SARMA SARV AHURA
COOLING MACHINES

HYBRID COOLING SYSTEM FOR HOT AND HUMID CLIMATES

TECHNICAL PROPOSAL

SARMA SARV AHURA
INDUSTRIAL AND HVAC CHILLERS

The Brand of New Technologies

Sarma Sarv Ahura Cooling Technology

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SARMA SARV AHURA COOLING MACHINES

HYBRID SYSTEMS

DESCRIPTION

More than 15 years of experience, in cooling industrial processes in hot and humid regions like Iraq and southern Iran, led us to the technology which we've called it hybrid systems. The hybrid system is the technology which takes advantage of air cooled and water cooled systems in one pack, combining them in a way which proper sub-cooled refrigerant is possible to attain. A proper water-cooled condenser with proper capacity is attached right after the air-cooled condenser with a proper control system which avoids entering non-subcooled refrigerant to the receiver. This technology maximizes the efficiency of the system in rejecting the absorbed heat to the ambient resulting in better heat absorption in the evaporator. Therefore, it doesn't matter in which terrible hot and humid weather your industry is, this system can bring enough cool to your process in the hottest season of the year. This system also can operate with only air-cooled condenser if it is not necessary to use water-cooled condenser because of the mild weather in some seasons of the year such as winters.

In order to have a better understanding of chiller performance in this method of cooling, it is better to define a criterion which is called COP.

COP is defined as the ratio of the refrigeration effect produced by the chiller against the amount of electrical power that went into the machine:

$$COP = \frac{KW\ REFRIGERATION}{KW\ ELECTRICITY}$$

Typical non-hybrid compression chiller with the capacity of 30 TR in certain ambient conditions with the following data in table 1. is considered:

Table 1.

Component	NO. of components	Electrical power consumption for each component (kW)	Sum of electrical power consumption for components (kW)	Chiller total electrical power consumption (kW)	Chiller total cooling capacity (kW)	COP
compressor	2	10.84	21.68	25.88	86.82	3.35
Chiller fans	6	0.7	4.2	-	-	-

And for the hybrid chiller with the same compressors and the same ambient conditions, the following table is valid:

Table 2.

Component	NO. of components	Electrical power consumption for each component (kW)	Sum of electrical power consumption for components (kW)	Chiller total electrical power consumption (kW)	Chiller total cooling capacity (kW)	COP
compressor	2	9.3	18.6	20.25	97.92	4.83
Chiller fans	6	0.7	1.4[1]	-	-	-
Cooling tower fan	1	0.25	0.25	-	-	-

With the comparison of the COP between table 1. and table 2. One can understand that COP in table 2. (hybrid system) has more than 30 percent increased.

[1]Regarding the existence of the cooling tower, the high-pressure switch doesn't act and 4 fans are out of operation. Therefore, two fans are only in operation to cool down the refrigerant in the condenser.

Results:

- Decreasing in electrical power consumption
- Gaining higher Cop
- Avoiding from chiller high-pressure failure in regions like Khuzestan.
- Better performance
- Longer lifespan for components

WARNING:

THIS HYBRID SYSTEM IS DESIGNED AND MANUFACTURED FOR THE FIRST TIME IN SARMA SARV AHURA CO IN IRAN BY COMPLETE ENGINEERING METHOD. ANY MISUSE OF THIS METHOD BY OTHER COMPANIES, INCLUDING INAPPROPRIATE CHOOSING OF WATER-COOLED CONDENSER, WILL LEAD INTO MALFUNCTION OF THE WHOLE SYSTEM.

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