

BALLAST WATER TREATMENT

VERSATILE - COMPACT - CONTAINERIZED - MODULAR



# COMPANY PROFILE



## ONE OF THE LEADING COMPANIES IN THE WORLD

With an emphasis on sustaining the environment for future generations Hamann have produced a range of products for the maritime industry that have seen the company grow into a global corporation, HAMANN AG.

The market acceptance experienced by HAMANN AG is proof that fully certified systems designed to protect the marine environment can be built economically and reliably for the marine shipbuilding industry.

Ballast water treatment and exhaust emission control are new problems requiring cutting edge technologies. HAMANN AG has addressed these problems with the introduction of the D2 complying ballast water treatment system and the HEC exhaust emission control system.

Hamann Metalltechnik, the production facility of HAMANN AG produces all the Hamann sewage systems as well as all pipe work, tanks and special constructions for external clients.

HAMANN AG believes in a long term partnership with all of its clients. To this aim all Hamann equipment is to this day fully serviced with spare parts and manuals irregardless of when it was sold.

HAMANN AG recently moved into its new purpose built factory and office complex. The ultra modern complex will ensure that HAMANN AG can offer the best possible service to its clients worldwide for many years to come.

## HAMANN AG – SERVICE AROUND THE WORLD



### Worldwide:

Australia, Balearic Islands, Brazil, Bulgaria, Canada, Chile, China, Croatia, Danmark, England, Finland, France, Greece, India, Italy, Ireland, Korea, Netherlands, Norway, Poland, Romania, Russia, Southafrica, Namibia, New Zealand, Spain, Sweden, Taiwan, Thailand, Turkey, United Arab Emirates and USA.

# BALLAST WATER TREATMENT

## SEDNA® - THE VERSATILE BALLAST WATER TREATMENT SYSTEM

The system is able to handle capacities from 250 up to 1000 m<sup>3</sup>/hour. A combination of moduls will be able to serve larger pump capacities. For Navy vessels and Mega Yachts smaller plants are in the engineering phase.

Various configurations are feasible but the following are the three basic designs:

- **Containerized system**
- **Skid mounted system**
- **Modular system**

The new ballast water treatment system SEDNA® is of such importance that in order to meet demands in the very near future HAMANN AG established a new section called Hamann Ballastwasser or HBW. The famous SEDNA®

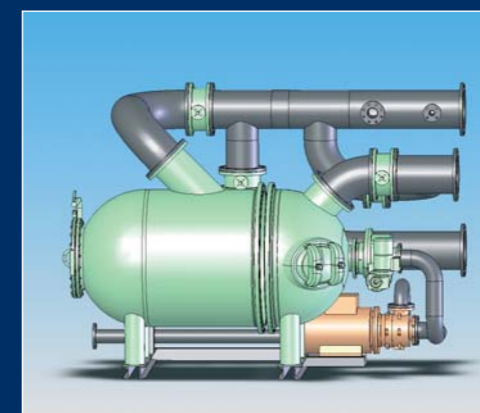
system is now ready for the world markets. Recently Germanischer Lloyd certified the system for engine room and on deck installation. Land and shipboard tests to obtain IMO certification are in progress.



SEDNA®  
Containerized Unit 2 x 250 m<sup>3</sup>/h



Skid mounted system



Filter Module



Hydrocyclone Module

A full scale plant is in continuous operation aboard an ultramodern Container Ship. All results show that the HAMANN treatment system has the potential to dramatically reduce the risk of unwanted introductions by ship's ballast water and/or by ballast tank sediments. According to all information available at present regarding future ballast water regulations, HAMANN AG feel very confident that the Hamann treatment system will meet even the most stringent regulations.

### Philosophy

- highest quality in workmanship and material
- flexibility in design, planning and individual construction
- competent service - before and after sales
- easy-to-handle system with low maintenance

# BALLAST WATER TREATMENT



## MODULAR BALLAST WATER TREATMENT SYSTEM SEDNA®

The SEDNA® system is treating the water during uptake. There is no delay in ballasting. All solids remain at the point of origin.

### Physical separation by means of the HAMANN Hydrocyclone

The newly developed hydrocyclone was specially designed for ballast water applications. It significantly reduces the sediment load of the ballast water and also removes some of the organisms. The small size of the individual hydrocyclone allows installation on a single deck. The number of hydrocyclones needed depends on the flow rate of the ballast water pump. Each hydrocyclone has a flow rate or Q equal to 35m<sup>3</sup>/hour up to max. 42m<sup>3</sup>/hour.

### Fine filtration (50µm), self cleaning

The fine filtration (50µm) has two functions:

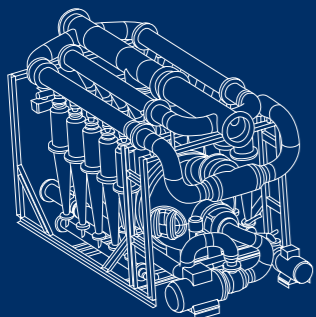
1. It removes nearly all organisms greater than 50µm in the smallest dimension.
2. It increases the stress imposed on the organisms as well as an increased sensitivity towards the disinfection.

### Secondary Treatment

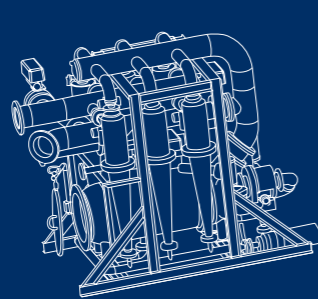
After the physical step, the ballast water is dosed with 150 ppm Peraclean® Ocean, a chlorine free oxidant that is fully bio-degradable.

The SEDNA® ballast water treatment system has been tested extensively at different locations and with two full-scale plants each with a capacity of 200 m<sup>3</sup>/hour respectively 500 m<sup>3</sup>/hour. In total these plants have been running without any problems for more than 3000 operating hours over the past three years. Both the mechanical performance and the biological efficacy were tested with a variety of different ballasting scenarios e.g. varying flow rates, different pressure and back pressure scenarios simulating different levels of tank fillings. The biological efficacy was evaluated with natural occurring plankton organisms and with the surrogate species i.e. Artemia Testing System (ATS).

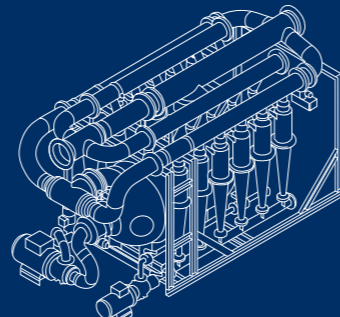
## SKID MOUNTED SEDNA® UNITS



**S420 (420m<sup>3</sup>/h)**  
4073 x 2024 x 2607mm  
(L x W x H)



**S250 (250m<sup>3</sup>/h)**  
2800 x 1538 x 2202mm  
(L x W x H)



**S500 (500m<sup>3</sup>/h)**  
4441 x 2024 x 2607mm  
(L x W x H)



# THE EFFICACY

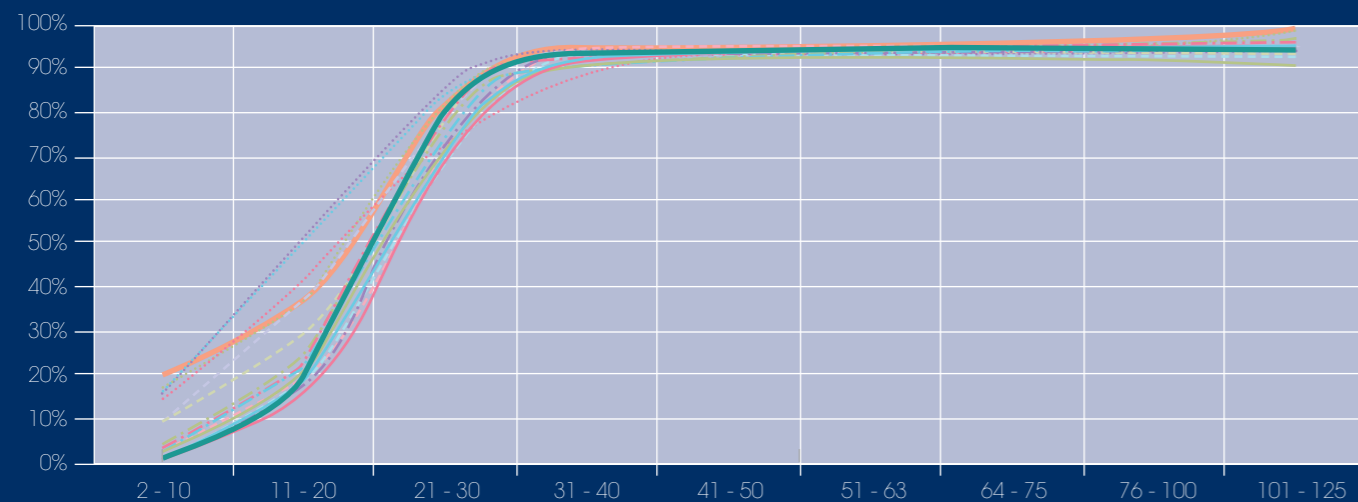
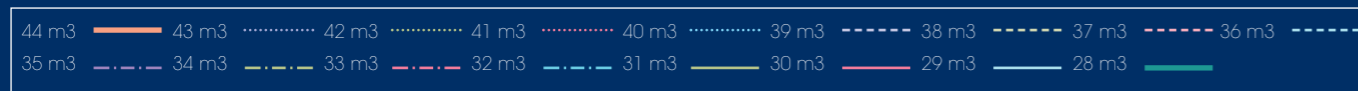


## 1. PHYSICAL SEPARATION

These tests were carried out with a single HAMANN AG Hydrocyclone and the following table confirms the very high efficacy of these new hydrocyclones:

Removal of particles with SEDNA® hydrocyclone at different flow rates

Particle size(µm)



## 2. BIOLOGICAL EFFICACY

The results detailed below show that the SEDNA® balast water treatment system removes and inactivates a great variety of organisms transported with ships' ballast water.

Test setup	Test location and number of test runs	Viable organisms > 50µm in smallest dimension (Ind./m³)		Viable organisms between 10µm and 50µm in smallest dimension (Ind./ml)	
		input	output	input	output
200 m³/h SEDNA® System Surrogate Organisms (Artemia Test System)	Elbe River, at Brunsbüttel: average of 6 test runs 24 hrs retention time	268500	0	n.d.	n.d.
200m³/h SEDNA® System Natural plankton	Elbe River, Blohm & Voss yard in the harbour of Hamburg average of 9 test runs 24 hrs retention time	22650	0	210	0
Natural plankton	average of 10 test runs 24 hrs retention time	35750	0	Few <sup>1</sup>	(0) <sup>1</sup>
500m³/h SEDNA® System Natural plankton	NIOZ harbor, Island of Texel, The Netherlands average of 2 test runs 24 hrs retention time	80928	0	28000	0 <sup>2</sup>
Natural plankton	48 hrs retention time	80928	0	28000	0 <sup>2</sup>

<sup>1</sup> - qualitative analysis of phytoplankton only

<sup>2</sup> - no re-growth occurred over 5 days n.d. - no data