

Absorption Chiller
RGQ-J



RGQ-J

EBARA-ALWAYS BENEFITING THE EARTH

EXHAUST & HOT WATER DRIVE ABSORPTION CHILLER

[HTTP://WWW.ERS.EBARA.COM/EN/](http://www.ers.ebara.com/en/)

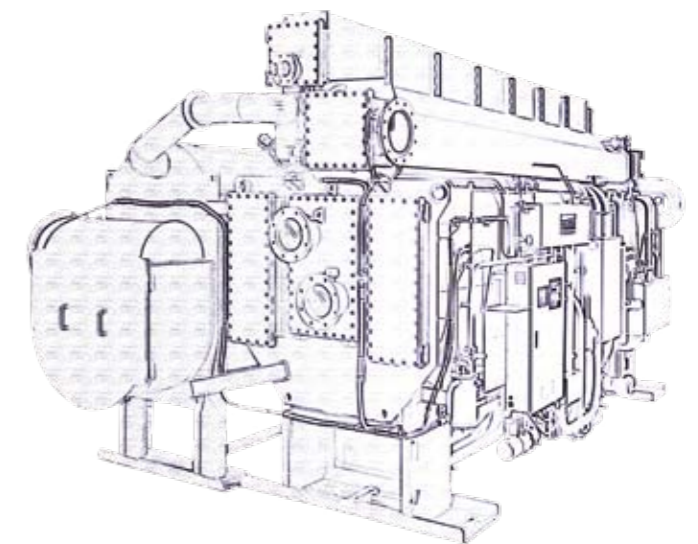
Cooling tower
Industrial blower
Electrical chiller
Absorption chiller

Absorption chiller

Electrical chiller

Industrial blower

Cooling tower



EBARA REFRIGERATION EQUIPMENT & SYSTEMS CO., LTD.

EBARA REFRIGERATION EQUIPMENT & SYSTEMS CO., LTD.

Ebara- An International famous brand
for Superior Environment
Friendly Products

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EBARA

ALL AROUND THE WORLD

AN ENVIRONMENTALLY FRIENDLY COMPREHENSIVE
ENGINEERING COMPANY

TRUST & EXPECTATION

BEYOND BOUNDARIES

Ebara All Around The World


EBARA Corporation

Ebara Corporation is one of the world's largest manufacturers of pumps, compressors, fans, heat pumps and other HVAC and refrigeration equipment. Since its establishment in 1912, Ebara Corporation has been fully dedicated to protecting the environment with a comprehensive and contemporary commitment. "Ebara-Always Benefiting the Earth" is the philosophy that guides Ebara corporate strategy.

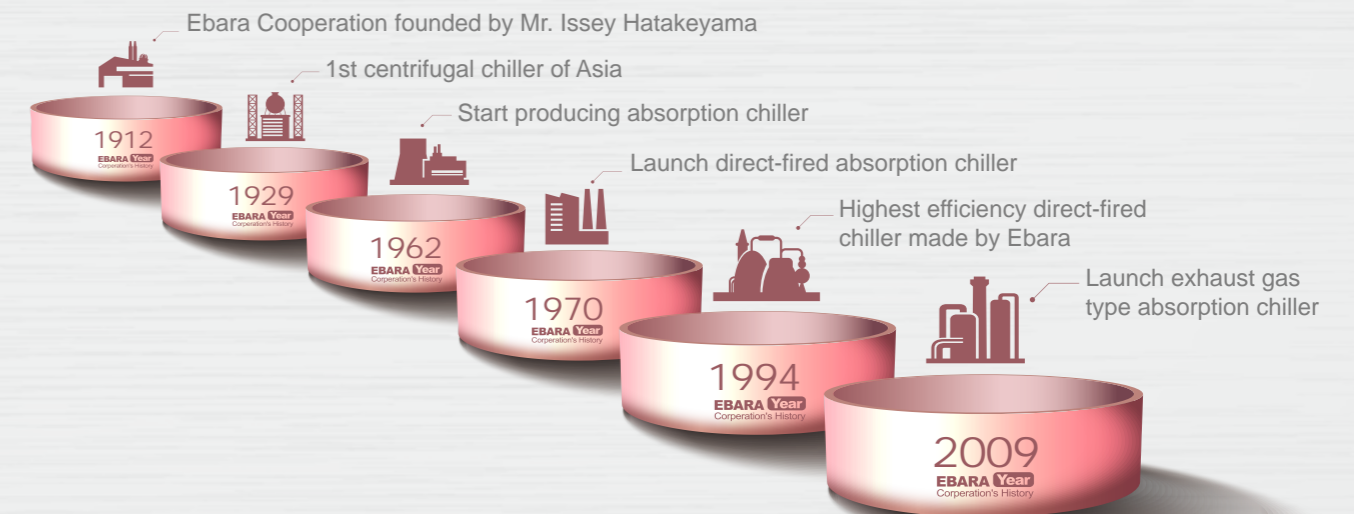


Yantai EBARA Company Profile

Yantai Ebara Air Conditioning Equipment Co., Ltd. established in 1996, is the only overseas production base of Ebara Japan for manufacturing air conditioning equipment including absorption heat pumps, absorption chiller (heat pump), centrifugal chiller (heat pump), screw chiller(heat pump), cross-flow (closed) type cooling tower, evaporative condenser, etc. Its products are exported to JAPAN and all over the world. Yantai Ebara always keeps up with the products and technology development of Ebara Japan.

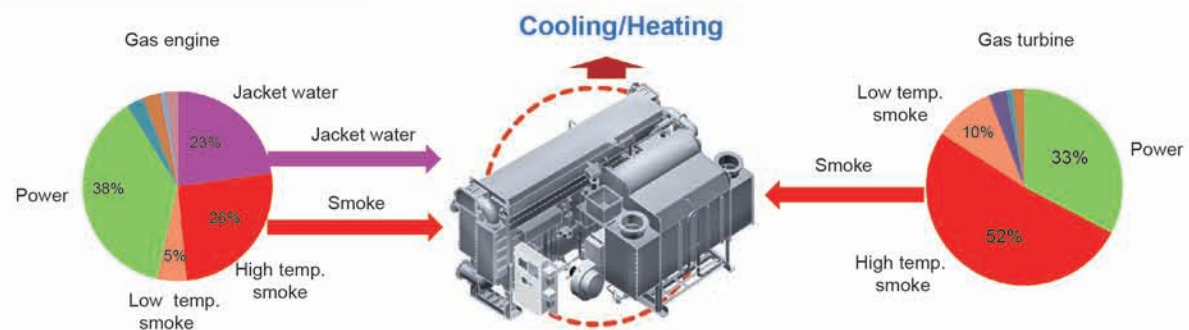
 <p>1962 Start producing absorption chiller</p>	 <p>1994 Highest efficiency direct-fired chiller made by Ebara</p>
 <p>1970 Launch direct-fired absorption chiller</p>	 <p>2009 Launch exhaust gas type absorption chiller</p>

Product Development History



RGQ-J ENERGY UTILIZATION P&ID

Energy Utilization P&ID



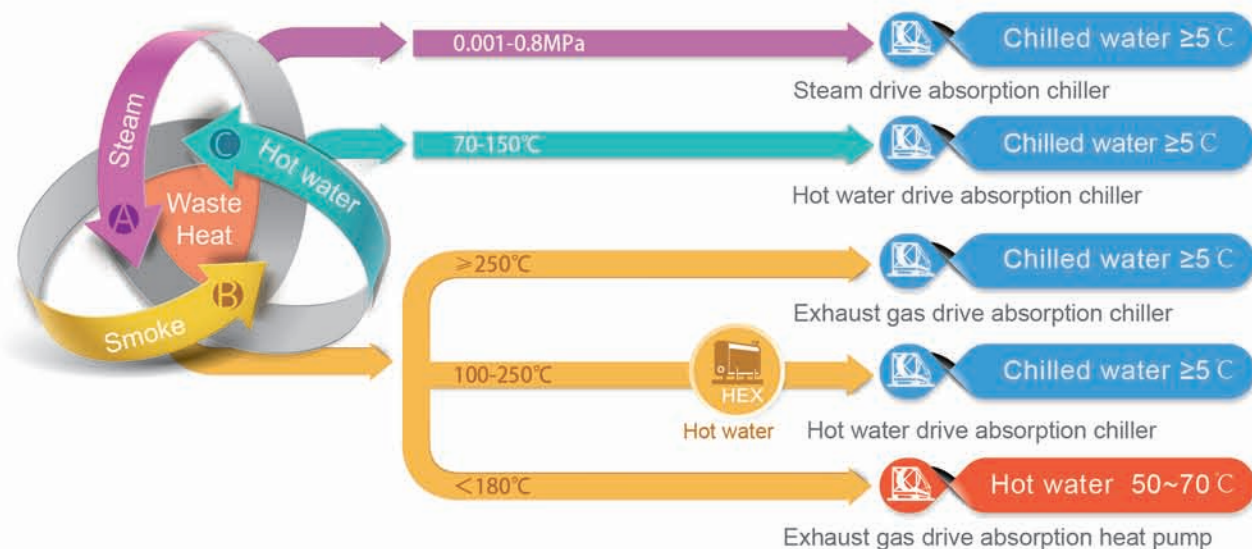
Ebara exhaust type ABS chiller

- Note 1. Low temp. smoke after absorption chiller is can also be utilized by absorption heat pump to generate hot water;
 2. Energy loss is about 8%, including generator loss, low temp. cooling water loss, lube loss ect.

- Note 1. Low temp. smoke after absorption chiller is can also be utilized by absorption heat pump to generate hot water;
 2. Energy loss is about 5%, including generator loss, low temp. cooling water loss, lube loss ect.

Utilize the hot water or high temperature smoke to generate chilled/hot water for air-condition, process cooling, ect.

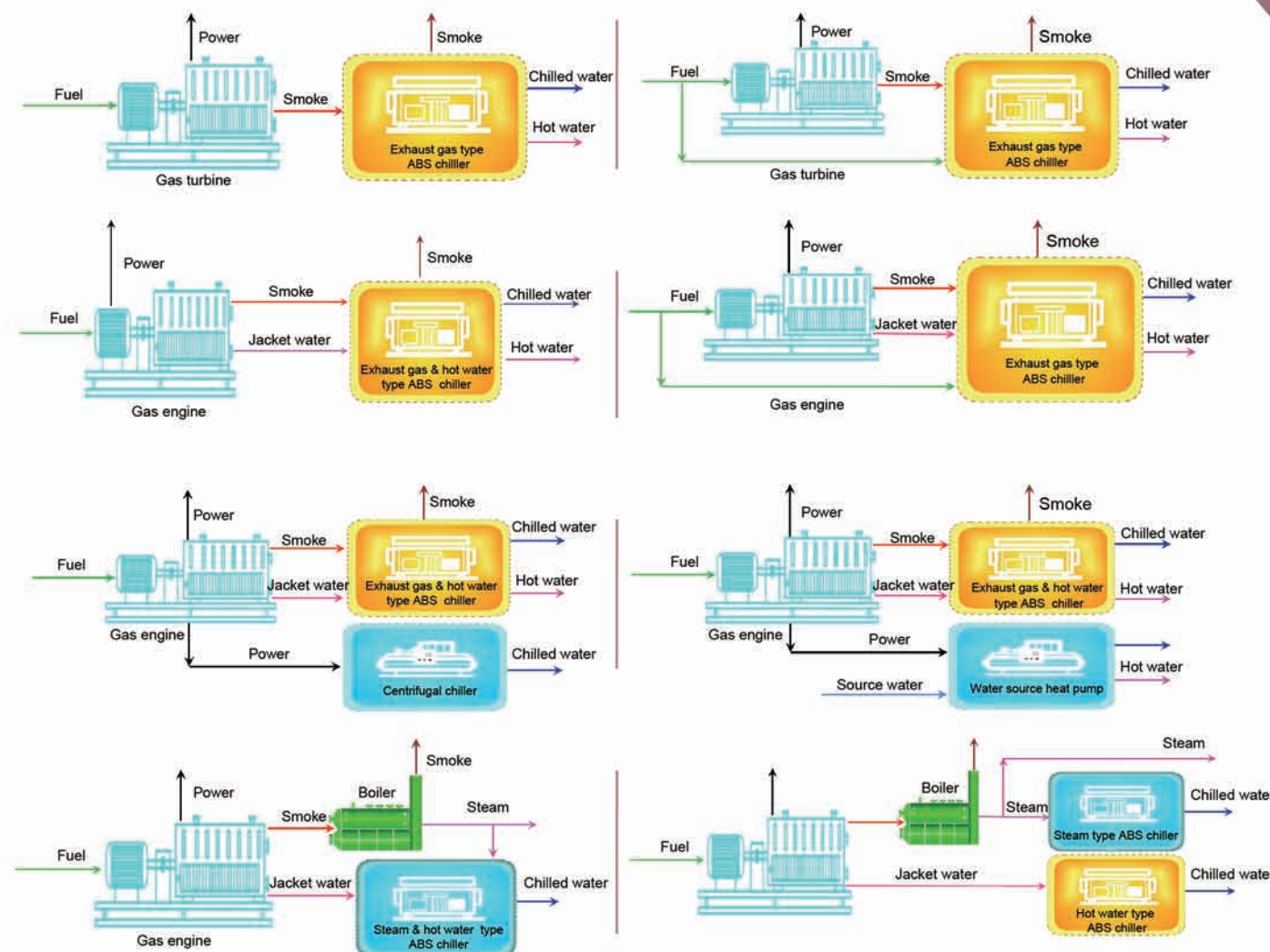
Waste Heat Utilization



Hybrid type absorption chiller: Hybrid type absorption chiller. Exhaust & hot water. Exhaust & natural gas, Exhaust & hot water & natural gas, Natural gas & hot water, Natural gas & steam, steam & hot water

APPLICATION FORM

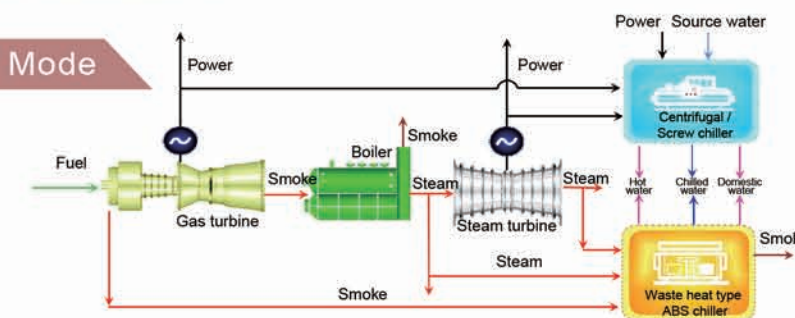
Typical Applications



Note Jacket water can also generate hot water through heat exchange, more details please contact local sales office or Ebara company.

Steam Turbine Combined Cycle Mode

Note This application form is suitable for natural gas power plant, it can provide chilled water, hot water, domestic water to client.

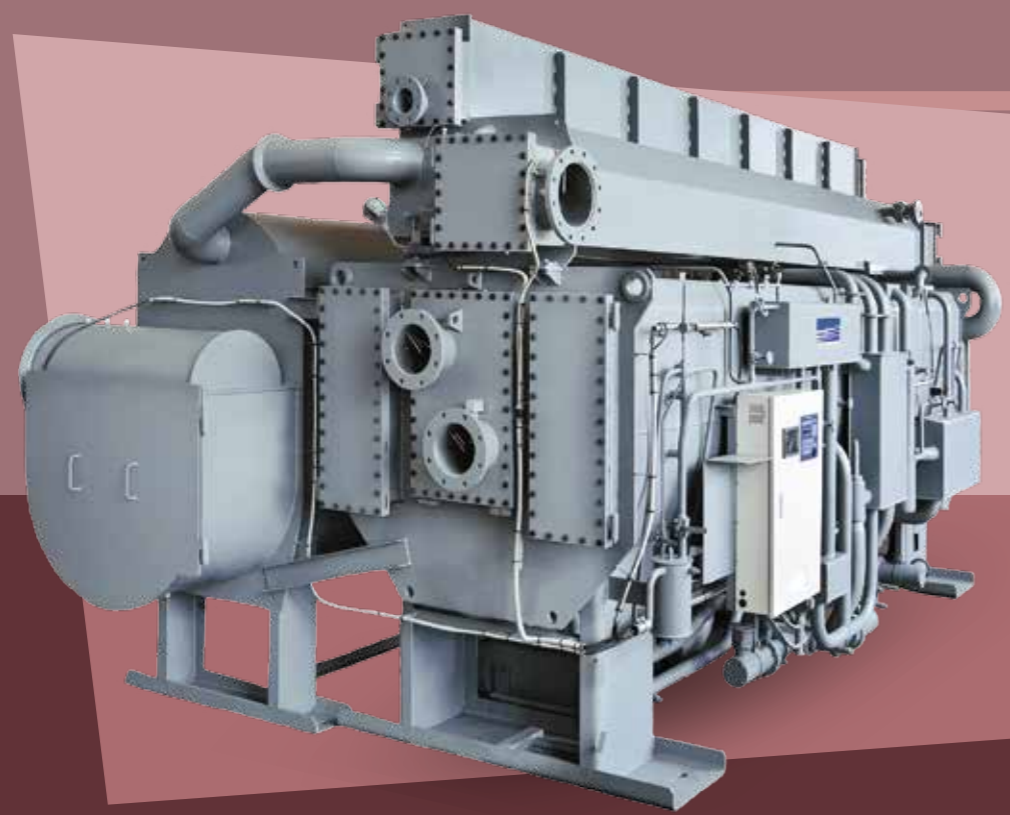


EXHAUST&HOT WATER ABSORPTION CHILLER

RGQ-J

PRODUCT FEATURES

Product Features



▶ RGQ-J Exhaust & hot water drive absorption chiller

Nomenclature

RGQ

Series

025

Nominal Capacity
250USRt

J

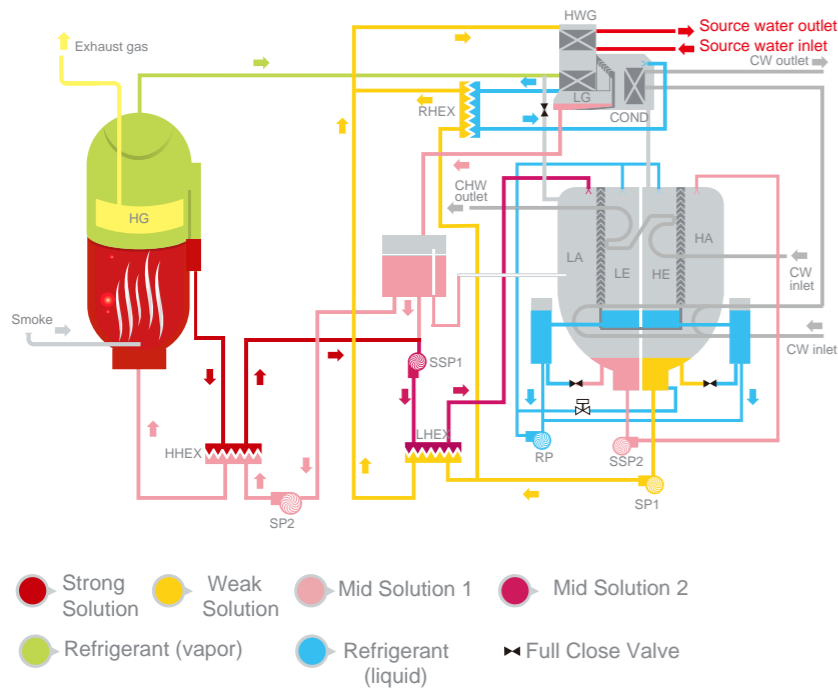
J: Exhaust & hot water
D: Exhaust & natural gas
JD: Exhaust & hot water & natural gas

- 
High Efficiency Make full use of system waste heat, energy saving, high efficiency, widely used in CCHP.
- 
High Intelligence Control System English color touch screen interface, visual display of running parameters, fault record, flow chart, performance curve, etc. EAasy operation, standard design of fault auto diagnosing, communication interface, chiller inter locking control, etc.
- 
Dilution Time Control According to the solubility concentration when stop machine, calculat optimum dilution operation time, reduce energy consumption. Min. dilution time is 5 minutes.
- 
Unique Reflux Circulation Flow Path Less heat loss, high efficiency, safe and reliable, can adapt to bad working condition.
- 
High efficiency of heat recovery Ebara chiller solution heat exchanger is plate type, can highly improve the heat recovery efficiency, reduce the temperature difference after heat exchanging and achieve high efficiency.
- 
Partial Load High Efficiency Solution pump and spray pump have VFD design, frequency is controlled by pressure difference, it is more more sensitive and more accurate, then improved the operation efficiency of partial load.
- 
Advanced Auto-purge System Advanced auto-purge device with new type of vacuum pump.
- 
Anti-crystallization Design Adopts many self-patented refrigerant level detecting devices to avoid crystallization of solution in evaporator. Auto de-crystallization system installed. Auto-diluting after power off.
- 
Low Pressure Spray Solution and refrigerant spaying is Ebara patented super low pressure spray nozzle technology, better pulverization, bigger wetting surface, increase absorption effect. Adopt canned pump as spraying force, avoid seal off possibility of spray nozzle.
- 
Dual Evaporater/Condenser High pressure evaporater/condenser and low pressure evaporater /condenser, when the evaporate temp. is higher, then the chiller efficiency is higher. Libr solution absorbs refrigerant more efficiently, less solution is required.
- 
Cooling&Heating RGQ-J can provide chilled water, hot water, domestic water.

RGQ-J

EXHAUST & HOT WATER ABSORPTION CHILLER
09/10

Cooling Principle



Refrigerant evaporate in evaporator to generate chilled water, and then refrigerant vapor goes into absorber, absorbed by strong solution. Solution pump drive this weak solution back to low temperature generator.

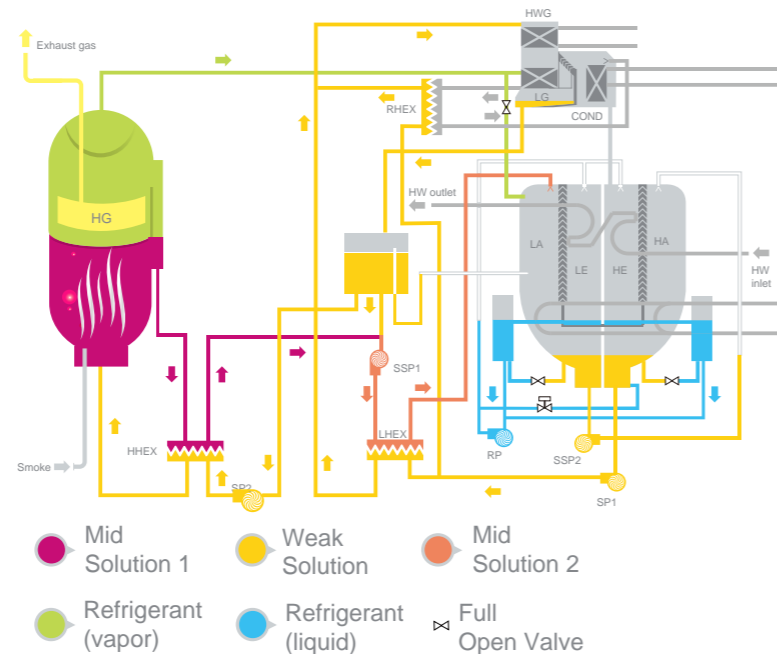
In this vessel, weak solution heated by hot water and vapor from high temperature generator to medium solution, the solution will be heated by smoke in high temperature generator becomes strong solution.

The strong solution is mingled with medium solution in high temperature heat exchanger, and then comes into absorber through low temperature heat exchanger to absorb refrigerant vapor from evaporator. Refrigerant produced in low temperature generator is cooled by cooling water in condenser to return to evaporator.

Heating Principle

Steam vapor from high temp. generator goes into evaporator, heat the hot water and become condensate water. Refrigerant mix with the mid solution from high temp. generator and become weak solution, then pumped to high temp. generator.

In winter, jacket water from gen-set get into plate heat exchange to get hot water for heating.

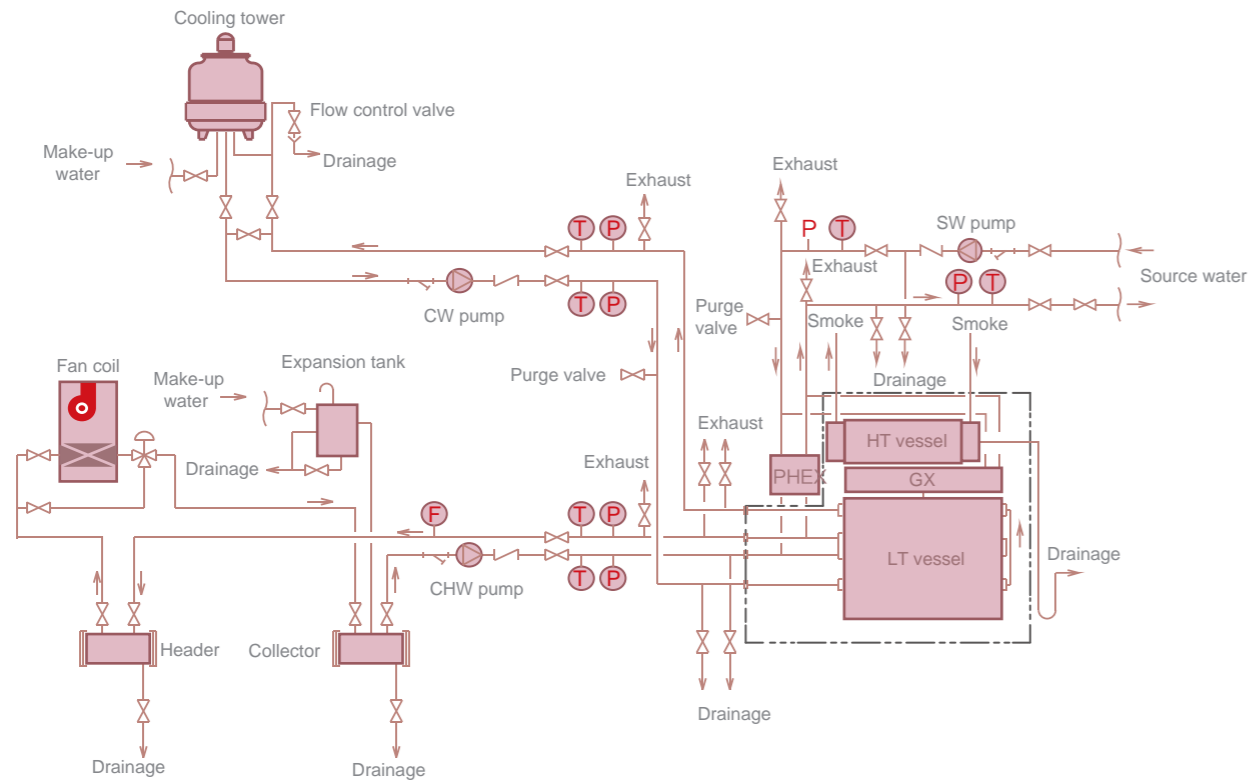


Performance Data

Model(RGQ-J)		Unit	015	018	021	025	028	032	038	040	045	050	058	066	083	100	120	135	150	166	182	200	
Cooling Capacity	RT	USRT	150	180	210	250	280	320	360	400	450	500	580	661	830	1000	1200	1350	1500	1660	1820	2000	
	10^4 kcal/h	10^4 kcal/h	45.4	54.4	63.5	75.6	84.7	96.8	108.9	121.0	136.1	151.2	175	200	251.0	302.4	363	408.2	453.6	502.0	550	605	
	kw	kw	528	633	739	879	985	1125	1266	1407	1583	1759	2040	2325	2919	3517	4220	4748	5276	5838	6401	7034	
Heating Capacity	10^4 kcal/h	10^4 kcal/h	27.1	32.6	38.0	45.2	50.6	57.9	65.1	72.3	81.4	90.4	104.9	119.5	150.1	180.8	217.0	244.1	271.3	300.2	329.1	361.7	
	kw	kw	315	379	442	526	589	673	757	841	946	1051	1220	1390	1745	2103	2523	2839	3154	3491	3827	4206	
Chilled/Hot water	CHW inlet temp.	°C	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
	CHW outlet temp.	°C	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
	CHW inlet temp.	°C	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	57	
	CHW outlet temp.	°C	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	
	Flow rate	m ³ /h		90.7	108.9	127.0	151.2	169.3	193.5	217.7	241.9	272.2	302.4	350.8	400	502.0	604.8	725.8	816.5	907.2	1004.0	1100.7	1209.6
	Pressure drop	mHzO		9.8	10.0	9.7	9.9	9.2	9.4	9.5	9.7	9.1	9.3	6.8	6.9	6.4	6.6	6.5	6.4	6.5	6.8	8.6	10.8
	Pass			4	4	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	
Pipe dia	mm		100	100	125	125	150	150	150	150	200	200	200	200	250	250	300	300	300	300	350	350	
Cooling water	CW inlet temp.	°C	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
	CW outlet temp.	°C	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	
	Flow rate	m ³ /h	145	174	202	241	270	308	347	385	434	482	559	637	800	963.8	1156	1302	1446	1600	1753	1927	
	Pressure drop	mHzO	8.8	9.7	8.8	9.4	7.7	8.0	8.4	8.7	7.8	8.4	11.0	11.6	11.0	15.0	11.5	10.6	11.4	14.7	13.6	17.0	
Pass			3+1	3+1	3+1	3+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1	2+1		
Pipe dia	mm		125	125	150	150	200	200	200	200	250	250	250	250	300	350	350	400	400	400	450	450	
Smoke Source water	Flow rate	kg/h	2532	3039	3545	4221	4727	5402	6078	6753	7597	8441	9792	11159	14013	16883	20259	22792	25324	28025	30726	33765	
	inlet temp.	°C	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	
	outlet temp.	°C	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	
	Pressure drop	mmHzO	165	165	170	170	175	175	192	192	187	187	190	190	196	196	206	206	210	215	215	230	
Pipe dia	mm	250	250	300	350	350	350	400	400	450	450	500	500	600	700	700	700	800	800	800	900		
Source water	Flow rate	m ³ /h	15.6	18.7	21.8	25.9	29.1	33.2	37.4	41.5	46.8	51.9	60.1	68.5	86.1	103.8	124.4	140.4	155.7	172.5	188.5	207.4	
	inlet temp.	°C	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	
	outlet temp.	°C	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	
	Pressure drop	mHzO	7.5	7.5	7.6	8.0	7.8	7.8	8.2	8.3	7.9	8.0	7.4	7.7	8.4	8.7	8.6	8.7	8.5	7.6	7.4	7.3	
Pipe dia	mm	50	50	50	65	65	65	80	80	80	80	100	100	100	125	125	150	150	150	150	200		
Electrical	Power	V×Hz×p	380×50×3																				
	Power capacity	kVA	10.8	10.8	10.8	11.9	11.9	15.7	16.8	16.8	18.8	18.8	24.7	24.7	30.5	31.1	36.4	41.9	41.9	51.9	51.9		
Dimension	Length	mm	4180	4180	4230	4060	5280	5300	5300	5360	5360	6215	6320	7505	7575	7600	7750	7750	8660	9050	9300		
	Width	mm	2299	2373	2431	2691	2665	2700	2861	2891	2980	3069	3774	3926	4157	4658	4800	5102	5394	5450	6280	6320	
	Height	mm	2280	2330	2415	2500	2430	2570	2650	2765	2885	2970	3280	3370	3565	3700	3960	4245	4375	4450	4800	4850	
Weight	Max. shipping weight	ton	5.5	6.0	6.7	7.2	8.4	9.4	10.2	11.1	12.3	13.0	22.9	29.7	22.4	25.1	22.0	23.6	26.7	30.9	33.1		
	Total shipping weight	ton	6.7	7.5	8.3	9.0	10.6	11.9	13.0	14.1	15.6	16.6	28.0	36.2	42.0	49.5	60.6	67.4	76.4	83.0			
	Operating weight	ton	7.2	8.0	9.0	9.9	11.6	13.0	14.2	15.4	17.1	18.3	28.0	40.9	47.7	56.3	62.7	69.2	77.3	86.5			

- Note
1. Fouling factor for chilled water, hot water, cooling water, source water is 0.0001 m² h² / (kcal{0.086 m² k/kW}).
 2. Selection will change depend on source water/smoke condition, for more details, please contact local sales office.
 3. Maximum working pressure for chilled water, hot water, cooling water, source water side is 1.0MPaG.
 4. Chilled water, hot water, cooling water flow rate regulating range : 50~120%.
 5. Minimum cooling water inlet temp. is 15°C, minimum chilled water outlet temp. is 5°C.

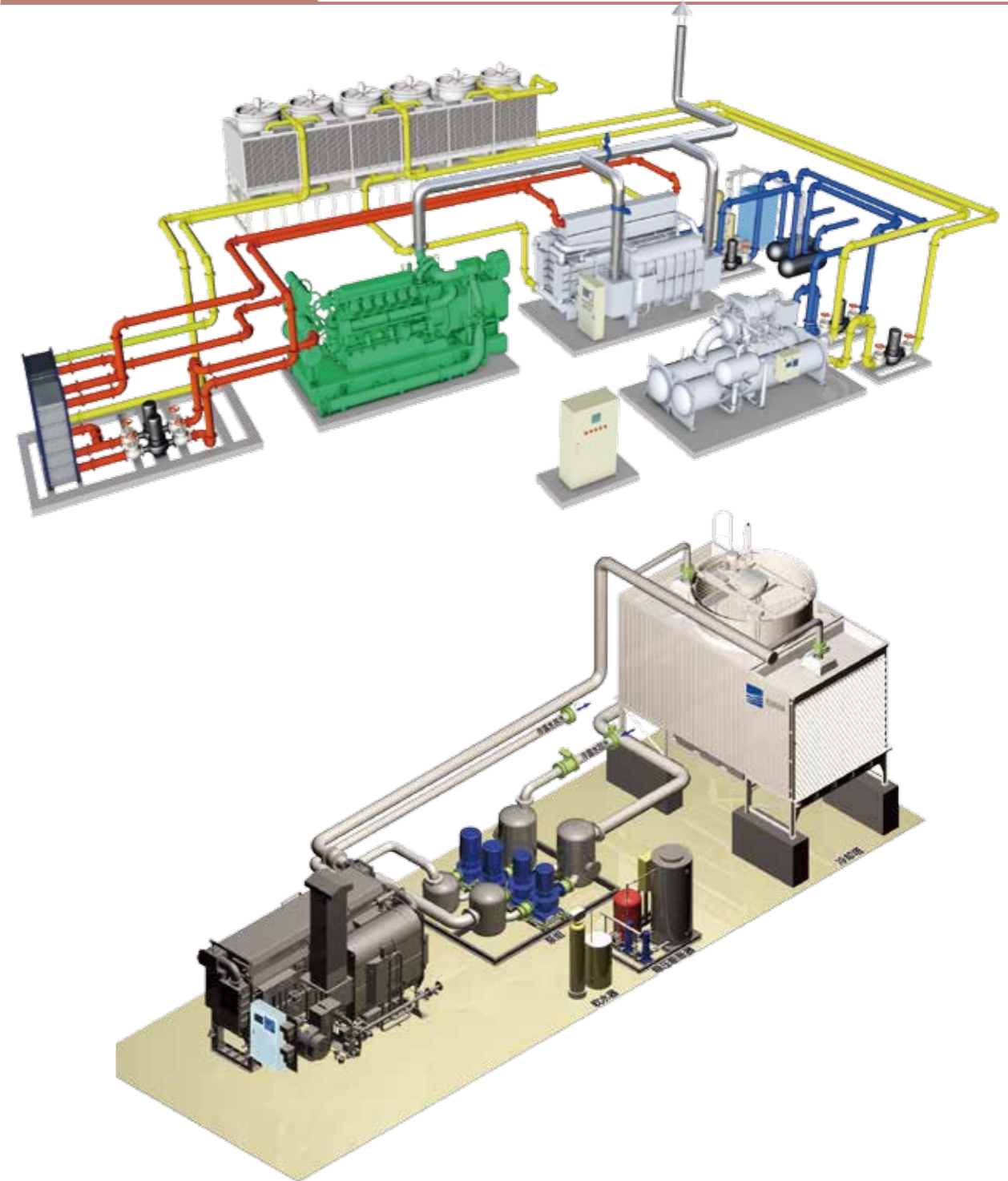
System P&I



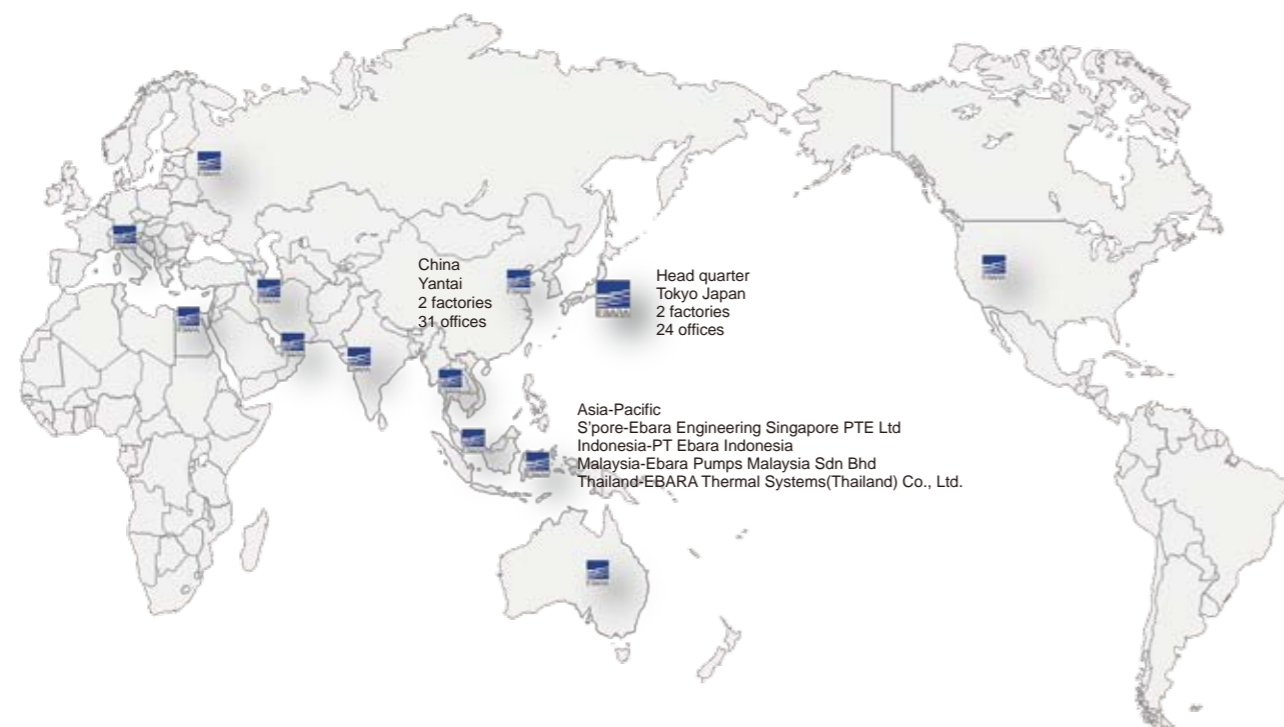
- Sign**
- P Pressure sensor
 - T Temp. sensor
 - F Flowmeter
 - Filter
 - Cut-off valve

- Note**
1. Within is the standard supply scope.
 2. The diagram show the typical piping system without standard supplyscope, just for reference.
 3. Water piping construction, please refer to the right side drawing.
 4. A 10 mesh strainer is requested for both chilled water and cooling water at 2 meters before water inlet of the chiller.

CCHP System P&ID



Service Network



1 Profession

- ▶ Ebara supply technical support for each chiller during its life span. We can remotely monitor our chiller operating by internet technology, analyzing the chiller real-time operating data and save them in the data base.

3 Convenient

- ▶ With its world-wide service network, Ebara guarantee the most convenient and fast service for all our customers.

2 Intimate

- ▶ Since its first chiller sales in the international market, Ebara has been trusted by our customers by advanced technology and excellent after-sales service, we have established true friendship between customer and Ebara. Ebara visit customers regularly to check the chiller operating status, and hold customer training of operating in both theoretical and practical.

4 Trust

- ▶ In China central air conditioning market, Ebara was voted to be the Top one manufacturer of "Brand Reputation" and "Customer Satisfaction".

INSTALLATION INSTRUCTION

Installation Instruction

Foundation

1. The chiller operating weight should be evenly distributed on the contact surface of foundation;
2. Foundation must be fixed with anchor bolts. Anchor bolts and metal gaskets are optional;
3. Foundation should be waterproof, better for chiller maintenance;
4. Set the water drain gouge around the chiller.

Transportation

1. Select right size lifting crane according to the chiller weight;
2. During transportation, the heat pump should be lifted up/down horizontally;
3. Please avoid collision with other objects around, especially the chiller front side, where there are a lot of pipes and meters;
4. For split lifting, please lift the part which will be installed further to the entrance.

Installation

1. Select well-ventilated place as machine room, ventilation device should be installed in the machine room;
2. Do not select place where is too moist or dusty, that may cause electrical failure for the chiller, so please avoid that.;
3. Keep the machine room temperature is above 0℃, if less than, it need special design;
4. Keep the machine room temperature less than 40℃;
5. Pay attention to the machine room lighting, convenient for regular monitoring and maintenance checking;
6. Machine should be installed at place easy to drain water;
7. The chiller levelness, the shell length direction and width direction, all should be within 1/1000. (Please refer to drawing 1);
8. During installation, use the steel gasket to look for a horizontal vertical degree;
9. For chiller dimension drawing, the tolerance is +20mm, -10mm;
10. Please refer to the dimension drawing and foundation drawing, and make sure there is enough space around the chiller for maintenance (At least 1m around and 0.2m on the top) and tube drawing. ;
11. Please be sure the chiller is far from the combustible part of the building or any combustible objects. Please follow the related regulations.

Pipe Work

1. Please refer to the dimension drawing for the cooling water inlet pipe direction; the standard design is at right side when we face the operating panel. If reverse, please contact Ebara before fabrication. For the flange connection location and diameter, please refer to the dimension drawing and specification.
2. Cooling water piping between absorber and condenser will be installed in Ebara factory.
3. For chilled water pipe direction, please refer to outline drawing.
4. During designing the installation position of chilled/heating water pump, cooling water pump, expansion tank, please consider the precondition of static water pressure and pump water head, the pressure to both chiller/heating water and cooling water cannot be over the Max. Working pressure. If the pressure is over standard data, the chiller should be special designed, so please confirm the specification before fabrication.
5. To keep the water flowrate stable, each chiller should be installed with specialized chilled water pump and cooling water pump.
6. A 10 mesh strainer is requested for both chilled water and cooling water inlet.
7. Please install pressure gages and thermometers at the chilled water inlet and cooling water inlet. And, in order to ensure the control stability, the chilled circle water storage volume should be at least 5 times than the volume of one minute circulation.
8. For chilled water and cooling water piping, please set vent valve above absorption chiller water chamber, set drain valve at lowest point.
9. There are release connection plinths at the evaporator and condenser water box (Rc3/4 internal thread). Install the on/off valve to use it, and pipe it to the water drain gouge.
10. If the cooling water temp. is below 15°C, please control the cooling water temp. E.g., use the cooling tower fan on-off to control cooling water temp., please use the cooling tower fan interlock function through chiller control panel.
11. Please install the cooling water drainage regulation valve at the cooling tower inlet piping.
12. Prepare water source for tube cleaning.
13. No load-bearing on the chiller water flange connections, install support frame under them.
14. In winter, please avoid water freezing after chiller shut down, especially for cooling water, please drain water out of chiller through the connection plinths at the absorber water box. Clean the heat transfer tube for cooling water during water drainage.
15. During heating operating, the surface temperature at the absorber water box connection flange may reach to more than 80°C. Please use plating tube and do the heat resistance treatment.
16. Install soft connecting pipe for the chiller water pipe connection points.
17. When testing the water pressure of chilled/heating water and cooling water, please make sure the testing pressure is less than the stamped testing pressure on the water box flange, furthermore, if use pneumatic pressure test at that time, it will be very dangerous if the broken fragment fly around.

INSTALLATION
INSTRUCTION

Flue Gas System

1. To be convenient for operating and maintenance, please install natural gas meter for each chiller.
2. Customer should prepare the flange which connect chiller to flue pipe, and for the retaining bolt please choose full thread type.
3. The flue pipe size should be bigger than the chiller exhaust outlet pipe. Avoid acute angle bending or area change sharply, be sure there is no eddy current and no back pressure.
4. Flue pipe should be designed horizontally as far as possible to reduce the bending part. For flue diameter and chimney height design, please consider the chiller smoke static pressure at the pipe outlet is near 0 kPa, the difference of ventilation air and smoke resistance should be more than 0.049kPa. If ventilation air pressure change too much, please set the ventilation regulation device, please consider the differences in winter and summer.
5. The horizontal flue should have 1/18 of ramp up, in addition, at the bend area, in order to reduce the ventilation resistance, please try to use smooth transition.
6. The flue pipe and chimney should be only for the absorption chiller. (Sharing the flue with other equipment, may cause troubles in smoke drainage). For flue tube with more than one chiller, please be sure the ventilation ability is high enough to avoid smoke upstream to the non-operating chiller. Please install on/off valve if necessary.
7. Flue pipe and chimney should be stainless steel (1Cr18Ni9Ti ect.), galvanized iron plate, or hot rolled steel. The thickness need to be above 4mm. Since the flue may vibrate and make noise if the rigidity is insufficient.
8. Please set water drainage hole at the bottom and middle of the flue and chimney to avoid condensate water flow into chiller connection part. In addition, the hole should be covered and easy for cleaning of the chimney.
9. There are drainage connection plinths at the generator smoke box (Rc 3/4 internal thread). Ins tall the on/off valve to use it, and pipe it to the water drain gouge.



RGQ-J

INSTALLATION INSTRUCTION

Installation Instruction

Flue

- For flue or chimney go through the wall, or ceiling light building part, please make it to heat resistance and fire resistance structure(use non-combustible materials like concrete, asbestos board, lime slurry, etc.)
- Both the flue pipe and chimney need to be heat insulated to avoid machine room temperature increasing or scald damage, the heat insulation material should be non-combustible. And the chimney heat resistance temperature should be Max.350 ℃.
- The chimney should not weight on the chiller. Please consider the heat expansion of the chimney and flue pipe, be sure there is no rain water flow in and no leakage at the connection part. Anti-vibration procedures should be installed.
- The chimney opening should be more than 1m far from the machine room, or at least 3m far from the window or door.
- The chimney opening should be at least 0.6m higher than the building.
- The chimney opening or exhaust drain pipe opening should be far away enough from the air inlet of the cooling tower and fan coils.
- The chimney opening should be special designed to avoid rainwater in and not blocked by wind.
- The chimney should be installed with lightning rod or grounding.
- Please install the silencer if the chimney is too noisy.
- Please follow the local law and regulations for chimney and flue pipe.

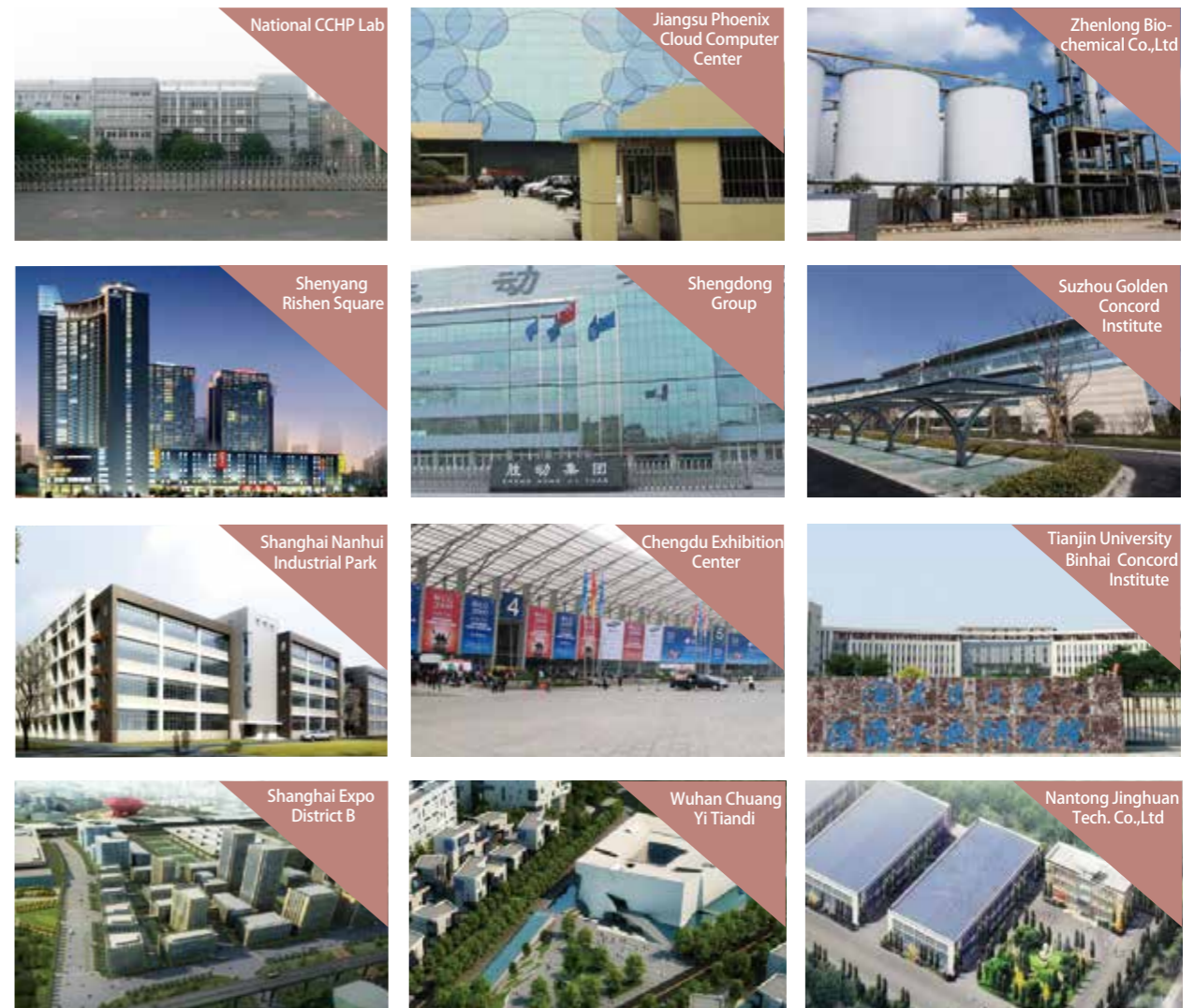
Requirement Of Water Quality

Item	Cooling water		Chilled water		Tendency	
	Circulating water	Make-up water	Circulating water	Make-up water	Corrosion	Fouling
PH[25℃]	6.5-8.0	6.0-8.0	6.8-8.0	6.8-8.0	—	—
Conductivity[25℃](μS/cm)	< 800	< 200	< 400	< 300	—	—
Cl-(mgCl-/L)	< 200	< 50	< 50	< 50	—	—
SO42-(mg/L)	< 200	< 50	< 50	< 50	—	—
Acid consumption[PH4.8] (mgCaCO3/L)	< 100	< 50	< 50	< 50	—	—
Total hardness(mgCaCO3/L)	< 200	< 70	< 70	< 70	—	—
CaCO ₃ (mg/L)	< 150	< 50	< 50	< 50	—	—
SiO ₂ (mg/L)	< 50	< 30	< 30	< 30	—	—

- In order to keep the chiller work effectively in long term, the water quality should be guaranteed. The data below show the reference value for chilled water and cooling water. During daily operating, please manage the water quality within the reference value.
- The reference value is based on GB/T18431-2013, just for reference.

JOB REFERENCE

Job References



EXHAUST & HOT WATER ABSORPTION CHILLER

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