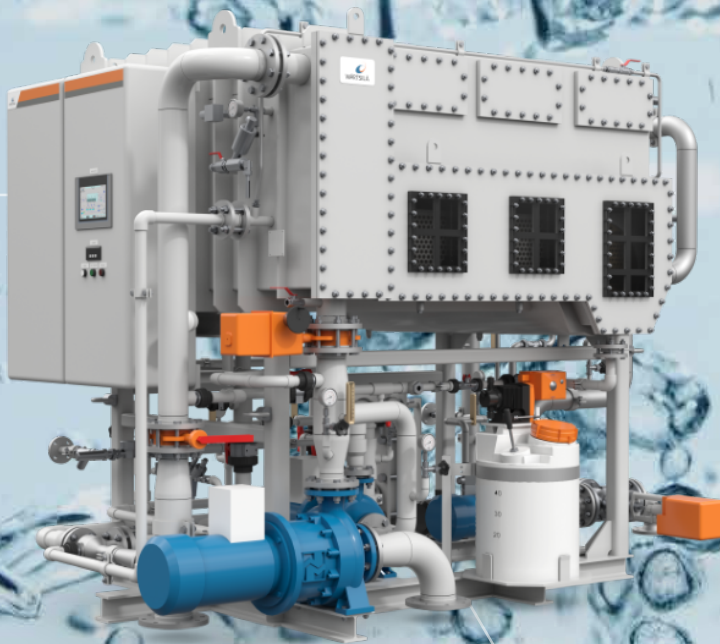


**WATER &
WASTE**
A WÄRTSILÄ® BUSINESS

FRESHWATER GENERATORS

HORIZONTAL INNER TUBE EVAPORATOR





Introducing Wärtsilä's freshwater generators

Within the marine world Wärtsilä's Freshwater Generators (FWG) are known as standard for on-board freshwater production. Ship owners, builders and operators can source from the widest range of freshwater making technologies available to the market today. This range includes Reverse Osmosis Plants, Horizontal Inner Tube Evaporators, Multi Flash Evaporators, Single Stage Desalination Plants or a combination of these. Also a growing number of land-based applications is fitted with our equipment. In choosing Wärtsilä as your freshwater production partner you secure a flexible, reliable, and fully automated solution.



Specialist solutions requiring high customer focus

Our diverse and dedicated team of engineers is developing, manufacturing and distributing freshwater solutions for and to customers worldwide. Thanks to a creative out-of-the-box mindset, this team excels in innovative and specialist solutions, bespoke set-ups that require a high customer focus.

Every successful implementation of a freshwater generator starts with an accurate analysis of the vessel's status, identifying possibilities and needs. In each case our team will strive for a solution that is most energy and space efficient. A higher energy efficiency, for instance, can often be reached by looping to energy sources already available on a vessel. Greater flexibility in construction and sizing can be accomplished by making a combination of different FWG technologies. This approach especially comes in handy when retrofitting engine rooms.

Building on more than 125 years of history

Our freshwater division in Geesthacht, Germany, is also known as Wärtsilä Serck Como GmbH and part of the bigger Wärtsilä Water & Waste business unit.

The company's expertise in freshwater generation is unrivalled: in 1894 Serck

Como started producing its first evaporator for sea-going vessels. Having survived two world wars, we know what it means to adapt to ever changing circumstances. We believe that it is important to both invest in own innovations and to adapt to new external trends. As water maker specialist our focus is on the future. We are confident to come up with solutions for any technical challenge that will come our way.

Total water & waste solution

Freshwater generators are part of a much wider water & waste product range, offered by Wärtsilä's eponymous "Water & Waste" business unit. Ship owners, builders and operators that are looking for a single provider for all their water, waste and wastewater challenges, will find the peace of mind they are looking for.

In addition to freshwater solutions, our total solution offer includes ballast water treatment technologies, wastewater, wet and dry waste treatment systems. Thanks to Wärtsilä Water & Waste's global agent and distributor network our after-sales and spare parts services are reliable and well organised. We are able to help our customers from the design phase of their freshwater equipment to the delivery of spare parts.

Product range



Reverse Osmosis Plants



Horizontal inner Tube Evaporators



Multi Stage Flash Evaporators



Single Stage Desalination Plants

HiTE

The Wärtsilä Horizontal inner Tube Evaporator (HiTE) is a multi-effect evaporator specifically designed for producing small to medium capacities of 30 to 175 tons of distillate per day. It guarantees freshwater for human consumption or clean process water for technical applications. It serves in a wide range of operational areas where alternative technologies like reverse osmosis or plate technology reach their limits. Shallow waters with poor seawater quality is an example of this.

The HiTE operates smoothly even at partial load, for example during dynamic positioning (DP) operations. The unit's control system can be fully or semi automated, and its smart processes adapt automatically to the amount of energy available. The HiTE is able to utilise waste heat, which is very convenient for vessels with varying engine profiles. The 4-effect HiTE offers up to 75% energy savings

with a specific heat consumption of 180 kWh/t compared to single effect designs (700 kWh/t). For a 3-stage HiTE this is 240 kWh/t.

The Wärtsilä HiTE is suited for a wide variety of vessel types, including special vessels, chemical tankers and small cruise ships. Also offshore and land-based applications can be equipped with HiTEs.

Working principle

The HiTE freshwater generator consists of 3 film evaporators (connected in series) and one condenser (1). The seawater is passing through the condenser. The major portion – after being used as cooling medium – is flowing back to the sea. A certain (minor) quantity is distributed in three parallel streams (2) directly into the evaporators. The 1st effect is heated by hot engine cooling water. Before evaporation can start, the feed water

entering evaporator effect one is heated inside the tubes up to the boiling temperature.

The released vapours (3) are separated from the water/vapour mixture and are entering the 2nd and possible 3rd effects as heating medium. The procedure of condensation/evaporation is repeated in the 2nd and 3rd effect before the residual vapours produced in the 3rd effect are entering the condenser.

The surplus brines are cascaded via syphon pipes from effect to effect, as well as the collected distillates. The distillate from the 3rd effect is flashing into the condenser hot well which also serves as distillate collecting tank. The distillate is pumped into the collecting tank.

Technical data

Model	Capacity, ton/day	L x W x H, mm	Specific thermal power, kWh/t	Electrical power, kWh *	Dry weight, kg	Wet weight kg	Foot-print, m ²
HiTE 30-3	30	1800 × 1500 × 2000	240	5 .9	2100	2415	5.4
HiTE 50-3	50	2300 × 2000 × 2000	240	5 .3	3500	4025	9.2
HiTE 80-3	80	2750 × 2000 × 2000	240	4 .2	5100	5865	11.0
HiTE 120-3	120	3250 × 2000 × 2000	240	4 .1	6500	7475	14.0
HiTE 120-4	120	3750 × 2000 × 2000	195	3 .2	7200	8280	19.0
HiTE 175-3	175	4250 × 2300 × 2200	240	3 .8	7500	8550	21.5
HiTE 175-4	175	4750 × 2300 × 2200	195	2 .9	8100	9315	24.0

Seawater inlet temperature: 0 – 35°C

Heating water inlet temperature from 70 – 90°C

Water conductivity < 4 µS/cm

Variants

Tandem ejector: without brine pump, but with higher electrical power

Heating water source: for all qualities of water between 70 °C and 95 °C, steam or a combination of both

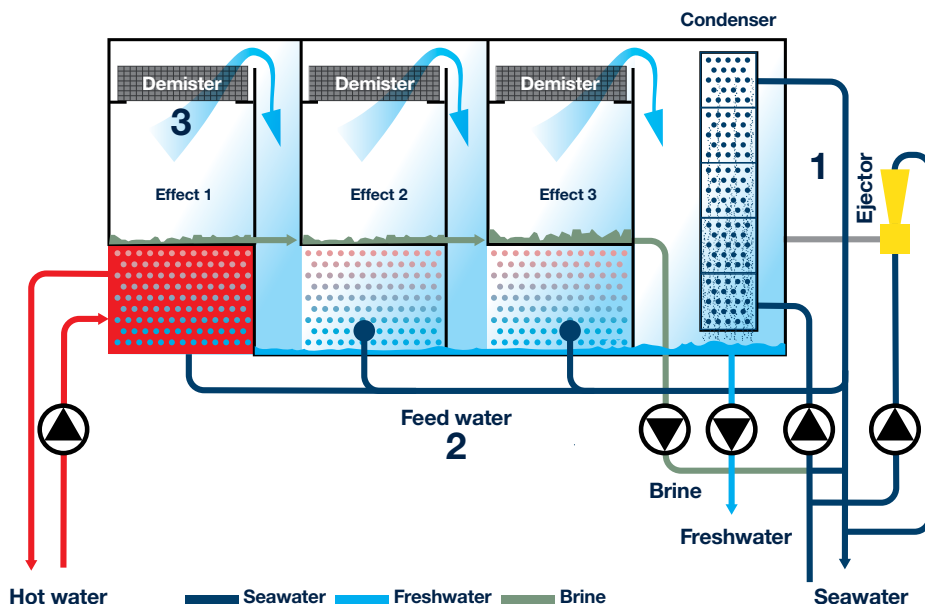
Electrical control: PLC or manual control

* Electrical power consumption varies depending on conditions



Key benefits

- Efficient & reliable multi-effect distilling process
- Low operational cost
- Lowest energy consumption in its range
- Very low water conductivity < 4 $\mu\text{S}/\text{cm}$
- Most efficient solutions when utilising engine waste heat
- Designed for easy maintenance and long service intervals
- Flexible adaptation to demand and/or supply (down to 50%) thanks to exceptional part-load capability
- Flexible use of heat sources: engine jacket water, steam or combination
- Fully automatic system
- Also suited for land-based applications



Scope of supply

Delivered as standard

- Tube evaporator with condenser
- Distillate pump
- Ejector pump
- Seawater pump
- Chemical dosing tank with dosing instruments
- Solenoid valve for draining lower quality distillate
- Siemens S7 control panel

Options

- Steam booster
- Distillate cooler
- Frequency converters for pumps
- Cleaning stations

Selection criteria

	RO	HiTE	MSF	SSD
Production capacity: 5 - 35 ton/day				●
Production capacity: 35 - 175 ton/day	●	●	●	
Production capacity: 175 - 1500 ton/day	●		●	
High quality distillate < 4 µS/cm		●	●	●
Bespoke design possible	●	●	●	
Able to use ship's rest heat (from engine)		●	●	●
Suitable for land-based applications	●	●	●	
Plug & Play solution, small footprint				●
Fully automatic operation (integrated PLC)	●	●	●	
Need for high filtration	●			●
Able to handle water with oil particles / emulsion		●	●	●
Maintenance less than once times per half year (in full time use)		●	●	●
Low Capex	●			●
Electrical consumption kW/ton distillate ¹	3.5	3.2	3.0	8.5
Modular design for extra flexibility	●			

¹ values can vary

Service

Wärtsilä Water and Waste has in-house technical service teams that are able to assist customers throughout the lifecycle of their freshwater generation installations. These teams help with the optimisation of efficiency and performance. Customers can also call in our technical support during installation, start-up, operation and maintenance.

Our facility in Geesthacht Germany provides customized solutions with short delivery time and with a tight quality control. Our worldwide network of agents and distributors ensures direct local support for the majority of our customers.

Scope of equipment	Scope of performance
We service following equipment: <ul style="list-style-type: none"> • Reverse osmosis plants • Desalination units • Evaporation systems • Water treatment systems • Cooling • Pre-heating • Condensation 	<ul style="list-style-type: none"> • Project consultancy • Assembly • Commissioning • Training • Maintenance • Inspection / Preventive maintenance • Spare part management • Automation & updates

All our services can be certified according to following classification societies:
TÜV, DEKRA, BV, LROS (Class 2.2), DNV-GL (Class II), RINA, RMROS, CCS, KR and ABS.

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