THERMAX

Exhaust & Multi Energy Absorption Chillers

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 it's 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 it's 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°F to 356°F by utilizing hot water starting from 176°F / vapour or steam from 0 psi(g) onwards/flue gases from engine and turbines from 518°F onwards and a variety of liquid and gaseous fuel.

Thermax has helped clients with Eco-friendly air-conditioning and process cooling to reduce their carbon footprints. Thermax has a global foot print in 90+ countries across Asia Pacific, Africa, Middle East to CIS countries, USA and South America.

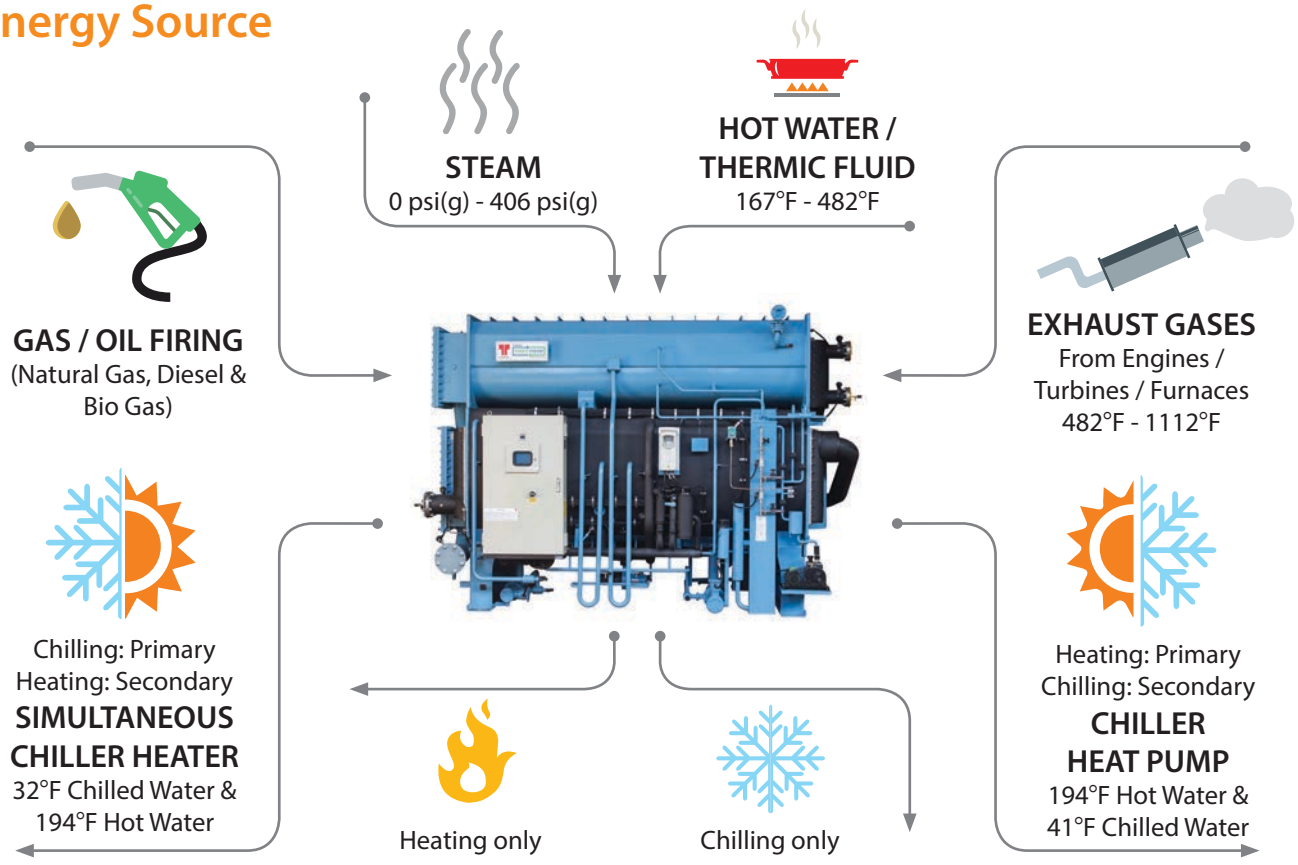
Thermax offers solutions to a wide array of industrial segments including pharmaceuticals, chemicals, fertilizers, steel, textiles, petrochemicals, food & beverages, commercial complexes, shopping complexes, office buildings, educational institutes, and airports among others.

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



Utility

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


Eco Arc II
THERMAX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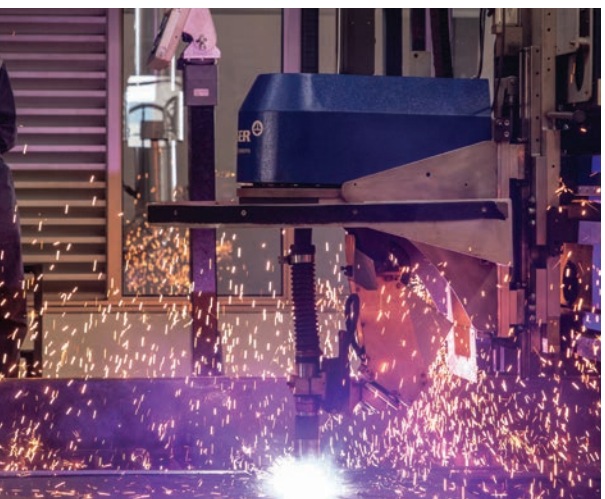
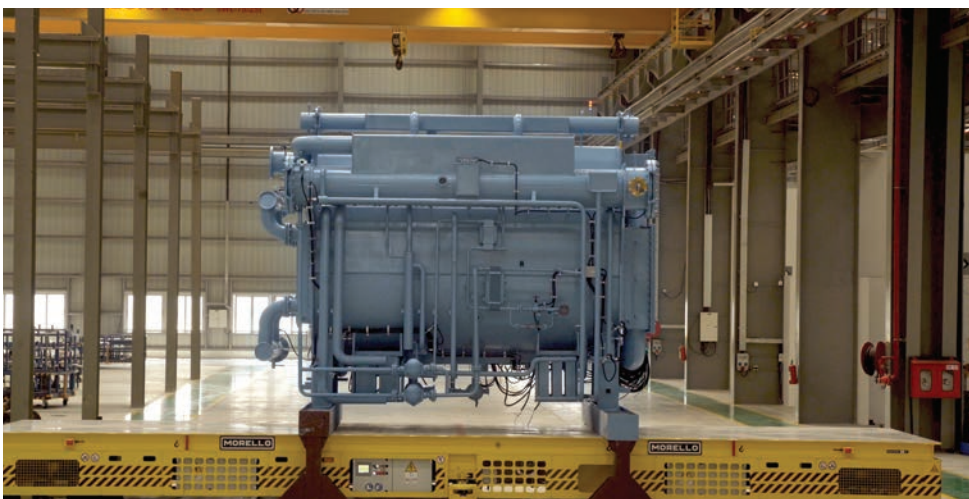



MORELLO
MORELLO

Salient Features

Best-in-class Coefficient of Performance

Thermax chillers come with a process design that ensures maximum internal heat recovery to give the lowest specific fuel consumption benefit.

Avenues for COP improvement	
Enlargement of heat transfer area	Done by all manufacturers
Two stage evaporation	Unique feature of Thermax chillers
Advanced series flow Design	Unique to Thermax chillers
Refrigerant heat exchanger	Unique feature of Thermax chillers

Advanced Series flow technology

Thermax chillers have an advanced Series Flow Cycle to avoid simultaneous occurrence of high temperature and high concentration, thereby minimizing the probability of corrosion.

Parameter	Parallel Flow	Advanced Series Flow
HTG Temperature	324°F	310°F
LiBr Concentration	64 - 65%	60.5%
LTG Temperature	190°F	194°F
LiBr Concentration	62 - 64%	63%

Unique Two stage evaporation technology

Thermax chillers are designed based on unique two stage evaporation technology. This ensures that the specific heat input is one of the lowest in the industry, resulting in higher cooling output for the same heat input. Also, larger temperature difference in chilled water to the tune of 187°F, is possible.

Gravity Feed LiBr and Refrigerant Distribution Mechanism

With a nozzle-less, non-clogging gravity feed distribution mechanism for stable and reliable operation throughout the life of the machine, Thermax chillers eliminate the drop in performance. Need for separate pump for spray eliminated, resulting in lower power consumption.

Split Evaporator Design

Split evaporator design helps to reduce the pressure drop for refrigerant vapour travelling from evaporator to absorber. This improves the absorption rate of LiBr, thereby improving capacity and efficiency.

Zero Crystallization

With a unique state-of-the-art concentration monitoring & control, Thermax chillers operate even at low cooling water inlet temperature without crystallization. This unique feature virtually eliminates crystallization and is distinctly different from the conventional auto de-crystallization..

Lowest Chilled Water/Brine Outlet Temperature

Thermax's innovative absorption chillers can deliver chilled water down to 33.8°F and outlet the chilled brine solution up to 28.4°F enabling absorption chillers to be used for applications involving low chilled water / brine temperature.

Stainless Steel Plate Heat Exchangers

All regenerative heat exchangers from Thermax are high efficiency plate type heat exchangers with SS 316 plates, for improved reliability and maximum internal heat recovery.

Single Exhaust Driven Machine on Multiple Engines

Heat recovery from multiple engines can be done by a single machine having dedicated tube banks for each of the engines. This avoids mixing of flue gases and eliminates back pressure issues, if engines are operating at different loads. This also facilitates heat recovery from dissimilar engines using a single chiller.

Online Pump Health Monitor

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

Special HTG Design for Highest Reliability

HTG design has LiBr entry from bottom and exit from top which enables uniform circulation of LiBr and avoids hot spots. Turbulators in smoke tubes improve the overall heat transfer coefficient, allowing higher heat recovery from exhaust and resulting in lower exhaust outlet temperature.

Maximum Heat Recovery from Exhaust Gas

Contrary to conventional exhaust gas chillers, Thermax chiller can cool exhaust gas up to 266°F which increases the overall efficiency of the CHP system. In addition to this, the unique design of Thermax chiller delivers 100% extra cooling for this extra heat, when compared to conventional chillers.

Leak Tight Exhaust Gas Dampers

To ensure highest reliability of the system, exhaust gas 3 way diverter dampers with over 99.5% leak tightness are supplied along with the chiller. In addition to this, an auxiliary condenser is provided in the generator circuit to protect the chiller in the event of minor exhaust gas leakage.

Multi-stage Level Control

Multiple stage level control in three locations enables effective operation during part load and prevents cavitation of refrigerant and absorbent pumps.

De-oxidised Low Phosphorus 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 hydrogen embrittlement in LiBr environment.

Variable Frequency Drive on Absorbent Pump

Variable Frequency Drive on absorbent pump for higher reliability, savings in fuel and power, during part load operation.

Isolation Valves for Canned Motor Pumps

Double seal isolation valves and bolted pumps facilitate easy maintenance of the machine mounted canned motor pumps without any loss of vacuum in the system. This significantly reduces the down time of the chiller.

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.

Improved Online Purge System

Factory fitted high efficiency purge system with purge cooler, continuously removes non-condensable gases from the chiller into the storage tank while in operation.

PLC Based Control Panel

Thermax chillers are provided with advanced PLC based control panel, user friendly 7 inch touch screen operator interface and data logging system.

Non-toxic Corrosion Inhibitor

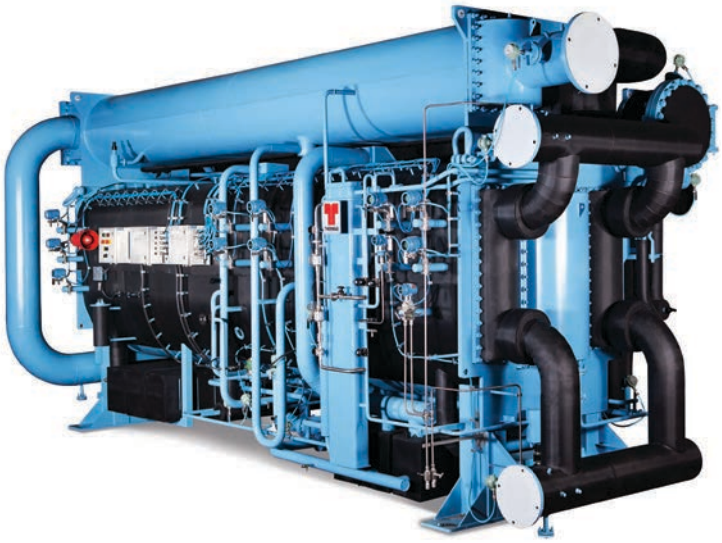
New generation non-precipitating, non-toxic molybdenum based corrosion inhibitor which is more effective than conventional inhibitors based on Chromate (Cancer causing, prohibited in several countries) and Nitrate.

Customised Solutions

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.



Tailor Made, High Efficiency Solutions for Low Steam Pressure

Double effect absorption chillers can be offered for steam pressures as low as 43.5 psi(g), where conventionally single effect chillers are used.

LiBr Absorption Chillers for Sub-Zero Cooling Applications

Lithium bromide absorption chillers can be offered for leaving brine temperatures as low as 14°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, re-frigerant and/or vacuum pump can be provided.

Special Tube Metallurgy

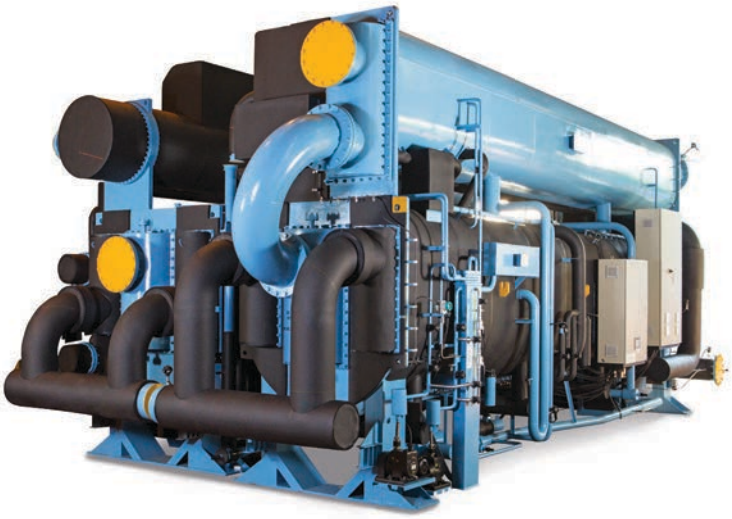
Special tube materials like Cupro-Nickel, Stainless Steel or Titanium depending on water quality on site. This not only improves the reliability & efficiency but also makes the chiller suitable for special applications involving sea water and brackish water.

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.

Chillers for High Capacity & High Pressure

As pioneers in Absorption technology, we offer specially designed absorption chillers for high capacity, high COP, customized solutions to cater large industrial and commercial air conditioning requirements. Chillers with steam and water circuits are designed for higher operating pressures such as 232 psi(g) and 352.5 psi(g).



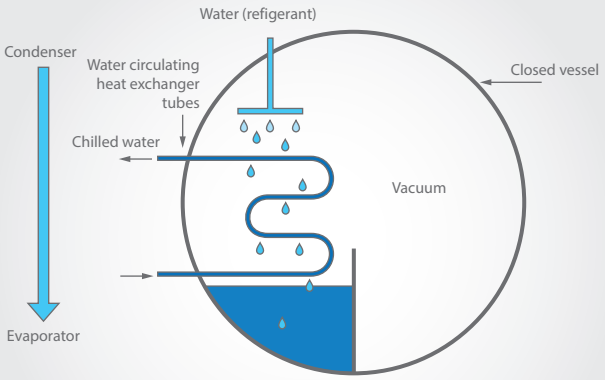
3500 TR
Absorption Chiller

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.

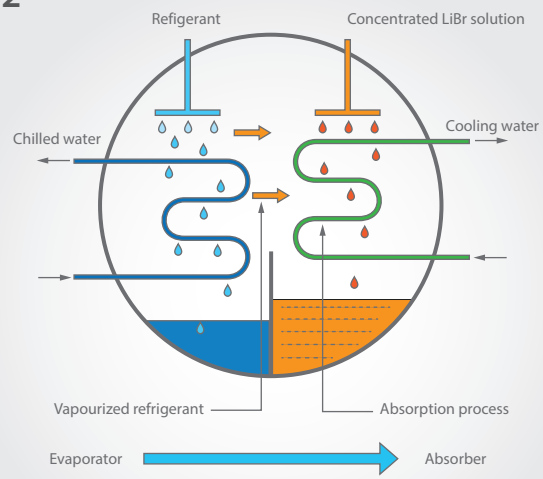
The boiling point of water is directly proportional to pressure. At 6mmHg absolute pressure the boiling point of water is 53.6°F. To change water from liquid to vapour it has to be heated. The heat, required to change the phase of a liquid to vapour, is called the Latent heat of evaporation.

1



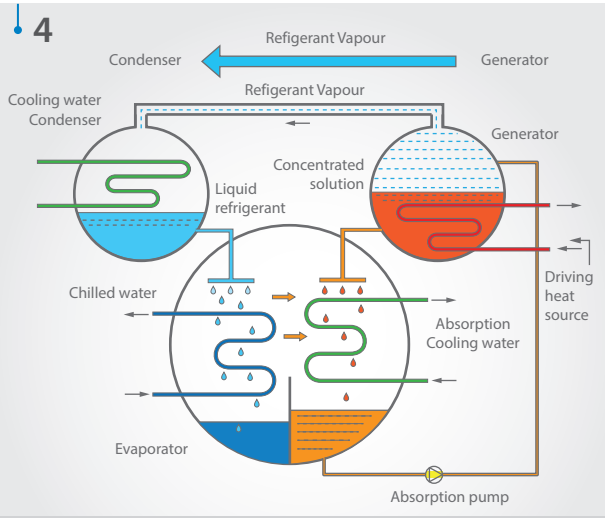
When maintained at high vacuum, water boils and flash cools itself.

2



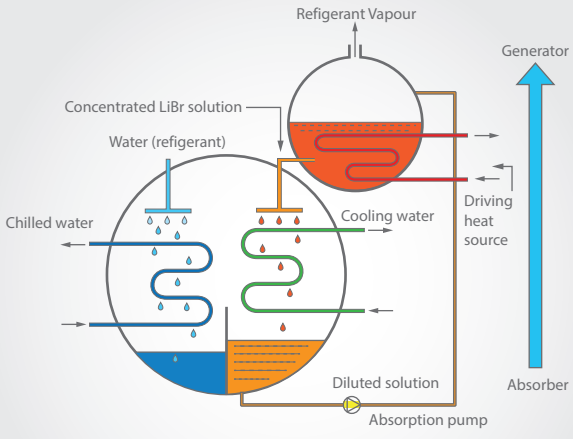
Concentrated LiBr solution has affinity towards water. The solution absorbs vapourized refrigerant.

4



This heat causes the solution to release the absorbed refrigerant in the form of vapour. This vapour is cooled at a separate chamber to become liquid refrigerant. The concentrated LiBr is sprayed in absorber.

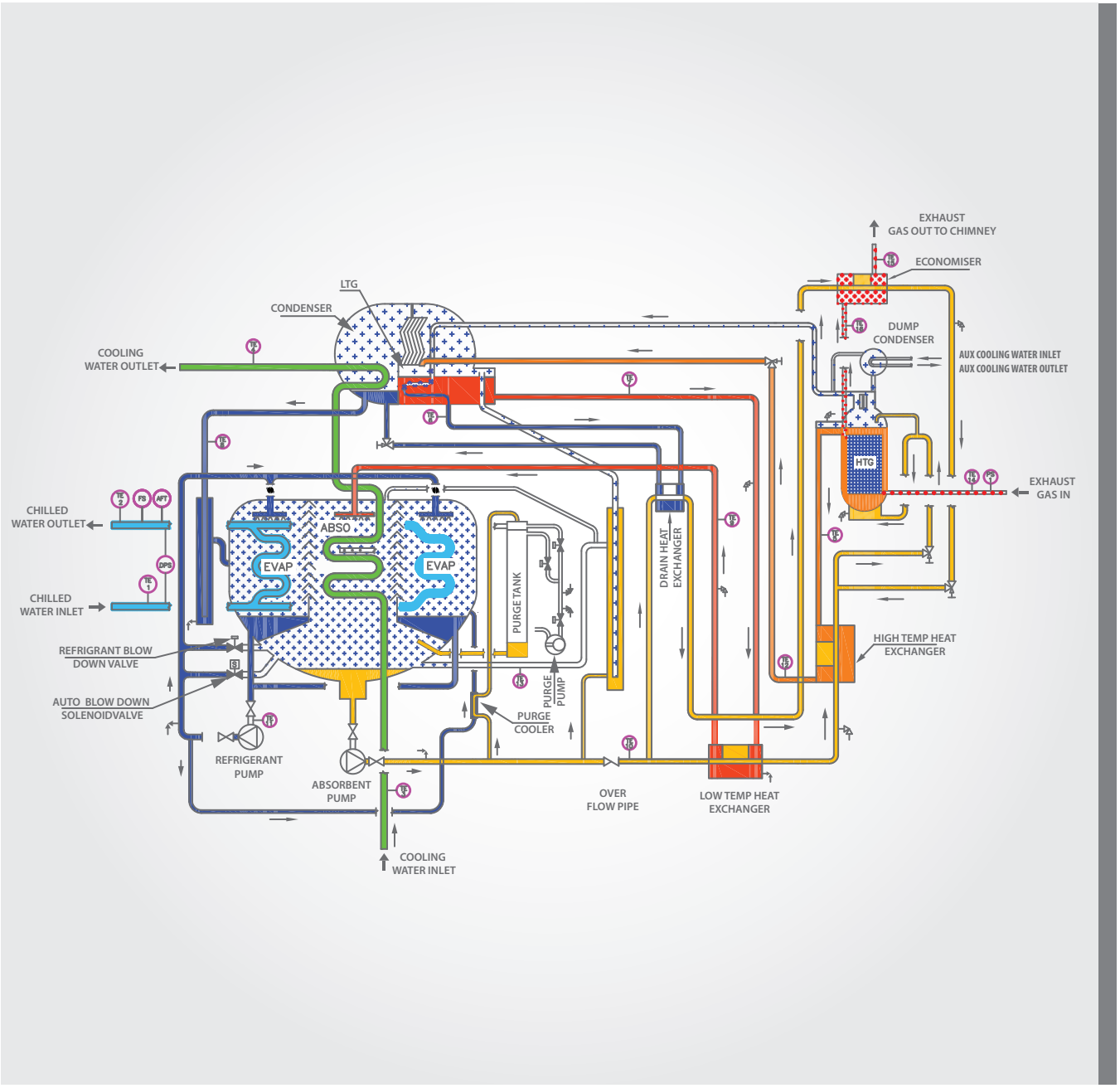
3



As LiBr becomes dilute it loses its capacity to absorb water vapour. It thus need to be re-concentrated using a heat source.

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.

E2 Cycle of Operation



Chilled Water
Cooling Water
Steam

Refrigerant Liquid
Refrigerant Vapour
Steam Condensate

Strong Solution
Intermediate Solution
Dilute Solution

Evaporator

The evaporator consists of a tube bundle, an outer shell, distribution trays, and a refrigerant pan. The process water to be cooled flows inside the evaporator tubes. A refrigerant pump circulates the liquid 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 (≈6mmHg). At this pressure 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 process water being circulated through the tubes and it gets cooled.

Absorber

The absorber consists of a tube bundle, an outer shell (common with the evaporator), distribution trays, and an absorbent collection sump. Concentrated absorbent solution (≈63.4%) from the Low temperature generator (LTG) is fed into the distribution trays. This solution falls on the absorber tubes.

Concentrated absorbent has an affinity to water vapour. Hence the vaporized refrigerant from the evaporator section is absorbed by the concentrated absorbent. Due to this absorption the vacuum in the shell is maintained 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 (57.0%) collects in the bottom of the shell.

Solution Heat exchangers

The absorbent pump pumps the diluted absorbent to the high temperature generator. A part of it first passes through drain heat exchanger where it absorbs heat from the condensed refrigerant from the low temperature generator. It then goes and meets the main solution line before the high temperature heat exchanger. The other part of liquid passes through the low temperature heat exchanger where it absorbs heat from the concentrated absorbent.

It next flows through the high temperature heat exchanger where it absorbs heat from the intermediate absorbent solution. Then both the dilute solutions mix at high temperature heat exchanger outlet. This solution then enters the high temperature generator. The heat exchangers serve to heat up the absorbent solution before it enters the high temperature generator for regeneration. This reduces the heat input required in the high temperature generator. This increases the efficiency of the cycle.

High Temperature Generator

The high temperature generator (HTG) consists of tube bundles, an outer shell and a set of eliminators. Exhaust gas from the DG set is allowed to pass inside the tubes.

The diluted absorbent flows around the exhaust gas tubes and gets heated up. The temperature of the solution increases until it reaches its boiling point. The absorbed refrigerant boils out of the solution. The solution concentration increases (to≈61%). This increased concentration is referred to as the intermediate concentration. The vaporised refrigerant generated passes through the eliminators and goes to the low temperature generator.

Low Temperature Generator and Condenser

The refrigerant vapour flowing in the low temperature generator (LTG) tubes heats the intermediate absorbent flowing outside the tubes and condenses. The condensed refrigerant flows into the condenser. Refrigerant vaporised from the intermediate absorbent passes through the eliminators to the condenser. Here cooling water circulated inside the condenser tubes cools these vapours. The refrigerant vapour condenses on the outside of the condenser tubes and collects in the bottom of the condenser. The condensed refrigerant from the LTG tubes and the condenser mix and flow to the evaporator. The absorbent, which has become concentrated in the LTG (63.4%) drains to the absorber to begin a new absorbent cycle.

E2 Technical Specifications

Model Number		Units	TAC E2 C3	TAC E2 C4	TAC E2 D1	TAC E2 D2	TAC E2 D3	TAC E2 D4	TAC E2 E1	TAC E2 E2	TAC E2 E3	TA
Cooling capacity		US RT	117	147	186	221	273	308	367	408	468	
		kW	411	517	654	777	960	1083	1290	1435	1646	
Chilled Water Circuit	Flow rate	gpm	279	351	445	528	652	736	877	975	1119	
	Connection diameter	NPS	5				6					
Cooling Water Circuit	Flow rate	gpm	515	647	819	973	1202	1356	1616	1796	2061	
	Connection diameter	NPS	6				8			10		
Exhaust gas circuit	Inlet temperature range	°F										
	Outlet temperature range	°F										
	Maximum Heat input	MBH	936	1176	1488	1768	2184	2463	2935	3263	3743	
Physical Data	Length	inches	116		174				198			
	Width	inches	97		110		122		124	135	135	
	Height	inches	114		113		119			132	132	
	Operating weight	lbs	17196	17857	22928	23810	28440	29762	33290	39242	40786	
	Dry weight	lbs	13669	14110	18519	18960	22046	22708	25133	28881	29983	
	Shipping Weight	lbs	16094	16755	22046	22708	27999	29101	32628	37699	39022	
	Tube cleaning space	inches	105		142				178			
Electrical Data	Power supply											
	Power consumption	kVA	8.3	8.3	8.3	8.3	10.7	10.7	13.1	13.1	13.1	
	Absorbent pump motor rating	kW (A)	2.2 (6.0)	2.2 (6.0)	2.2 (6.0)	2.2 (6.0)	3.0 (9.0)	3.0 (9.0)	3.7 (12.0)	3.7 (12.0)	3.7 (12.0)	5.
	Refrigerant pump motor rating	kW (A)	0.3 (1.4)	0.3 (1.4)	0.3 (1.4)	0.3 (1.4)	0.3 (1.4)	0.3 (1.4)	0.3 (1.4)	0.3 (1.4)	0.3 (1.4)	0
	Vacuum pump motor rating	kW (A)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.

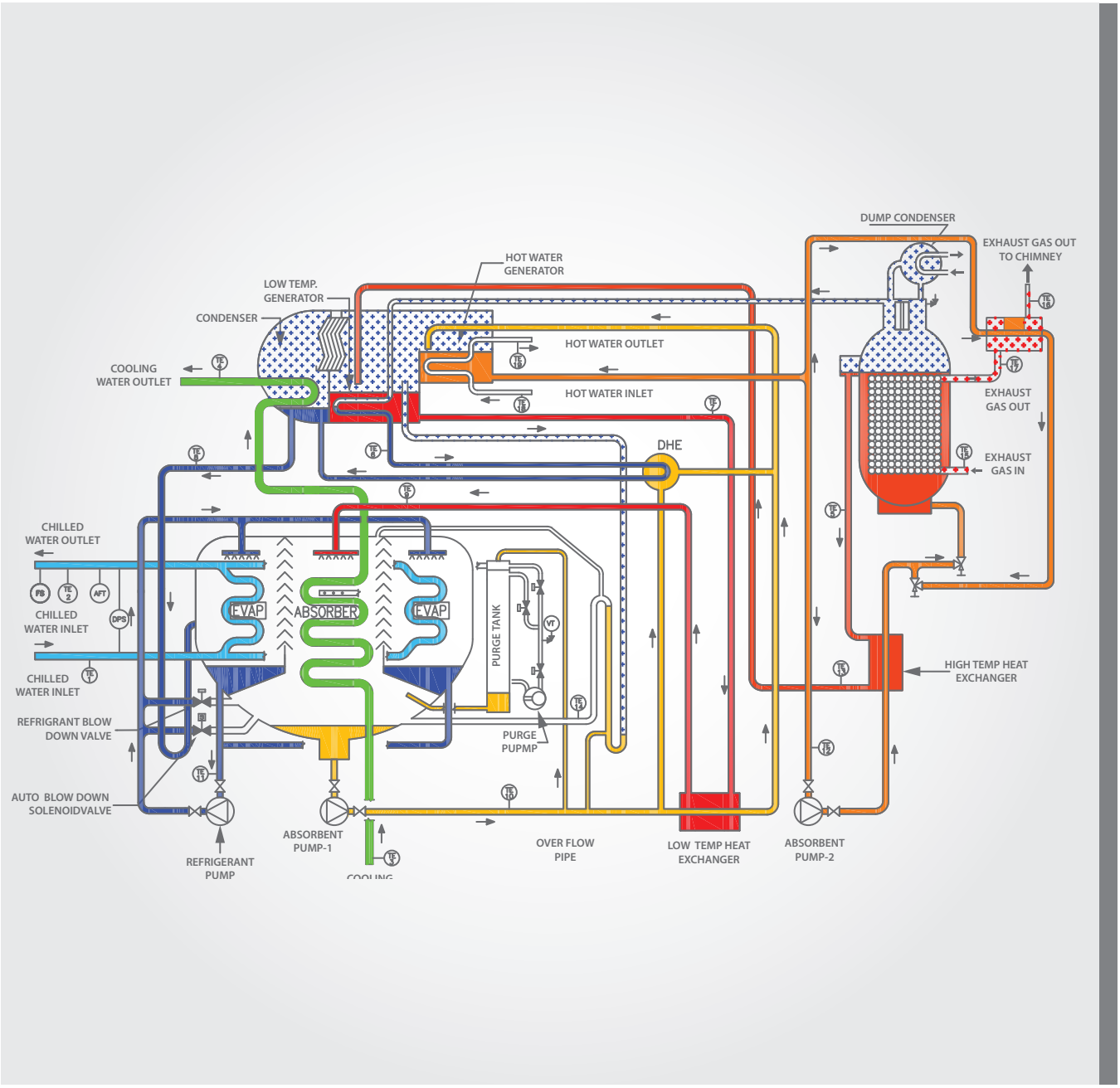
Notes:

- Chilled water inlet / outlet temperature = 54 / 44 °F
- Cooling water inlet / outlet temperature = 85 / 94.1 °F
- Minimum Chilled water outlet temperature is 32°F
- Minimum Cooling water outlet temperature is 50°F
- Exhaust Gas circuit can be designed for pressure drops between 4 to 12 Inches of WC
- Special design available for Exhaust gas outlet temperature of 270°F
- Optional: Backup firing with Natural Gas & Diesel for full capacity
- Ambient condition shall be between 41 to 113°F

C E2 E4	TAC E2 E5	TAC E2 E6	TAC E2 F1	TAC E2 F2	TAC E2 F3	TAC E2 G1	TAC E2 G2	TAC E2 G3	TAC E2 G4	TAC E2 G5	TAC E2 G6	TAC E2 H1	TAC E2 H2	TAC E2 J1	TAC E2 J2
506	561	625	672	698	778	879	985	1088	1179	1351	1462	1633	1842	1954	2208
1779	1973	2198	2363	2454	2736	3091	3464	3826	4146	4750	5141	5742	6477	6871	7764
1210	1341	1494	1607	1669	1860	2101	2355	2601	2819	3230	3495	3903	4402	4670	5277
8			10					12		14				16	
2228	2470	2743	2959	3073	3425	3870	4337	4790	5191	5948	6437	7190	8110	8603	9722
	12		14					16		18				20	
			525 - 1110												
			285 - 340												
4047	4487	4999	5375	5583	6223	7031	7878	8702	9430	10806	11694	13061	14733	15629	17660
203			245			302		310		321		370		436	
135	144		149			151		168		189		189		190	
132	142	142	145			149		158		168		176		180	
41888	47840	48943	61950	62832	65036	72532	76059	97224	98767	117947	120813	133672	135793	143126	145398
30644	33951	34833	44974	45636	47399	53572	55997	71871	72982	85539	86862	95399	96874	103074	104668
40124	45415	46297	58422	59525	61509	69005	72312	90169	91051	106924	109129	119855	121027	128047	129300
166			217			264		268		276		335		394	
	460 V(±10%), 60 Hz (±5%), 3 Phase+N														
14.7	14.7	14.7	20.0	20.0	20.0	20.8	20.8	20.8	20.8	27.9	27.9	27.9	27.9	31.5	31.5
5 (14.0)	5.5 (14.0)	5.5 (14.0)	6.6 (17.0)	6.6 (17.0)	6.6 (17.0)	7.5 (18.0)	7.5 (18.0)	7.5 (18.0)	7.5 (18.0)	9.0 (27.0)	9.0 (27.0)	9.0 (27.0)	9.0 (27.0)	11.0 (28.0)	11.0 (28.0)
.3 (1.4)	0.3 (1.4)	0.3 (1.4)	1.5 (5.0)	1.5 (5.0)	1.5 (5.0)	1.5 (5.0)	1.5 (5.0)	1.5 (5.0)	1.5 (5.0)	1.5 (5.0)	1.5 (5.0)	1.5 (5.0)	1.5 (5.0)	2.2 (8.5)	2.2 (8.5)
75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)	0.75 (1.8)

- All Water Nozzle connections to suit ASME B16.5 Class 150
- Maximum Allowable pressure in chilled / cooling water system = 114 psi(g)
- These chillers are custom built, Design is done based on the engine parameters and operating load
- Dimensions & Weights are approximate and should be used for indicative purpose only.
- Optional: Special design for delivering simultaneous heating water of upto 195°F
- Tube metallurgy for Evaporator / Absorber / Condenser is DLP Copper

E7 Cycle of Operation



Chilled Water
Cooling Water
Steam

Refrigerant Liquid
Refrigerant Vapour
Steam Condensate

Strong Solution
Intermediate Solution
Dilute Solution

Evaporator

The evaporator consists of a tube bundle, an outer shell, distribution trays, and a refrigerant pan. The process water to be cooled flows inside the evaporator tubes. A refrigerant pump circulates the liquid 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 (≈6mmHg). At this pressure 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 process water being circulated through the tubes and it gets cooled.

Absorber

The absorber consists of a tube bundle, an outer shell (common with the evaporator), distribution trays, and an absorbent collection sump. Concentrated absorbent solution (≈63.4%) from the Low temperature generator (LTG) is fed into the distribution trays. This solution falls on the absorber tubes.

Concentrated absorbent has an affinity to water vapour. Hence the vaporized refrigerant from the evaporator section is absorbed by the concentrated absorbent. Due to this absorption the vacuum in the shell is maintained 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 (≈57.0%) collects in the bottom of the shell.

High Temperature Generator

The high temperature generator (HTG) consists of a furnace and a tube bundle for direct firing fuel, a separate tube bundle for hot exhaust gases, an outer shell and a set of eliminators. These act as the heat source. The intermediate absorbent flows around these tubes and is heated. The temperature of the solution increases until it reaches its boiling point. The absorbed refrigerant boils out of the solution. The solution concentration increases (to ≈61%). This solution is referred to as medium solution. The vaporised refrigerant generated passes through the eliminators and goes to the low temperature generator.

Hot water Generator

The Hot water Generator (HWG) tube bundles are enclosed in the upper shell. The low temp hot water is allowed to flow into the HWG tubes. It heats the dilute absorbent, flowing outside the tubes. Refrigerant vaporised from the dilute absorbent passes through the eliminators to condenser. The absorbent, which has become concentrated in the HWG, is referred to as intermediate solution and is pumped by the Absorbent pump-2 to the high temp generator through the high temp heat exchanger.

Solution Heat exchangers

The absorbent pump-1 pumps the dilute absorbent from the absorber to the Hot water Generator via the Low temperature Heat Exchanger. A part of it before entering the Low temperature heat exchanger first passes through drain heat exchanger where it absorbs heat from the condensed refrigerant from the low temperature generator (LTG). The other part of liquid passes through the low temperature heat exchanger where it absorbs heat from the concentrated absorbent from Low temperature Generator.

Both the dilute solutions mix at low temperature heat exchanger outlet and enter the hot water generator. Here some of the refrigerant absorbed in the absorber boils out of the dilution solution due to heat gained from in the hot water generator. The regenerated solution, referred as intermediate solution, is then pumped through the high temperature heat exchanger where it absorbs heat from the medium solution exiting from the HTG. The heat exchangers serve to heat up the absorbent solution before it enters the high temperature generator and hot water generator, for regeneration. This reduces the heat input required in the generators thereby increasing the efficiency of the cycle.

Low Temperature Generator and Condenser

The low temperature generator and condenser tube bundles are enclosed in a shell and are separated by an insulation plate. The vaporised refrigerant from the high temperature Generator flows into the LTG tubes. It heats the medium solution absorbent, flowing outside the tubes, and condenses within the tubes. The condensed refrigerant flows into the condenser after passing through the Drain Heat Exchanger. Refrigerant vaporised from the medium absorbent passes through the eliminators to the condenser section.

The refrigerant vapour condenses on the outside of the condenser tubes and gets collected in the bottom of the condenser. The condensed refrigerant from the LTG and the condenser mix and flows to the evaporator. The absorbent, which has become concentrated in the LTG drains to the absorber through the Low Temperature Heat exchanger to begin a new absorbent cycle.

Dump Condenser

The dump condenser consists of a shell and tube heat exchanger. Cooling water is circulated through the tubes, whenever the damper is closed. The vaporised refrigerant from the High temperature generator flows into the shell side of dump condenser. It heats the cooling water circulated through the tubes and gets condensed. The condensed refrigerant flows back into the high temperature generator.

E7 Technical Specifications

Parameters	Model Number - TAC	UNIT	E7 C3	E7 C4	E7 D1	E7 D2	E7 D3	E7 D4	E7 E1	E7 E2	E7 E3
Cooling Capacity		US RT	132	157	198	236	285	320	376	426	481
Chilled Water Circuit	Flow Rate	US gpm	319	379	478	570	688	773	908	1029	1161
	Connection Diameter	NPS	5"				6"			8"	
Cooling Water Circuit	Flow Rate	US gpm	581	691	872	1035	1255	1409	1655	1876	2118
	Connection Diameter	NPS	6"				8"			10"	
Exhaust Gas Circuit	Inlet Temperature range	°F	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110
	Outlet Temperature range	°F	340	340	340	340	340	340	340	340	340
	Maximum Heat Input	MBH	664	790	997	1188	1435	1611	1893	2144	2421
Hot Water Circuit	Inlet Temperature range	°F	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250
	Outlet Temperature range	°F	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230
	Maximum Heat Input	MBH	842	1002	1264	1506	1819	2042	2400	2719	3070
Overall Dimensions	Length	in.	126		165		173		201	201	
	Width	in.	124		128		136		148	148	
	Height	in.	128		128		130		134	134	
Weights	Maximum Shipping weight	x 1000 lbs	20.9	23.1	25.4	27.6	33.1	35.3	38.6	44.1	46.3
	Operating weight	x 1000 lbs	22.0	24.3	27.6	29.8	36.4	38.6	41.9	49.6	51.8
Clearance	Tube Cleaning space	in.	105		142				178		
Electric Supply	Total Electric Input	kVA	11.0		12.3		17.9		20.3	22.7	
	Power Supply										

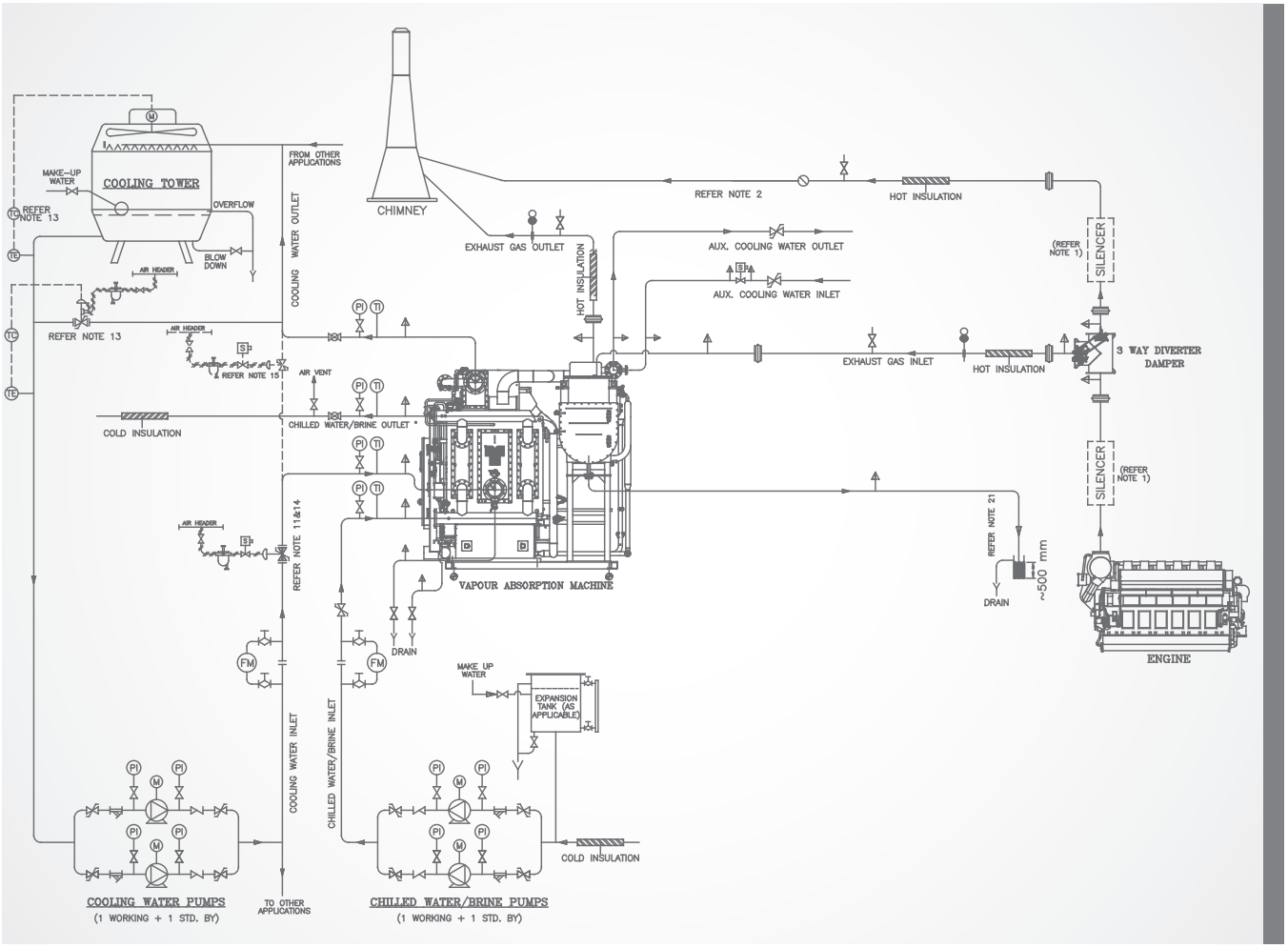
Notes:

- Chilled water inlet / outlet temperature = 54 / 44 °F
- Cooling water inlet / outlet temperature = 85 / 96 °F
- Minimum Chilled water outlet temperature is 32°F
- Minimum Cooling water outlet temperature is 50°F
- Exhaust Gas circuit pressure drop - 4 to 12" WC
- Special design available for Exhaust gas outlet temperature of 270°F
- Optional: Backup firing with Natural Gas & Diesel for full capacity

E7 E4	E7 E5	E7 E6	E7 F1	E7 F2	E7 F3	E7 G1	E7 G2	E7 G3	E7 G4	E7 G5	E7 G6	E7 H1	E7 H2	E7 J1	E7 J2
530	583	644	690	747	829	945	1046	1159	1293	1466	1613	1874	2037	2168	2357
1280	1408	1555	1666	1804	2002	2282	2526	2799	3123	3540	3896	4526	4919	5236	5692
	8"		10"					12"		14"				16"	
2334	2567	2835	3038	3289	3650	4161	4605	5103	5693	6455	7102	8251	8969	9545	10378
	12"		14"					16"		18"				20"	
525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110	525 - 1110
340	340	340	340	340	340	340	340	340	340	340	340	340	340	340	340
2668	2935	3242	3473	3760	4173	4757	5265	5834	6509	7380	8120	9434	10254	10914	11865
175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250	175 - 250
160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230	160 - 230
3382	3721	4110	4403	4767	5290	6031	6675	7396	8252	9356	10294	11959	12999	13835	15042
	220		268			295		301		309		366		436	
	160		167			177		185		197		201		206	
	159		165			171		183		195		195		198	
48.5	55.1	61.7	68.7	73.9	79.4	97.0	101.4	119.0	125.7	145.5	151.0	167.6	176.4	193.7	202.9
54.0	61.7	68.3	76.4	81.6	87.1	110.2	114.6	136.7	143.3	169.8	176.4	194.0	202.8	222.4	232.4
166			217			265		270		276		335		394	
	24.3		28.2			34.3		31.1		38.3		41.5		42.3	
	460 V(±10%), 60 Hz (±5%), 3 Phase														

- Ambient condition shall be between 41 to 113°F
- All Water Nozzle connections to suit ASME B16.5 Class 150
- Maximum Allowable pressure in chilled / cooling water system = 114 psi(g)
- These chillers are custom built, based on the engine parameters and operating load
- Dimensions & Weights are approximate and are for indicative purpose only
- Optional: Simultaneous heating, hot water of upto 195°F
- Tube metallurgy for Evaporator / Absorber / Condenser is DLP Copper

E2 Piping and Instrumentation Guidelines

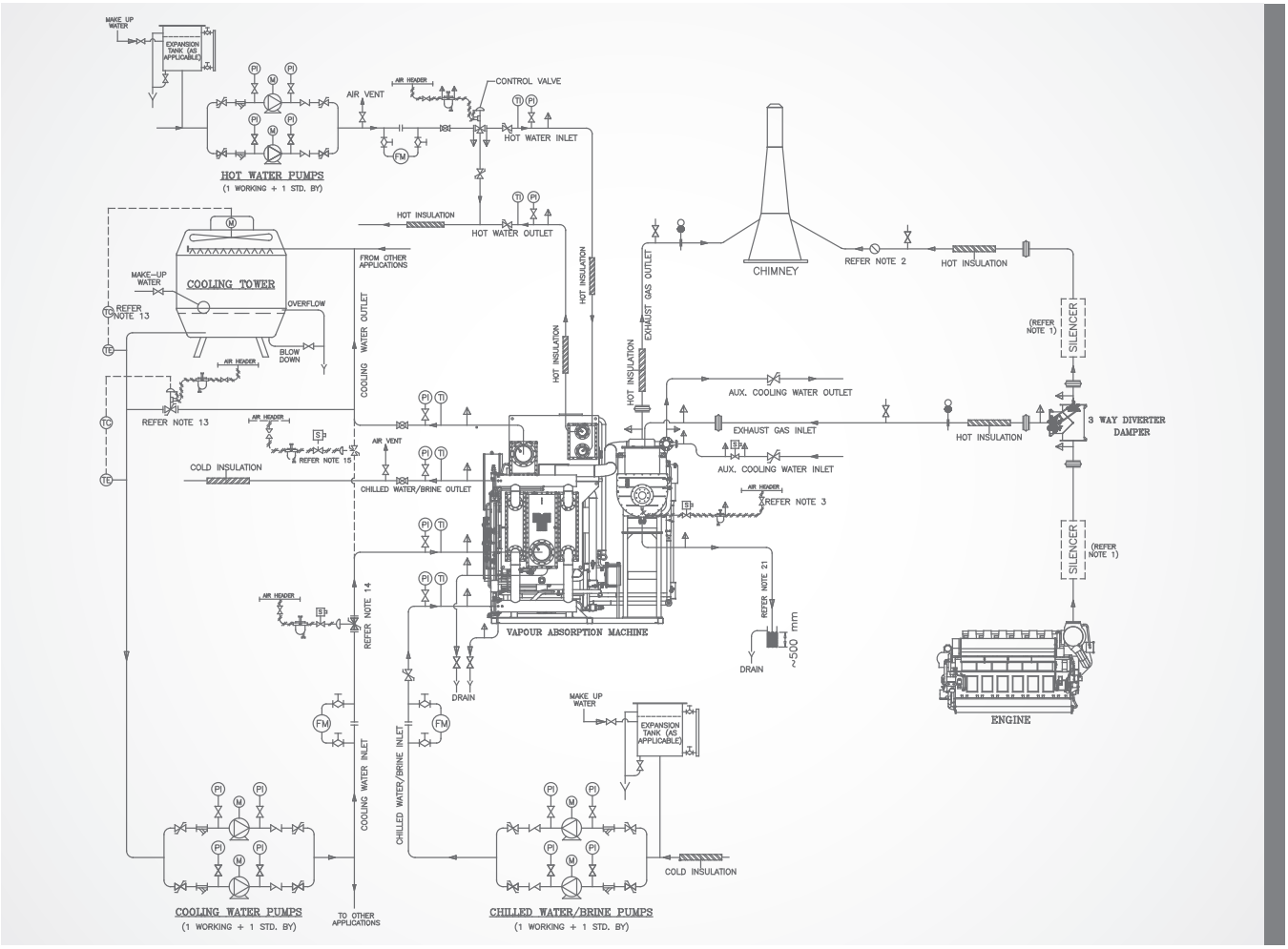


	Gate Valve (Open)		Control Valve (Open)		Air Filter Regulator	Ⓜ	Motor
	Gate Valve (Close)		Bellow/ Flexible Connection	Ⓟ	Pressure Indicator		"Y" Strainer
	Globe Valve (Open)		Solenoid Valve	Ⓣ	Temperature Indicator		Level Incicator
	Globe Valve (Close)		Butterfly Valve (Open)	Ⓕ	Flow Meter		Safety Valve
	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 ⏚ Thermax Scope							

NOTES:

1. Silencer location to be decided by user after giving due consideration to pressure drops in the machine and exhaust gas ducting.
2. Provide manual butterfly damper on the engine exhaust gas bypass line to balance the pressure drop in machine and exhaust gas bypass line.
3. For machines running on diesel engine exhaust, compressed air supply is required for soot blower.
4. Power supply for the 3 way diverter damper should be taken from the engine power panel to ensure uninterrupted power supply to the diverter damper when engine is in operation.
5. Provide necessary mechanism to isolate the exhaust gas inlet / outlet of the machine, to prevent leakage / back flow of exhaust gases when not in operation.
6. Local regulations are to be strictly followed for chimney design; emission of flue gases etc. Chimney discharge should be located at a sufficient distance away from cooling tower.
7. If same stack is used to discharge flue gas from more than one machine, provide automatic shut off damper on the flue gas outlet of machine to prevent back flow of flue gases.
8. Expansion bellows should be provided where ever necessary based on the actual ducting design to minimise thermal stress and nozzle loads.
9. Auxiliary cooling water for dump condenser should be preferably taken from the engine lt water circuit. Auxiliary cooling water solenoid valve size is DN 40.
10. Automatic arrangements should be provided to stop cooling water flow through the machine, if the chilled water/brine flow stops.

E7 Piping and Instrumentation Guidelines



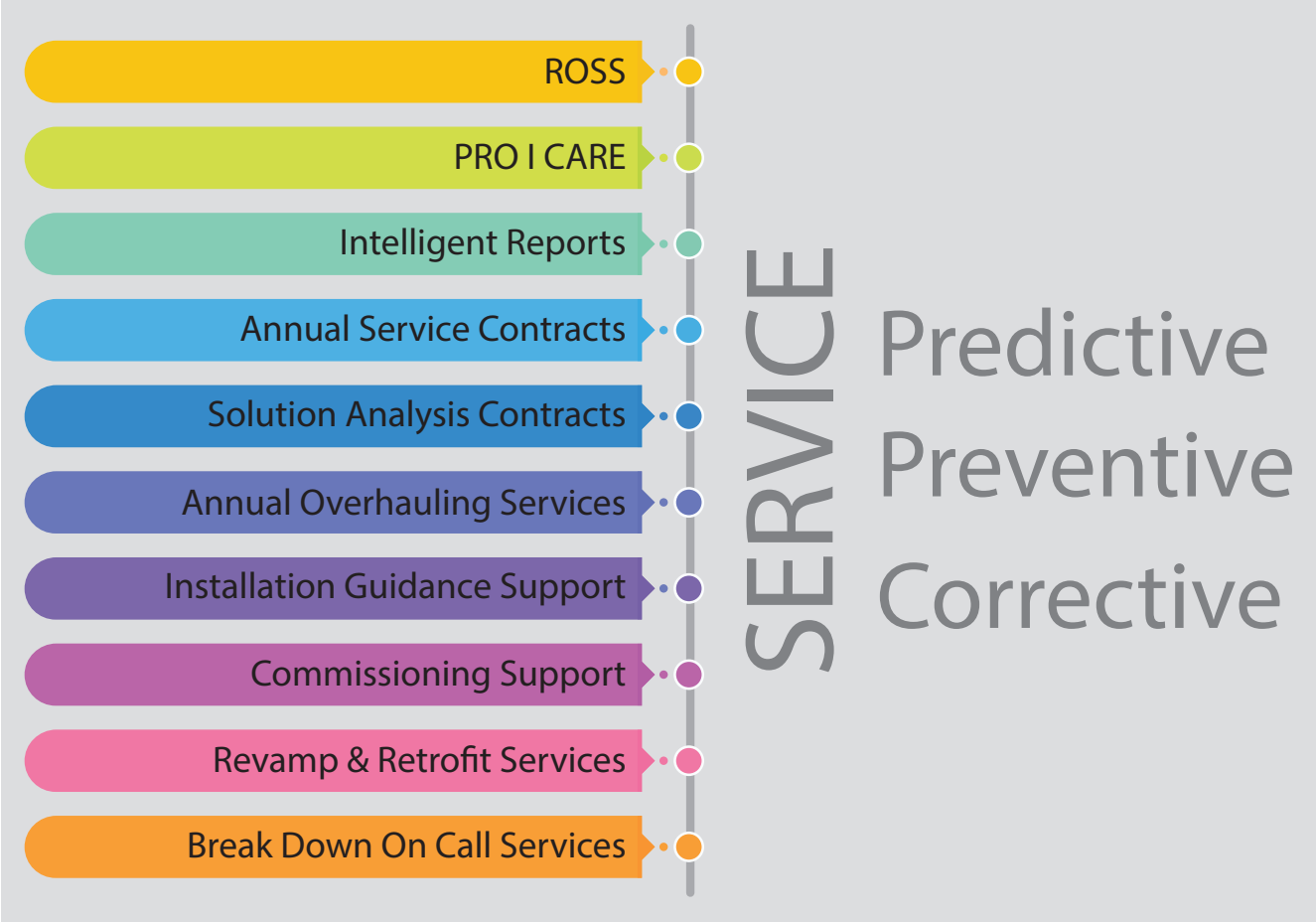
	Gate Valve (Open)		Control Valve (Open)		Air Filter Regulator	Ⓜ	Motor
	Gate Valve (Close)		Bellow/ Flexible Connection	Ⓟ	Pressure Indicator		"Y" Strainer
	Globe Valve (Open)		Solenoid Valve	Ⓣ	Temperature Indicator		Level Incicator
	Globe Valve (Close)		Butterfly Valve (Open)	Ⓕ	Flow Meter		Safety Valve
	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 ⏚ Thermax Scope							

NOTES:

11. Maximum working pressure in water headers is 8.0 bar (g). This should be noted for design of chilled brine and cooling water system.
12. Minimum allowable cooling water inlet temperature is 10OC. Necessary arrangements to be provided to maintain constant cooling water inlet temperature to the machine.
13. Cooling water automatic shut-off valve is mandatory, refer offer document for scope. Install automatic shut off valve on the cooling water inlet line, if cooling water pumps are not dedicated to the machine.
14. Else install cooling water automatic shut off valve only on the bypass line between cooling water inlet and outlet, if cooling water pumps are dedicated to the machine.
15. For exact nozzle location, size and rating, refer general arrangement drawing.
16. Ensure that the compressed air supply to the instruments is available at 5.0 bar.g and is free from oil and dust.
17. Approximate compressed air requirement - for control valve - 0.4 nm^3/hr (min), 0.8 nm^3/hr (max), for on/off valve 0.2 nm^3/hr (min), 0.4 nm^3/hr (max).
18. Least count of pressure gauge in water circuits should be 0.1 bar.
19. Expansion tank should be provided for closed loop chilled water system.
20. Condensate drain from exhaust gas circuit should be provided with a liquid seal to prevent flue gas leakage.
21. Provide separate ducts to connect engine exhaust gas to chimney.
22. Necessary arrangements to be provided to ensure that hot water inlet temperature to the machine doesn't increase beyond allowable limit (10 °c above rated).

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 and 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 and provides resolution to the problem in time to enable 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.

THERMAX ROSS
remote online service support

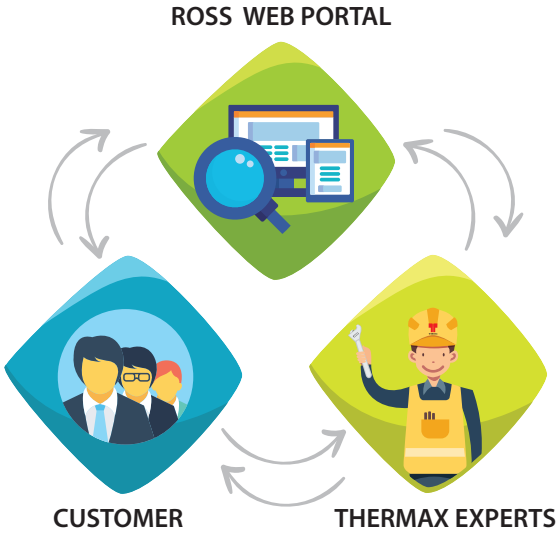
Multi-layered security

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 and 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 (Précised 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

Lego, Hungry

The Lego Group of Denmark, best known for the Lego brand toys , is the world's fourth largest toy maker. Situated near the Ukranian border where the availability of power is a major concern, Lego had installed 3nos. x 2.6 MW GE Jenbacher JMS 620 gas engine to cater to the captive power requirement. With the increase in the production capacity at this facility, the cooling requirement for the moulds also increased leading Lego to procure and use Thermax's exhaust driven chillers of 1830 TR (610 USRT x 3 no.s) for their cooling requirements..

Cadbury, Nigeria

Thermax supplied a 660 TR (2317 kW) exhaust gas driven absorption chillers to Cadbury (Mondelez International) in Nigeria. This absorption chiller is used in process cooling and air-conditioning using the heat recovered from a 3.7 MW gas engine. The waste heat from the exhaust of an existing gas engine was recovered serving as the heat source for the vapor absorption chiller that generates chilled water at 6°C which is used in process cooling and air-conditioning applications at the plant.

Hudson Yard, USA

Thermax has supplied four multi-energy absorption chiller-heaters for the Hudson Yards Development Project spread across 28 acres including commercial, residential spaces, shops, restaurants and a luxury hotel, in Manhattan, New York. The chillers are used to provide chilled and hot water for air conditioning.Each chiller is designed for 664 TR of cooling and 4280 MBH heating. They are driven by exhaust gases and heat from jacket water coming from 3.3 MW GE Jenbacher natural gas engines which generate electricity for the buildings.

CHPP, Thailand

Combined Heat and Power Company Limited (CHPP) is a 100% subsidiary of PTT Public Company Limited, a gas and Energy company incorporated to execute the combined heat and power project for a government complex in Bangkok. The project consisted of generating electricity and chilled water systems for the government complex. Thermax provided an optimal solution to meet the chilled water requirements of the customer with two exhaust driven chillers. These chillers with a capacity of 1600 TR each (3200 TR/11232 kW in total) were supplied for comfort cooling. The electricity for this project is generated using a 5.2 MW Solar Turbine while the single turbine exhaust is split equally into the two absorption chillers to generate chilled water.

California State University, USA

California State University, Fullerton (CSUF or Cal State Fullerton) is a public university located in Fullerton, California with the largest student body of all the 23-campus California State University (CSU) system. With an objective to create an environment friendly facility, the university constructed a 'Trigen' facility that generates heating, cooling and electricity for the entire campus and helps in energy conservation.. For this new plant, Thermax supplied two exhaust fired absorption chillers of a total capacity of 2620 TR (9196 kW) which were designed and manufacturer to run directly on the Turbine gases and/ or by natural gas firing. The double absorber design provides flexibility at part load conditions.

MathWorks, USA

The MathWorks, Inc. is an American privately held corporation that specializes in mathematical computing software. Data centre air-conditioning is a mission critical application as maintaining temperature in a data centre is essential for proper functioning of the servers. To meet this requirement Math works selected Thermax's multi-energy chiller-heater of capacity 96 TR cooling + 250 kW heating . The exhaust generated by the four C65 Capstone micro turbines of 65 kW capacity each for generating power at this data centre was harnessed to be an input to trigger the exhaust driven absorption chiller-heater that provides chilled water at 14.4OC during summers & hot water at 60 OC during winters in order to maintain the ambient condition inside the data centre.

Our Prestigious Installations

Santos Jaya Abadi, Indonesia

Thermax supplied a 418 TR (1470 kW) exhaust gas driven absorption chillers to Santos Jaya Abadi in Indonesia. This absorption chiller is used in milk chilling using the heat recovered from a 1.5 MW caterpillar engine. The waste heat from the exhaust of an existing gas engine was recovered serving as the heat source for the vapor absorption chiller that generates chilled water at 2°C of chilled water which is used in milk cooling applications at the plant.

101 Miller Street, Australia

101 Miller Street, the largest commercial building in North Sydney comprising of both premium office space and retail outlets, houses a Trigeneration plant .. The 101 Miller Street Trigeneration plant comprises of two units if 1166 kW engines of MTU make which are connected parallel to the grid. For their cooling requirement, two absorption chillers from Thermax, each of capacity 750 kW (213 TR) are coupled directly to each engine and integrated into the building's chilled and condenser water systems. With this Trigeneration plant in place, 101 Miller street was able to achieve approximately 50% reduction in greenhouse gas emissions and save 600 tons of CO_2 per year for which the building achieved a 5 star NABERS and a 5 star green star status.

Shanghai Tech University, China

Shanghai Tech University is a research university in Shanghai, China where. Thermax has supplied four vapour absorption chillers, which can utilise multi energy sources simultaneously and efficiently. This CHPC project with its distributed energy centre provides chilling and heating to the entire campus also becoming the teaching and research platform of distributed energy system for the campus. This is an ideal installation to showcase energy security for low carbon, clean, efficient and green campus. The three vapour absorption chillers of 1180 TR capacity each (cumulative capacity - 3540 TR) are triggered using exhaust and jacket hot water from three Jenbacher internal combustion engines of 4.4 MW. One chiller of 2116 TR runs on exhaust from a 1.25 MW gas turbine. The chilled water is supplied at 6°C for comfort cooling and hot water at 60°C for heating application. China Hua Dian Engineering Co. Ltd. is the general contractor for the project taking care of all the utilities.

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)
- Guiness 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 $NH4^+$	ppm	< 1	< 1	NA	NA
Biological Oxygen Demand	ppm	< 50	< 50	< 50	< 50
Chemical Oxygen Demand	ppm	< 100	< 100	< 100	< 100
Free Chorine	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, and when especially 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.

Notes

THERMAX

Sustainable Solutions in
Energy & Environment

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Thermax Business Portfolio

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