

G&O BIOREACTOR BR-9250 BG-V



Installation onboard "Mary Arctica" owned by Royal Arctic Lines, dk

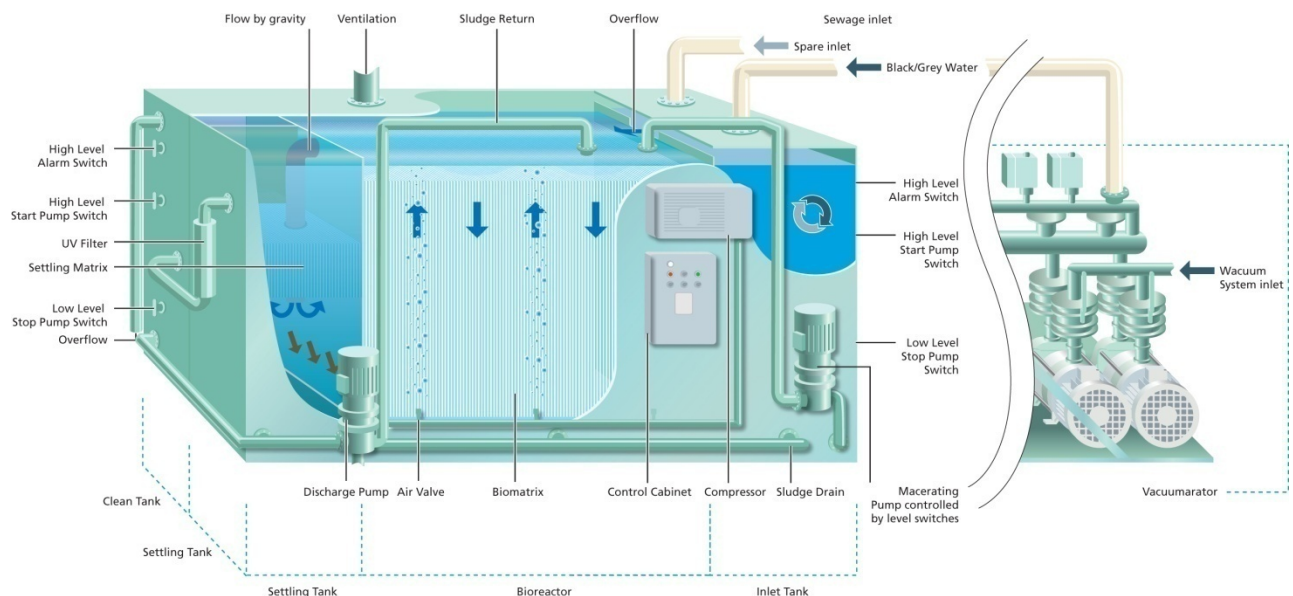
1. INTRODUCTION

The G&O Bioreactor represents the next generation of Biological Sewage Plants and is able to handle grey and black water from any Ship or Offshore construction. The plant is an "Aerated Submerged Fixed Film Unit" which operates by use of the "Matrix Technology". The G&O Bioreactor system provides an excellent growth environment for our bacteria media. The tank is fitted with a rigid PP/PVC matrix. By this we obtain a 125 times larger internal surface where the bacteria media can adhere compared to any traditional Active Sludge Plant/tank. In this manner we secure any operator full operational freedom all around the globe with a system that exceeds any known or expected future environmental demands.

2. PRINCIPLE OF OPERATION

Black and Grey water is directed to the Inlet Mixing Tank either by gravity or by a Vacuumator Pump. The Inlet Mixing Tank is designed to even-out peak loadings to ensure a steady liquid flow through the plant and thus optimizing the biological cleaning process in the Bioreactor tank.

From the Inlet Mixing Tank, the waste water is transferred to the Bioreactor Tank by a Macerating Pump mixing grey and black water and cutting up all solids. The mixed waste water passes the vertically installed Matrix in the Bioreactor Tank driven by compressed air fed into the process by air diffusers in the bottom part of the tank. The compressed air further supplies oxygen and in turn enhances the biological process in the Bioreactor Tank. The treated water flows from the Bioreactor Tank to the Settling Tank by gravity. In the Settling Tank the treated water passes an installed matrix prior to being transferred to the Clean Water Tank. By exposure to an advanced UV light filter all remaining Thermo Tolerant Coli Bacteria are eradicated prior to entering the Clean Water Tank. Organic and mineral sludge deposits in the Settling Tank are at regular intervals transferred to the Bioreactor Tank for further treatment. Liquid level in both the Inlet Mixing Tank and the Clean Water Tank is controlled by 2 level switches: A high level switch starting a transfer pump and low level switch stopping the pump. The plant is designed for fully automatic operation but can also be operated manually from the control cabinet. The plant is designed for easy access for all maintenance purposes.



3. LAYOUT DRAWING

PLEASE SEE ATTACHED DRAWING FOR FURTHER DETAILS.

STANDARD PLANT SIZES (VACUUM)

| STP Type | Org. Load [BOD ₅ / day] | Hydr. Load [m ³ /day] | Dimensions [mm] | Dry weight 316L/St 52-3 [kg] | Operating weight 316L/St 52-3 [kg] |
|----------|---------------------------------------|-------------------------------------|--------------------|------------------------------------|--|
| BR 1850 | 0.75 | 1.85 | 2910x1320x1560 | 954/1117 | 3006/3170 |
| BR 3700 | 1.50 | 3.70 | 3010x1620x1560 | 1069/1285 | 3970/4185 |
| BR 5500 | 2.25 | 5.50 | 3610x1620x1560 | 1202/1488 | 5086/5372 |
| BR 7400 | 3.00 | 7.40 | 4210x1650x1560 | 1347/1685 | 6504/6541 |
| BR 9250 | 3.75 | 9.25 | 4010x1650x1860 | 1410/1777 | 6973/7340 |
| BR 11100 | 4.50 | 11.10 | 4460x1650x1860 | 1586/1996 | 8035/8445 |

Recommended service area:

| | |
|------------|--------------|
| Front | Min. 1000 mm |
| Left side | Min. 500 mm |
| Right side | Min. 500 mm |
| Above | Min. 500 mm |

4. TYPICAL P&I DIAGRAM

PLEASE SEE ATTACHED DRAWING FOR FURTHER DETAILS.



5. TECHNICAL SPECIFICATIONS

CONSTRUCTION

The system is delivered as one complete unit with separate vacuum-aerator pumps.

The plant is produced and tested according to internal G&O QA prior to delivery.

Factory Acceptance Test (FAT) with fresh water is available.

MAIN COMPONENTS

| | |
|---|------------------------------|
| Macerating Pump - ORPU type ES 135/4 | 1 off |
| Max. flow | 9 m ³ /h |
| Max. delivery head | 6 mWC |
| El. consumption | 1,3 kW |
| Discharge Pump - ORPU, type ES 130 | 1 off |
| Max. flow | 17 m ³ /h |
| Max. delivery head | 23 mWC |
| El. consumption | 2,6 kW |
| UV, Van Remmen, type W1 | 1 off |
| El. consumption | 0.06 kW |
| Vacuumerator - JETS 15MB-D | 2 off |
| Max. flow | 15 m ³ /h |
| Max. delivery head | 15 mWC (water) |
| El. consumption | 2.55 kW/each |
| Control cabinet 400/440V 50/60 Hz | 1 off |
| Air Compressor, Becker, type DT 4.25 | 1 off |
| El. consumption | 1,25 kW |
| Tank plating | 6 mm Black steel 52-3 coated |
| Optional tank plating | 4 mm Stainless steel 316L |
| Power supply | 3 x 400/440V 50/60 Hz |
| Power consumption 60 Hz (with compressor) | 10,3 kW (installed) |

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TECHNICAL SPECIFICATIONS

Rev. No: 05

Piping connections

| | | |
|---------------------------------|-------|----------------------|
| Black water to vacuumators | 2 off | Flanged DN50 / PN10 |
| Grey water to inlet mixing tank | 1 off | Flanged DN100 / PN10 |
| Spare to inlet mixing tank | 1 off | Flanged DN50 / PN10 |
| Venting | 1 off | Flanged DN65 / PN10 |
| Emergency overflow | 1 off | Flanged DN50 / PN10 |
| Discharge | 1 off | Flanged DN40 / PN10 |
| Filling | 1 off | Flanged DN50 / PN10 |

OPERATION ENVIRONMENT

The G&O Bioreactor is designed for use in a marine environment. For special environmental conditions, modifications of the standard design may, however, be required.

Generally the maximum relative humidity shall not exceed 90% and the environmental temperature shall be in the range of 5 - 55°C for normal continuous operation. The optimum temperature for biological process is 5 - 40°C

DESIGN LIMITATIONS

The G&O Bioreactor is specifically designed for efficient treatment of grey and black waste water originating from normal use of toilets and bathrooms. In case the G&O Bioreactor in addition is to treat galley waste water, the requirement for a grease trap must be evaluated to ensure continued optimum performance of the biological cleaning process.

The system design must also be evaluated in more detail if larger amounts of chemicals may be directed to the sewage treatment plant.