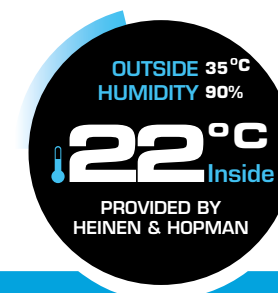




HEINEN & HOPMAN

# PRODUCTS

> Maritime Absorption Chiller



Heating



Ventilation



Air Conditioning



Refrigeration

## INTRODUCTION

Absorption chillers use heat to drive the refrigeration cycle, they produce chilled water while consuming just a small amount of electricity to run the pumps on the unit. Absorption chillers generally use steam or hot water to drive the lithium bromide refrigeration cycle but can also use other heat sources.

How it works

An absorption cooling cycle relies on three basic principles:

- When a liquid is heated it boils (vaporizes) and when a gas is cooled it condenses
- Lowering the pressure above a liquid reduces its boiling point
- Heat flows from warmer to cooler surfaces.

Absorption cooling relies on a thermochemical “compressor.” Two different fluids are used: a refrigerant and an absorbent. The fluids have high “affinity” for each other, which means one dissolves easily in the other. The refrigerant—usually water—can change phase easily between liquid and vapor and circulates through the system.

Heat from a hot water boiler, steam or a waste-heat source drives the process. The high affinity of the refrigerant for the absorbent (lithium bromide) causes the refrigerant to boil at a lower temperature and pressure than it normally would and transfers heat from one place to another.

## APPLICATION

A special Maritime Absorption Chiller has been designed considering and resolving negative aspects such as the refrigerant’s overflow and mixing caused by ship motions, special welding, structure strength and performance de-rating in view of the ship pitching and rolling. After careful design and research the absorption chillers were tested on a moving bed to simulate the marine conditions. Our Maritime Absorption Chillers can be steam or hot water fired and seawater cooled with Cu/Ni or Ti absorber and condenser heat exchangers.

It can be used to replace a conventional electric chiller (heat source must be 100% of the time available) or in a hybrid version (Electric chiller as back up).

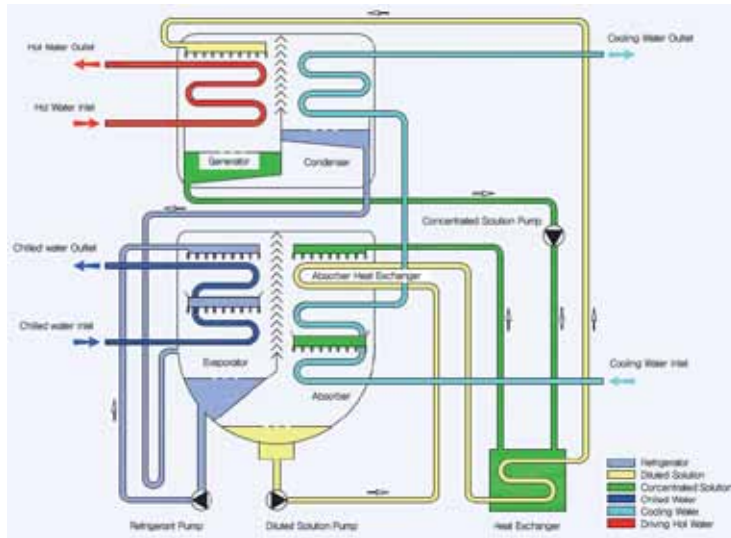
## KEY FEATURES

- Customized design for vessel conditions
- Anti-rolling & pitching construction
- Standard designed for hot water (min. 75C) & steam (1 ÷ 3 bar(g)) as a heat source.
- Other waste heat sources available on request. (i.e exhaust gas)
- Seawater absorber & condenser in Cu/Ni or Ti.
- Range from ~150kw to ~5,000kW
- Electrical load up to
- COP up to 0,8

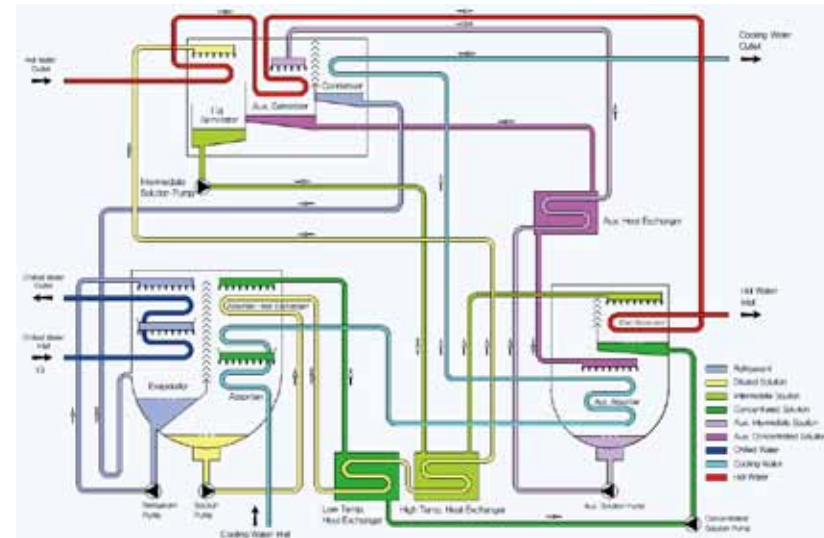




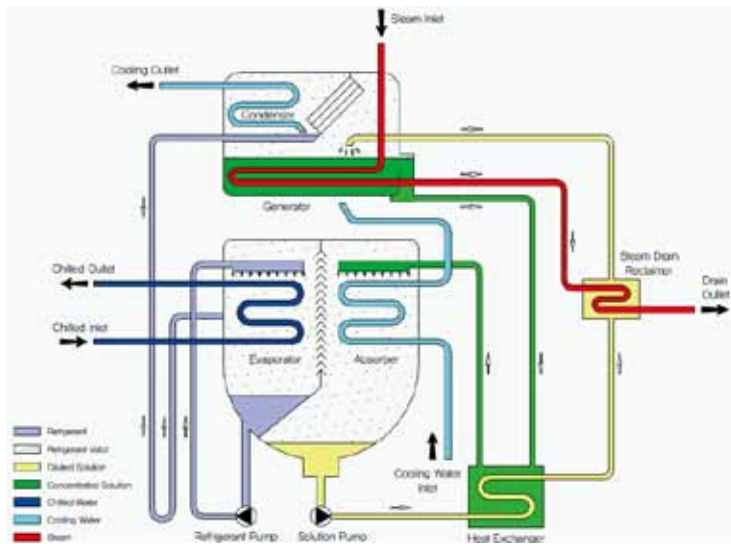
# HEAT SOURCES



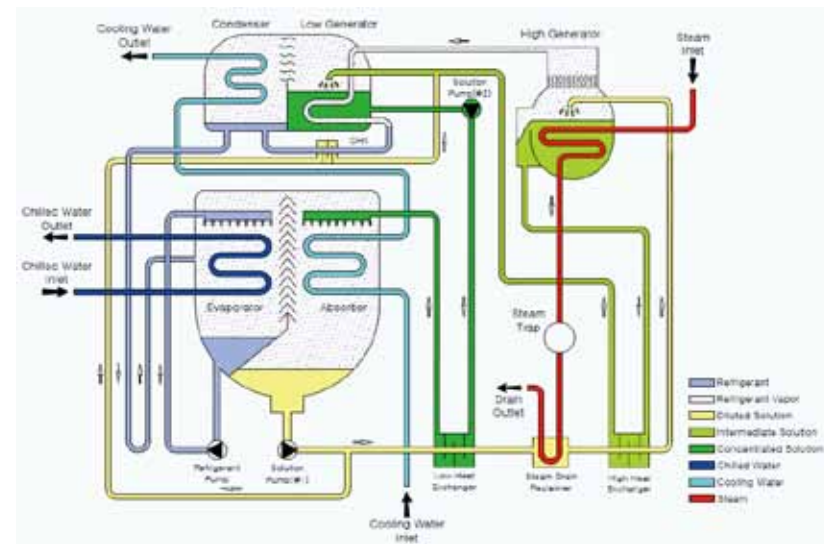
**Hot water**



**Hot water - Double lift**

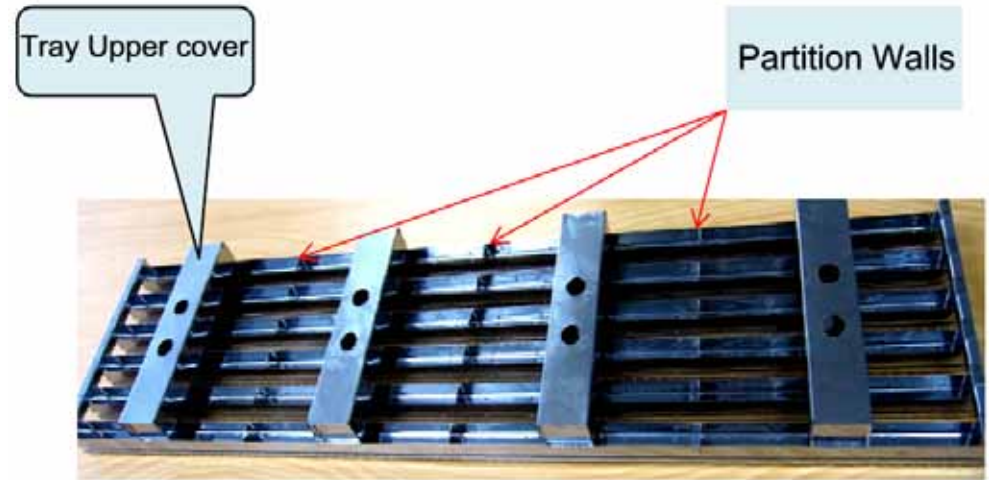
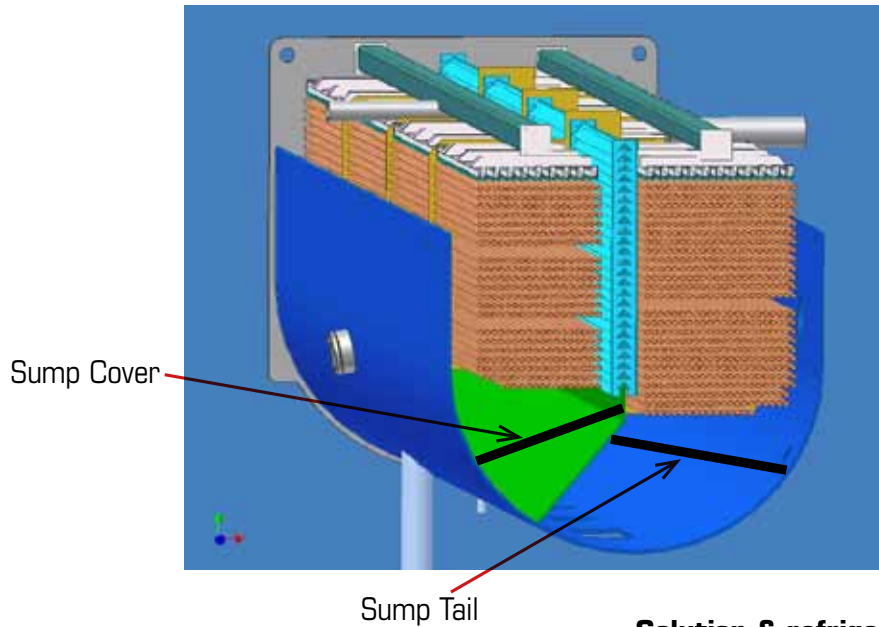


**Steam**



**Steam - Double lift**

## CONSTRUCTION



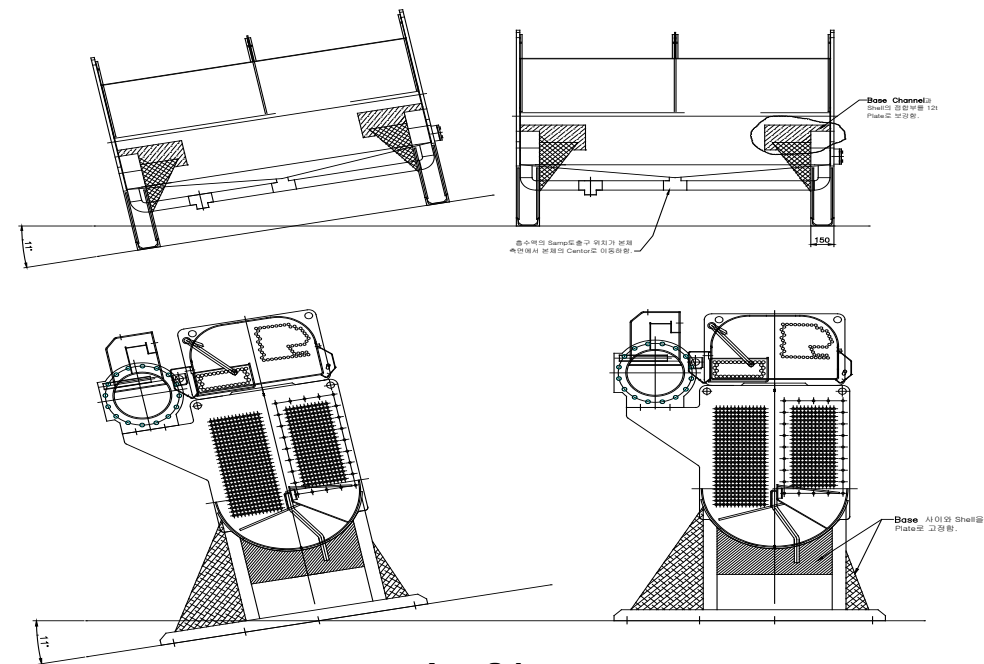
**Solution & refrigerant Storage and distribution system**

## SERVICE & MAINTENANCE

The system has a very little amount of rotating components (only refrigerant & solution pump) and requires therefore relative little service & maintenance. The most important part is to check if the system is air tight to prevent air entering into the system and reacts with the Litium Bromide, which will cause a corrosive reaction in the system.

We advise following maintenance schedule:

- 1~2 preventative maintenance visits per year, which consists of:
  - o Leakage testing
  - o Taking samples of the Litium Bromide
  - o Eventually adding remedial chemicals
  - o Cleaning of condenser (Only then the unit must be shut down)
- Refill of LiBr
  - o Experience has thought that the Litium Bromide should be refilled once every 10 years and shall be done by professional companies. The removed Litium Bromide shall be treated as chemical waste.



**Leg & base**

## Performance Data (typical steam)

Model		Unit	SWM60	SWM70	SWM80	SWM100	SWM120	SWM150	SWM180	SWM210	SWM240	SWM280	SWM320	SWM360			
Cooling Capacity		kW	176	211	246	281	352	422	527	633	738	844	985	1,125			
		usRT	50	60	70	80	100	120	150	180	210	240	280	320			
Chilled Water	Inlet/Outlet Temp.	°C	12 / 7														
	Flow rate	m <sup>3</sup> /h	30	36	42	48	60	73	91	109	127	145	169	194			
	P. Drop	mH <sub>2</sub> O	2.7	4.7	5.4	3.7	4.2	5.1	5.8	5.7	5.8	4.1	4.2	4.7			
	Connection	mm	80			100			125			150					
Cooling Water	Inlet/Outlet Temp.	°C	32 / 37														
	Flow rate	m <sup>3</sup> /h	55	66	77	88	110	132	165	198	231	265	309	353			
	P. Drop	mH <sub>2</sub> O	4.6	8.1	8.2	6.2	6.9	7.3	8.1	8.5	9.2	7.1	7.1	7.4			
	Connection	mm	100			125			150			200					
Steam	Inlet Pressure	MPa	0.6														
	Flow rate	kg/h	216	259	303	346	432	519	649	778	908	1,038	1,211	1,384			
	Inlet Connection	mm	40			50			65			80					
	Drain Connection	mm	25														
	Control Valve	mm	32			40			50			65					
Electric	Power source	-	3PH, 440V, 60Hz														
	Abs. Pumps	kW	0.2			0.3			0.4			0.4					
	Ref. Pump	kW	1.5			1.8			2.4			3.2					
	Purge Pump	kW	0.4														
	Control Panel	kW	0.2														
	Total Ampere	kW	2.3			2.7			3.4			4.2					
	Total Current	A	6.9			8.0			10.2			12.3					
Size	Length (L)	mm	2600			2,716			3,680			3,717			4,734		
	Width (W)	mm	1400			1,506			1,700			1,920					
	Height (H)	mm	1877			2,166			2,147			2,399					
Weight	Rigging	ton	3.5	3.6	3.7	3.8	3.9	4.9	5.2	5.9	6.4	7.4	7.8	9.6			
	Operation	ton	3.9	4	4.1	4.2	4.4	5.5	5.8	6.7	7.2	8.4	8.9	10.9			
Space for Tube Replacement		mm	1900		2400		2,400		3,400		4,500						





## Performance Data (typical steam)

Model		Unit	SWM400	SWM450	SWM500	SWM560	SWM630	SWM700	SWM800	SWM900	SWM1000	SWM1100	SWM1200		
Cooling Capacity	kW	1,266	1,407	1,582	1,758	1,969	2,215	2,461	2,813	3,165	3,516	3,868			
	usRT	360	400	450	500	560	630	700	800	900	1,000	1,100			
Chilled Water	Inlet/Outlet Temp.	°C	12 / 7												
	Flow rate	m³/h	218	242	272	302	339	381	423	484	544	605	665		
	P. Drop	mH <sub>2</sub> O	5.0	4.1	4.5	3.4	4.7	6.4	4.5	6.2	8.4	5.6	7.4		
	Connection	mm	150	200				250			300				
Cooling Water	Inlet/Outlet Temp.	°C	32 / 37												
	Flow rate	m³/h	397	441	496	551	617	694	772	882	992	1,102	1,212		
	P. Drop	mH <sub>2</sub> O	7.5	7.1	7.4	5.8	7.9	10.7	7.2	10.1	13.7	9.8	12.6		
	Connection	mm	200	250		300			350			400			
Steam	Inlet Pressure	MPa	0.6												
	Flow rate	kg/h	1,556	1,729	1,946	2,162	2,421	2,724	3,026	3,459	3,891	4,323	4,756		
	Inlet Connection	mm	80			100			125			150			
	Drain Connection	mm	40			50			65			80			
	Control Valve	mm	65			80			100						
Electric	Power source	-	3PH, 440V, 60Hz												
	Abs. Pumps	kW	0.4					1.5			7.5				
	Ref. Pump	kW	3.2			5.5				7.5					
	Purge Pump	kW	0.4			0.75									
	Control Panel	kW	0.2												
	Total Ampere	kW	4.2			6.5			7.6			10.0			
Total Current	A	12.3			18.3			20.9			30.7				
Size	Length (L)	mm	4,872	4,876		4,998	5,534	6,038	5,953	6,410	6,650	6,293	6,818		
	Width (W)	mm	1,920	2,138			2,344			2,631			2,829		
	Height (H)	mm	2,399	2,667			2,860			3,176			3,450		
Weight	Rigging	ton	10.1	11.6	12.0	16.1	17.5	18.9	21.1	23.7	26.2	28.7	31.3		
	Operation	ton	11.5	13.3	13.8	18.7	20.3	21.8	24.5	27.4	30.4	33.4	36.4		
Space for Tube Replacement	mm	4,500					5,200	5,700	5,200	5,700	6,200	5,700	6,200		

Alternatives available on request.

Owing to continued product development Heinen Hopman reserves the right to introduce alternations without prior notice.

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Heinen & Hopman encourages a more sustainable world. By providing eco-friendly solutions and services we offer our clients the option of reducing energy consumption and thus CO2 emissions. Visit [greenmanifest.info](http://greenmanifest.info) for more information.



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