JANGHAN Engineers, Inc.

ICE STORAGE SYSTEM



Advanced Technology
Ice Cooling Storage Systems

JANGHAN
ENGINEERS, INCORPORATED.





Ice Storage System

JANGHAN's Ice Storage System

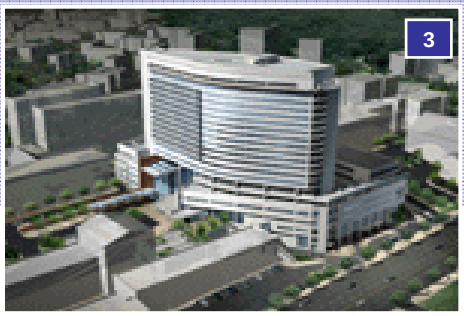
In cooperation with the leader in this technology, FAFCO(USA), new technology are being adapted to improve efficiency and to lower cost.

Major experience record

66 Sets of our New Parallel Type Cool Storage Systems (with increased capacity) are to be installed at the ASEM Convention Center, now in construction, being one of the biggest Cool Storage projects in Korea.









<1> ASEM Convention Center, Seoul, Korea [Capacity:33,000 RTH]
<2> The head-office of SC The first bank, Seoul, Korea [Capacity : 6,700 RTH]
<3> Yeonse Hospital, Seoul, Korea [Capacity : 9,000 RTH]
<4> KT Yeouido office, Seoul, Korea [Capacity : 3,500 RTH] and so on





Ice Storage System

Cool storage system

Advanced Technology Cool Storage System

As a new Thermal Storage System, Cool Storage Tanks have proven to be superior to others, by using low-cost energy to freeze water at night, and to use this energy to cool buildings at daytime. Now building engineers, consulting engineers routinely include this ice-based thermal energy system

Increased demand of electric power

Greater request of cooling

Decreased reserve electric power

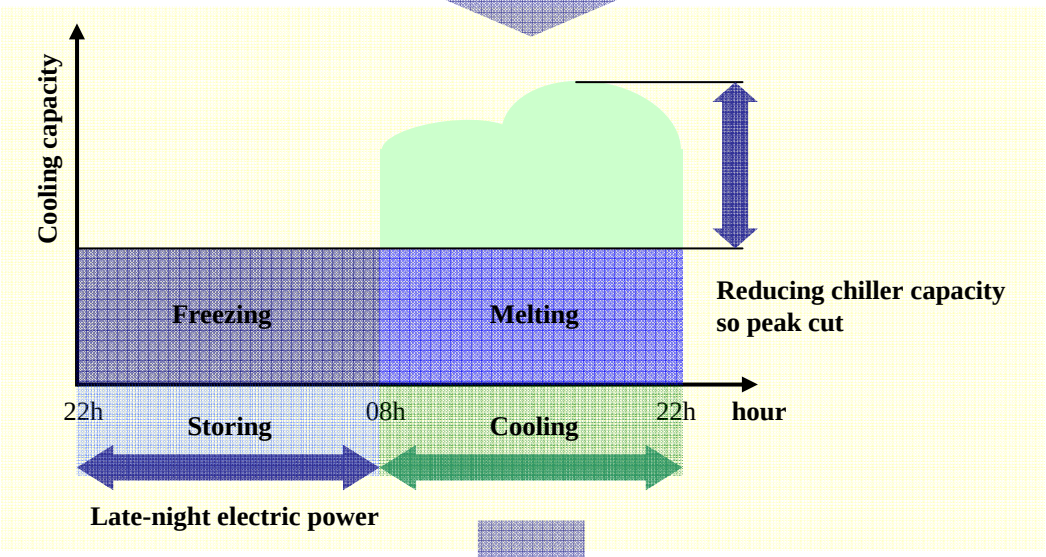
Need to building power plant for peek capacity

Environmental pollution

Building power plant

Increased CO_2 exhaust

Rising expense
Environmental destruction



Energy saving

Use of late-night electric

Decreased chiller capacity & contract power

Rated running of chiller at day and night

Environmental preservation

Hold building power plant

Power plant's efficient operation

Decreased CO_2 exhaust





Ice Storage System

Feature

IPF 90%, largest melting capacity at small space



- Uniformed and compact arrangement of coil for IPF 90%.
- Need small space for installing ice storage
- Owing to large heat transfer area of coil, very efficiently freezing and melting

Simplicity system

- Without trouble, inexpensive installation and operation cost by simplicity system

Easy maintenance

- Ice storages are connected to coil module, so easy repair.
- Not corrosion for the part under water's nonmetal

No ice bridge phase, No ice channel phase

- No ice bridge phase easy happen to freezing at outer shape
- Utilized distribution piping, no ice channel phase happen to melting

High COP

- Chiller has high COP, owing to uniform density of ice by constant brine temperature as -4 ºC ~ -5ºC at inner coil

Flexibly module type

- Steel tank and concrete tank are able to install anywhere as a machine room and the outdoor, several configuration

Certified durability

- We have used record more 20 year, then certified durability and long life time.



Concrete tank



Steel tank





Ice Storage System

Cool storage system's Model

Description	unit	HX-12-6 (2 m)				HX-12-9 (3 m)				HX-12-12(4 m)	
		#140	#280	#420	#590	#220	#440	#660	#880	#590D	#1180
Latent heat	RT·hr	125	250	375	500	188	375	565	750	500	1,000
Sensible	RT·hr	15	30	45	60	22	45	70	90	60	120
Total	RT·hr	140	280	420	560	210	420	635	840	560	1,120
Heat transfer Area	m^2	183	365	548	730	274	548	825	1095	730	1,460
No. of HX-12	EA	1	2	3	4	1	2	3	4	2	4
Inlet/Outlet Size	A	80 x 2	80 x 2	80 x 2	80 x 2	80 x 2	80 x 2	80 x 2	80 x 2	80 x 2	80 x 4
Width	mm	1,662	3,032	4,607	5,977	1,810	3,180	4,755	6,125	3,375	6,320
Length	mm	2,422	2,422	2,422	2,422	2,670	2,670	2,670	2,670	2,820	2,715
Height	mm	2,092	2,092	2,092	2,092	3,002	3,002	3,002	3,002	4,027	4,027
Storage volume	m^3	8.4	15.4	23.3	30.3	14.5	25.5	38.1	49.1	38.3	69.1
Installation area	m^2	4.0	7.3	11.2	14.5	4.8	8.5	12.7	16.4	9.5	17.2
Weight	kg	910	1,450	2,175	2,730	1,230	2,130	3,120	4,095	2,990	5,625
Operation Weight	kg	6,175	11,980	17,970	23,790	9,125	17,925	26,815	35,685	24,050	47,745
Water volume	liter	5,000	10,000	15,000	20,000	7,500	15,000	22,500	30,000	20,000	40,000
Brine volume	liter	265	530	795	1,060	395	795	1,195	1,590	1,060	2,120
Max. temperature	ºC	40									
Max. pressure	kg/cm^2	6									
Insulation coef.	$m^2h℃/kcal$	2.5									
Outdia of tube	mm	6.35									
Casing		A galvanized steel sheet									
Insulation		Compression polystyrene Board									
Waterproofing		PE Sheet									
Material of HX		Polypropylene (all face contact with water is non steal)									
Level sensor		Melting									

* Latent heat : -2.5 ~ 7 ºC

Ring Blower

Model	Power (kW)	Max. flow (m^3/min)	Max. Press. (mmAq)	Noise (dB)	Volt (V)	Dimension LxWxH(mm)	Weight (kg)	Stage
AB-1.5H	1.5	1.8	5,000	65	220/380	460x348x550	41	2 stage
AB-2.2H	2.2	2.5	6,000	66	220/380	460x355x590	43	2 stage
AB-3.7H	3.7	4.0	8,000	68	220/380	505x373x630	47	2 stage
AB-5.5H	5.5	9.7	8,000	73	220/380	914x440x1044	79	2 stage
AB-7.5H	7.5	10.7	9,000	75	220/380	914x440x1044	87	2 stage
AB-2.2D	2.2	4.0	4,000	67	220/380	460x355x590	42	2 stage
AB-3.7D	3.7	8.0	5,500	69	220/380	505x373x630	46	2 stage





Ice Storage System

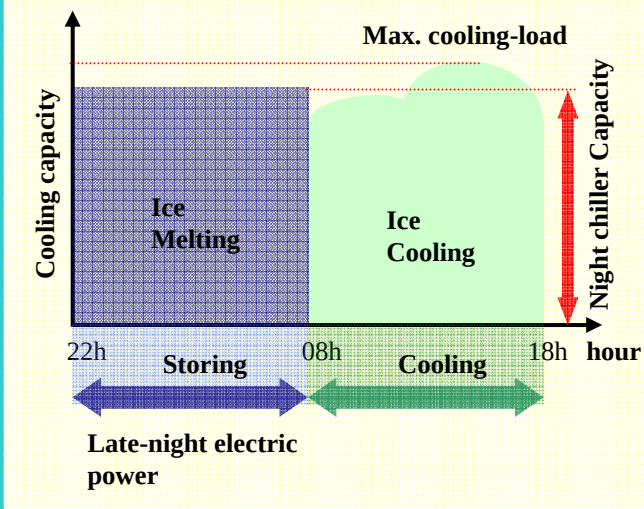
circuitn type

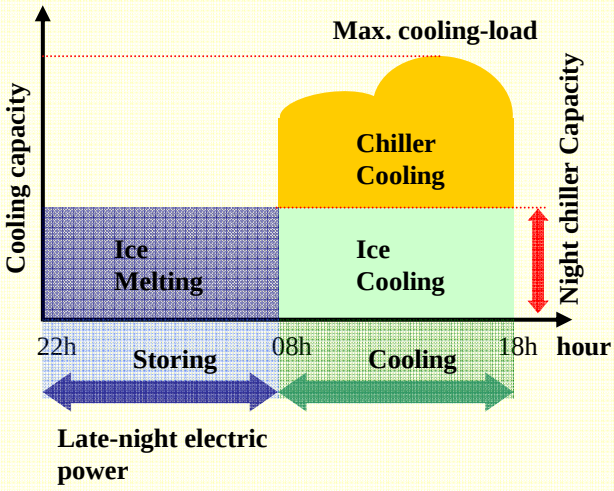
Complete ice storing

- Whole of cooling load utilize to cooling by ice storage. The chiller not operates at daylight.

Partial ice storing

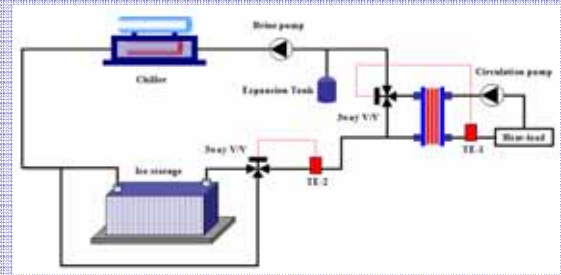
-Part of cooling load utilize to cooling by ice storage as above 40%. The chiller operates with ice storage at daylight.



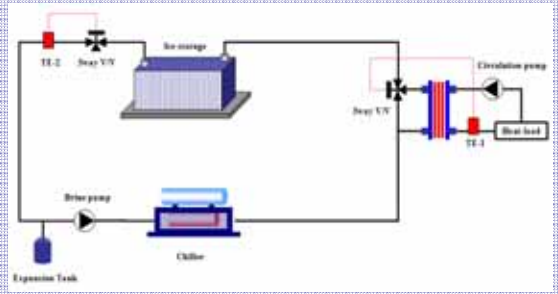


Series circuit

Chiller upstream – Chiller COP Increased
Simply System Control

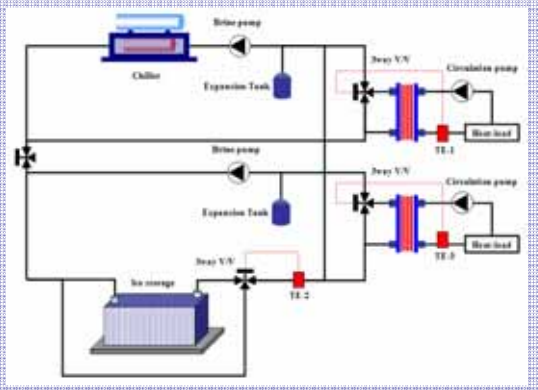


Chiller upstream – Melting Efficiency Increased
Supply Low Temperature Water



Parallel circuit

Separate circuit chiller and ice storage



- If heat load is small or fluctuation then low pump power and easy operated by peak cut

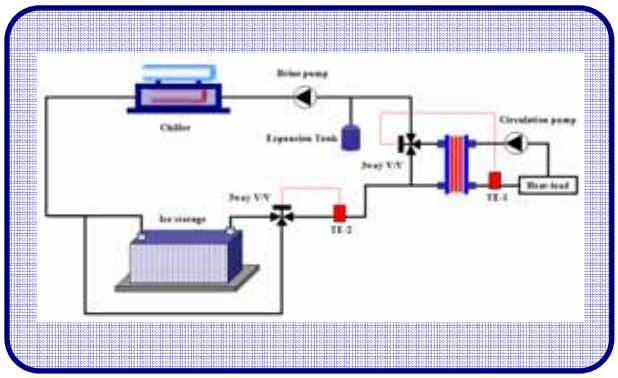




Ice Storage System

Circuit type

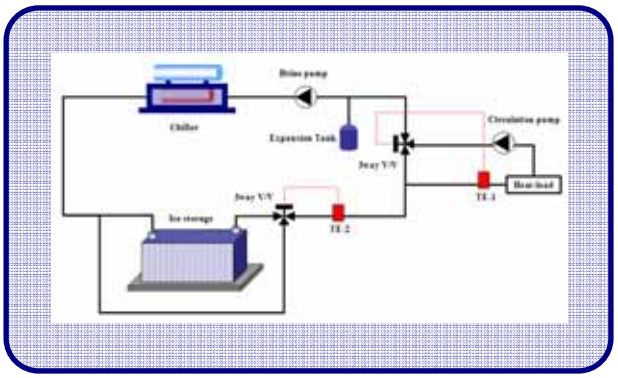
Indirect circuit



Heat transfer from water (load side) to brine (ice storage side) with heat exchanger, cooling water supply to building

- **Suitable to large building**
- **Easy maintenance**

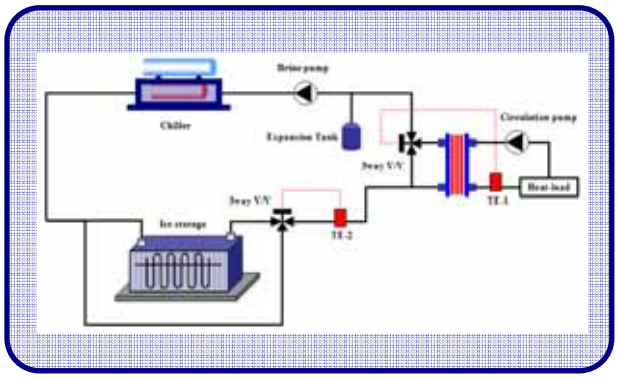
Direct circuit



Brine from ice storage direct supply to building without heat exchanger

- **Improve system efficiency**
- **Attention to insulation piping and brine volume**

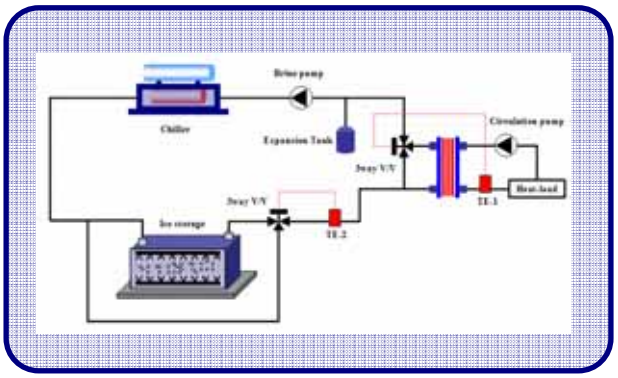
Close circuit



Brine (ice storage side) not contact with atmosphere

- **low piping corrosion, low brine volume**
- **Exactly measured to freezing quality**

Open circuit



Brine (ice storage side) contact with atmosphere

- **Low height of storage**
- **Low melting efficiency**
- **Attention to concentration of brine**

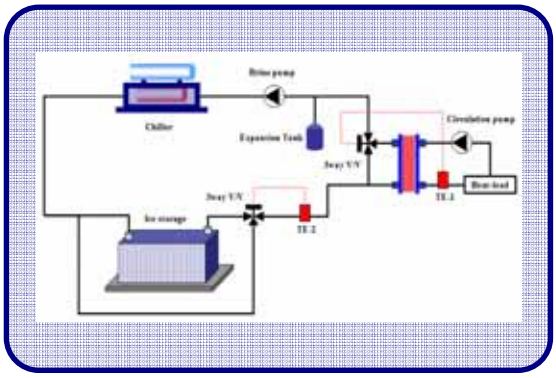




Ice Storage System

Operation type

Ice storage system has operated for making ice at night as freezing mode, utilized this ice for cooling load , Determining to operate mode as singly chiller or ice storage, parallel mode (chiller and ice storage) by load fluctuation



Parallel mode (Chiller & Ice storage)

This mode operate simultaneously chiller with ice storage. Mainly operating in the case of large load .

Ice melting Only

This mode not operate chiller and only run ice storage. Mainly operating in the case of small load as early summer and early fall.

Ice Making

This mode operated for making ice at night. Chiller running on low temperature

Chiller Only

This mode mainly delay to melting ice and all ice molten. In the case of early morning and late evening in summer utilized.

Priority Ice storage

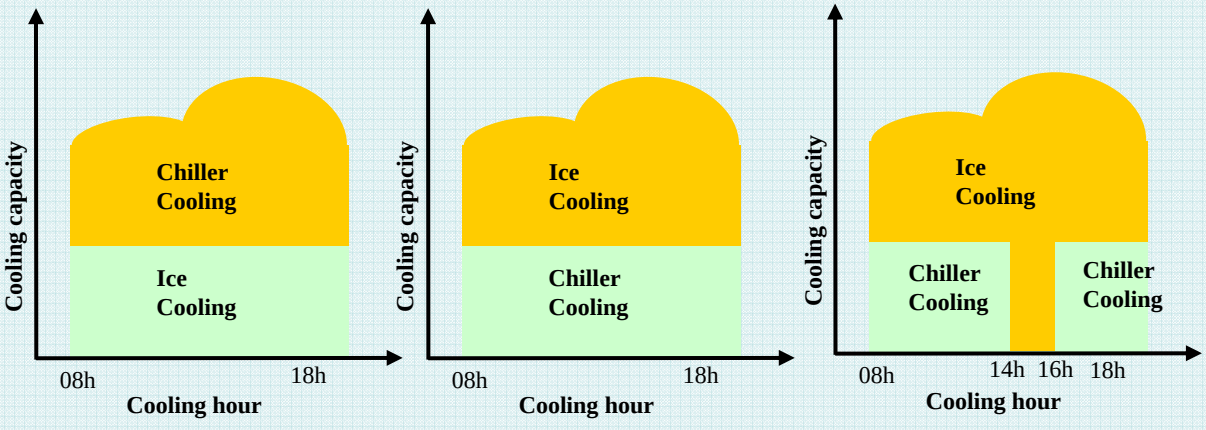
Base cooling : Ice storage
Adjustable cooling : Chiller

Priority Chiller

Base cooling : Chiller
Adjustable cooling : Ice storage

Limited power demand

Peak time(14h~16h) :
: Ice storage only



- Low operating cost
- Increasing chiller capacity

- Easy operating
- Occasionally remained ice at cooling over

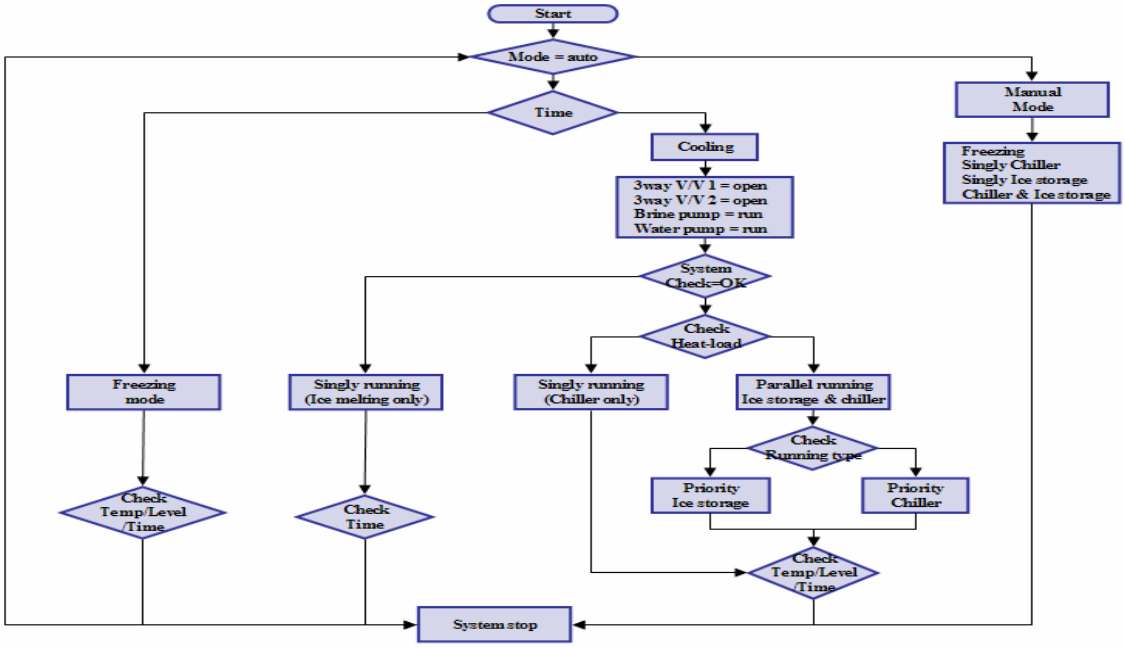
- Peak safe
- Large size chiller and ice storage



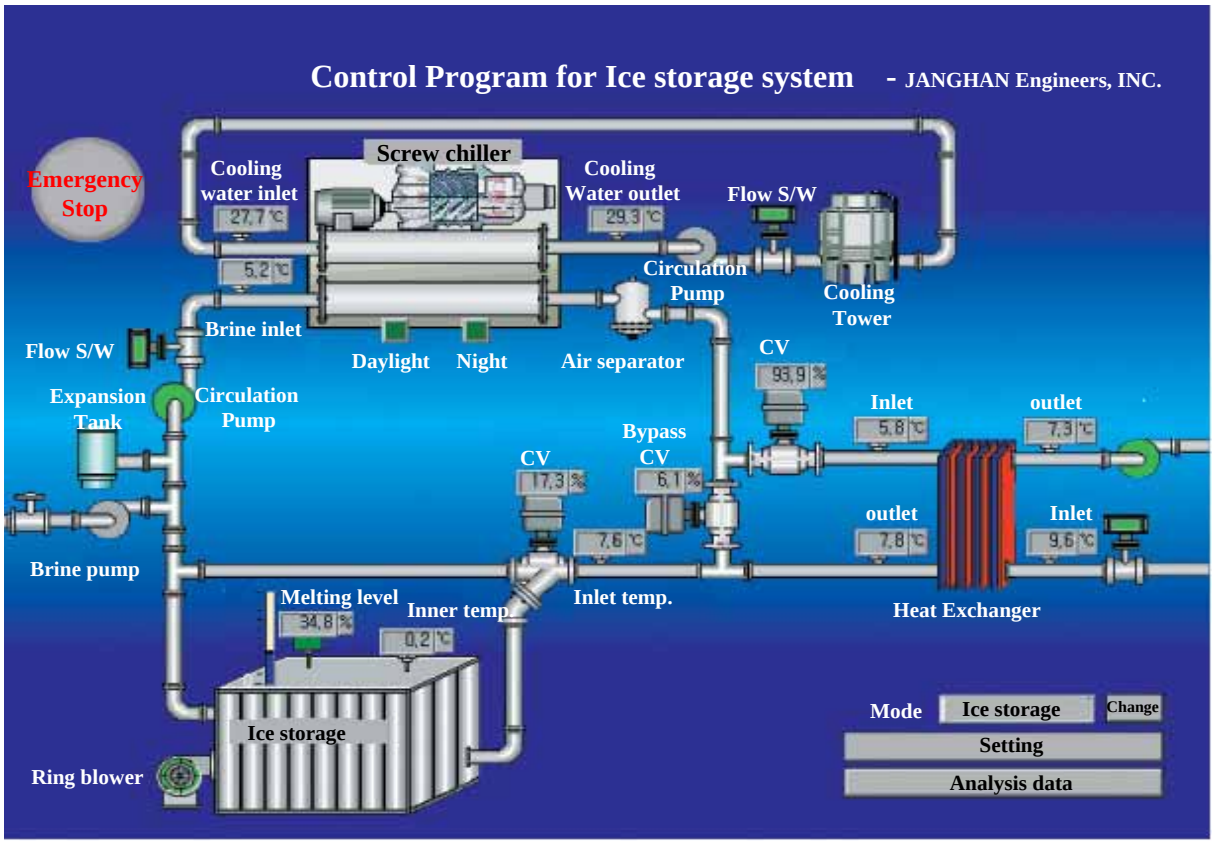


Ice Storage System

IsaTrol-2000 Logic



Storage view main screen



JANGHAN Engineers, Inc.

Ice Storage System

Engineered by JANGHAN

JANGHAN provides all customers with top quality products and services, intelligent solutions

JANGHAN
From the start of our business in 1987,
We devoted ourselves to develop the innovative system & products for hydronics, pumping system, heat exchangers, thermal energy storage, water filtration and environmental protection equipment
,with the challenging spirit of creating new industry standards.
,with the quality products from state-of-the-art production technology.
,with the experienced knowledge to provide solutions and O&M supports.
We are endeavoring to satisfy the customer's requirements and always opening the ears to hear of all your criticism for continuing improvement of our services.

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