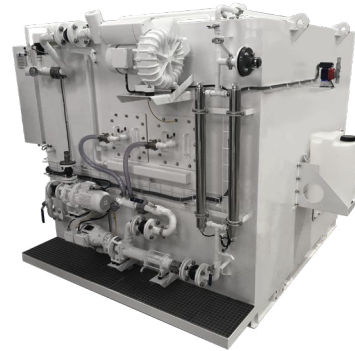


# ACO Clarimar® MF Sewage Treatment Plants

## IMO MEPC 227 (64)

IMO has adopted RESOLUTION MEPC 227(64) with revised guidelines for effluent standards and performance test procedures for sewage plants.

These guidelines, adopted in October 2012, which supersede resolution MEPC 159 (55), include the standards of section §4.2 that specifically apply to passenger ships operating in MARPOL Annex IV special areas and which intend to discharge treated sewage effluent into the sea. The ACO Clarimar® range of sewage treatment plants are fully certified by Bureau Veritas (BV) to IMO MEPC 227 (64) [excluding §4.2]. Manufacturing, Test and Quality Management are certified to ISO9001:2009/ ISO9001:2008 and EC MED Module D.



## ACO Clarimar MF - ACO-MF 'Bio-Sword' Filtration Technology

The ACO Clarimar MF biological sewage treatment plant incorporates ACO-MF filtration technology eliminating the requirement for settling and chlorination stages. Disinfection of the treated effluent is by in-line mounted UV lamp with no requirement for chemicals in any part of the ACO MF process.

■ **Type Approved to IMO  MEPC 227(64) and EC MED Module 'B' **

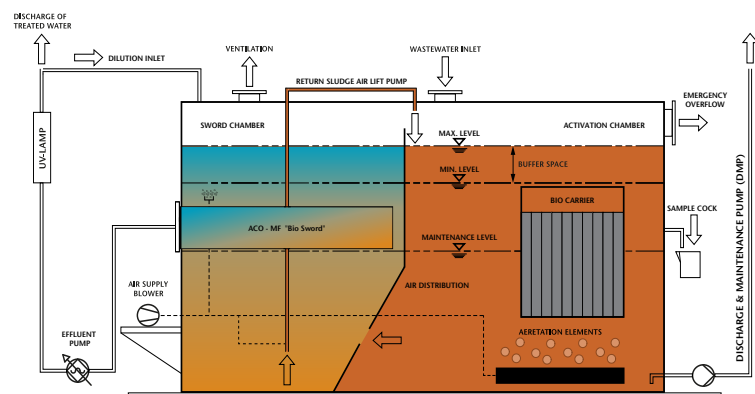
■ Compatible with both gravity and vacuum systems

- Manufactured entirely in the EU from high performance materials which, unlike coated black steel, are completely corrosion resistant and light weight
- Modular design concept for simple installation requiring only one power connection
- Lowest running costs of any sewage treatment plant on the market with minimal operator intervention
- Simple automated operation requires minimal operator intervention and maintenance

### Process description

Sewage and waste water enters into the main activation stage where it is thoroughly mixed and aerated by fine bubble aeration membrane elements. Mounted blower(s) (an optional standby unit is available) provide air to the aeration elements whose innovative design allows quick and easy removal for cleaning. Aerobic bacteria and microorganisms, naturally present within the waste material, break down the organic matter into mostly carbon dioxide, water and inert non-organic material. Throughout the process the bacteria cells continue to reproduce new organisms to sustain the biological process. High efficiency of purification is ensured by the use of biocarrier.

Clean water from the mixed liquor in the sword chamber is drawn through the ACO-MF 'bio-sword' by the effluent discharge pump (an optional standby unit is available) and discharged either directly overboard or alternatively to be recycled back into ship's storage for re-use as technical fresh water for all non-potable requirements such as toilet flushing, deck washing or even laundry applications.



Disinfection of outlet treated water is carried out by the unit mounted UV lamp. A separate Discharge & Maintenance Pump (DMP) provides the higher capacity de-sludge and emptying requirement. Discharge is controlled by level control connected to the effluent discharge pump.

	USCG 33CFR159	IMO MEPC.2 (VI)	IMO MEPC 227(64) excl. chapter 4.2	ACO Clarimar MF test values
Coliform bacteria [n/100ml]	200	200	100	25
Total suspended solids [mg/l]	150	100	35	<14
BOD <sub>5</sub> [mg/l]	-	50	25	<3
COD [mg/l]	-	-	125	<25
pH	Not req'd	Not req'd	6 - 8.5	7.44
Chlorine (mg/l)	Not req'd	As low as practicable	<0.5	NIL

**Clarimar MF Technical Description**

The main tank is manufactured entirely within the EU from high performance 'ACO Composite PPFGR GREY' material which, unlike coated black steel, is light weight and completely resistant to corrosion, abrasion and chemical attack. Available as standard in grey colour.

The tank is supplied as a complete welded construction directly mounted on to a primer painted steel baseplate (sizes MF-6 and above) for direct welding or bolting to the ship structure. Smaller units up to size MF-4 have no baseplate and mount direct by bolting (using pre-drilled holes in the extended tank base) to the ship's structure on flat steel plate.

All other components are also mounted on the base frame providing a complete 'plug & play' installation solution.

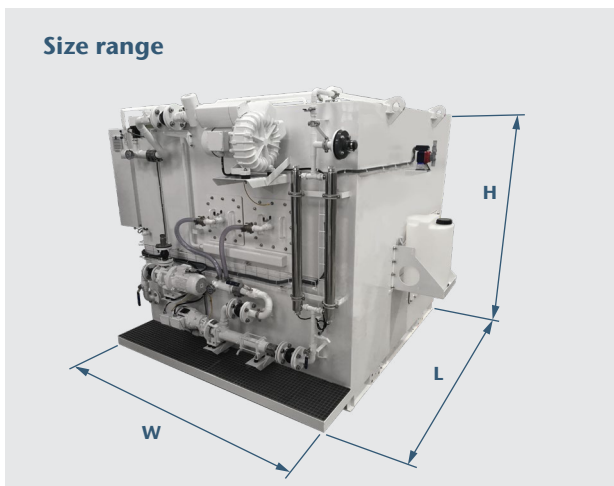
All Clarimar MF installed components are designed to operate, as standard, in the voltage range 380 to 440 volts and at frequencies of either 50 or 60 Hz, without any additional modification.

Additional voltage options are also available. Control of the system is via an IP55 rated steel cabinet complete with safety isolator and volt-free contacts for connection to the ship's central monitoring and alarm system.

Clarimar MF	Hydraulic Load [lits/day]	BOD5 Load [kg/day]	Overall Dimensions [mm]			Weight [kg]		Article Numbers**	
			L	W	H	Dry	Wet	50Hz	60Hz
Clarimar MF-0,5	1 200	0,77	1 300	1 080	1 612	270	930	412005.50	412005.60
Clarimar MF-1	2 100	1,31	1 535	1 202	1 691	360	1 500	412001.50	412001.60
Clarimar MF-2	3 500	2,41	1 928	1 375	1 788	470	2 700	412002.50	412002.60
Clarimar MF-3	5 600	3,61	2 158	1 605	1 782	560	3 650	412003.50	412003.60
Clarimar MF-4	7 200	4,59	2 400	1 815	1 765	680	4 700	412004.50	412004.60
Clarimar MF-6	11 200	7,22	2 657	2 161	2 070	1 280	7 700	412006.50	412006.60
Clarimar MF-8	14 200	9,10	2 927	2 311	2 099	1 500	9 300	412008.50	412008.60
Clarimar MF-10	18 900	12,14	3 717	2 311	2 099	1 850	12 500	412010.50	412010.60
Clarimar MF-12*	22 400	14,44	2 805	4 893	2 077	2 250	15 512	On request	On request
Clarimar MF-16*	28 300	18,16	3 111	5 193	2 077	2 500	19 046	On request	On request
Clarimar MF-20*	37 800	24,28	3 855	5 193	2 077	3 000	25 062	On request	On request

\* To minimise transport costs MF-12, 16 & 20 are delivered as two separate tanks to be bolted together during installation. Dimensions are only indicative. Article numbers on request.

\*\* Standard article numbers are applicable for version with 1 EP, 1 Blower and 1 DMP, voltages 380-415V/50Hz or 440V/60Hz. Different version – article number on request.



## Retrofit 'flat pack' solution

### Benefits of the ACO Clarimar MF 'flat pack' STP solution

- No requirement to cut access hole(s) through ship's hull and wing tanks
- Minimal, if any, disruption to existing ship equipment installations
- Same, if not less, time to complete installation
- Minimal intervention by ship and yard personnel
- Significant cost saving
- New solution treats not only black water, but now also grey



### Summary

Sewage Treatment Plant (STP) is delivered, transferred into the vessel, welded, assembled and tested on board in couple of days - including the removal of the old system.

Flexible design allows standard Clarimar MF configuration to be adapted to fit within the available space envelope whilst at the same time maintaining access to surrounding engine room equipment