



ADVANCING MARINE SEWAGE TECHNOLOGY. SINCE 1972.

A dynamic, high-speed photograph of a blue liquid splash, likely water, moving from the top right towards the bottom left. The splash is characterized by numerous small, glistening droplets and bubbles, creating a sense of motion and freshness. The background is a deep, solid blue.

# SEWAGE TREATMENT

EQUIPMENT FOR SHIPS



Sewage Treatment



Galley Water Treatment



Sewage Tanks



Additives



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# THIS IS US

ADVANCING MARINE SEWAGE TECHNOLOGY. SINCE 1972.

## OUTSTANDING CUSTOMER SUPPORT

Our team is at the customer's side from the early planning stage to operation. Direct, personal and flexible.

## TAILORED SOLUTIONS

We are the specialists in sewage systems. We listen carefully, provide expert consultancy and then offer the best system for the customer's project. Providing customer specific solutions is part of HAMANN's DNA.

## QUALITY MADE IN GERMANY

All our products are designed and made in Hollenstedt, Germany. Our quality management system is ISO 9001 accredited by DNV. High-grade materials and components and superb workmanship distinguish our products. That shows in the details like the quality of the welds on our pipes, frames and tanks as well as clean and secure cable routing.

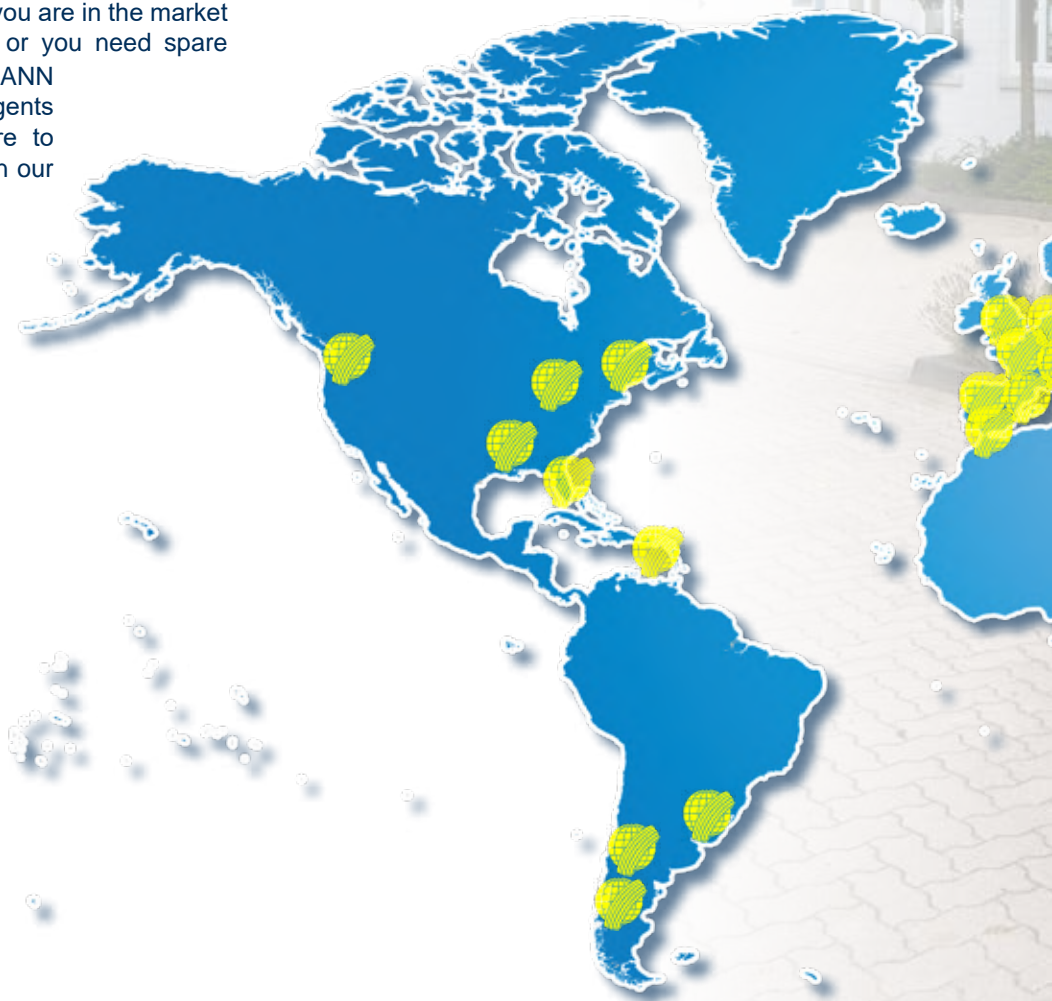
## REPRESENTED WORLDWIDE

Our GLOBAL NETWORK of more than 40 sales agents and service partners provides customer support and technical field service around the world. Whether you are in the market for new sewage system components or you need spare parts or technical service, either HAMANN AG direct or one of our official sales agents and certified service partners is there to help. Find the partner closest to you on our website.

HAMANN AG is a worldwide recognized manufacturer of sewage treatment equipment for the marine industry. We serve our clients to meet ever stricter regulation on sewage discharge and thus to rise to our joint responsibility to protect the marine environment. Our commitment to quality goes far beyond the R&D, engineering and manufacturing processes. The same amount of effort and attention to detail goes into every step that follows.

Since delivering our first sewage treatment plant back in 1972, we have installed over 5.500 systems on yachts, ferries, cruise ships, commercial and naval vessels all over the world.

HAMANN plants ensure continuous high effluent quality, reliability in day-to-day operation and low maintenance to the benefit of our customers and the oceans.







HAMANN AG

ADVANCING MARINE SEWAGE TECHNOLOGY SINCE 1972



# OVERVIEW: COMPONENTS OF A SEWAGE SYSTEM

COLLECT. DISTRIBUTE. STORE. CONDITION. PROCESS.

The sewage system comprises of all the installation and equipment used to collect, distribute, store, condition and process the sewage produced on board. That includes piping, tanks, grease separators, conditioning systems, tank transfer systems and sewage treatment plants. At HAMANN, we always consider grey water and galley water besides black water in sewage systems. All our sewage treatment plants and advanced wastewater treatment systems are designed to

process both black water and grey water in the same process. We offer a complete range of high quality components for sewage systems, designed and manufactured in Hollenstedt, Germany. Furthermore, we support our customers in the design and layout of the sewage systems for their vessels to ensure that they are able to perform their duty: Protect the marine environment from pollution by ships.

## ESSENTIAL COMPONENTS

**GS Compact** GREASE SEPARATORS

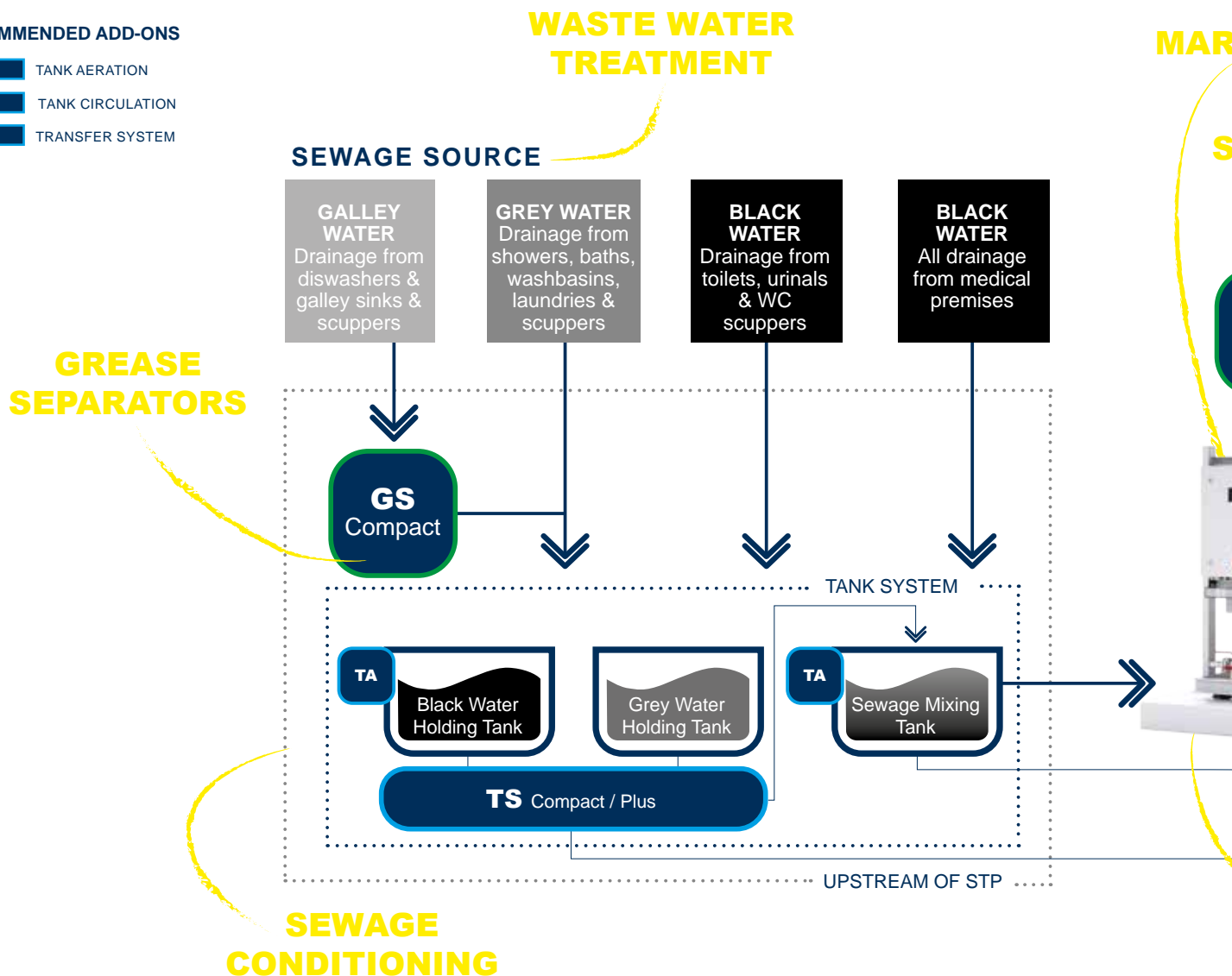
**HL-CONT** SEWAGE TREATMENT PLANT  
(HL-CONT Compact / Plus)  
ADVANCED WASTEWATER TREATMENT SYSTEM  
(HL-CONT Plus OceanCruise / HL-CONT Plus RiverCruise)

## RECOMMENDED ADD-ONS

**TA** TANK AERATION

**TC** TANK CIRCULATION

**TS** TRANSFER SYSTEM



## A LITTLE TERMINOLOGY

### "SEWAGE" MEANS

- Black water
- Grey water, when mixed with black water

### "BLACK WATER" MEANS

- Drainage and other wastes from any form of toilets, urinals and WC scuppers
- Drainage from medical premises (dispensary, sick bay, etc.) via wash basins, wash tubs and scuppers located in such premises

### "GREY WATER" MEANS

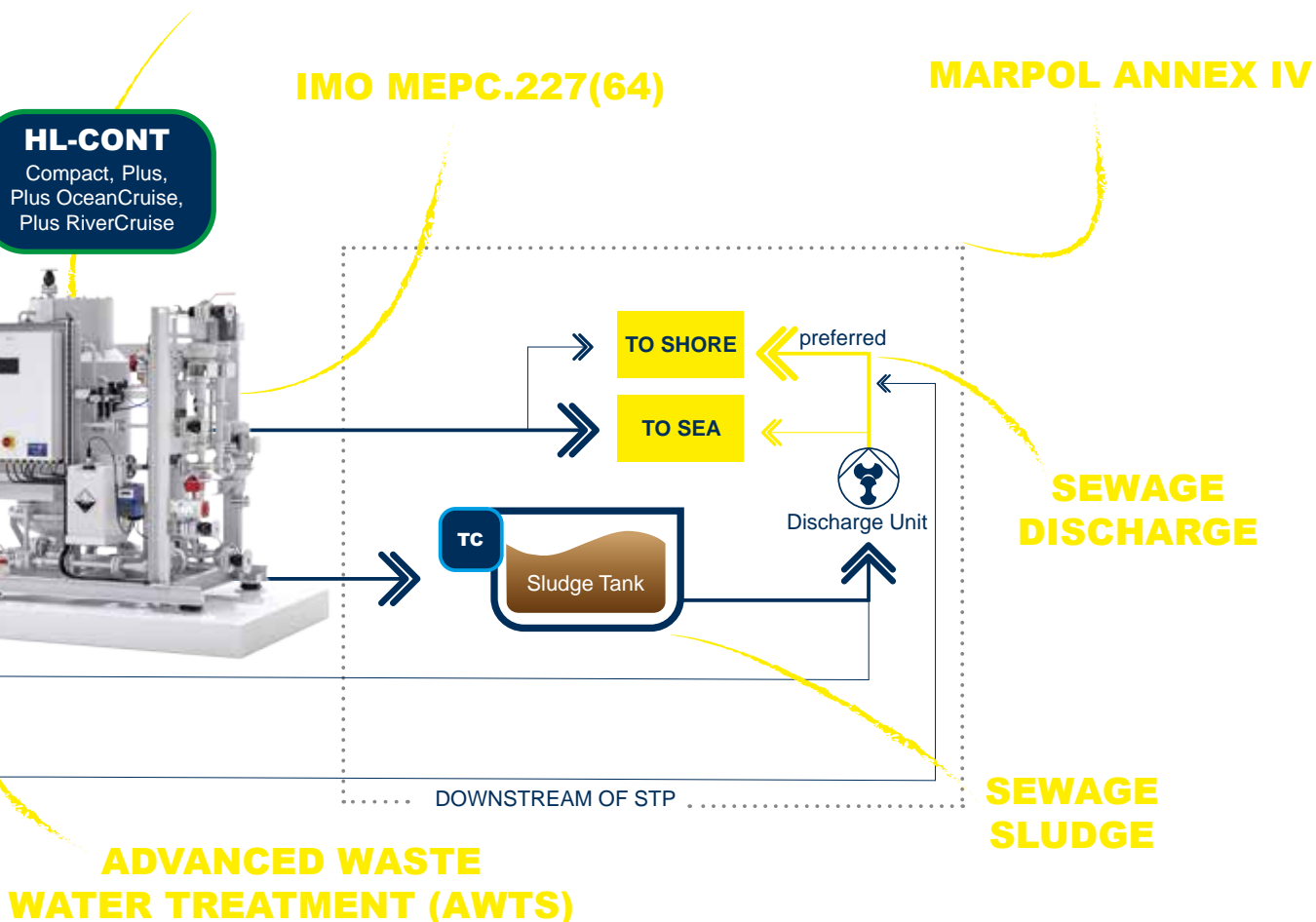
- Drainage free from faecal matter or fat, e.g. from dishwashers, showers, wash basins, laundry, etc.
- Galley water, after it has been processed in a grease separator

### "GALLEY WATER" MEANS

- Drainage from kitchen premises via sinks and scuppers located in such premises as it likely contains fat

## SHIP SANITATION DEVICES

## SEWAGE TREATMENT PLANTS (STP)







Sewage Treatment



Galley Water Treatment



Sewage Tanks



Additives



# SEWAGE TREATMENT

## ■ SEWAGE TREATMENT PLANTS

HAMANN HL-CONT Compact

HAMANN HL-CONT Plus

## ■ ADVANCED WASTEWATER TREATMENT SYSTEMS

HAMANN HL-CONT Plus OceanCruise

HAMANN HL-CONT Plus RiverCruise

# SEWAGE TREATMENT PLANTS

HAMANN HL-CONT Compact



- ✓ **CERTIFIED TO IMO MEPC.227(64) & US 33 CFR 159 (USCG TYPE II MSD)**
- ✓ **EXTRA SMALL & LIGHT WITH ADAPTABLE LAYOUT**
- ✓ **OPTIMISED PACKAGE FOR BASIC SCENARIOS**
- ✓ **NO FILTERS OR MEMBRANES**
- ✓ **BLACK WATER & GREY WATER TREATMENT IN THE SAME PROCESS**





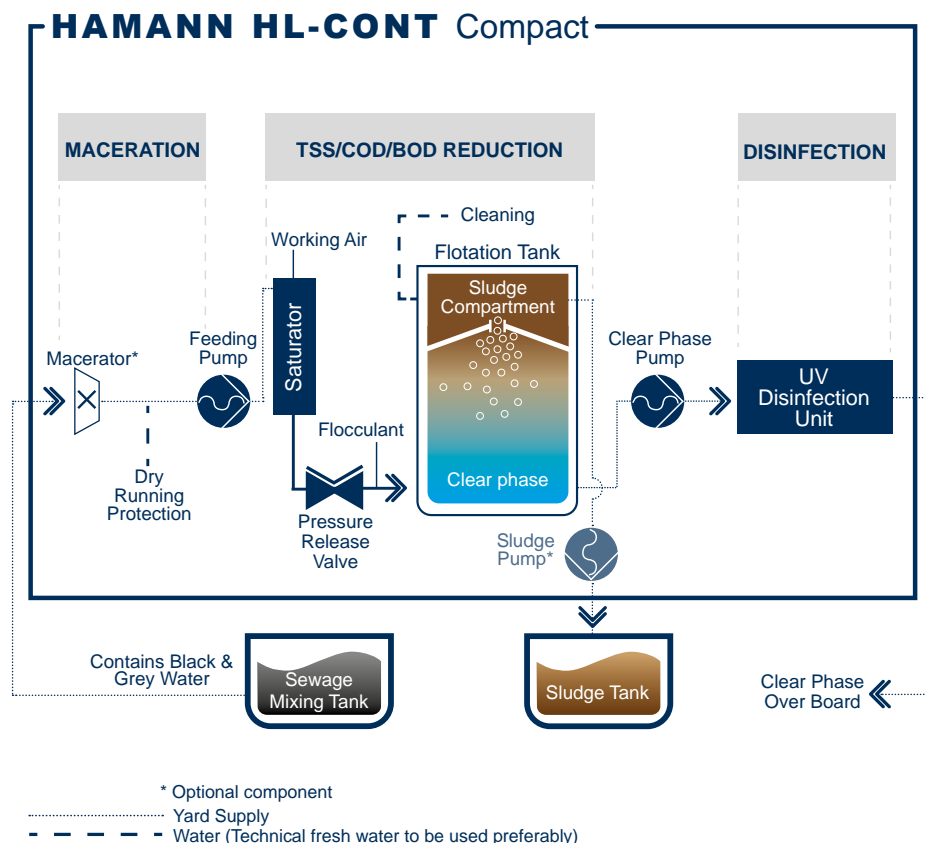




HAMANN HL-CONT Compact sewage treatment plants (STP), or marine sanitation devices (MSD), are optimised for the common operating scenarios for units in the capacity range of up to 3000 litres/day in the marine industry. They offer maximum performance and reliability in the smallest and lightest package. Being a true HAMANN sewage treatment plant, the HL-CONT Compact features stainless

steel construction to the highest standards and top-quality components throughout. This unit covers all the essential tasks of a sewage treatment plant as part of the sewage system on board and it does so in a truly compact package at lower costs. For sewage treatment plants offering more customisation options, please take a look at our HL-CONT Plus range.

## PROCESS DESCRIPTION



### PREPARATION: CREATING THE SEWAGE MIX

HAMANN HL-CONT Compact sewage treatment plants are designed to process both black water and grey water as a sewage mixture. This mixture is created in the sewage mixing tank from which it is pumped into the sewage treatment plant. Depending on the tank configuration on board, grey water and/or black water are transferred into the sewage mixing tank to create the sewage mixture. When the filling level in the sewage mixing tank reaches a predefined level, the feeding pump of the sewage treatment plant starts to operate and the treatment process is initiated.

### MACERATION

Most toilet systems on board vessels within the size range of the HL-CONT Compact 0125 sewage treatment plant are macerating. If not, a macerator can be ordered as an option for the HL-CONT Compact 0125. The sewage mixture from the sewage mixing tank is then first run through the macerator to chop up solid and fibrous components prior to the next process step.

### TSS/COD/BOD REDUCTION

By means of our Dissolved Air Flotation (DAF) technology we separate the suspended solids (TSS) and reduce the chemical (COD) and biological (BOD) oxygen demand. The sewage is enriched with air under pressure in the saturator. After being discharged into the flotation tank through the pressure release valve, the excess air forms micro bubbles. A flocculant is added in order to let air bubbles and suspended particles form larger flakes. These flakes float upwards, creating a sludge foam on the surface and leaving the clear phase in the lower part of the flotation tank. The sludge foam spills into the sludge compartment and is subsequently fed into the ship's sludge tank.

### DISINFECTION

The already largely purified sewage is finally exposed to UV radiation to degrade the DNA of bacteria and microorganisms, rendering them incapable of reproducing and infecting. After this finishing step, the treated sewage is safe to be discharged overboard (if permitted).



## KEY FACTS

### IMO & USCG CERTIFICATION

HAMANN HL-CONT Compact sewage treatment plants, or marine sanitation devices comply with the regulations for most use cases: The IMO's MEPC.227(64), excluding section 4.2, and US 33 CFR 159 (US Coast Guard Type 2 MSD).

### EXTRA SMALL & LIGHT WITH ADAPTABLE LAYOUT

The HL-CONT Compact 0125 is the smallest and lightest sewage treatment plant, or marine sanitation device with these performance characteristics and full IMO, USCG and EU MED certification available on the market. It can be set up in two different layouts to suit different mounting positions.

### OPTIMISED PACKAGE FOR BASIC SCENARIOS

HL-CONT Compact plants are optimised for the most common operating scenarios in their class. They offer the renowned HAMANN performance and quality at a lower cost.

### EASE OF OPERATION & LOW MAINTENANCE

Routine functions on HAMANN plants are fully automatic and no specialised skills are required to operate them. Our technology eliminates the need for filters and membranes, which would require a lot of work for regular cleaning and replacement. Routine maintenance on HAMANN plants can be carried out quickly and easily by the crew on board. The open design allows instant access to all components for inspection and service purposes.

### COMBINED BLACK WATER & GREY WATER TREATMENT

As all HAMANN plants, HL-CONT Compact systems are designed to treat black water and grey water as a sewage mixture in the same process. This benefits the performance and reliability of the sewage treatment system as well as the environment.

## PRODUCT SPECIFICATIONS

	0125
<b>Hydraulic loading</b> (m <sup>3</sup> /day)	3
<b>Organic loading</b> (kg BOD <sup>*</sup> //day)	2.41
<b>No. of persons on board<sup>*</sup></b> (approx. from/to)	16
<b>Basic measurements<sup>**</sup></b> Layout A w/d/h (m)	0.8/0.5/0.9
<b>Basic measurements<sup>**</sup></b> Layout B w/d/h (m)	0.9/0.4/0.9
<b>Weight empty</b> (kg)	165
<b>Power consumption<sup>***</sup></b> (kW)	1.2 - 4.8
<b>Certification &amp; Compliance</b>	IMO MEPC.227(64), EU MED Modules B & D, USCG Type II (33 CFR 159)

#### PLEASE NOTE:

This information is not to be used for design purposes. All details are subject to change without notice. Detailed technical specifications and all information on the scope of delivery are given in the product specifications. Please contact our sales team via [sales@hamannag.com](mailto:sales@hamannag.com).

\* Biological oxygen demand

\*\* Basic measurements of main unit, excluding the following separate components: Control cabinet, feeding pump, flocculant dosing station, uv unit

\*\*\* Depending on configuration / optional components

# SEWAGE TREATMENT PLANTS

HAMANN HL-CONT Plus

- ✓ CERTIFIED TO IMO MEPC.227(64) & US 33 CFR 159 (USCG TYPE II MSD)
- ✓ OPTIONAL ON-SITE ASSEMBLY FOR RETROFITS
- ✓ NO FILTERS OR MEMBRANES
- ✓ BLACK WATER & GREY WATER TREATMENT IN THE SAME PROCESS
- ✓ HIGHLY CUSTOMISABLE



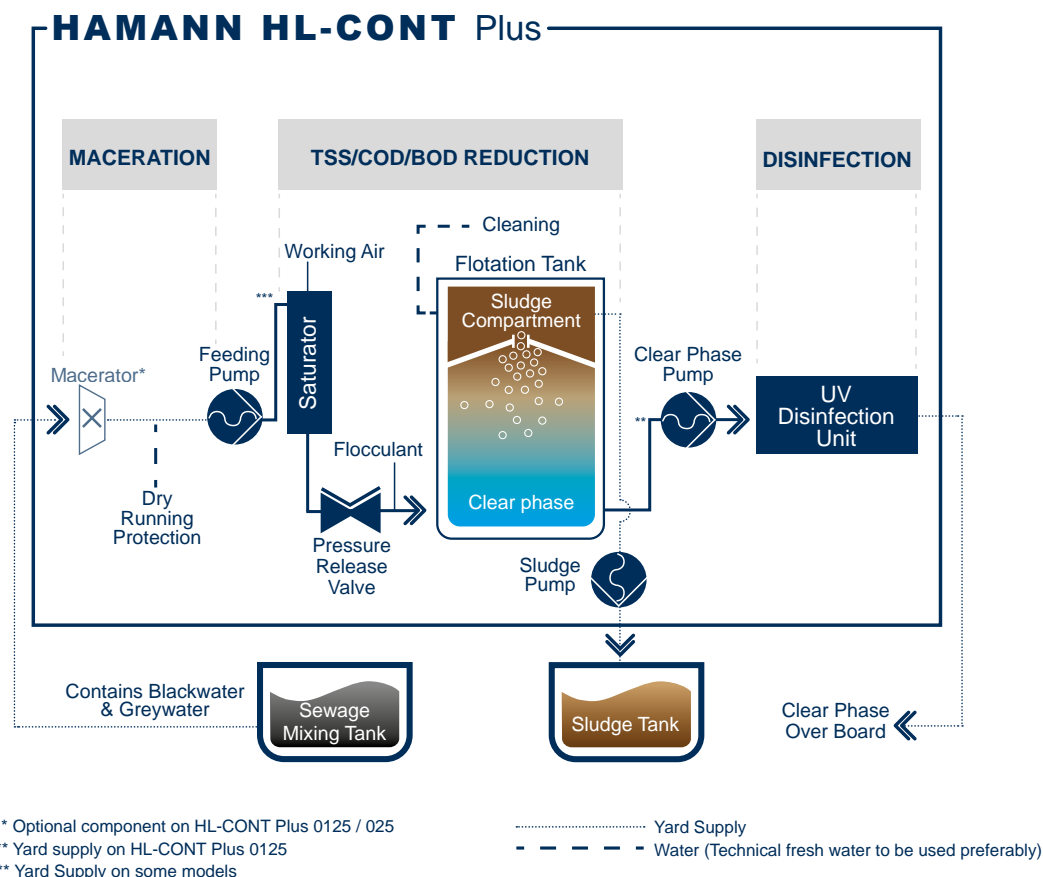




HAMANN HL-CONT Plus sewage treatment plants (STP), or marine sanitation devices (MSD), are available in many different sizes, offering treatment capacities from 3,000 litres/day up to 192,000 litres/day. Stainless steel construction on frames, top-quality components and extensive customisation options make these systems the all-rounders in our program. HAMANN HL-CONT Plus plants are renowned for their ease of operation, reliability, low maintenance requirements and

compact dimensions. As with all plants using our Dissolved Air Flotation (DAF) technology, HL-CONT Plus units can be delivered dismounted for assembly at the location of installation on board the vessel. The HAMANN HL-CONT Plus range of sewage treatment plants covers most use-cases in the marine industry and is available for any size of vessel.

## PROCESS DESCRIPTION



## PREPARATION: CREATING THE SEWAGE MIX

HAMANN HL-CONT Plus sewage treatment plants are designed to process both black water and grey water as a sewage mixture. This mixture is created in the sewage mixing tank from which it is pumped into the sewage treatment plant. Depending on the tank configuration on board, grey water and/or black water are transferred into the sewage mixing tank to create the sewage mixture. When the filling level in the sewage mixing tank reaches a predefined level, the feeding pump of the sewage treatment plant starts to operate and the treatment process is initiated.

## MACERATION

The sewage mixture from the sewage mixing tank is first run through a macerator to chop up solid and fibrous components. A macerator is part of the HL-CONT Plus sewage treatment plant from size 05 upwards and can be ordered as an option on the HL-CONT Plus 0125 and 025 models if the toilet system on board is non-macerating.

## TSS/COD/BOD REDUCTION

By means of our Dissolved Air Flotation (DAF) technology we separate the suspended solids (TSS) and reduce the chemical (COD) and biological (BOD) oxygen demand. The sewage is enriched with air under a pressure in the saturator. After being discharged into the flotation tank through the pressure release valve, the excess air forms micro bubbles. A flocculant is added in order to let air bubbles and suspended particles form larger flakes. These flakes float upwards, creating a sludge foam on the surface and leaving the clear phase in the lower part of the flotation tank. The sludge foam spills into the sludge compartment and is subsequently fed into the ship's sludge tank.

## DISINFECTION

The already largely purified sewage is finally exposed to UV radiation to degrade the DNA of bacteria and microorganisms, rendering them incapable of reproducing and infecting. After this finishing step, the treated sewage is safe to be discharged overboard (if permitted).



## KEY FACTS

### IMO & USCG CERTIFICATION

HAMANN HL-CONT Plus sewage treatment plants, or marine sanitation devices comply with the regulations for most use cases: The IMO's MEPC.227(64), excluding section 4.2, and US 33 CFR 159 (US Coast Guard Type 2 MSD).

### EXTENSIVE CUSTOMISATION OPTIONS

We offer a wide range of customization options for HL-CONT Plus sewage treatment plants. This enables us to supply a system that exactly meets the customer's specifications.

### OPTIONAL ON-SITE ASSEMBLY FOR RETROFITS

HL-CONT Plus plants can be almost completely assembled at the location of installation on board the vessel to facilitate movement to the site through most doors and hatches. A huge benefit in retrofit projects, where this feature can often spare cutting an opening into the hull, saving a lot of time and costs.

### EASE OF OPERATION & LOW MAINTENANCE

Routine functions on HL-CONT Plus plants are fully automatic and no specialised skills are required for daily operation. Our technology eliminates the need for filters and membranes, which would require a lot of work for regular cleaning and replacement. Routine maintenance on HAMANN plants can be carried out quickly and easily by the crew on board. The open design allows instant access to all components for inspection and service purposes.

### COMBINED BLACK WATER & GREY WATER TREATMENT

As all HAMANN plants, HL-CONT Plus systems are designed to treat black water and grey water as a sewage mixture in the same process. This benefits the performance and reliability of the sewage treatment system as well as the environment.

## PRODUCT SPECIFICATIONS

	0125	025	05	10	20	40	80
<b>Hydraulic loading</b> (m <sup>3</sup> /day)	3	6	12	24	48	96	192
<b>Organic loading</b> (kg BOD <sup>*</sup> //day)	2.41	4.82	5.81	11.62	23.24	46.5	93.0
<b>Avg. number of persons on board<sup>**</sup></b>	16	32	65	130	260	519	1,038
<b>Basic measurements<sup>***</sup></b> main unit w/d/h (m)	0.9/0.8/0.9	0.9/1.2/1.1	1/1.4/1.4	1.2/1.7/1.8	1.6/2.1/2.1	2.2/2.7/2.3	2.3/3.9/3
<b>Weight empty</b> (kg)	165	312	691	880	1,600	2,036	2,684
<b>Power consumption<sup>****</sup></b> (kW)	1.2 - 4.8	1.7 - 4.8	2.6 - 7.4	3.4 - 7.7	5 - 9.8	10.2 - 24	11.1 - 24
<b>Certification &amp; Compliance</b>	IMO MEPC.227(64), USCG Type II (33 CFR 159), EU MED Modules B & D						

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\* Biological oxygen demand

\*\* Depending on the assumed volume of sewage per person and day. The information given here is based on 185 l/person per day.

\*\*\* Basic measurements of main unit, excluding separate components.

Separate components HL-CONT Plus 0125: Control cabinet, feeding pump, flocculant dosing station, uv unit

Separate components HL-CONT Plus 025 Control cabinet, feeding pump, flocculant dosing station

Separate component HL-CONT Plus 05 / 20 / 40 / 80 / 120: Flocculant dosing station

no separate components on HL-CONT Plus 10

\*\*\*\* Depending on configuration / optional components



# ADVANCED WASTEWATER TREATMENT SYSTEMS

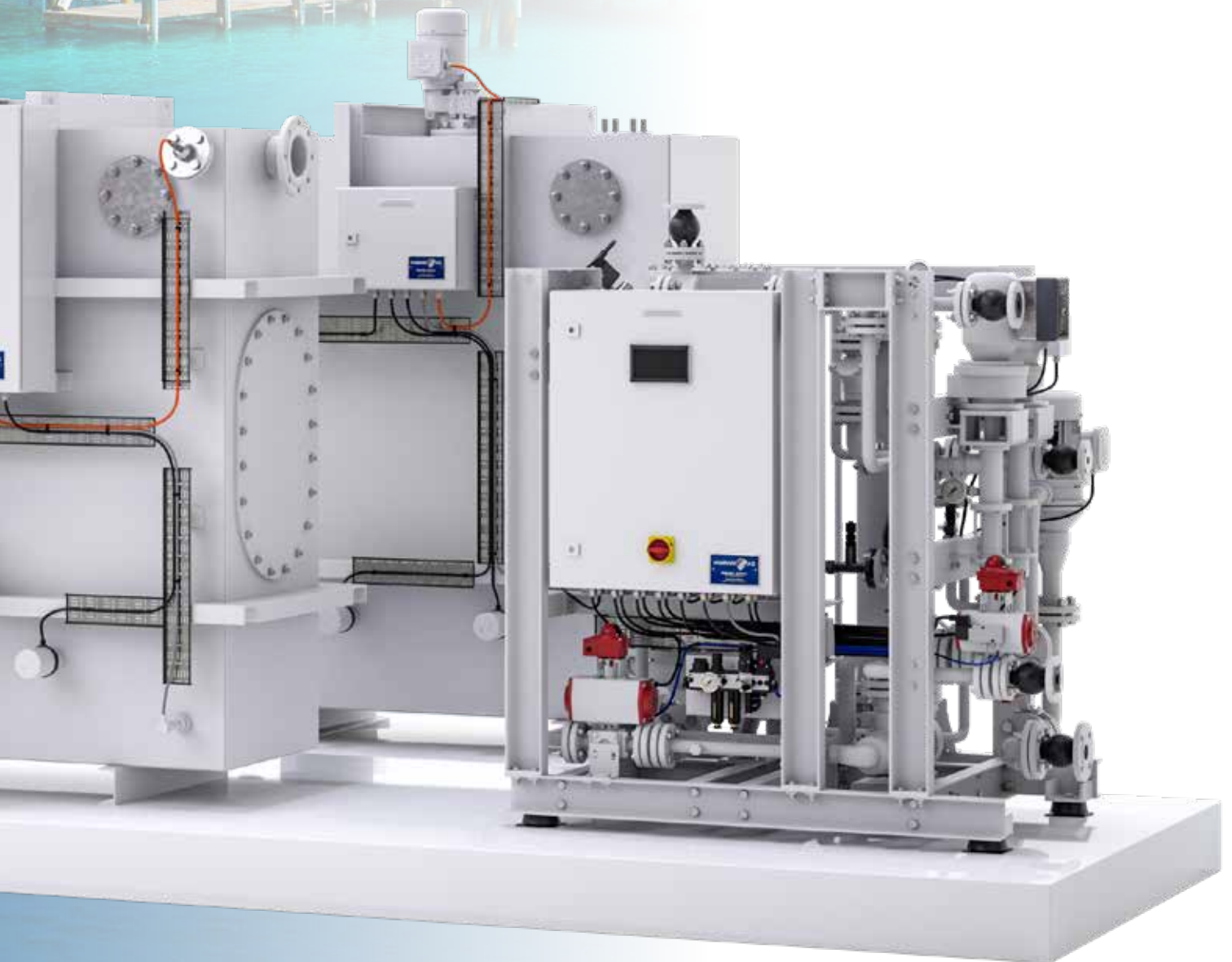
HAMANN HL-CONT Plus OceanCruise







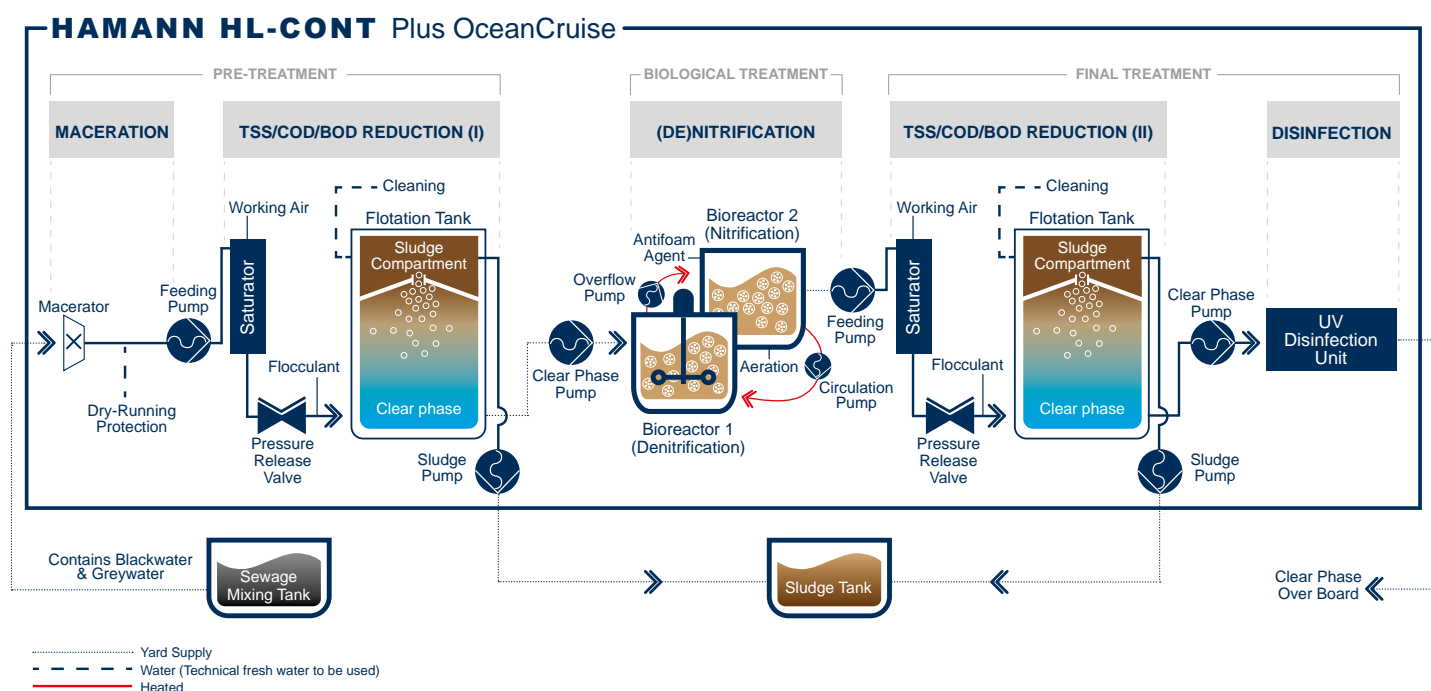
- ✓ **IMO MEPC.227(64) 4.2 (BALTIC SEA) & US 33 CFR 159 SUBPART E (ALASKA) COMPLIANT**
- ✓ **MODULAR DESIGN & SMALL FOOTPRINT**
- ✓ **NO FILTERS OR MEMBRANES**
- ✓ **BLACK WATER & GREY WATER TREATMENT IN THE SAME PROCESS**
- ✓ **IDEAL FOR NEW BUILDS AND RETROFIT PROJECTS**



The HAMANN HL-CONT Plus OceanCruise range of advanced wastewater treatment systems (AWTS) are designed to meet or exceed the highest current standards for sewage and greywater discharge. These systems are compliant with IMO regulation MEPC.227(64) including section 4.2 (Baltic Sea as MARPOL Annex IV special area) as well as US regulation 33 CFR 159 Subpart E (Alaska). Therefore, they are the perfect choice for vessels operating in the waters of Alaska or the Baltic Sea. Combining our physical and biological treatment technologies, HL-CONT Plus OceanCruise systems eliminate the need for filters and

membranes. Their modular design consists of four separate modules: Two Dissolved Air Flotation (DAF) units and two Moving Bed Biofilm Reactors (MBBR). Each module can be installed apart from the others, even on different decks. This gives tremendous flexibility when it comes to fitting a sewage system into a hull. Moreover, ship's tanks may be converted to become the biological treatment modules. The footprint of a HAMANN HL-CONT Plus OceanCruise system can be up to 70% smaller than that of a comparable system from other manufacturers.

## PROCESS DESCRIPTION



### PREPARATION: CREATING THE SEWAGE MIX

HAMANN HL-CONT Plus OceanCruise systems are designed to process both black water and grey water as a sewage mixture. This mixture is created in the sewage mixing tank from which it is pumped into the sewage treatment plant. Depending on the tank configuration on board, grey water and/or black water are transferred into the sewage mixing tank to create the sewage mixture. When the filling level in the sewage mixing tank reaches a predefined level, the feeding pump of the sewage treatment plant starts to operate and the treatment process is initiated.

### PRE-TREATMENT

The sewage mix from the sewage mixing tank is first run through a macerator to chop up solid and fibrous components. By means of our Dissolved Air Flotation (DAF) technology we separate the suspended solids (TSS) and reduce the chemical (COD) and biological (BOD) oxygen demand. With the addition of a flocculant, the solids create a sludge foam on the surface, leaving the clear phase in the lower part of the flotation tank. The sludge foam spills into the sludge compartment and is subsequently fed into the ship's sludge tank.

### BIOLOGICAL TREATMENT

The pre-treated sewage is drained into the two-stage biological treatment, consisting of two Moving Bed Biofilm Reactors (MBBR). Circulating between the denitrification and nitrification stages, bacteria metabolize the nitrogen compound in the sewage.

### FINAL TREATMENT

Since the bacterial processes in the biological treatment also produces biomass, the solids have to be removed in the second DAF unit. The flocculant used in this process also removes the phosphorus.

The already largely purified sewage is finally exposed to UV radiation to degrade the DNA of bacteria and microorganisms, rendering them incapable of reproducing and infecting. After this finishing step, the treated sewage is safe to be discharged overboard (if permitted).





## KEY FACTS

### BALTIC SEA & ALASKA COMPLIANT

HAMANN HL-CONT Plus OceanCruise advanced wastewater treatment systems (AWTS) comply with the strictest regulations on sewage discharge in place today: The IMO's MEPC.227(64) section 4.2 regarding the Baltic Sea as MARPOL Annex IV special area, as well as US 33 CFR 159 Subpart E regarding the waters of the state of Alaska.

### SMALL FOOTPRINT

Due to our technology and design, the footprint of HAMANN HL-CONT Plus OceanCruise advanced wastewater treatment systems (AWTS) can be up to 70% smaller than comparable systems from other manufacturers - depending on the model.

### RETROFIT-FRIENDLY MODULAR DESIGN

Each of the four separate modules of a HAMANN HL-CONT Plus OceanCruise system is only a fraction of the size of a comparable single block plant. Therefore, it is much easier to find the space to install them, most particularly on an existing vessel. In addition, the DAF units of HAMANN systems can be delivered dismounted for assembly at the location of installation

on board the vessel. A huge benefit in retrofit projects, where this feature can often spare cutting an opening into the hull, saving a lot of time and money.

### EASE OF OPERATION & LOW MAINTENANCE

Routine functions on HAMANN plants are fully automatic and no specialised skills are required for daily operation. Our technology eliminates the need for filters and membranes, which would require a lot of work for regular cleaning and replacement. The open design of the DAF units allows instant access to all components for inspection and service purposes. Routine maintenance on HAMANN plants can be carried out quickly and easily by the crew on board.

### COMBINED BLACK WATER & GREY WATER TREATMENT

As all HAMANN plants, HL-CONT Plus OceanCruise systems are designed to treat black water and grey water as a sewage mixture in the same process. This benefits the performance and reliability of the sewage treatment system as well as the environment.

## PRODUCT SPECIFICATIONS

	025	05	10	20	40	80	120
<b>Hydraulic loading</b> (m <sup>3</sup> /day)	6	12	24	48	96	192	288
<b>Organic loading</b> (kg BOD <sup>*</sup> /day)	3.6	7.21	14.42	28.85	57.70	115.39	173.09
<b>Avg. number of persons on board**</b>	32	65	130	260	519	1,038	1,567
<b>Basic measurements***</b>							
Pre-Treatment w/d/h (m)	0.9/1.2/1.1	1/1.4/1.4	1.2/1.7/1.8	1.6/2.1/2.1	2.2/2.7/2.3	2.3/3.9/3	2.7/3.5/3.4
Final-Treatment w/d/h (m)	0.9/0.8/0.9	0.9/1.2/1.1	1/1.4/1.4	1.2/1.7/1.8	1.6/2.1/2.1	2.2/2.7/2.3	2.3/3.9/3
<b>Weight empty</b> (kg)	depending on configuration						
<b>Power consumption</b> (kW)	depending on configuration						
<b>Certification &amp; Compliance</b>	Compliant with IMO MEPC.227(64) incl. Sect. 4.2 (Baltic Sea), US 33 CFR 159 Subpart E (Alaska) and EU MED B & D standards***						

#### PLEASE NOTE:

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\* Biological oxygen demand

\*\* Depending on the assumed volume of sewage per person and day. The information given here is based on 185 l/person per day.

\*\*\* Basic measurements of main unit, excluding MBBR modules for biological treatment (project specific)

\*\*\*\* For the latest information on the certification of specific models, please contact us or check [gis.imo.org](http://gis.imo.org) for IMO certificates, [cgmix.uscg.mil](http://cgmix.uscg.mil) for USCG certificates and [mared.org](http://mared.org) for EU MED certificates

# ADVANCED WASTEWATER TREATMENT SYSTEMS

HAMANN HL-CONT Plus RiverCruise







- ✓ **EU CERTIFIED FOR INLAND NAVIGATION TO COMMISSION DIRECTIVE 2012/49/EU (ES-TRIN)**
- ✓ **MODULAR DESIGN & SMALL FOOTPRINT**
- ✓ **NO FILTERS OR MEMBRANES**
- ✓ **BLACK WATER & GREY WATER TREATMENT IN THE SAME PROCESS**
- ✓ **IDEAL FOR NEW BUILDS AND RETROFIT PROJECTS**

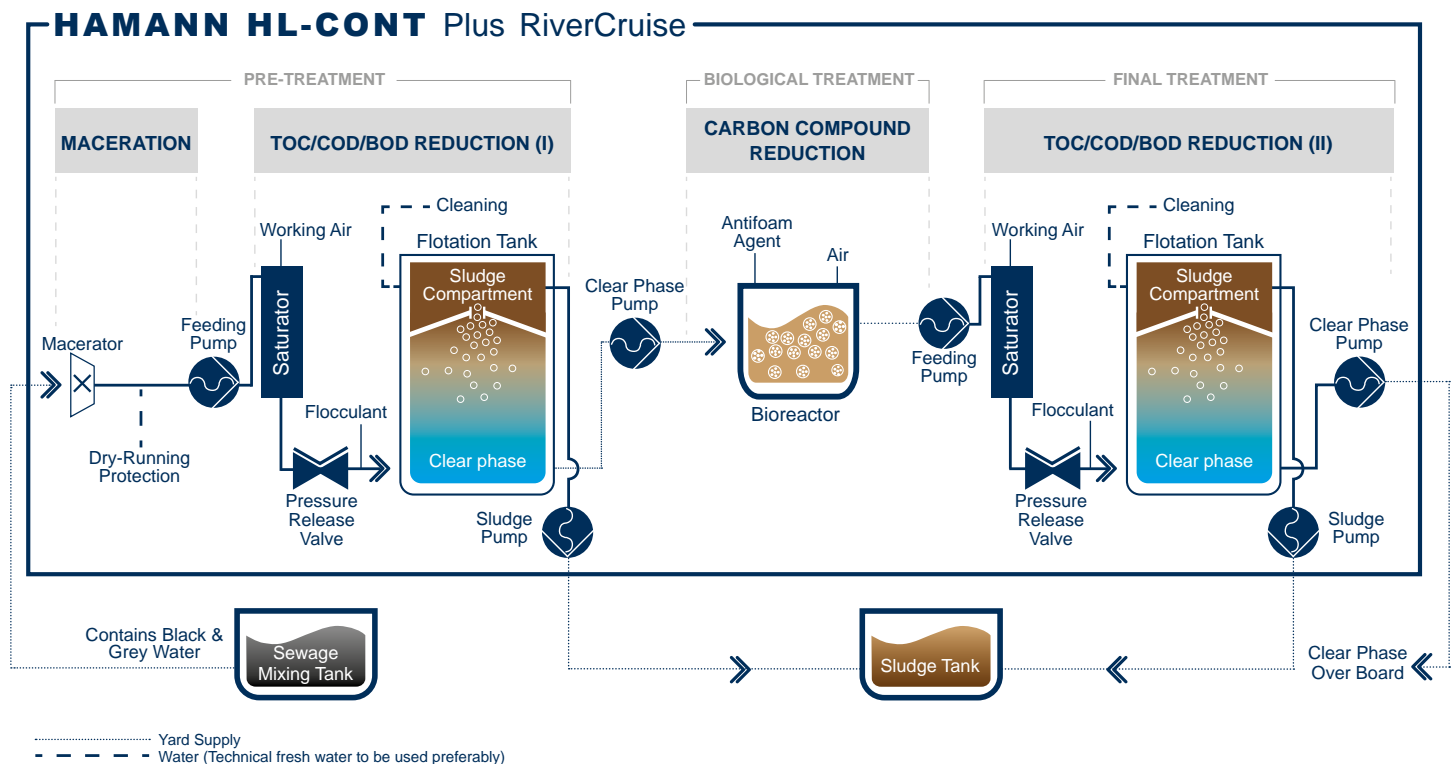




The HAMANN HL-CONT Plus RiverCruise range of advanced wastewater treatment systems (AWTS) is specifically designed to meet the technical requirements of Commission Directive 2012/49/EU on sewage and greywater discharge for inland waterway vessels. Combining our physical and biological treatment technologies, HL-CONT Plus RiverCruise systems eliminate the need for filters and membranes. Their modular design consists of three separate units: Two Dissolved Air Flotation (DAF) units and one Moving

Bed Biofilm Reactor (MBBR). Each of these modules can be installed apart from the others, even on different decks. This gives tremendous flexibility when it comes to fitting a sewage system into a hull. Moreover, ship's tanks may be converted to become the biological treatment module. The footprint of a HAMANN HL-CONT Plus RiverCruise system can be up to 70% smaller than that of a comparable system from other manufacturers.

## PROCESS DESCRIPTION



### PREPARATION: CREATING THE SEWAGE MIX

HAMANN HL-CONT Plus RiverCruise systems are designed to process both black water and grey water as a sewage mixture. This mixture is created in the sewage mixing tank from which it is pumped into the sewage treatment plant. Depending on the tank configuration on board, grey water and/or black water are transferred into the sewage mixing tank to create the sewage mixture. When the filling level in the sewage mixing tank reaches a predefined level, the feeding pump of the sewage treatment plant starts to operate and the treatment process is initiated.

### PRE-TREATMENT

The sewage mix from the sewage mixing tank is first run through a macerator to chop up solid and fibrous components. By means of our Dissolved Air Flotation (DAF) technology we separate the suspended solids (TSS) and reduce the chemical (COD) and biological (BOD) oxygen demand. With the addition of a flocculant, the solids create a sludge foam on the surface, leaving the clear phase in the lower part of the flotation tank. The sludge foam spills into the sludge compartment and is subsequently fed into the ship's sludge tank.

### BIOLOGICAL TREATMENT

The pre-treated sewage is drained into a Moving Bed Biofilm Reactor (MBBR). Under permanent aeration and at a controlled temperature, bacteria metabolise the carbon compound (TOC) in the sewage.

### FINAL TREATMENT

Since the bacterial processes in the biological treatment also produces biomass, the solids have to be removed in the second DAF unit. The flocculant used in this process also removes the phosphorus.

The treated sewage effluent is safe to be discharged overboard (if permitted).



## KEY FACTS

### EU CERTIFIED FOR INLAND NAVIGATION

HAMANN HL-CONT Plus RiverCruise advanced wastewater treatment systems (AWTS) are certified to the European Union's Commission Directive 2012/49/EU (ES-TRIN) regarding technical requirements for inland waterway vessels.

### SMALL FOOTPRINT

Due to our technology and design, the footprint of HAMANN HL-CONT Plus RiverCruise advanced wastewater treatment systems (AWTS) can be up to 70% smaller than comparable systems from other manufacturers - depending on the model.

### RETROFIT-FRIENDLY MODULAR DESIGN

Each of the three separate modules of a HAMANN HL-CONT Plus RiverCruise system is only a fraction of the size of a comparable single block plant. Therefore, it is much easier to find the space to install them, most particularly on an existing vessel. In addition, the DAF units of HAMANN systems can be delivered dismounted for assembly at the location of installation on board the vessel. A huge benefit in retrofit projects, where this feature can often spare cutting an opening into the hull, saving a lot of time and money.

### EASE OF OPERATION & LOW MAINTENANCE

Routine functions on HAMANN plants are fully automatic and no specialised skills are required for daily operation. Our technology eliminates the need for filters and membranes, which would require a lot of work for regular cleaning and replacement. Routine maintenance on HAMANN plants can be carried out quickly and easily by the crew on board. The open design of the DAF units allows instant access to all components for inspection and service purposes.

### COMBINED BLACK WATER & GREY WATER TREATMENT

As all HAMANN plants, HL-CONT Plus RiverCruise systems are designed to treat black water and grey water as a sewage mixture in the same process. This benefits the performance and reliability of the sewage treatment system as well as the environment.

## PRODUCT SPECIFICATIONS

	025	05	10	20	40	80
<b>Hydraulic loading</b> (m <sup>3</sup> /day)	6	12	24	48	96	192
<b>Organic loading</b> (kg BOD*/day)	2.4	4.8	9.6	19.2	38.4	76.8
<b>Avg. number of persons on board**</b>	26	52	104	208	417	835
<b>Basic measurements***</b>						
Pre-treatment w/d/h (m)	0.9/0.8/0.9	0.9/1.2/1.1	1/1.4/1.4	1.2/1.7/1.8	1.6/2.1/2.1	2.2/2.7/2.3
Final-treatment w/d/h (m)	0.9/1.2/1.1	1/1.4/1.4	1.2/1.7/1.8	1.6/2.1/2.1	2.2/2.7/2.3	2.3/3.9/3
<b>Weight empty</b> (kg)	depending on configuration					
<b>Power consumption</b> (kW)	depending on configuration					
<b>Certification &amp; Compliance</b>	Comission Directive 2012/49/EU / ES-TRIN					

#### PLEASE NOTE:

This information is not to be used for design purposes. All details are subject to change without notice. Detailed technical specifications and all information on the scope of delivery are given in the product specifications. Please contact our sales team via [sales@hamannag.com](mailto:sales@hamannag.com).

\* Biological oxygen demand

\*\* Depending on the assumed volume of sewage per person and day. The information given here is based on 230 l/person per day.

\*\*\* Basic measurements of main unit, excluding MBBR modules for our biological treatment (project specific)



Sewage Treatment



Galley Water Treatment



Sewage Tanks



Additives





# GALLEY WATER TREATMENT



## **GREASE SEPARATORS**

HAMANN GS Compact

# GREASE SEPARATORS

## HAMANN GS Compact

Fats, oils and greases (short: FOG) have many properties which negatively impact the performance of the sewage system. Pipelines and sensors can be blocked or sealed by deposits. In holding tanks, fats and greases accelerate the formation of hydrogen sulphide ( $H_2S$ ) and subsequently of sulphuric acid ( $H_2SO_4$ ). In addition, they severely reduce the purification performance of the sewage treatment plant or advanced wastewater treatment system. Fats, oils and greases mainly get into the sewage via food residues. Therefore, all drainage from galley areas, i.e. from sinks and

dishwashers, must first be processed in a grease separator before it is fed into a holding tank. After this treatment, galley water may be considered as grey water.

HAMANN grease separators are completely made of stainless steel. This makes them extremely robust and reliable. HAMANN grease separators are DIN certified by TÜV Rheinland according to DIN EN 1825-1, DIN EN 1825-2 and DIN EN 4040.

## KEY FACTS

### REDUCED RISK OF SEWAGE SYSTEM BLOCKAGES AND $H_2S$ -FORMATION

Fats, oils and greases can block pipes and sensors. They also accelerate the formation of hydrogen sulphide ( $H_2S$ ) and subsequently sulphuric acid ( $H_2SO_4$ ). HAMANN GS Compact grease separators reduce these risks by removing fats, oils and greases from the galley water before it enters the greywater system.

### EASE OF OPERATION & LOW MAINTENANCE

HAMANN GS Compact grease separators work with gravity separation. There are no moving mechanical parts inside the plant and no additives are needed. Operation is extremely easy and maintenance requirements are minimal.

### ROBUST & RELIABLE

HAMANN grease separators are completely made of stainless steel for maximum robustness, durability and reliability.

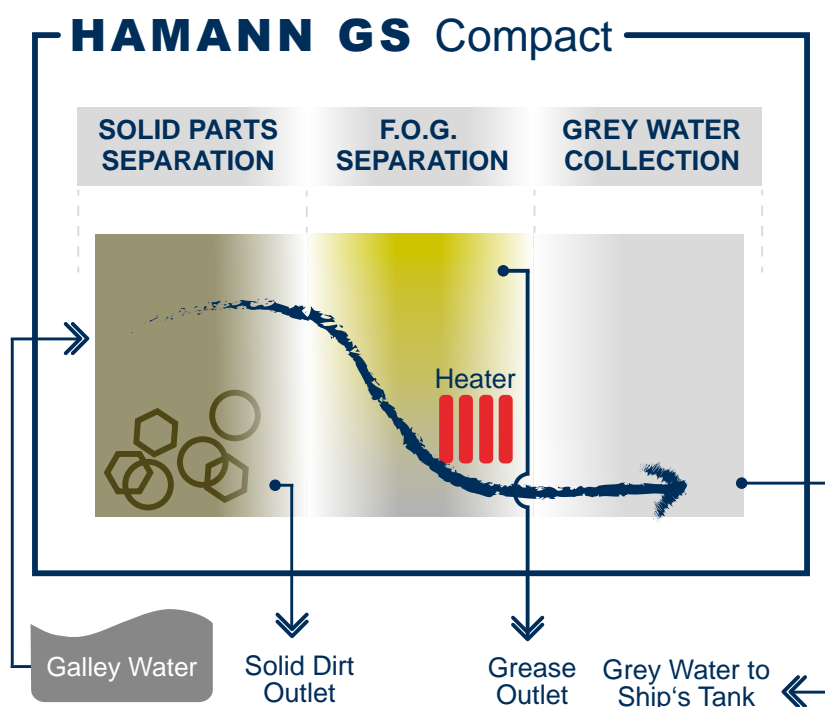
### TÜV RHEINLAND CERTIFIED

HAMANN grease separators are DIN certified by TÜV Rheinland according to DIN EN 1825-1, DIN EN 1825-2 and DIN EN 4040.





## PROCESS DESCRIPTION



HAMANN GS Compact grease separators work exclusively according to the principle of gravity separation without mechanical parts or additives. Solid food residues are first separated from the galley water by gravity. Then, the fats and oils, which are lighter than water are collected at the top of the separation chamber of the grease separator. From there the collected fats and oils can be drained. A built-in heater keeps the fat liquid so that it can be drained more easily. Separated fats and oils from the grease separator, as well as solid food residues are transferred into external containers via the outlets provided for this purpose and disposed of ashore.

## PRODUCT SPECIFICATIONS

	025	050	100	200	280	400	1000
<b>Flow rate capacity</b> (m <sup>3</sup> /h)	1	2	4	7.2	11	16.5	41
<b>Galley capacity</b> (Persons)	~25	~50	~100	~200	~280	~400	~1,000
<b>Basic measurements</b> w/d/h (cm)	72/61/92	98/68/110	154/76/ 124	144/111/ 124	222/111/ 124	196/127/ 140	342/205/ 165
<b>Weight empty</b> (kg)	76	116	188	243	323	560	1,756
<b>Grease compartment volume</b> (l)	16	40	80	120	200	240	600
<b>Certification</b>	Certified by TÜV Rheinland according to DIN EN 1825 & 4040						

### PLEASE NOTE:

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Sewage Treatment



Galley Water Treatment



Sewage Tanks



Additives



# SEWAGE TANKS

## ■ **TANK TRANSFER SYSTEMS**

HAMANN TS Plus Tank Transfer Systems

HAMANN TS Compact Tank Transfer Systems

## ■ **CONDITIONING SYSTEMS**

HAMANN TA Tank Aeration Systems

HAMANN TC Tank Circulation Systems

# TANK TRANSFER SYSTEMS

## HAMANN TS Plus | HAMANN TS Compact

In most cases, there will be two or more separate holding tanks on board a vessel, containing either black water or grey water or a mix of both. The sewage treatment plant, or advanced wastewater treatment system, is fed from one of these tanks containing both black water and grey water with the sewage mix to be processed. We call this tank the sewage mixing tank (please also refer to „COMPONENTS OF A SEWAGE SYSTEM“ on pages 6/7). Depending on the tank system configuration, grey water and/or black water need to be transferred from their dedicated holding tanks into the sewage mixing tank to create the desired

mixture. In addition, there are several other reasons to distribute contents of holding tanks onwards. Storage times of sewage should always be kept short and tank contents should be processed in the sewage treatment plant as soon as possible. There may be the need to transfer sewage or grey water back and forth between different holding tanks, e.g. to equalise the filling levels. Whatever the requirements may be, our HAMANN TS Plus tank transfer systems can be customised to suit them. For basic two-tank scenarios, we offer our preconfigured HAMANN TS Compact tank transfer systems.

## KEY FACTS

### SOFTWARE CONTROLLED AUTOMATIC TRANSFERS

HAMANN TS tank transfer systems take over routine transfers fully or semi-automatic and therefore support the crew in the operation of the sewage system.

### OPTIMISED SEWAGE MIX FOR BETTER TREATMENT PERFORMANCE

The automated transfer of grey water into the sewage mixing tank facilitates optimises the sewage mix to be treated in the sewage treatment plant and supports the treatment performance.

### EASY MANAGEMENT OF TANK CAPACITIES

HAMANN TS Plus tank transfer systems can support the crew in the management of tank capacities. A touch operated display on the switch cabinet shows the fill levels for every tank in the system and manual transfers between holding tanks can be initiated easily.

### PRE-CONFIGURED OR FULLY CUSTOMISED

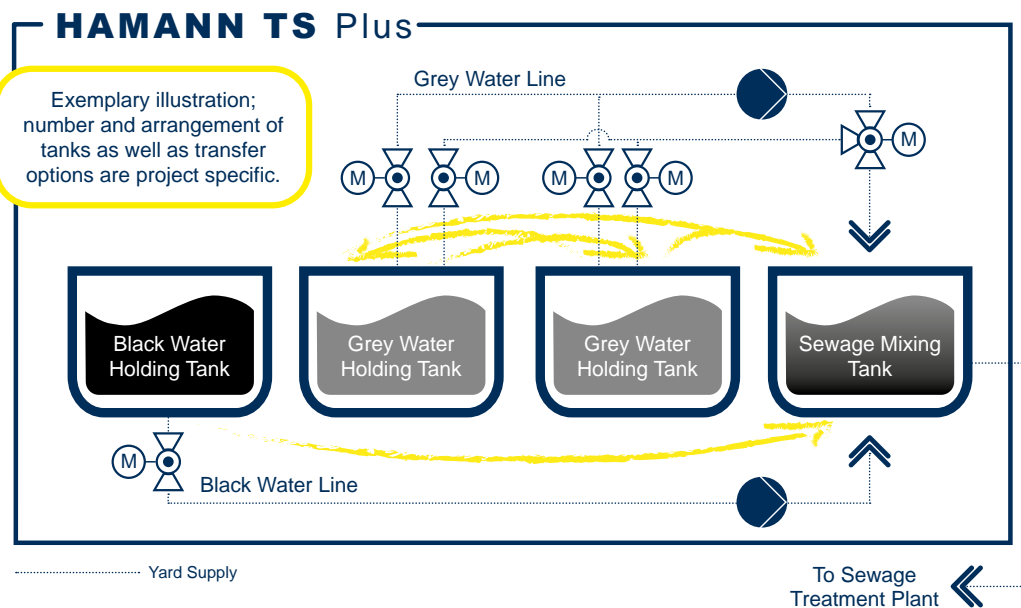
Pre-configured HAMANN TS Compact tank transfer systems cover the needs of basic tank layouts. TS Plus systems are customised to the the tank layout and specified functional scheme of a specific vessel.







## PROCESS DESCRIPTION



### HAMANN TS Plus

HAMANN TS Plus tank transfer systems are customised to the tank layout and specified functional scheme of a specific vessel. They can take over virtually all the tasks involved with managing sewage tank systems automatically and/or semi-automatically. The system software controls when and from which tank sewage is transferred to the sewage mixing tank. This ensures that the sewage mixing tank always contains a mixture of black water and grey water ready for feeding into the sewage treatment plant. Storage times of sewage is kept to a minimum in all tanks.

The exemplary HAMANN TS Plus tank transfer system shown here consists of four tanks: The sewage mixing tank, out of which the sewage treatment plant or advanced wastewater treatment plant is fed, and three holding tanks

for black water or grey water. The system offers the following options:

- Transfer from the black water holding tank to the sewage mixing tank
- Transfer from both grey water tanks to the sewage mixing tank
- Transfer between grey water holding tanks

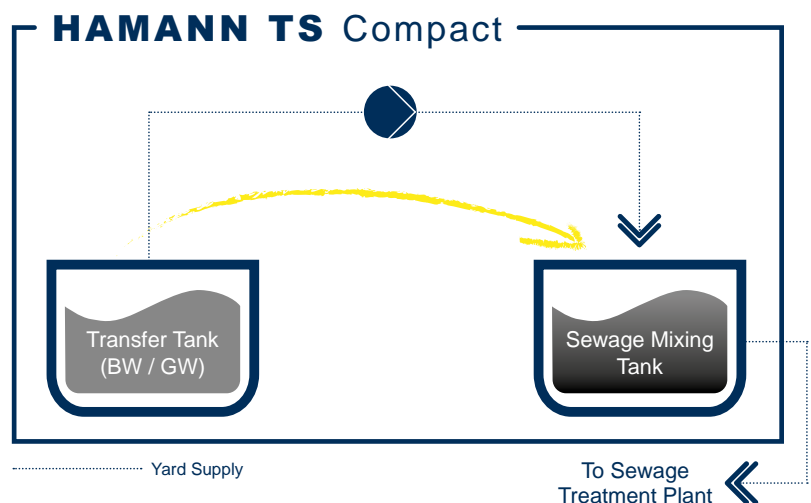
The scope of delivery of this exemplary system would include the software, configured to match the customer specifications, and control cabinet as well as the required pumps, motor-operated valves and level sensors.

### HAMANN TS Compact

HAMANN TS Compact 0125 tank transfer systems are specifically designed to work together with our small HL-CONT Plus 0125 / 025 and HL-CONT Compact 0125 sewage treatment plants.

These systems are preconfigured and cover the needs of a basic tank layout with one grey water holding tank and one sewage mixing tank. Transfers are unidirectional from the grey water tank to the sewage mixing tank, out of which the sewage treatment plant is fed.

For larger and/or more complex tank system layouts we offer our customised HAMANN TS Plus tank transfer systems.



# CONDITIONING SYSTEMS

## HAMANN TA | HAMANN TC

Anaerobic conditions and sedimentation are two problems associated with the storage of untreated sewage, blackwater and sewage sludge. Anaerobic conditions develop due to natural oxygen consuming biological processes within the sewage. As a result, hydrogen sulphide ( $H_2S$ ) or even sulphuric acid ( $H_2SO_4$ ) may form. The first is an extremely smelly and potentially lethal gas, the latter can erode the substance of the plant, the piping and ultimately the ship's structure. Sedimentation occurs because of the solid par-

ticles and suspended solids, e.g. from toilet paper or hairs, in the sewage. As they are heavier than water, they tend to settle and concentrate in the lower layers of the sewage in a holding tank. When the "thick" lower layers are fed into the sewage treatment plant, they may cause clogging of valves, sensors and pipes of the plant. Both anaerobic conditions and sedimentation in the sewage mix lead to significantly reduced treatment performance of the sewage treatment plant. Therefore, both are to be avoided.

## KEY FACTS

### PREVENTS SMELLY AND TOXIC GASES

HAMANN TA tank aeration systems ensure a constant supply of oxygen in sewage holding tanks to prevent the formation of hydrogen sulphide ( $H_2S$ ) or subsequently sulphuric acid ( $H_2SO_4$ )

### PROMOTION OF ACTIVE BIOLOGICAL PROCESSES

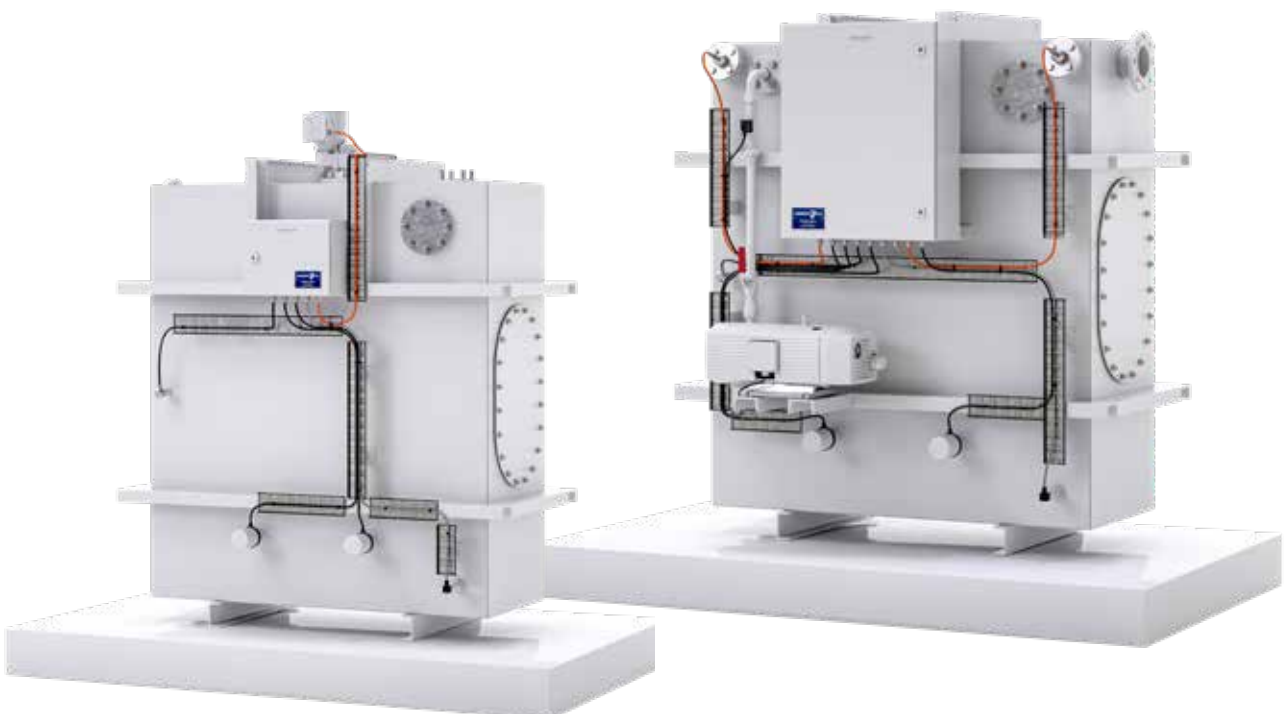
The constant supply of oxygen also assists the active biological processes in the sewage. This is the natural way of sewage treatment. It is a form of natural pre-treatment that contributes to the performance of the sewage system on board.

### REDUCED RISK OF BLOCKAGES OF PIPES, SENSORS AND VALVES

Pumping sewage concentrated by sedimentation into the sewage treatment plant can result in blockages of pipes, sensors and valves, which will reduce the performance of the plant or cause it to fail altogether. HAMANN TA tank aeration systems counteract sedimentation of solid particles through the movement in the tank contents induced by blowing air into the tank.

### KEEPS SEWAGE SLUDGE PUMPABLE

Sewage sludge stored in a holding tank tends to rapidly develop sedimentation and will then no longer be pumpable. A HAMANN TC tank circulation systems effectively prevents sedimentation and keeps sludge pumpable at all times.



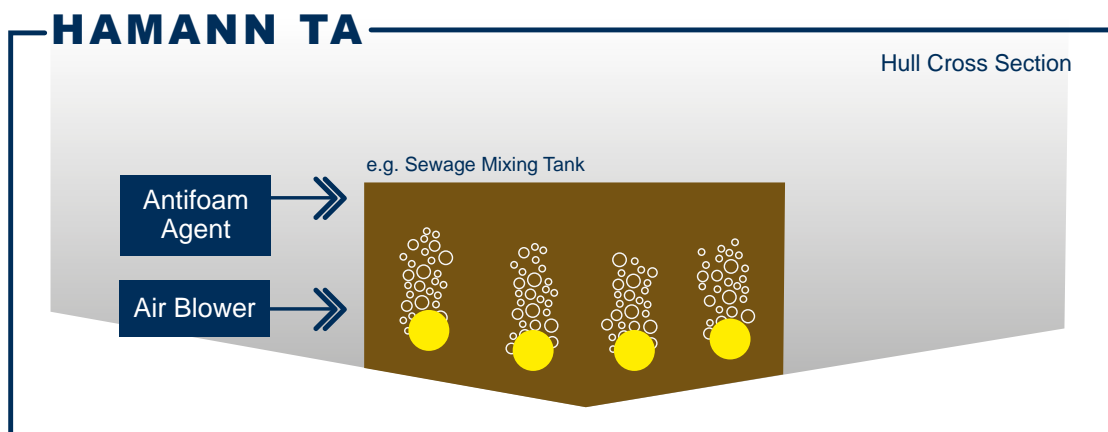
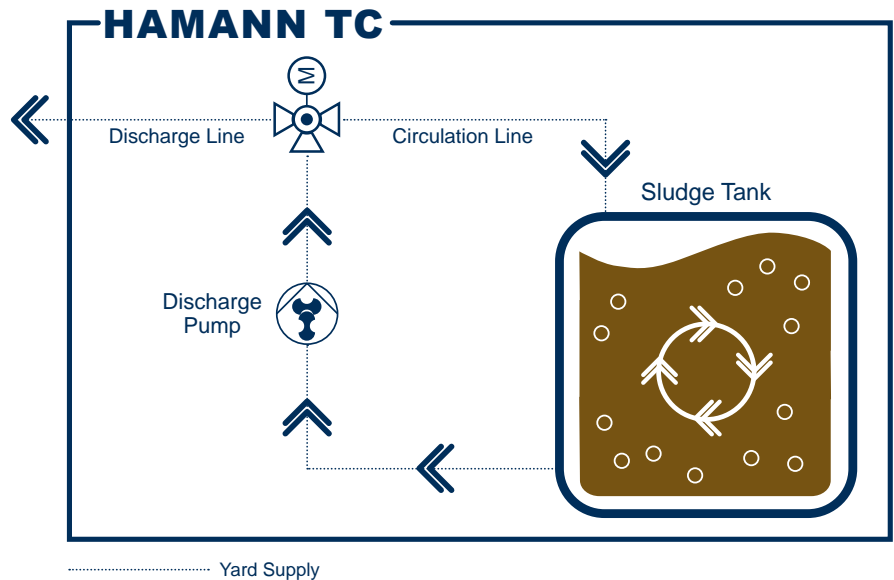


## PROCESS DESCRIPTION

### HAMANN TC TANK CIRCULATION SYSTEMS

Sludge basically consists of the solid particles and suspended solids extracted from the sewage in the treatment process. Therefore, it already has a thickened consistency, but is still pumpable. Sewage sludge stored in a holding tank tends to rapidly develop sedimentation. Within a very short period of time, the lower layers in the sludge tank will then no longer be pumpable. To be discharged, the contents then would have to be manually removed from the tank, requiring a considerable amount of time and effort.

To avoid having to execute this most unpleasant task, a HAMANN TC sludge circulation system should be installed. It constantly circulates the sludge in the holding tank, preventing sedimentation and keeping it in pumpable condition at all times.



### HAMANN TA TANK AERATION SYSTEMS

A HAMANN TA tank aeration system compensates the oxygen consumed by biological processes within the sewage by supplying fresh oxygen. This effectively prevents the build-up of hydrogen sulphide (H<sub>2</sub>S) in blackwater holding tanks. The constant supply of oxygen also assists the active biological processes in the sewage. This is the natural way of sewage treatment. It is a form of natural pre-treatment that contributes to the performance of the sewage system on board.

Blowing air into the tank also creates movement in the tank contents. That helps to counteract sedimentation of solid particles. We recommend HAMANN TA systems for all holding tanks containing blackwater.





Sewage Treatment



Galley Water Treatment



Sewage Tanks



Additives

# ADDITIVES



## **FLOCCULANT**

HAMANN BlueFloc



# FLOCCULANT

## HAMANN BlueFloc

### KEY FACTS

#### HIGH PERFORMANCE FLOCCULANT FOR SEWAGE TREATMENT PLANTS

Flocculant is essential for the treatment process HAMANN sewage treatment plants and advanced wastewater treatment systems applied and is required for their operation.

#### SUPPORTS TSS/COD/BOD REDUCTION

The flocculant is used in the process step, where TSS (Total Suspended Solids), COD (Chemical Oxygen Demand) and BOD (Biological Oxygen Demand) are reduced by Dissolved Air Flotation (DAF).

#### ENHANCES FLOCCULATION & CONTRIBUTES TO THE TREATMENT PERFORMANCE

HAMANN BlueFloc is designed to optimise the flocculation during the Dissolved Air Flotation (DAF) process and thus optimise the treatment performance achieved in this process step.

#### READY-TO-USE MIXTURE OF ALUMINIUM-BASED FLOCCULANT AND POLYMER

HAMANN BlueFloc is an aluminium-based mix with polymers and ready to use right out of the container.

Flocculant is required for the operation of HAMANN HL-CONT Compact / HL-CONT Plus sewage treatment plants and HL-CONT Plus OceanCruise / HL-CONT Plus RiverCruise advanced wastewater treatment systems. The flocculant supports the Dissolved Air Flotation (DAF) process, the main sewage treatment technology applied in these plants. Better flocculation results in a better treatment performance of the sewage treatment plant. HAMANN BlueFloc has been developed to the specifications of the HAMANN R&D team and has been proven in our test facilities.

HAMANN sewage treatment plants and advanced wastewater treatment systems apply our Dissolved Air Flotation (DAF) technology as one of several steps in the sewage treatment process. To support the flotation process, a flocculant is needed. HAMANN BlueFloc is designed to optimise the flocculation and thus optimise the treatment performance achieved in this process step.

The flocculant is used in the process step, where TSS (Total Suspended Solids), COD (Chemical Oxygen Demand) and BOD (Biological Oxygen Demand) are reduced by Dissolved Air Flotation (DAF).

The sewage is enriched with air under a pressure in the saturator. After being discharged into the flotation tank through the pressure release valve, the excess air forms micro bubbles. The flocculant is added in order to let air bubbles and suspended particles form larger flakes. These flakes float upwards, creating a sludge foam on the surface and leaving the clear phase in the lower part of the flotation tank. The sludge foam spills into the sludge compartment and is subsequently fed into the ship's sludge tank.

To learn more about the treatment principles applied in HAMANN sewage treatment plants and advanced wastewater treatment systems, please turn to pages 10-25.









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