

Low Temperature Hot Water Driven Absorption Chiller

200 TR to 1640 TR (700 kW to 5765 kW)

COP 0.81



Absorption Cooling & Heating Solutions

Sustainable Solutions in Energy & Environment

Thermax is a USD 750 million engineering major providing sustainable solutions in the areas of energy and environment. Spanning over 90 countries, customers make use of Thermax's business-to-business solutions for heating, cooling, power and cogeneration plants; waste heat recovery units; systems for water & wastewater management and air pollution control; performance improving chemicals.

Thermax's operations are supported by ongoing Research & Development and also with tie-ups from global technology majors. With an international sales & service network spread over 27 countries, Thermax also has its state-of-the-art manufacturing facilities in 14 locations including India, Poland, Indonesia, Denmark & Germany.

Our Vision

To be a globally respected high performance organization offering sustainable solutions in energy and environment

We heat, we cool, we power and we clean

Thermax, an engineering company providing sustainable solutions in energy and environment, has the vision for the future, firmly anchored in the belief that to stay competitive, companies need to adopt sustainable development practices.

The systems, products and services developed by Thermax help industries achieve better resource productivity and improve bottom lines, while maintaining a cleaner environment. Even in the conversion of costs to profits, Thermax helps to protect the environment in its own way. A win-win for industry and the society at large.

Thermax's business portfolio includes products for heating, cooling, water and waste management, and specialty chemicals. The company also designs, builds and commissions large boilers for steam and power generation, turnkey power plants, industrial & municipal waste water treatment plants, waste heat recovery systems and air pollution control projects.



Thermax Cooling Business

With over 50 years of expertise in the field of Thermodynamics, Thermax helps extract even the last calorie available at your facility. Solutions in the form of absorption chillers, heat pump, chiller-heaters, composite chillers, ultra low pressure vapour chiller & multi energy chillers are used in more than 100 applications and over 50 industrial segments for air conditioning, industrial cooling and heating.

Thermax absorption chillers cater to industrial-cooling, commercial air-conditioning as well as industrial and space heating needs. Thermax's USP lies in identifying the unused heat available at your plant and provide recovery based or live energy based solutions to optimize energy thus reducing your operational cost.

Thermax offers solutions from -40°C to 180°C by utilizing hot water starting from 80°C vapour or steam from 0 bar(g) onwards, flue gases from engine & turbines from 270°C onwards and a variety of liquid & gaseous fuel.

Thermax has helped clients with eco-friendly air-conditioning and process cooling solutions to reduce

their carbon footprints. Thermax has a global presence in 90+ countries across Asia Pacific, Africa, Middle East to CIS countries, USA and South America.

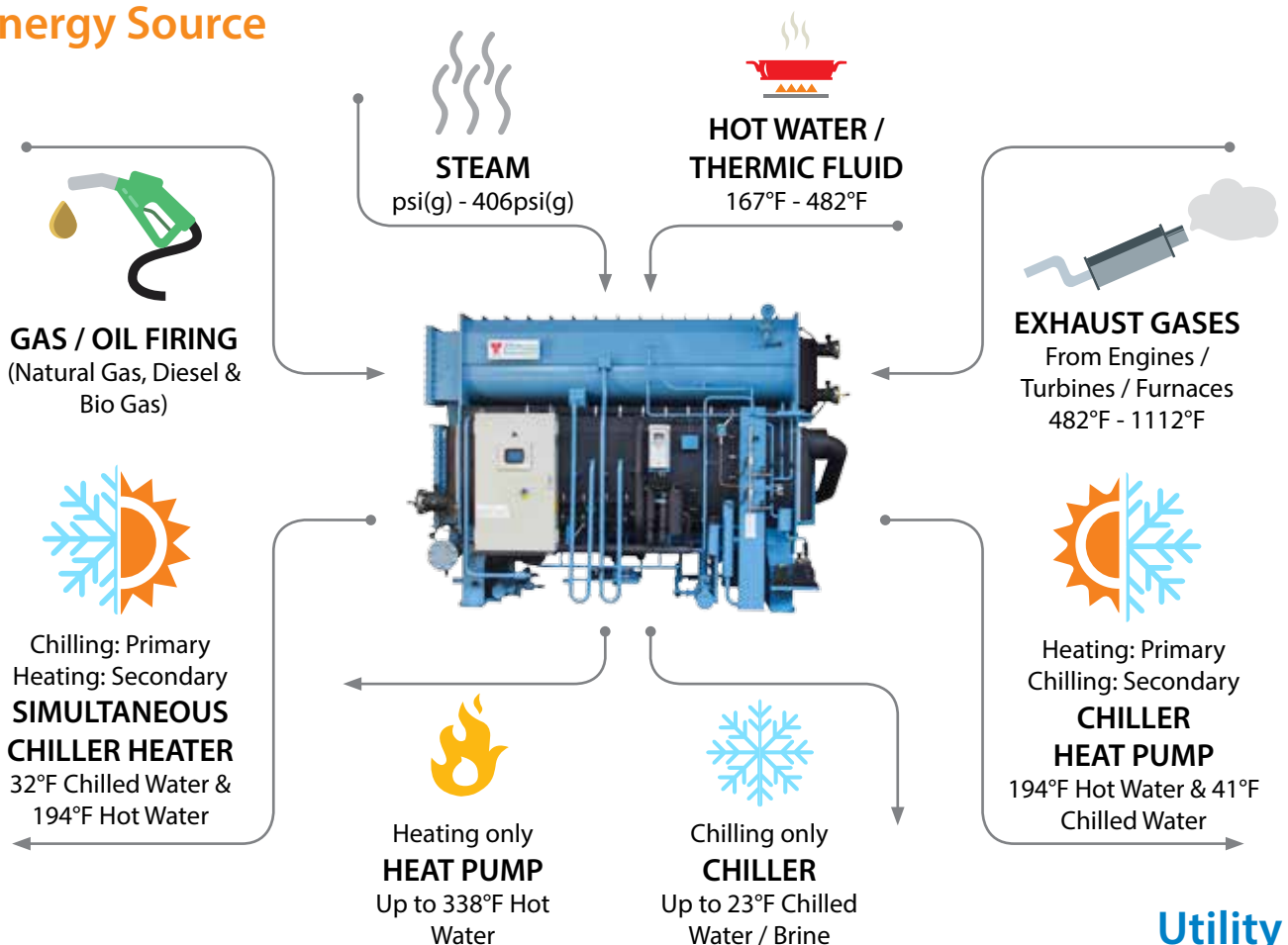
Thermax offers solutions to a wide array of industrial segments including pharmaceuticals, chemicals, fertilizers, steel, textiles, petrochemicals, food & beverages, commercial complexes, shopping complexes, office buildings, educational institutes, and airports among others.

Solutions offered by Thermax are differentiated by:

- Reduction of operational cost
- Reduction in electricity consumption
- Reduction in the GHG emissions, zero ozone depletion potential

Thermax's unique heating & cooling solutions accommodate a wide range of industrial & commercial applications across the globe. These solutions deliver high efficiency, cost effectiveness & are environment friendly.

Energy Source



Manufacturing Excellence

Inaugurated in early 2019, Thermax's manufacturing facility at Sricity, Andhra Pradesh is a state-of-the-art IGBC platinum certified green factory building and has been designed focusing on process automation, mechanisation and digitisation. This smart facility is equipped with best in class machinery and is a big step towards automation to facilitate zero-defect processes ensuring superior quality products. Critical processes such as welding are carried out with robots and CNC machines carry out the precision machining activities. Fabrication processes are mechanised using specially

designed fixtures. Entire manufacturing records are digitised for real time updates using MES software. Engineering design automation using 3D drawings, Cloud computing and MES have enabled this plant to employ contemporary technologies and follow the path of Industry 4.0 principles. The plant is equipped with a Welding Training Centre to hone the skills of operators. Products upto 3000 TR capacity can be tested for performance at its digitally controlled test bay facility. This infrastructure is created to deliver best in class quality output.

Certifications

Recognized by global standards





Salient Features

Best-in-class Coefficient of Performance

Process design to ensure maximum internal heat recovery to give the lowest energy consumption benefit to the customer. Unique 'Twin Design' ensures optimum solution circulation rates, delivering highest possible COP.

Two Stage Absorption Technology

Heat input is one of the lowest in the industry, resulting in higher cooling output from the same heat input. Also, larger temperature difference in chilled water up to 86°F is possible.

Heat Recovery at Lower Temperature

Due to two stage absorption, the resultant solution concentration is low, which helps to recover heat by cooling hot water to a much lower temperature. This helps to achieve high temperature difference in hot water.

Multi-Level Spray in Generator

To improve the heat transfer in generator at lower temperature, multi-level spray system is provided. This ensures uniform spray and wettability of generator tubes

Highly Efficient Online Purge System

Factory fitted high efficiency purge system with subcooler, continuously removes non-condensable gases from the chiller into the storage tank. The rate of removal of non-condensable gases is highly improved by the independent purging from different circuits. The purge system comes fitted with an absolute pressure transmitter for precise vacuum measurement.

Plate Type Solution Heat Exchanger

The regenerative heat exchanger used is high efficiency plate type heat exchangers with SS316 plates, for improved reliability and maximum internal heat recovery.

Multi Stage Level Control

Multiple stage level control of evaporator and absorber enables effective operation during part load preventing cavitation of refrigerant and absorbent pumps. This level control system is also capable of detecting the ingress of process fluids from external circuits, maximizing uptime and minimizing maintenance cost.

Gravity Feed LiBr & Refrigerant Spray System

Nozzle-less, non-clogging gravity feed distribution mechanism for stable and reliable operation throughout the life of the machine. Drop in performance due to nozzle wear and clogging eliminated

10-100% Stepless Modulation

For cooling loads ranging from 10% to 100% of the designed capacity, the steam/hot water control valve automatically varies heat input in order to maintain the temperature of chilled water leaving the machine. An advanced PID control system continuously monitors and controls the process parameters to ensure steady temperature.

Isolation Valves for Canned Motor Pumps

The canned motor pumps fitted on the chiller are time tested and offer high degree of durability. Double seal isolation valves on the suction and discharge lines along with bolted pumps facilitate easy maintenance of the canned motor pumps without any loss of vacuum in the system. This significantly eases the maintenance process and reduces the down time of the machine.

Lowest Chilled Water and Brine Temperatures

Our innovative absorption chillers can deliver chilled water temperatures down to 33.80°F leaving chilled brine solution up to 33.80°F. This allows use of low grade heat for low temperature applications, saving precious electricity.

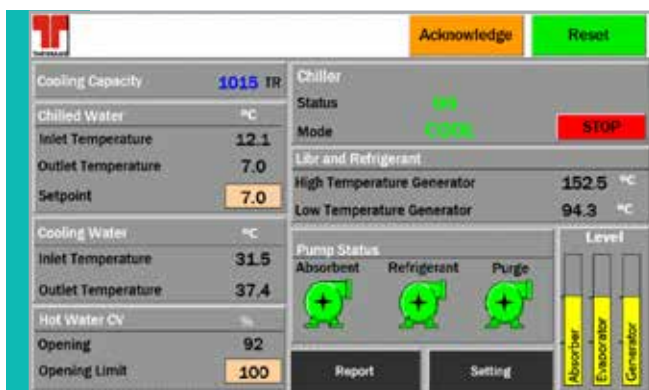
Non-Toxic Corrosion Inhibitor

New generation, non-precipitating, non-toxic molybdenum-based corrosion inhibitor which is more effective than conventional inhibitors based on Chromate and Nitrate. Chromates are known to have health hazards and are prohibited in several countries. Nitrates tend to disintegrate to release ammonia, which corrodes copper and copper alloys.

DLP Grade Copper Tubes

Copper tubes conforming to ASTM/JIS standards, with phosphorus content maintained below 0.005 ppm are used in chilled water and cooling water circuits. This protects the tubes from undergoing hydrogen embrittlement in LiBr environment

PLC based Control Panel



Thermax chillers are controlled through a standalone skid mounted control panel. The backbone of the control system is an advanced Programmable Logic Controller (PLC), sourced from globally respected manufacturers. This makes it possible to customize the controls and safeties based on customer's process requirements. A facility which is not possible with microprocessor-based control systems. Special RTD cards are used for temperature measurement to ensure high level of accuracy.

Online Pump Health Monitor

The chiller PLC continuously monitors the health of canned motor pumps and informs user of any impending maintenance requirement.

Zero Crystallisation

Distinctive concentration monitoring and control which operates along with auto de-crystallization system, virtually eliminates crystallization. The chiller PLC continually monitors strong solution concentration, takes proactive measures to prevent crystallization. In addition to this heat input to the chiller is limited based on cooling water inlet temperature. This helps the machine to operate even at low cooling water inlet temperature without crystallization.

Redundant Chilled Water Flow Safeties

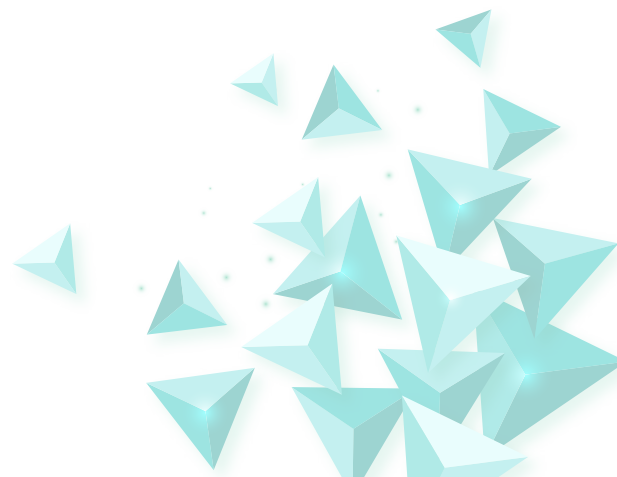
Chilled water circulation is critical to prevent water from freezing inside chilled water tubes. Redundancy in chilled water flow detection is provided by the use of a flow switch, differential pressure switch and chilled water pump run interlock.

Fail Safe Control Valves

The electro-pneumatic steam/ hot water control valves are designed to close immediately on power or signal failure to ensure reliability and equipment uptime. Option of fail-safe electric control valves are available on request.

BAS/DCS Connectivity

Direct connectivity of machine PLC panel with Third party monitoring systems like BAS (Building Automation System), DCS (Distributed Control System) or PLC (Programmable Logic Controller) can be provided via Modbus RTU protocol on RS485 network.



Customised Solutions

LiBr Absorption Chillers for Sub-Zero Cooling Applications

Lithium bromide absorption chillers can be offered for leaving brine temperatures as low as 140°F, offering great savings in operating costs.

Stand-by Pumps

For critical applications where scheduled maintenance of pumps cannot be carried out, stand-by absorbent, refrigerant and/or vacuum pump can be provided.

Fully Automatic Purging

The automatic purging system eliminates the need for periodic monitoring of purge tank pressure and operation of purge system.

Multi Sectional Shipment Arrangement

For convenience of shipping, the absorption chillers can be shipped in two or more sections depending upon the site requirement. This is particularly convenient arrangement for retrofit / replacement jobs.

Special Tube Metallurgy

Special tube materials like Cupro-Nickel, Stainless Steel or Titanium depending on water quality on site. This not only improves the reliability and efficiency but also makes the chiller suitable for special applications involving sea water and brackish water.

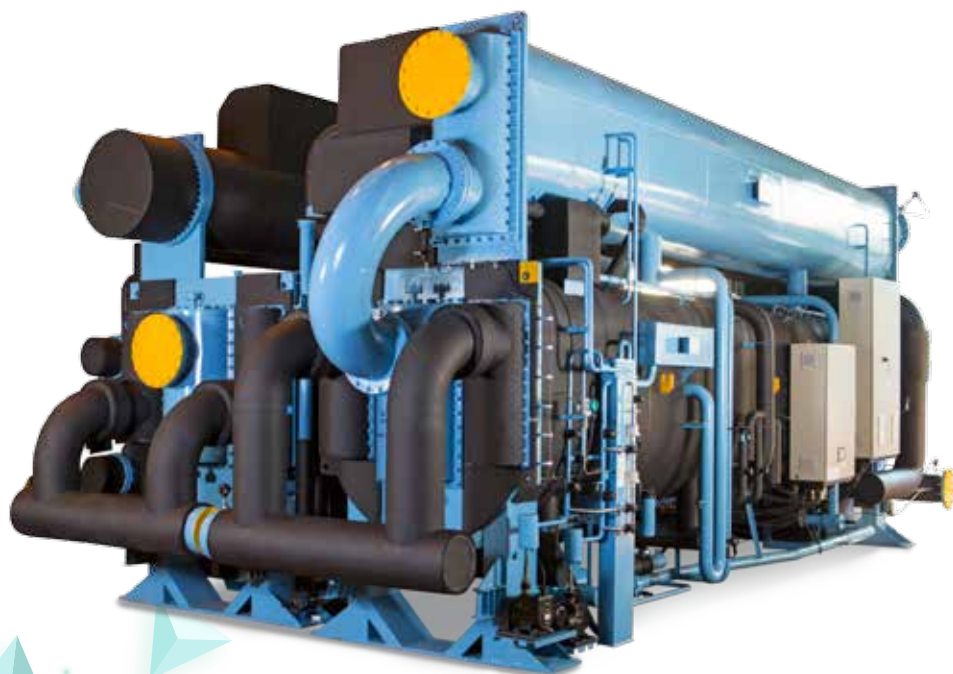
Customized Electrical and Instrumentation

Thermax possesses rich experience supplying chillers for critical applications in refinery and petrochemical plants across the globe. Thermax has in house capability to address critical applications such as:

- Hazardous area design for gas group class 1, division 2, IIA/IIB, per IEC and NEC Standards
- Redundant PLC systems, with redundancy at all levels, of various makes for fail safe operations
- Centralized Load Management systems for multiple machines operating in tandem
- SCADA connectivity for remote monitoring and control of machines.

Chillers for High Capacity and High Pressure

As pioneers in Absorption technology, we offer specially designed absorption chillers for high capacity, high COP and customized solutions to cater large industrial & commercial air conditioning requirements. Chillers with steam and water circuits designed for higher operating pressures such as 250 psi(g) and 350psi(g) are also available on request.

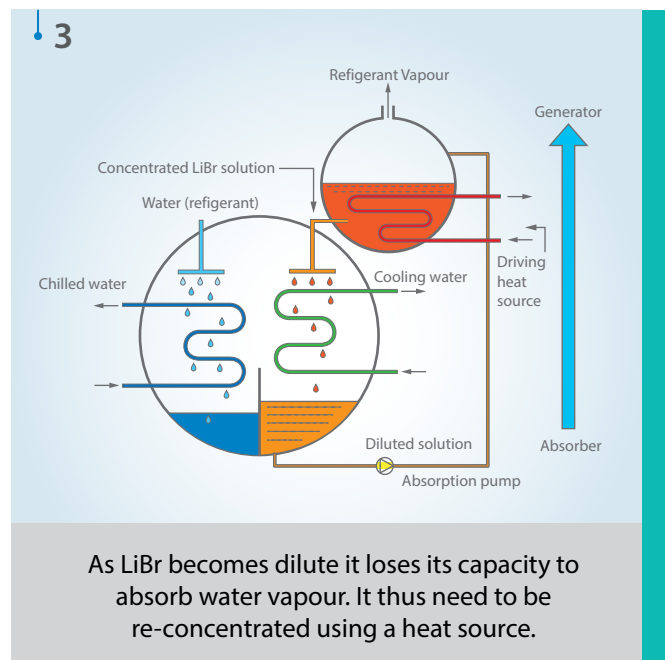
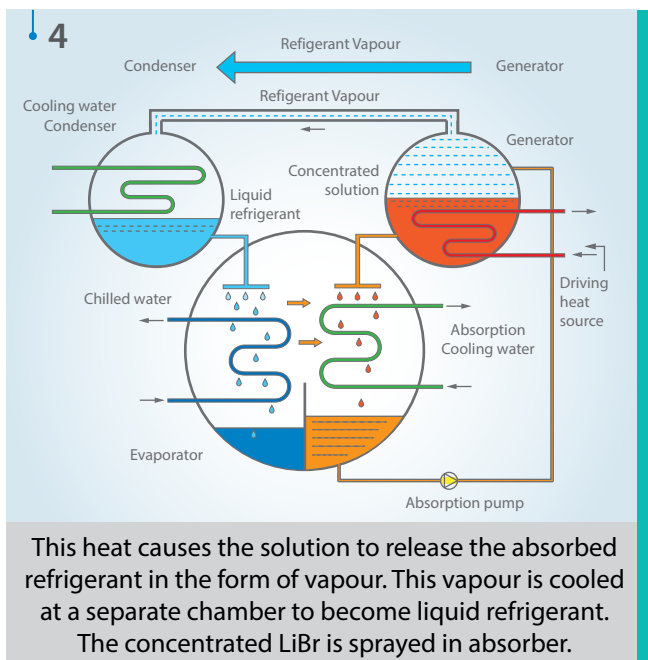
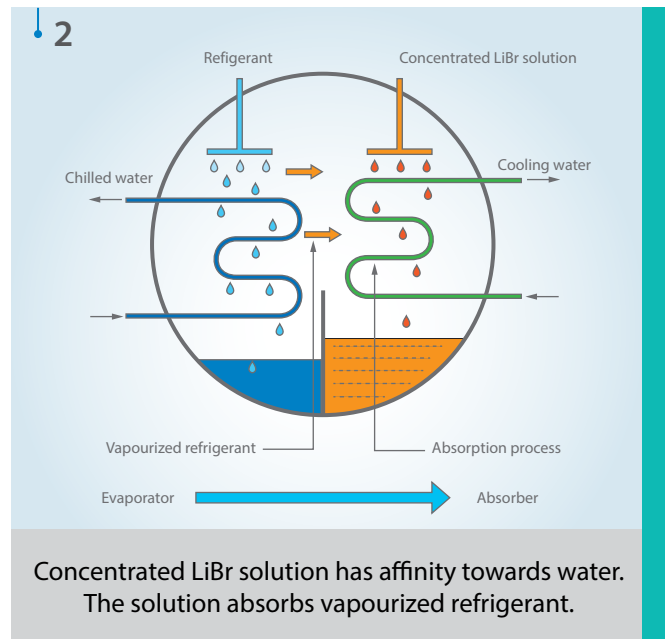
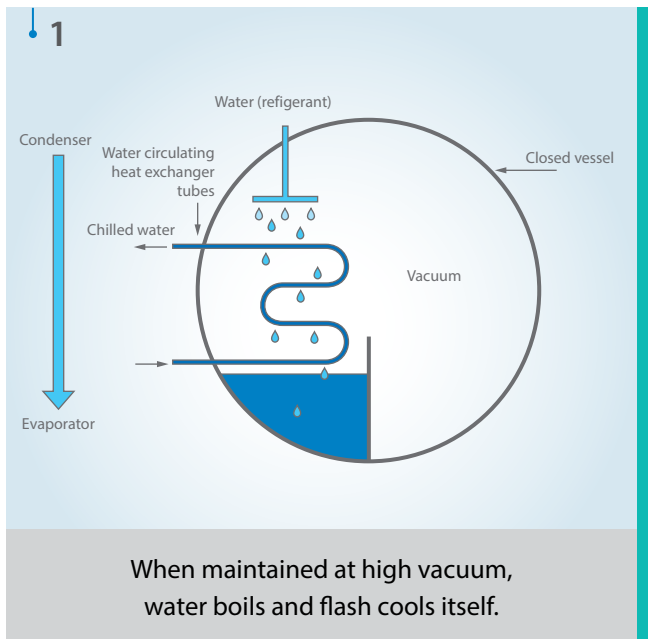


3500 TR
Absorption Chiller

Basic Principle

Vapour Absorption Machine uses water as the refrigerant and Lithium Bromide (LiBr) solution as the absorbent. The process of cooling goes through stages such as evaporation of refrigerant in evaporator, absorption of refrigerant by concentrated LiBr solution in absorber, boiling of dilute LiBr solution to generate refrigerant vapour in generator and condensation of refrigerant vapour in condenser.

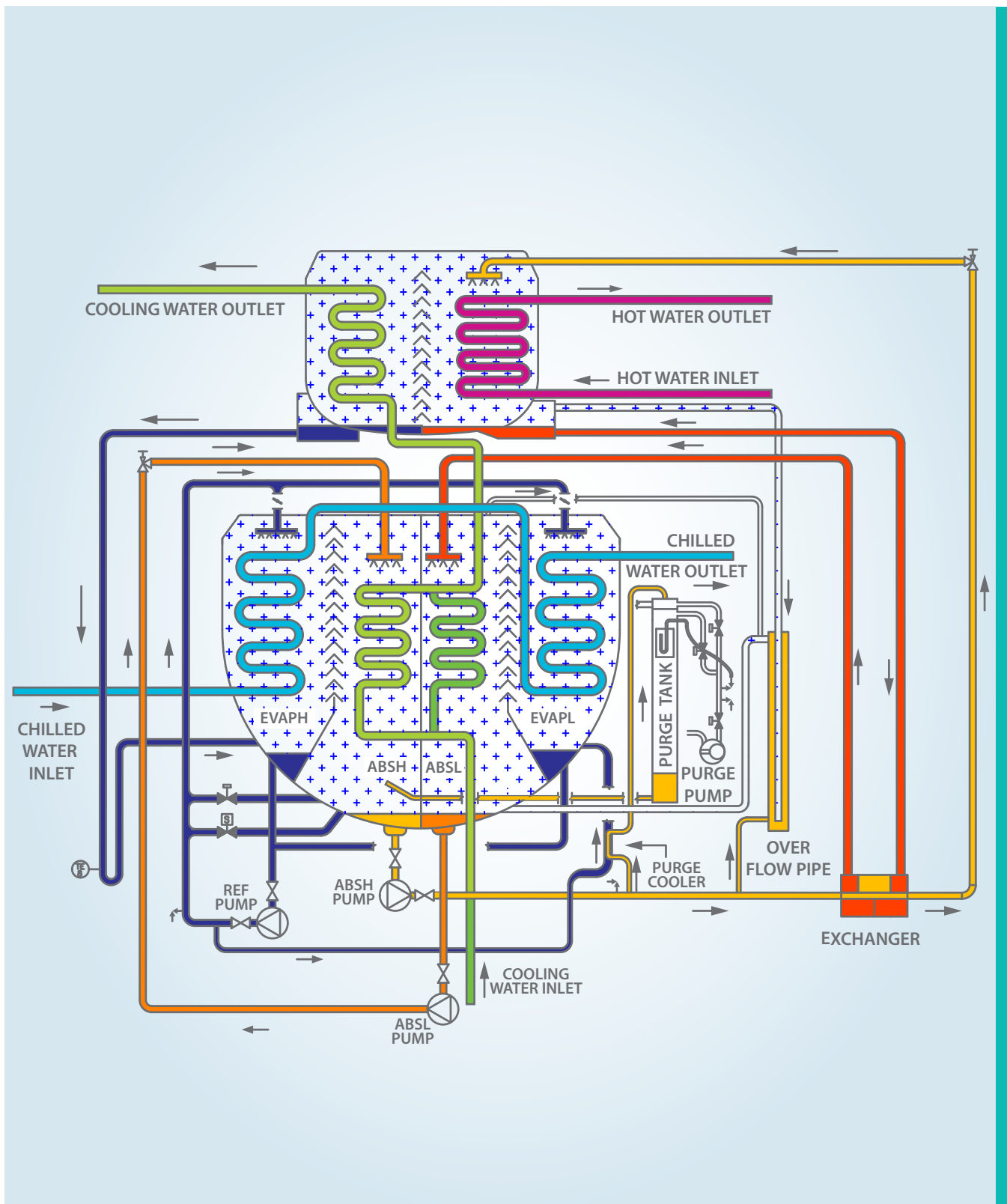
The boiling point of water is directly proportional to pressure. At 6mmHg absolute pressure the boiling point of water is 38.660°F. To change water from liquid to vapour it has to be heated. The heat, required to change the phase of a liquid to vapour, is called the Latent heat of evaporation.



LiBr is a chemical similar to common salt (NaCl). LiBr is soluble in water. The LiBr water solution has a property to absorb water due to its chemical affinity. As the concentration of LiBr solution increases, its affinity towards water vapour increases. Also as the temperature of LiBr solution decreases, its affinity to water vapour

increases. Further, there is a large difference between vapour pressure of LiBr and water. This means that if we heat the LiBr water solution, the water will vapourise but the LiBr will stay in the solution and become concentrated.

Cycle of Operation



■ Chilled Water
■ Cooling Water
■ Hot Water

■ Refrigerant Liquid
+ + + + Refrigerant Vapour

■ Strong Solution
■ Intermediate Dilute Solution
■ Dilute Solution

Evaporator

The lower shell consists of evaporator and absorber sections. The evaporator consists of a tube bundle, an outer shell, distribution trays, and a refrigerant pan. The chilled water flows inside the tubes of the evaporator. A refrigerant pump circulates the refrigerant from the refrigerant pan into the distribution trays. From the trays the refrigerant falls on the evaporator tubes.

The shell pressure is very low, due to which the refrigerant evaporates at a low temperature and extracts latent heat of evaporation from the water being circulated through the evaporator tubes. Thus the heat is extracted from the water being circulated through the tubes and it becomes chilled to a certain degree.

Absorber

The absorber consists of a tube bundle, an outer shell, distribution trays, and an absorbent collection sump. Concentrated absorbent solution from the generator is fed into the distribution trays. This solution falls on the absorber tubes. Concentrated absorbent has an affinity to water. Hence the vaporized refrigerant from the evaporator section is absorbed. Due to this absorption the vacuum in the shell is maintained at a low pressure, and ensures the heat extraction from the chilled water.

The concentrated absorbent becomes diluted. During this dilution the 'Heat of Dilution' is generated. This increases the temperature of the absorbent solution. The cooling water being circulated in the absorber tubes removes the heat of dilution. As it loses its heat to the cooling water, the absorbent is able to absorb more refrigerant vapour and gets further diluted. The diluted absorbent collects in the bottom of the shell.

Solution Heat exchanger

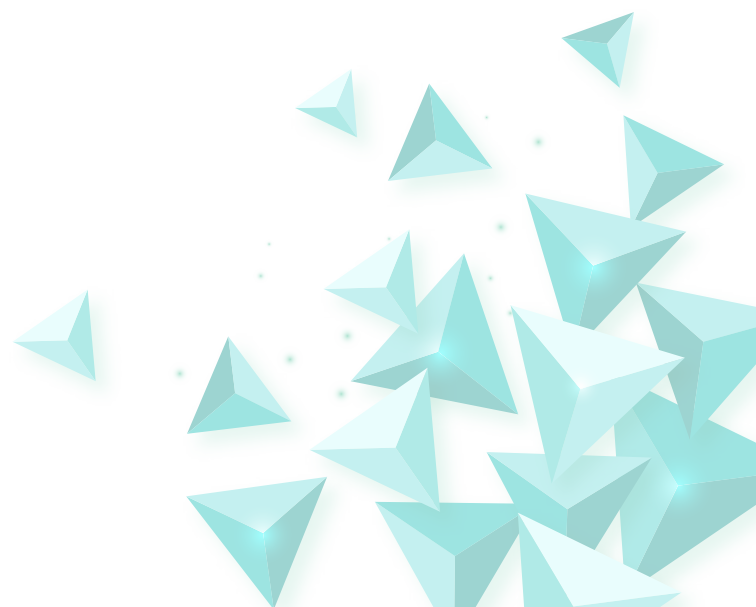
The absorbent pump pumps the diluted absorbent to the generator through the solution heat exchangers, where it gets heated up by the strong solution coming from the generator. The solution heat exchanger serves to heat up the absorbent solution before it enters the generator for regeneration. This reduces the heat input required in the generator. This increases the efficiency of the cycle.

Generator

The generator and condenser tube bundles are enclosed in a shell and are separated by an insulation plate. Hot water at the rated inlet conditions passes through the tubes in the generator. Here it heats up the dilute solution coming from absorber. The absorbent, which has become concentrated in the generator drains to the absorber to begin a new absorbent cycle. Due to boiling, the refrigerant vapours are generated.

Condenser

The vapours flow into the condenser side via the eliminators. In the condenser they get condensed in the shell side because of the cooling water passing in the tube side. The condenser consists of tube bundle, an outer shell and a refrigerant pan. The condensed refrigerant gets collected in the bottom of the condenser. The condensed refrigerant then flows back to the evaporator to begin a new refrigerant cycle.



Technical Specifications

Parameters	Model Number - TAC	Units	L5 D3	L5 D4	L5 E1	L5 E2	L5 E3	L5 E4
Cooling Capacity		TR	184	209	253	278	313	345
Chilled Water Circuit	Flow rate	gpm	440	500	605	665	749	826
	Connection diameter	NPS	5"			6"		
Cooling Water Circuit	Flow rate	gpm	662	752	911	1001	1127	1242
	Connection diameter	NPS	6"		8"			
Hot Water Circuit	Flow rate	gpm	321	366	440	480	542	599
	Connection diameter	NPS	4"			5"		
Overall Dimensions	Length	in	159		183	186		
	Width	in	84		82	89		
	Height	in	121		122	127		
Weights	Operating weight	x 1000 lbs	24.5	25.4	28.7	33.1	34.2	35.1
	Maximum Shipping Weight	x 1000 lbs	22.7	23.1	26.0	29.5	30.4	30.9
Clearance	Tube cleaning space	in	141		174	178		
Electric Supply	Power supply							
	Power consumption	kVA	11.7			14		
	HP Absorber pump rating	kW (A)	2.2 (5.1)			3.4 (8.0)		
	LP Absorber pump rating	kW (A)	2.2 (5.1)			2.2 (5.1)		
	Refrigerant pump rating	kW (A)	0.3 (1.4)			0.3 (1.4)		
	Vacuum pump rating	kW (A)	0.75 (1.8)			0.75 (1.8)		
	MOP		22			28		
	MCA		19			22		

Notes:

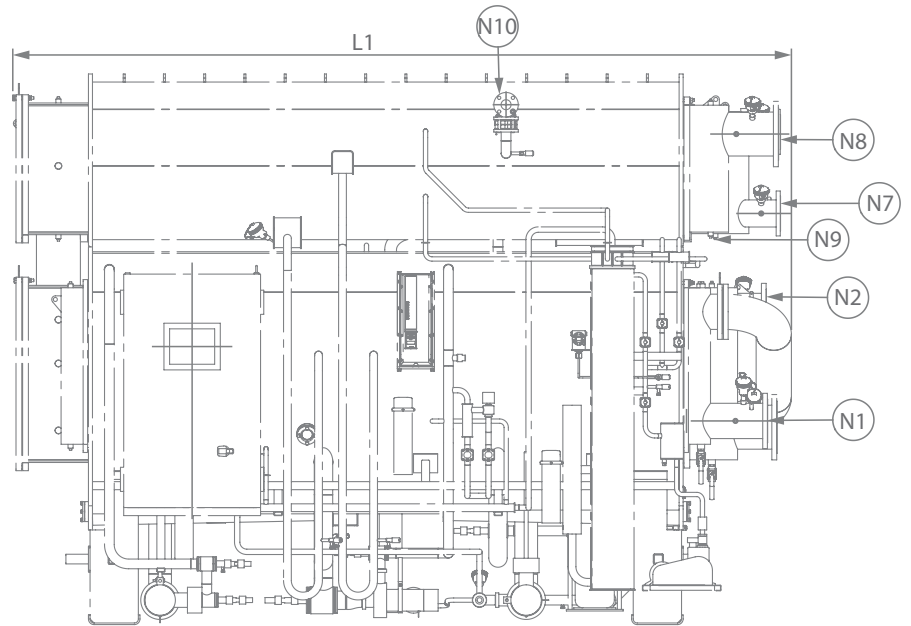
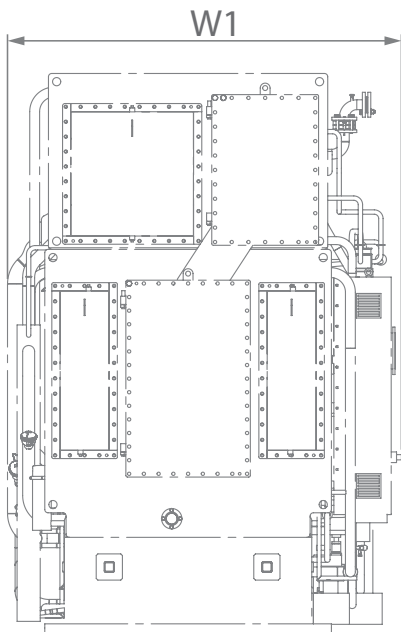
- Model Number: TAC L5 XX - Twin type Low Temperature Hot Water Absorption Chiller
- Chilled water inlet / outlet temperature = 54 / 44 °F
- Cooling water inlet / outlet temperature = 85 / 100.2 °F
- Hot water inlet / outlet temperature = 203 / 185 °F
- Minimum Cooling water inlet temperature is 50 °F
- Ambient condition shall be between 41 to 113 °F
- Maximum Allowable pressure in Chilled / Cooling / Hot water system = 150 PSI(g)
- All Water Nozzle connections to suit ASME B16.5 Class 150

L5 E5	L5 E6	L5 F2	L5 F3	L5 G1	L5 G2	L5 G3	L5 G4	L5 G5	L5 G6	L5 H1	L5 H2	L5 J1	L5 J2
393	433	493	545	647	712	788	831	975	1056	1110	1181	1414	1526
941	1036	1180	1304	1548	1704	1886	1989	2333	2527	2656	2826	3384	3652
8"				10"						12"			
1415	1559	1775	1962	2329	2563	2837	2992	3510	3802	3996	4252	5090	5494
10"				12"		14"				16"			
683	753	854	942	1123	1229	1361	1436	1682	1823	1915	2043	2440	2633
6"		8"						10"					
193		233		295		298		301		356		415	
95		96		100		108		120		125		125	
135		139		142		152		157		160		160	
42.3	43.4	50.9	52.5	68.8	70.8	89.7	91.3	106.5	108.9	122.8	125.7	140.2	143.7
36.8	37.7	44.8	45.9	60.4	61.7	78.0	79.1	91.3	92.8	105.2	107.1	120.4	122.6
174		237		272		276		280		330		388	
460 V(±10%), 60 Hz (±5%), 3 Phase+N													
16.3		25.9		28.7		33.5		27.1				33.5	
3.4 (8.0)		5.5 (14.0)		5.5 (14.0)		6.6 (17.0)		4.5 (13.0)				5.5 (17.0)	
3.4 (8.0)		5.5 (14.0)		5.5 (14.0)		6.6 (17.0)		4.5 (13.0)				5.5 (17.0)	
0.3 (1.4)		0.3 (1.4)		1.5 (5.0)		1.5 (5.0)		1.5 (5.0)				1.5 (5.0)	
0.75 (1.8)		0.75 (1.8)		0.75 (1.8)		0.75 (1.8)		0.75 (1.8)				0.75 (1.8)	
31		50		54		64		51				64	
26		41		46		53		43				53	

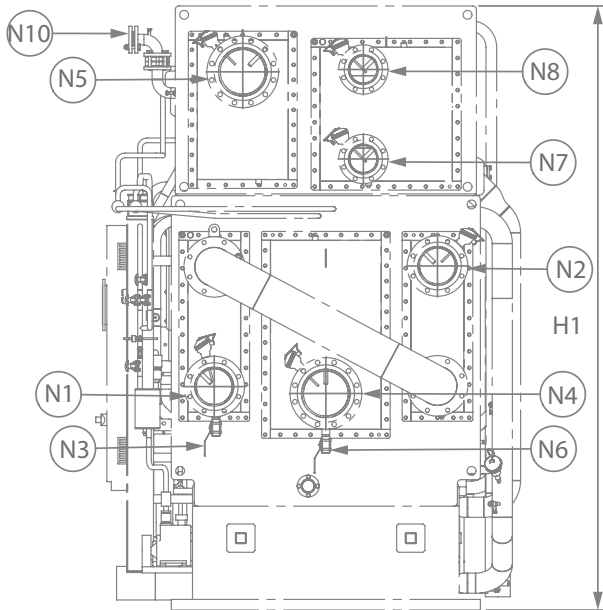
- Technical specification is based on AHRI 560-2000
- Please contact Thermax representative / office for customized specifications



Physical Dimensions



Model	Machine Dimensions												
	L1	W1	H	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10
	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch	Inch
L5 D3	161	86	127	5	5	1	6	6	1	4	4	1/2	2.0
L5 D4	161	86	127	5	5	1	6	6	1	4	4	1/2	2.0
L5 E1	188	86	127	5	5	1	6	6	1	4	4	1/2	2.0
L5 E2	189	88	131	6	6	1	8	8	1	5	5	1/2	2.0
L5 E3	189	88	131	6	6	1	8	8	1	5	5	1/2	2.0
L5 E4	189	88	131	6	6	1	8	8	1	5	5	1/2	2.0
L5 E5	192	94	132	8	8	1	10	10	1	6	6	1/2	2.0
L5 E6	192	94	132	8	8	1	10	10	1	6	6	1/2	2.0
L5 F2	234	95	132	8	8	1	10	10	1	6	6	1/2	2.0
L5 F3	234	95	132	8	8	1	10	10	1	6	6	1/2	2.0
L5 G1	296	102	148	10	10	1	12	12	1	8	8	1/2	2.0
L5 G2	296	102	148	10	10	1	12	12	1	8	8	1/2	2.0
L5 G3	300	108	156	10	10	1	12	12	1	8	8	1/2	3.0
L5 G4	300	108	156	10	10	1	12	12	1	8	8	1/2	3.0
L5 G5	301	120	166	10	10	1	14	14	1	10	10	1/2	3.0
L5 G6	301	120	166	10	10	1	14	14	1	10	10	1/2	3.0
L5 H1	355	124	166	12	12	1	16	16	1	10	10	1/2	3.0
L5 H2	355	124	166	12	12	1	16	16	1	10	10	1/2	3.0
L5 J1	419	126	168	12	12	1	16	16	1	10	10	1/2	3.0
L5 J2	419	126	168	12	12	1	16	16	1	10	10	1/2	3.0

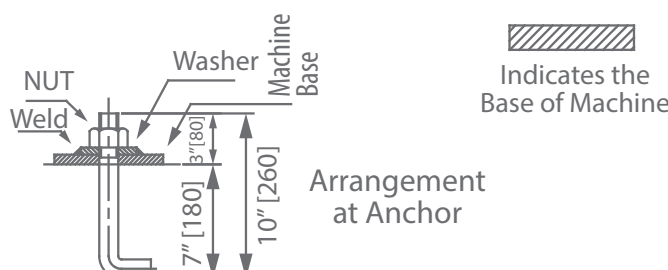
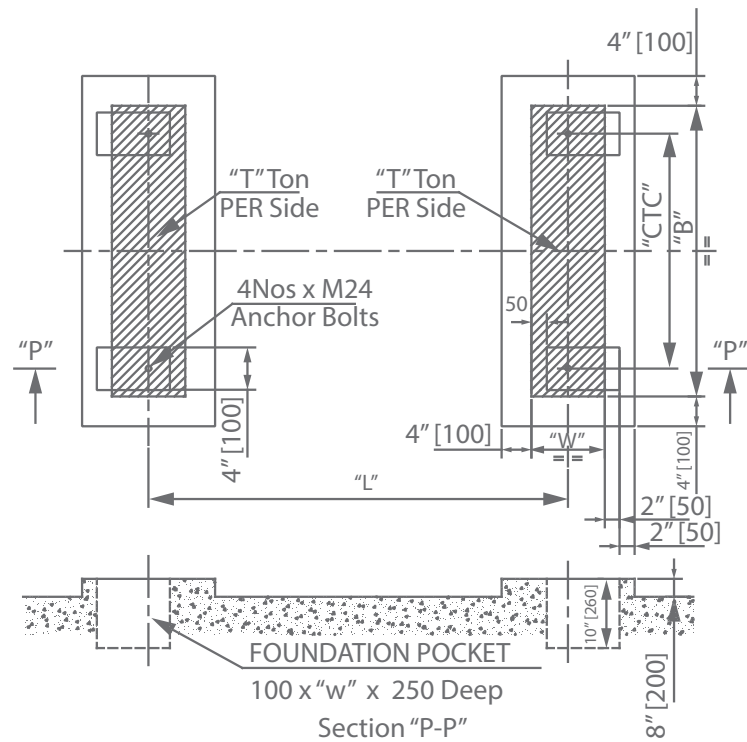


Nozzle Schedule		
Nozzle	Nozzle	Description
FL. Rating		
N1	ASA 150	Chilled Water Inlet
N2	ASA 150	Chilled Water Outlet
N3	-	Chilled Water Drain Valve
N4	ASA 150	Cooling Water Inlet
N5	ASA 150	Cooling Water Outlet
N6	-	Cooling Water Drain Valve
N7	ASA 150	Hot Water Inlet
N8	ASA 150	Hot Water Outlet
N9	NPT (F)	Hot Water Drain Plug
N10	ASA 150	Rupture Disc Outlet

Minimum installation clearance

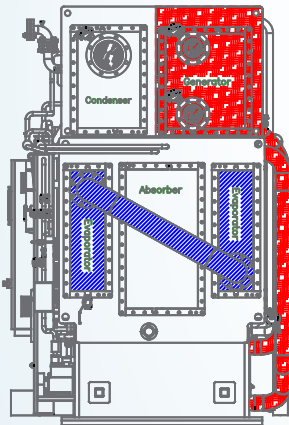
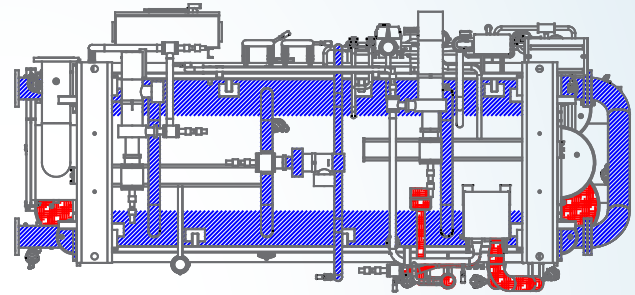
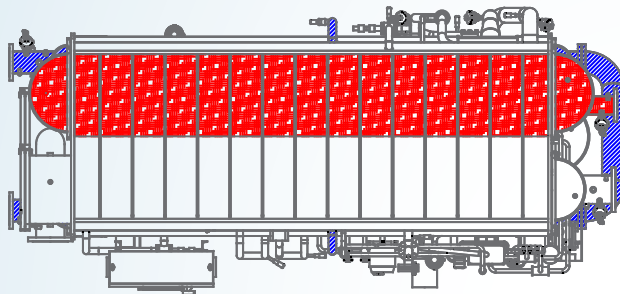
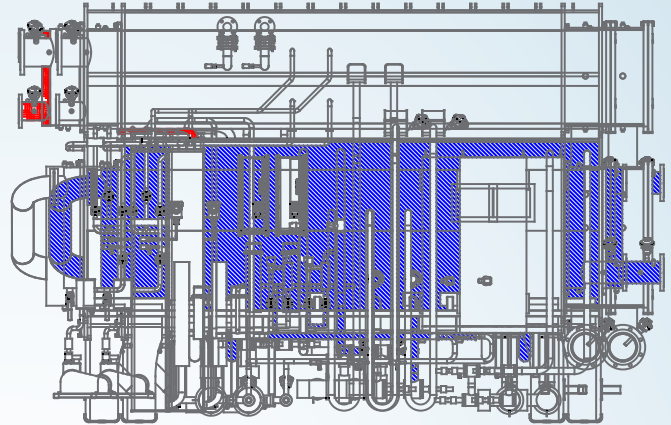
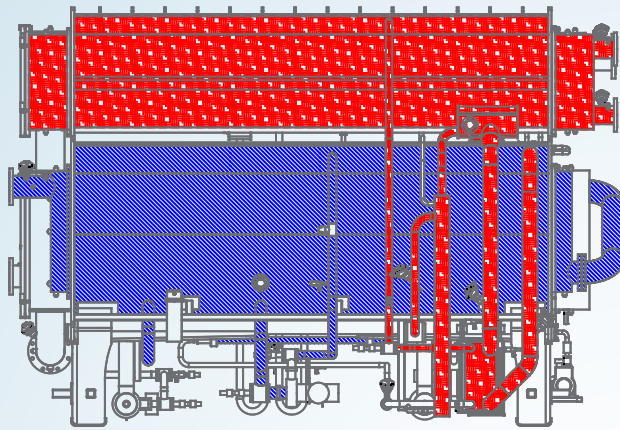
- Control panel side: 50 Inch
- Top: 8 Inch | Others: 20 Inch

- Notes
- Indicates the position of anchor bolts
 - Indicates the position of power supply to the control panel



Foundation				
L	W	B	CTC	Weight
Inch	Inch	Inch	Inch	Pound
4	10	60	54	12320.0
4	10	60	54	12768.0
5	10	60	54	14560.0
5	11	62	58	16576.0
5	11	62	58	17248.0
5	11	62	58	17696.0
5	13	70	64	21504.0
5	13	70	64	21952.0
7	13	70	64	25536.0
7	13	70	64	26432.0
9	13	71	66	34496.0
9	13	71	66	35616.0
9	17	86	80	45920.0
9	17	86	80	46816.0
9	17	98	92	53984.0
9	17	98	92	55328.0
11	17	98	92	62272.0
11	17	98	92	63840.0
13	17	98	92	71232.0
13	17	98	92	73024.0



Insulation Guidelines



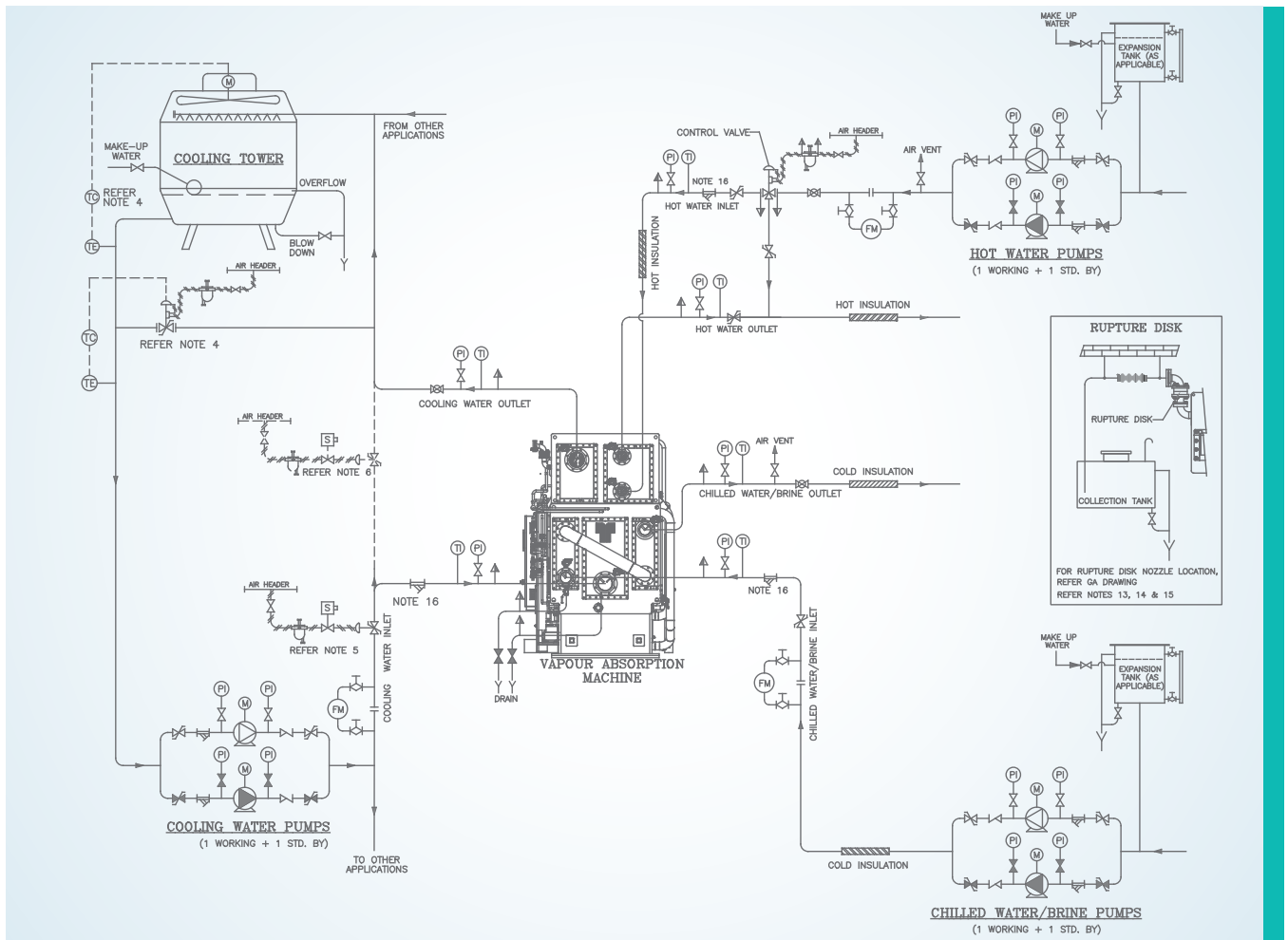
NOTES:

- Do not cover sight glass with insulation
- The total area includes the area of pipes in the machine
- Use non combustible insulation material
- LTHE & DHE shall be insulated with 1 layer of foam
- Insulation areas given in the table have been doubled assuming 2 layers of foam will be used
- Do not cover refrigerant pump motor with insulation

Model	Cold Surface Insulation	Hot Surface Insulation	Model	Cold Surface Insulation	Hot Surface Insulation
	sqft	sqft		sqft	sqft
TAC L5 D3	154.20	59.10	TAC L5 G1	349.30	126.70
TAC L5 D4	154.20	59.10	TAC L5 G2	349.30	126.70
TAC L5 E1	174.90	64.80	TAC L5 G3	417.10	149.40
TAC L5 E2	209.80	76.70	TAC L5 G4	417.10	149.40
TAC L5 E3	209.80	76.70	TAC L5 G5	460.40	166.70
TAC L5 E4	209.80	76.70	TAC L5 G6	460.40	166.70
TAC L5 E5	238.30	99.30	TAC L5 H1	538.50	187.00
TAC L5 E6	238.30	99.30	TAC L5 H2	538.50	187.00
TAC L5 F2	276.80	111.00	TAC L5 J1	631.40	211.30
TAC L5 F3	276.80	111.00	TAC L5 J2	631.40	211.30

Symbol	Surface	Description	Temperature Range
	COLD	1 Inch (min) thick elastomeric foam insulation	32 °F [0°C] MIN
	HOT	.75 Inch Thick Epdm Foam	356 °F [180 °C] MAX

Piping and Instrumentation Guidelines



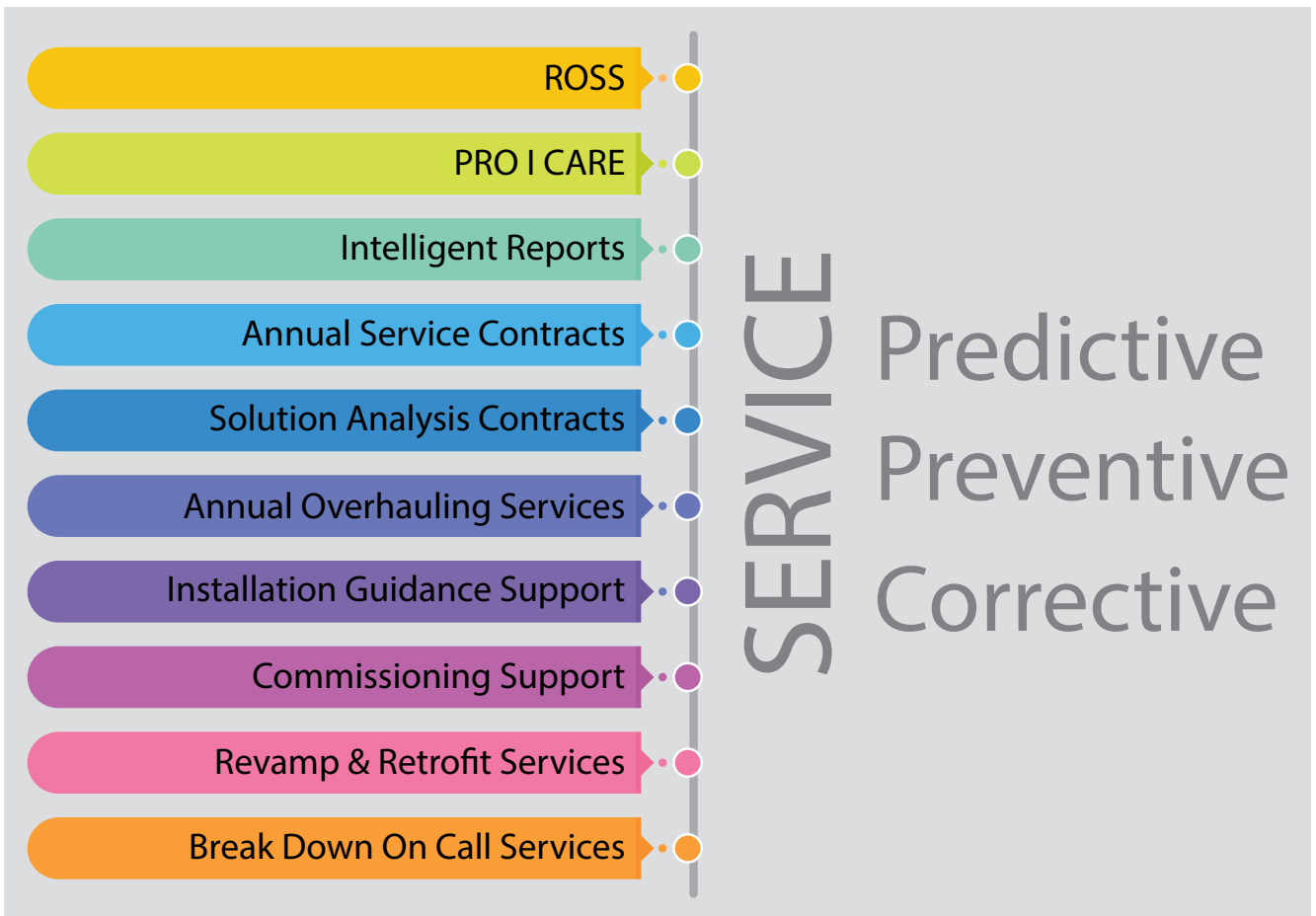
	Gate Valve (Open)		Control Valve (Open)		Air Filter Regulator		Motor
	Gate Valve (Close)		Bellow/Flexible Connection		Pressure Indicator		"Y" Strainer
	Globe Valve (Open)		Solenoid Valve		Temperature Indicator		Level Indicator
	Globe Valve (Close)		Butterfly Valve (Open)		Flow Meter		Safety Valve
	Non Return Valve		Butterfly Valve (Close)		Pneumatic Line		Pneumatic on/ off Butterfly valve
	Cock		Inverted Bucket Steam Trap		Pump		Electro-Pneumatic Globe Type Control Valve
Client Scope ↓ Thermox Scope							

NOTES:

- Necessary arrangements to be provided to ensure that hot water inlet temperature to the machine doesn't increase beyond allowable limit (50°F above rated).
- Automatic arrangements should be provided to stop cooling water flow through the machine, if the chilled water/brine flow stops.
- Maximum working pressure in water headers is 116 psi(g). This should be noted for design of chilled water/brine, cooling water and hot water system.
- Minimum allowable cooling water inlet temperature is 68°F. Necessary arrangements to be provided to maintain constant cooling water inlet temperature to the machine.
- Install automatic shut off valve on the cooling water inlet line, if cooling water pumps are not dedicated to the machine.
- If cooling water pumps are dedicated to the machine and chilled water/brine temperature is < 40°F, install cooling water automatic shut off valve only on the bypass line between cooling water inlet and outlet.
- Ensure that the compressed air supply to the instrument is available at 72.5°F and is free from oil and dust.
- Least count of pressure gauge in the water circuits should be 0.72psi(g).
- Suitable expansion tank should be provided for closed loop chilled water / hot water system.
- Additional y-strainers (20 mesh) should be installed on chilled water, hot water and cooling water inlet line close to the machine, to prevent choking and tube failure due to foreign particles.

Global Service Support – Cooling

Thermax has a wide network of Service Centers throughout the globe to ensure quick response to customers. With a cumulative service experience of over 6000 VACs operating for more than 30 years, Thermax service personnel are equipped to deliver the right solution to the users. Thermax has developed specific modules for different types of users depending on their usage pattern, conforming to our proactive approach.



PROiCARE

PROiCARE is next generation AI based remote monitoring system. This feature enables the facility manager or Thermax engineer to monitor the performance remotely using internet. It offers features like e-logbook, status, trends, abnormal start-stops, maintenance schedules,

alerts etc and keep track of their chiller. It's a round the clock service that gives you a unified view so you can track the performance of your machine from anywhere and resolve issues faster.(This feature is available on request)

Remote Services at your Fingertip

This technology offers a single point window to access and monitor the chiller performance along with easy and secure remote access to real-time operations, performance data, and historical analysis.

Advanced Monitoring

ROSS offers a wide range of services which includes remote monitoring, advance trend analysis, data logging and diagnostic, enabling Thermax to provide proactive and well advance recommendation to keep the chiller performance intact eliminating any future downtime.

Expert Opinion

Real-time data and historical data from the chiller is collected and analyzed by Thermax experts, which enables identification of a potential threat to the chiller provide resolution to the problem in time enabling unhindered continuous process by smooth operation of the chiller. In case of any major breakdown, the data analytics provides insight into the nature of the problem and hence enables a quick turnaround time.



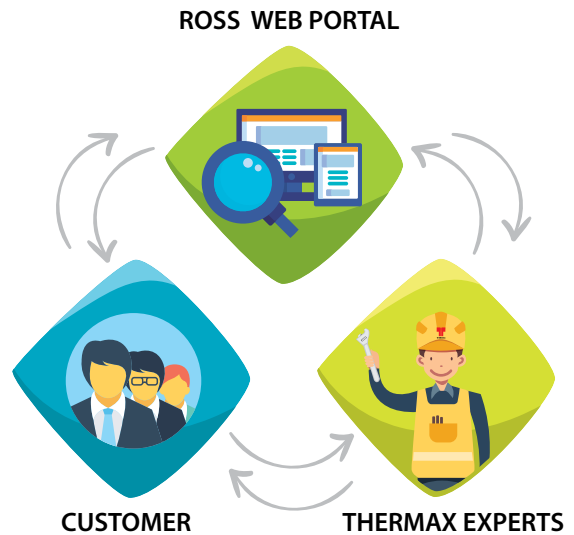
Multi-layered security

ROSS operates on an optimum level of security for remote connections and runs on VPN network, eliminating any security breach along with two point authentication. An advanced user management ensures that data remains in safe hands at any given point.

Analytical Reports

Customized reports are being generated with the intent to make a precise decision regarding the process, ensuring the optimum performance is delivered.

Architecture



A tailor-made offering for your specific needs

FEATURES	BASIC	ADVANCED	PRO
REMOTE ACCESS (24*7*365 days easy real-time access to the chiller)	✓	✓	✓
ALARM NOTIFICATION (Notification with the set of customized alarms)	✓	✓	✓
DATA LOGGING (Timely data logging of equipment)	✓	✓	✓
CORRECTIVE ACTION (Expert opinion & intervention whenever required to maximize the uptime of chiller)	✓	✓	✓
EVENT STATISTICS (Analysis of any recurring alarm & abnormality)		✓	✓
REPORTING (Precised reports)		✓	✓
OPERATIONAL DATA INSIGHT (Operational data analysis)			✓
EQUIPMENT PERFORMANCE ANALYSIS (Overall chiller performance analysis)			✓

We believe in increasing uptime, reducing unscheduled interruption and optimizing chiller efficiency.

Our Prestigious Installations

Paramount Pictures, USA

The CHPC facility at Paramount Pictures in the USA includes a 230 TR Thermax Vapor Absorption Chiller triggered by hot water and four flex energy micro-turbine generators (259 mW each). Since the waste heat from engine jacket water is recovered and utilized in driving the chiller, the project is highly energy-efficient and environmentally-friendly.



BMW, Germany

BMW's Landshut, plant in Germany uses 5 nos. of Thermax's Hot Water Driven Absorption Chillers for comfort cooling of their manufacturing and office area. These five Absorption Chillers have a cumulative capacity of 4475 TR and utilize hot water to drive the chiller.



Indo Gulf Fertilisers, India

Indo Gulf Fertilisers (IGF) a leading agri-solution provider, uses Thermax's Hot Water Driven Absorption Chiller of capacity 700 TR for process cooling requirements in their plant, reducing dependency on the power grid for cooling.



Maklada, Tunisia

Maklada, specialized in the manufacturing of high and low carbon steel wires and cables chose Thermax to be its preferred partner for catering to the process cooling requirement and uses Thermax's Absorption Chiller of 245 TR capacity driven by hot water.



Made In India for the World

Thermax adopts a partnering relationship with customers to address their energy and environmental challenges and enhance their performance and profits. With integrated energy-environment expertise and a proven track record in global markets, Thermax is the preferred partner of enterprises across industrial sectors in more than 85 countries.

Automobile



- BMW (Germany)
- Ducati (Italy)
- Volkswagen (Germany)
- Ford Motors (India)
- Honda (Thailand)

Healthcare



- Niguarda Hospital (Italy)
- Brookedale Hospital (USA)
- DM Hospital (India)
- VallD'Herbron Hospital (Spain)
- Royal Free Hospital

Refinery & Petrochemical



- SABIC (KSA)
- Essar Oil (UK)
- Petrobras (Brazil)
- Reliance Industries (India)
- Covestro (USA)

Breweries



- Karmeliten Brauerei (Germany)
- Carlsberg (India)
- Guinness Brewery (Nigeria)
- Peroni Brewery (Italy)
- United Breweries (India)

Education



- Fordham University (USA)
- University Of Central Florida (USA)
- University of Magna Graecia (Italy)
- Shanghai Tech University (China)
- Michigan State University (USA)

Pharma



- GSK (India)
- Novartis (China)
- Sanofi (Italy)
- Astra Zeneca (UK)
- Zydus Cadilla (India)

Chemicals



- Nirma (India)
- Celanese Corporation (USA)
- Gulf Flour (UAE)
- JBF RAK (UAE)
- Yaroslavl Paraffin Plant (Russia)

Beverages



- Coca Cola (KSA)
- Silver Mill Natural Beverages (Sri Lanka)
- Cardinal Agri (Philippines)
- Niagra Bottling (USA)
- Tata Global Beverages (India)

Metal



- Maklada Prestressed Steel (Tunisia)
- Vedanta Alumina Limited (India)
- PT Jindal Stainless Steel (Indonesia)
- TATA Steel (India)
- Arcelor Mittal Steel (KSA)

Commercial / Hospitality



- Hyatt Plaza (Qatar)
- Carlyle Hotel (USA)
- Hudson Yards (USA)
- Atlantic City Casino (USA)
- Gardens by the Bay (Singapore)

Food Processing



- Ferrero (Italy)
- Cadburys (Nigeria)
- Perfetti Van Melle (Bangladesh)
- PepsiCo (South Africa)
- Tipco Foods (Thailand)

Dairy



- PT Santos Krimer (Indonesia)
- Lilongwe Dairy (Malawi)
- Alpro (Belgium)
- Mother Dairy (India)
- Milkfarm Bahnitz (Germany)

Airport



- Rome Airport (Italy)
- Perth Airport (Australia)
- Berlin Airport (Germany)
- Istanbul Ataturk Airport (Turkey)
- Venice Airport (Italy)

Textile



- Polyplex (Turkey)
- DeMillus (Brazil)
- Gildan TM (Honduras)
- Envoy Textiles (Bangladesh)
- Indorama (Thailand)

Edible Oil



- Cargill (Brazil)
- Shabnam Vegetable Oil (Bangladesh)
- Malabon Soap & Oil (Philippines)
- PZ Wilmar (Nigeria)
- Pan Century Edible Oils (Malaysia)

Recommended Water Quality

Water quality is a critical factor for the smooth operation of the machine. Poor water quality can result in scaling of tubes, corrosion, choking or failure of tubes. Hence

it is highly recommended that proper water quality be maintained throughout the life of the VAM.

Allowable Range for Circulating Water in Chilled water and cooling water (< 104°F)

Items	Units	Copper	Cu:Ni (90:10)	SS316L	Titanium
pH (25°C)		6.8 - 8.5	6.8 - 8.5	6.8 - 8.5	6.8 - 8.5
TDS	ppm	< 600	< 20000	< 2500	4.00%
Turbidity	NTU	< 10	< 10	< 10	< 10
M Alkalinity	ppm	< 100	< 100	< 100	< 100
Chloride Ion Cl ⁻	ppm	< 300	< 10000	< 200	< 25000
Sulphates Ion SO ⁴	ppm	< 300	< 300	< 300	< 300
Silica	ppm	< 50	< 75	< 50	< 50
Total Hardness	ppm	< 300	< 300	< 300	< 300
Calcium Hardness	ppm	< 200	< 200	< 200	< 200
Total Iron Fe	ppm	< 0.5	< 0.5	< 0.5	< 0.5
Sulphide Ion S ⁻	ppm	ND	ND	ND	ND
Ammonium Ion NH ₄ ⁺	ppm	< 1	< 1	NA	NA
Biological Oxygen Demand	ppm	< 50	< 50	< 50	< 50
Chemical Oxygen Demand	ppm	< 100	< 100	< 100	< 100
Free Chlorine	ppm	< 0.2	< 0.2	< 0.2	< 0.2
Oil & Grease	ppm	< 1	< 1	< 1	< 1
Free Carbon dioxide	ppm	< 3	< 3	< 3	< 3
Phenol, cyanide, lead, manganese etc.	ppm	ND	ND	< 0.1	< 0.1

*ND – Not Detected

*NA – Not Applicable

NOTES:

- Avoid stagnant water in Machine for longer period. In case of more than 1 day of shut down, circulate water for 30 minutes in the Machine every day. For longer duration, drain the water from Machine and keep the Machine in dry conditions. There should be no stagnant zone in the water circuit near the machine.
- When the temperature is high (104°F or higher), generally the corrosion behaviour is noticeable. Especially when the steel material is directly in contact with water without the protective coating, the effective corrosive protection, such as the addition of corrosion inhibitor, degassing treatment should be applied.





THERMAX

Sustainable Solutions in
Energy & Environment

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Thermax Business Portfolio

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-  Cooling
-  Power
-  Air Pollution Control
-  Chemicals
-  Water and Wastewater Solutions
-  Solar
-  Specialised Services



This brochure presents only some of our products and we reserve the right to amend any product details without notice. The photographs used in the brochure are indicative and may not match the actual plant.

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