260 | 2800 | 3200 | 3900 | 4600 |
| Applicable Vessel (KDWT) | | <1 | 1-5 | 5-10 | 10-30 | 30-50 | 50-100 | 100-200 | 100-300 | >300 |

3 Principle

The device adopts the combination of 1st stage, cone plate gravity and coalesce separation; 2nd stage, fiber filter and 3rd stage, membrane permeation in order to make the treated bilge water to reach the requirements of discharge standard of the resolution of IMO MEPC.107 (49).

As shown in the enclosed drawing, bilge water comes into the 1st stage coalescer separator because of the suction of the **Feeding** pump, that is in a vacuum negative pressure, and it effectively prevents the problem that the bilge water is difficult to be separated because of the emulsion caused by feed pump under pressure. The liquid coming out of **Feeding** pump is adsorbed and filtered by the 2nd stage fiber filter, and then goes into the 3rd stage membrane **to reach the discharge standard**.

There is a 15ppm bilge alarm in the ship cabin to measure the oil content of effluent. If it finds that the oil content of effluent is in an excess of limit, the oil content meter can make order to switch turn it into the 3rd stage, membrane treatment process.

The oil content meter will give an alarm if finds the oil content of effluent is above limit, and the unqualified water pneumatic **three-way** valve **VS6** is opened automatically, so that the unqualified water is return to bilge, not to the overboard.

4 Installation

4.1 Base of the device

All the components of the device are installed on the equipment base welded by channel steel. A ship base which matches the size of the bottom of the equipment base should be fixed in the machine cabin. The ship base should be welded with the ship structure. The ship base is connected to the bottom of the base of device by bolts and channel special square bevel gaskets GB/T853 suggested. See attached Figure 2, the size of the device base and the position of connecting bolt holes.

4.2 Connection of the pipes

The bilge suction, effluent discharge, back flushing water inlet, and **Return to bilge interface, oil outlet**, should be fitted by the shipyard.

| Name Type | Oil water inlet | Discharge liquid outlet | Clean water inlet | Return to bilge interface | Oil outlet | Return to bilge interface | Concentrated liquid Return to bilge interface |
|--------------|-----------------|-------------------------------|-------------------------|---------------------------------|---------------|---------------------------------|--|
| YWC-0.25 | DN20 | DN20 | DN20 | DN20 | DN20 | DN20 | None |
| YWC-0.50 | DN25 | DN25 | DN25 | DN25 | DN25 | DN25 | |
| YWC-1.00 | DN25 | DN25 | DN25 | DN25 | DN25 | DN25 | |
| YWC-1.50 | DN25 | DN25 | DN25 | DN25 | DN25 | DN25 | |
| YWC-2.00 | DN32 | DN32 | DN32 | DN32 | DN32 | DN32 | |

| | | | | | | | |
|----------|------|------|------|------|------|------|------|
| YWC-2.50 | DN32 | DN32 | DN32 | DN32 | DN32 | DN32 | |
| YWC-3.00 | DN32 | DN32 | DN32 | DN32 | DN32 | DN32 | DN32 |
| YWC-4.00 | DN50 | DN50 | DN50 | DN50 | DN50 | DN50 | DN32 |
| YWC-5.00 | DN50 | DN50 | DN50 | DN50 | DN50 | DN50 | DN32 |

4.3 Connection of electric box

Power source 380 V/440V, 3 Φ 、50HZ/60HZ is connected into electric control box; Bilge level probe, refer to electric draw, when the product leaves from the factory, the external contact points JYB3 # 15, # 5or # 6 of the liquid level relay which is used to detect the bilge water level are short connected. If Bilge level probe needed to be linked, the short connected copper wire should be removed.

Warning: The operator should skill a basic technology and be familiar with the instruction. Also he should master the operation control and know clearly the maintenance regulations.

5 System flow Refer to enclosed Figure 1

The bilge oily water comes into the 1st coalescer through Seawater initial filter and bottom valve, floating ball non-returned valve V1. There is an oil chamber in the tope of separator. Most of the oil in the bilge oily water floats to the surface of chamber because of the effects of small gravities. The tiny oil drops gather and coalesce in the cone wave plate which is made of hydrophilic and oil-left materials and floats in the main and then adverse current. The water flows from the bottom of the 1st separator goes through the pneumatic valve Vs3 into the inlet of **Feeding** pump. When the **Feeding** pump is in operation, Vs3 is opened automatically while the flushing valve Vs2 is closed.

When the oil accumulates to interface level in the top chamber of the 1st coalescer, the oil water interface electrode sends out a signal and the pneumatic valve Vs1, Vs2 is opened and VS3 is shut down automatically to let back flushing water into the bottom of 1st coalescer. **At this time, the feeding pump is not working.** The back flushing water(fresh water) props up the oil to let the oil discharge to the waste oil tank through pneumatic oil discharge valve Vs1. At that time, the feeding pump doesn't work(VS1 is closed Pneumatic Valve). It resets automatically after the oil is discharged and it again starts to treat the oily bilge water.

The effluent already treated by the 1st coalescer comes into the 2nd filter and is treated again, then is discharged to overboard. If the oil content in the effluent is overlimit, Three-way valve Vs4 will be automatically turned to the direction of 3rd separation .(Note:YWC-2.00,YWC-2.50,YWC-3.00,YWC-5.00,YWC-5.00pneumatic VS4 is closed,VS5 is opened and turned to 3rd stage treatment)make the exceeded water enter into 3rd stage membrane separation.In this way, the water is further treated in the 3rd membrane element. THE 3rd Ultrafiltration adopts permeation principle. The ultrafiltrated liquid finally fLow into outboard valve through outlet ball valve V3, check valve V5, flow meter, pneumatic triple valve VS6 and manual triple

valve V7.

The part of influent liquid which comes into the 3rd membrane becomes concentrated liquid which is through V6 and discharged to the bilge. The recovery rate of the produced water in the membrane, i.e. $\eta = \text{penetrated capacity} / \text{influent}$. This device is designed to set on $\eta = 80\%$. So the water produced at that time = $0.8 \times 0.31 \text{ m}^3/\text{h} = 0.25 \text{ m}^3/\text{h}$. The opening of V6 is fixed before leaving from factory. If this fix is found that has been changed, it may adjust the V6, so as to fix the volume of the effluent on rated capacity by measuring meter in this device. The recovery rate should not be too high; otherwise, the concentration will be over limited as to effect the membrane life.

The 3rd membrane element needs to be kept wet in water, and is already filled with reserved solution inside of the 3rd stage, and the inlet and outlet valves V3, V4 V6 and V8 are completely shut before leaving from factory. Even when it is off packaged and installed, those valves can not be opened. Until the device is in operation after filled with water, and before starting the device, V 3, V6 and V 8 can be opened.

This device uses the electric heater to heat up the oil collecting chamber to about Over 0 °C (heavy oil is over 50 °C). The temperature is controlled by the current point contact thermometer to adapt the link on or break off the heater. **Temperature** is very important to treat the bilge water with the much residual heavy oil. This can accelerate the separation rate of the separator and decrease the possibilities of the block of the device.

Two pressure meters measure the inlet and outlet pressure of the 2nd filter respectively. The vacuum pressure meter on the 1st stage coalescer is used to measure the vacuum pressure in the cylinder and protect the safety of the operation of the **Feeding** pump.

The bilge alarm installed will take the sample automatically to analyse the oil content of the discharged liquid. When the oil content of effluent is exceeded, the oil content meter will send a sound and light alarm, meanwhile Vs6 **pneumatic** three-way valve automatic will turn back to the bottom line, so as to return the unqualified water back to bilge .If the water qualified, then the Vs6 pneumatic three-way valve, automatic steering qualified pipeline and discharge qualified water overboard. The requirement of the back pressure of the effluent for this device is 5~10m-H₂O. If the back pressure is less than 5m-H₂O, the siphon pipe should be fixed in the discharge pipeline so as to prevent water self-flow to overboard.

The pipe systems are needed to be installed in the shipyard as following: bilge suction and its pipe system; the pipe system from the waste oil discharge valve to the waste oil tank; the backflushing water inlet pipe system; the pipe system to discharge sludge to bilge or other places; the pipe systems to discharge qualified water to overboard and concentrated liquid to bilge.

As for the first operation, the containers and pipes are to be filled with water.

When water is filled, turn to the change-over switch “oil discharge back flushing, water feeding” on electric control box to “Auto”. The water enters through the bottom of the 1st stage coalescer, and then from lower to upper, its water level can be known through sludge discharge valve V2, trial water valve C2 and air cock C1. When the water comes to a valve and flows out, this valve is to be shut. When the water comes to the air cock that means the water is filled fully.

Oil content meter, i.e. 15ppm Bilge Alarm; Refer to the instruction book of it.

Caution: This device uses high voltage power source and may cause the imminent hazardous injury caused by electric shock. The door of electric control box should not be opened at presumptuously. When doing electrical repair, make sure the power is cut off and the repair is to be done by professionals.

6 Operation Please see the electric drawing, the drawing of the control box panel.

Before normal operation open outboard valve, bilge water valve (single), compressed air valve (not under 0.4mpa) back flush water valve (not under 0.3mpa)

6.1 The operation of normal run is as follows:

(1) Use the handle to open the door of the electric control box, and turn on the total power switch QF0 to check whether the electricity supply is normal.

(2) Turn on the Feeding pump power switch Q4 and the Feeding pump is not be started to operate..

(3) Turn on power supply switch Q5. Turn on the electric heater power switch Q8, Close the door of the electric control box.

(4) Turn on the “control power” 220V switch Q6 on the faceplate and its indicator light H0 should be lighted.

(5) Turn on “oil content meter switch” Q7 and its indicator light should be lighted. And at the same time, adjust it according to the requirements of the operating procedures of oil content meter.

(6) Turn the exchange switch Q3 which is exchanged among “manual or automatic discharge, back flushing, water feeding” to the condition of “manual”. At same time, the indicator light H4 showing the opening of Vs1 and Vs2 must be on to show that back flushing water goes in. Water can be seen to flow out from every trial cock, valve of the 1st Coalescer. And the cock valves should be closed from bottom to top ordinally until to the highest point and this shows that water is completely filled.

(7) Turn the “exchange switch” Q3 to the condition of “auto” and stop the inlet water. After the operation is in a good condition, the control system will discharge oil

automatically, if the oil in the top of the 1st Coalescer accumulates to some thickness. After all the oil is discharged, the system returns to its normal condition.

(8) Turn “the 3rd, 2nd membrane treatment switch” Q10 to “Auto”.

(9) Press the Reciprocate pump start button QA to start the pump. The pump is started and the rotation direction should be paid attention to. Observe the vacuum pressure meter and its needle points from 0 to -0.01MPa. If the needle stays between -0.01MPa and -0.05MPa, the device is running in normal condition.

(10) If the oil content meter is malfunction, turn 《the 3rd treatment exchange switch》 Q10 to “manual”. Let water into the 3rd stage forcibly through pneumatic three-way valve, whether VS4 is transferring (Note: YWC-2.00, YWC-2.50, YWC-3.00, YWC-4.00, YEC-5.00 let water cross the pneumatic valve VS4 is closed and turned to the 3rd stage treatment) The method of check is to see the relative location of finger at the top of the pneumatic. Also check the pressure meters of both the 1st and 2nd stages and they are all in a good operation if the pressures exist. Make V3 completely open and adjust the opening of V6 and keep a rated water.

(11) Keep the temperature of the point contact meter between 20°C and 40°C, and the electric heater will be on and off automatically and adapt the inlet water within the above scope. The working temperature of the membrane should not be over 50°C. Until then, the whole device is in a normal operation.

6.2 The abnormal conditions may contain:

(1) When the suck-in pipes of bilge water or suck-in filter is blocked, or the vacuum inside the 1st coalescer is over 0.05Mpa, the Feeding pump will stop automatically to protect. The operator should take action to check and solve the problem.

(2) After the bilge water is empty, air comes into the 1st coalescer, and the vacuum inside the coalescer is destroyed. And the Feeding pump will stop protecting automatically and now the operator should check the bilge water level. If the bilge water probe JYB3 of this device is used in the ship, the possibilities can be very a little. And the device starts or shuts automatically according to the bilge level.

(3) If the bilge alarm is installed and often sends out alarm signals, the device needs to be cleaned. First, treat the 1st coalescer by backflush method manually to see whether the separation rate of the 1st Coalescer decreases. Next stage is to observe the 2nd and 3rd pressure meters. If the pressure differences are too big, replace a new filter core. Now the water should be drained out manually. Open the lid and replace a new filter core. Tighten the lid and add new water in. The possibilities of the block of the 2nd filter is more often so the filter should be changed usually.

(4) As for the sludge discharge, oil often comes out of the top of the 1st coalescer automatically and the sludge in the bottom should be cleaned manually regularly. The sludge will cause the block of the following filters. The method of sludge discharge is to turn the exchange switch of 《manual or auto discharge, backrushing, and water

feeding》 to the condition of “manual”. And at the same time, open the discharge valve **V2** in the bottom of the 1st Coalescer and flush out the sludge with clean water.

6.3 Shut down of the device.

The device can be started or stopped automatically according to the bilge level higher or lower after it is in a good operation condition and it doesn't need man to operate. If the ship stops sailing for a very long time, the operator in the engine room can shut down the device if he is sure that the device doesn't need operating. First, press the stop button on the Feeding pump and the pump stops working whose indicator light H3 goes out. Then cut off control power Q6 while K2, K20, K5, and K6 lose power source. The pneumatic valves Vs1, Vs2, Vs3, Vs4, Vs6, Vs7 which are corresponding to them reset to its former state automatically (Note: YWC-2.00, YWC-2.50, YWC-3.00, YWC-4.00, YWC-5.00 pneumatic valves VS1, VS2, VS3, VS4, VS5, VS6 its former state automatically).

Caution: This device adopts the air operated valve controlled by the air-electric transfer Pneumatic Valve; the compressed air of 0.25-0.40MPa should be supplied by the ship. First the air enters into the air supply filter, which is installed the pressure gauge with electrical contact, for preventing the Feeding pump run without water, if the compressed air lost the pressure. The Y101 electric contact in the electric control box makes the whole separator will not be able to start. When the separator is shut down, the compressed air general inlet valve may be shut also.

Caution: The electric motor of the **Feeding pump is a rotating part, any worker who approaches must take care to his safety and prevent parts or clothes into it. This might cause injury.**

7 Maintenance

7.1 The cone wave plate separator inside the 1st coalescer should be back flushed regularly. The method is to turn the 《exchange switch》 Q3 to the condition of “manual back flush”. At the same time, close the waste oil valve on the waste oil tank and open the backwash valve to let clean water go into the bottom from VS2 and go out from VS1 and to let water back to bilge. This process is to be done every 6 months and the time needed is about 15 minutes once time.

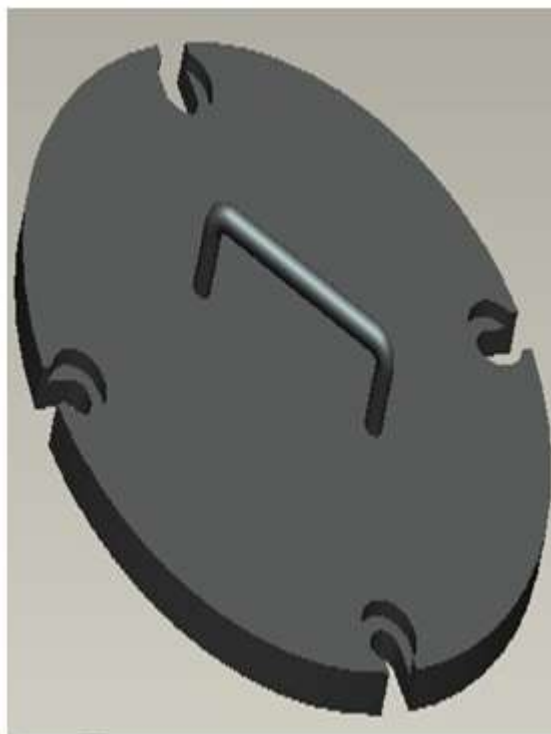
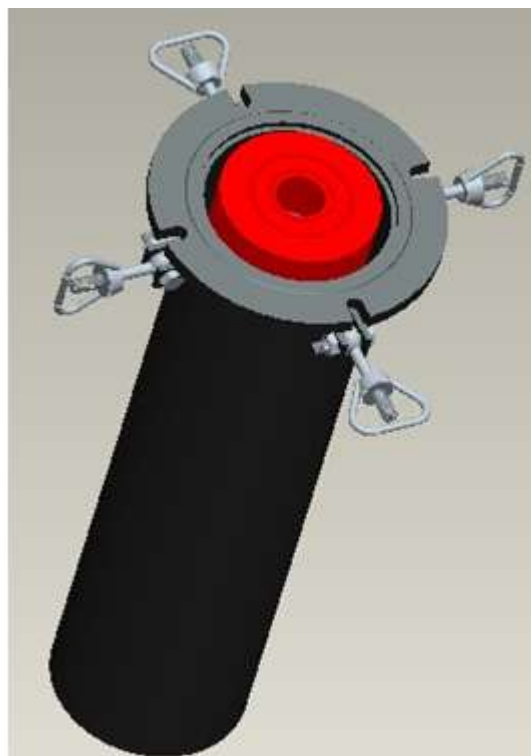
7.2 As for the replacement of the filter core of the 2nd filter, if the pressure differences of the inlet and outlet of the 2nd filter are over 10m-H₂O, which means the block is very serious and the device should be shut down and the liquid in the 2nd filter should be drained. Open the lid and take out the blocked filter core and replace it with a new one which is the same size as old one. At last, cover the lid. The core is to be replaced once a year averagely.

Change the filter core as follows:

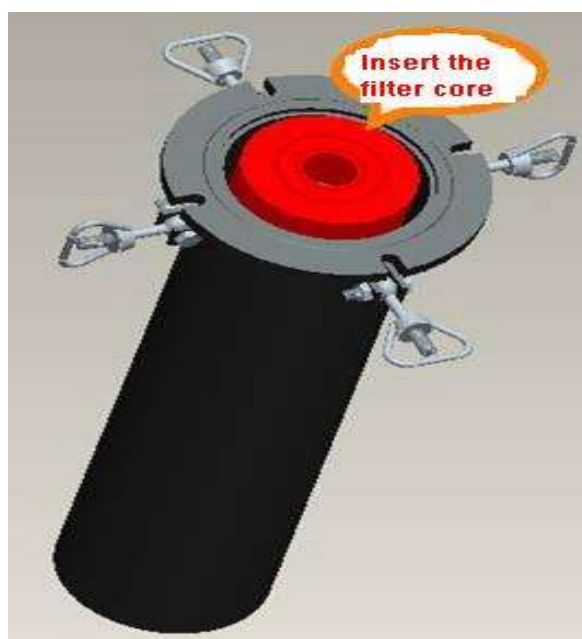
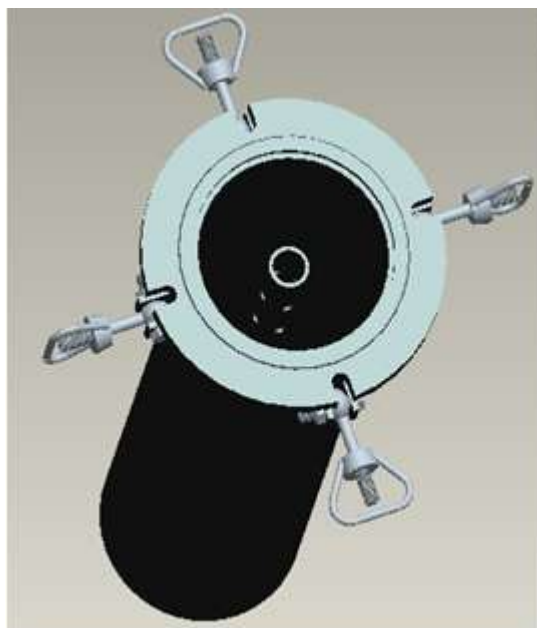
1). Twist off the eyenut



2). Open the cover.



3) Put in the new filter core



7.3 The 3rd membrane element can also be judged from the 2nd pressure meter whether it is blocked. When the pressure difference of the transmembrane is over 0.1MPa, it needs to be cleaned or replaced.

7.4 The supporting bearings of the axis of the **Feeding** pump should be checked regularly.

7.5 The pneumatic valve opens and closes automatically. If the position limit switch inside it fails and needs operation, the valve can be closed manually.

7.6 The suck-in filter of the bilge water (24 meshes) should often be checked whether it is blocked or not. If so, the rubbish should be cleaned timely. The filter net should be replaced if broken.

8 The cleaning of the membrane

8.1 The 3rd membrane filter uses the hollow fiber separation method and after long-time operation will be polluted or formed scaling and even blocked. So the regular cleaning is needed. When the pressure difference of the transmembrane is over 0.1MPa or the membrane operates without stopping for 6 months, the membrane needs to be washed. If either condition exists, the membrane should be washed. If it is not washed and the membrane will be blocked too seriously, the membrane elements should be changed as it is impossible to clean the membrane completely.

8.2 The choices of the chemicals

(1) NaOH

It is suitable to clean the oil pollution with NaOH as it can dissolve the oil and restore the membrane flux and not harmful to the membrane.

(2) Citric acid

It is effective to remove the fouling caused by Ca^{2+} or Mg^{2+} . Citric acid which is edible and not harmful. It is kept in the state of solid and can be dissolved and diluted by water.

(3) Bleach powder (NaClO)

Bleach powder, i.e. sodium hypochlorite has ion Cl^- which is of great killing to the pollution caused by the bacteria and also is catalytic to the mycete. But its oxidizability is too strong and harmful to the membrane. It can not be mixed with citric acid or with HCl as this will cause strong chemical reaction and create provocative Cl_2 . It is not recommended to use in this device.

(4) HCl is not advised to use.

(5) Sodium bisulfate (the one used in food)

It can be used for maintenance of the membrane and also a food preservative and can effectively prevent the membrane from invalidation caused by oxidation.

Caution: It must be very careful to do with any chemicals. Rubber gloves must be worn when touching these chemicals. If any chemicals touch the skin or comes into eyes, clean the injured part with clean water immediately and go to a doctor if the injury is very serious.

8.3 Cleaning method

8.3.1 Stopp the machine to clean online

(1) First prepare NaOH solution, do as the instruction in the chemical package box. Pour a portion of NaOH powder into the plastic bottle which contains one liter water. Wait the powder to be thawed and a 3% concentration NaOH solution is done.

(2) closed the V6,V3,V4. Open drain valve V8 then put all water and close the Drain valve

(3) Pour the 3% concentration NaOH solution in the bottle into inlet C4 and close C3 when the solution flows out of C3. If the membrane elements are not fully filled, another bottle of solution can be made to pour into C4 again until the solution flows out and closes C4. After the membrane is soaked for 3 to 8 hours, open C3 and recycle the solution for later use.

8.3.2 Dismount the membrane and clean

Close the inlet and outlet valves of the membrane and dismount the elements. When coming ashore it can be cleaned ashore. Replace the elements with spare ones and tighten the ripple.

8.3.3 If the membrane is expected not to be used for 3 months, or a long time, the anticorrosive maintenance is needed. Replace a new drug bottle, and implant the sodium bisulfite solution (1%) into the membrane. At the same time, close keeping water valve V3, V4, and V6.

8.4 The life of the membrane

The life of the membrane has something to do with the membrane elements which are provided by its manufacturer. So try to adopt good-quality products. The life for the excessive use is 3 to 5 years at least and 8-9years at most.

To operate in the right way is a good method of prolonging the life of the membrane. For example, do not always use manual the 3rd membrane treatment as this will make the membrane work long time without stopping. The normal oily water treated by the 1st and 2nd treatment process could meet the discharge standard. If the emulsified oil is found in a short time and could be above the discharge standard. It is suggested to use "auto" switch, it can be turned to the 3rd stage automatically.

In the actual operation, the ship crew should take good care of the bilge water and do not let the washing surfactant flow to the bilge. This will greatly decrease the use of the 3rd membrane.

8.5 Freeze protection of membrane

For the freeze protection of membrane and device,you can make up 60%-20% glycol solution (volume percent)to be antifreeze.Powr the glycol solution into device it has no damages to membrane and plastic parts.The 60% glycol will freeze when it is -49%,the lower concentration freezing point can adjust the concentration according to need.

9 Troubleshooting

| No. | Troubles | Likely reasons | Troubleshooting |
|-----|---|--|--|
| 1 | The vacuum inside the 1 st coalescer is over -0.05Mpa | The block of the Suck-in Pipes | Clean the Suck-in Filter |
| 2 | The loss of the vacuum of the 1 st coalescer is over -0.01Mpa | Out of Bilge Water | Cease the device and start when water is there |
| 3 | Frequent stop and start of the feeding pump | Failure of the vacuum pressure protect | Check the time delay relay in the electric control box |
| 4 | The shock and noise of the feeding pump | Out of water | Pour into water or check whether Vs3 is opened |
| | | Over pressure | Check whether the pipes after the pump is unblocked |
| 5 | The progress can't be operated as designed | Failure of the Pneumatic Valve | Check whether the on or off condition is normal, then check the electric control system. |
| 6 | The bilge alarm can't control the solenoid valve | Failure of the bilge alarm | Check and repair the bilge alarm |
| 7 | The pressure differences of the 1 st and the 2 nd stages is over 0.1Mpa | The block of the 2 nd stage filter core | Replace it with a new one |
| 8 | The 2 nd pressure meter is over 0.2Mpa | The discharge valve of the concentrated liquid is not opened | Open it and adjust it |
| | | The penetration rate of the membrane is too small | Clean it or replace it |
| 9 | The oil content of discharge water is always over board | The separation rate gets lower | Clean the device completely |
| 10 | It can't discharge oil | Be used for a long time of the liquid lever relay is destroyed | If the liquid level relay works normally, take the level probe out and rub it bright |

| | | | |
|----|--|--|--|
| 11 | The oil content meter is showed to “EE” | The glass tube is polluted or chapped | If the glass tube is intact, please clean it with a brush |
| 12 | The showed valve of oil content meter is changing all the time, and the valve fluctuation is big | The air the device hasn’ t been emptied | Wait for 10min, check whether the valve VS7 is opened, if VS7 is closed, please open it |
| 13 | Feeding pump doesn’ t work | The air is not enough | Provide the compressed air with pressure of 0.4 Mpa |
| | | Check whether the indicator lights of VS1 and VS2 on electric control box are lighting | Check the switch of 《water feeding, back flushing, oil discharge》 is turned to manual position, if it is on manual position, it can operate after the indicator lights of VS1 and VS2 are went out. |
| | | The pressure of vacuum pressure gauge is too high | Check whether the valve VS7 is opened, if VS7 is closed, please open it |
| | | JYB1, JYB3 level controllers are destroyed | If they are destroyed, please replace them. |
| 14 | The pneumatic valve can’t be started up | The solenoid valve has been destroyed, or the device hasn’t been used for a long time | Check the outlet of solenoid valve, if there is no air ejected, it is destroyed, please replace it. If the solenoid valve can work normally, provide compressed air of 0.8Mpa to open pneumatic valve, then resume normal pressure |
| 15 | Safety valve jumps | Outlet valve has not been opened,filter has been blocked | Open outlet valve and replace fitter |

10 Spare parts

Table of spare parts as follows:

| NO. | Name | Type | Quantity | References |
|-----|---------------------------------|------|----------|------------|
| 1 | Grease seal of feeding pump | | 2 sets | |
| 2 | The 2 nd filter core | | 2 sets | |
| 3 | O-Ring of the separator | | 1 piece | |
| 4 | O-Ring of the filter | | 1 piece | |
| 5 | O-Ring of the flange | | 8pieces | |
| 6 | Bilge level Probe | | 1 pcs | |
| 7 | Seawater initial Filter | | 1 pcs | |

Please say clear of the type of the spare parts when offering an order.

11 Warning

To comply with resolution IMO MEPC.107 (49), on board, especially ocean-going ships, they must be installed on board: 15ppm bilge separator, 15ppm bilge alarm and automatic stopping device. The elementary diagram as follow:

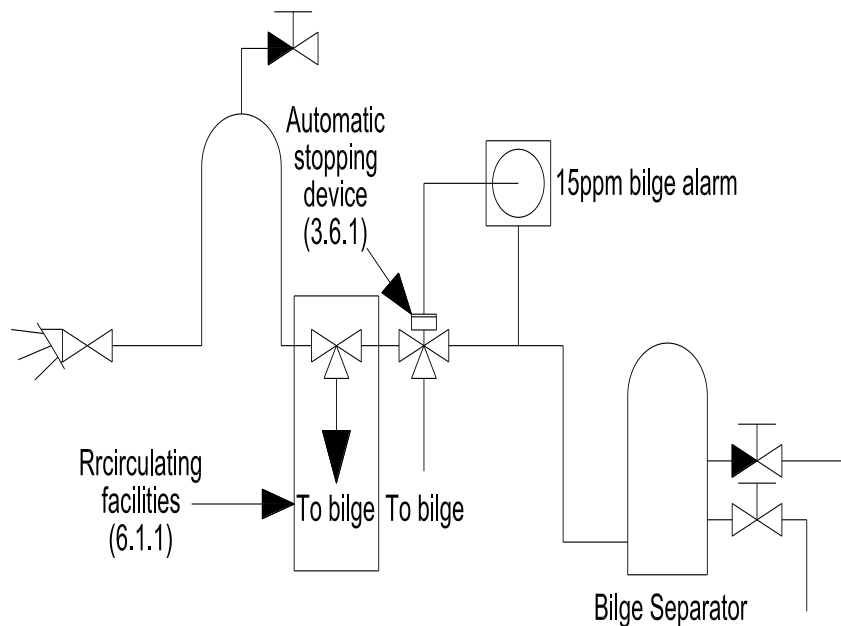


Figure 1