

RACA/E Free Cooling



Free Cooling

FRIGOSYSTEM has designed a system for cooling the process water required for plastic processing machines with substantial reduction in the use of energy, the cost of which is variable and subject to continuous rise. The problems in water treatment and make up water as well as those concerned with limiting formation of scales and oxides or corrosion in the equipment have led to the adoption of the closed circuit solution. The water coolers consists of a refrigerator unit comprising a compressor, condenser and evaporator. The heat absorbed by the refrigerant fluid passing from the liquid to the gaseous phase, takes place in the evaporator at the heat possessed by the process water. The machines are also provided with fans for cooling the condenser to which the refrigerant fluid yields heat after compression when passing from the gaseous to the liquid phase.

In conventional system, the compressor is permanently operating and mechanical power is therefor needed to achieve water cooling.

With a view to energy saving, FRIGOSYSTEM has installed a heat exchanger in the refrigerator units, through which the process water can be cooled by using the atmospheric air. The latter, forced by condenser fans, impinges on this supplementary radiator. Hence under favourable atmospheric conditions, the free cooling system allow the compressors to be stopped in the cooling circuit, with substantial energy saving. Such savings (according to FRIGOSYSTEM is assessments and on the basis of results obtained with a pilot plan installed in North Italy) can exceed the average value over a yearly basis by 50%. For the production of process water at 15 gradi C in italian latitudes, the free cooling system could be used from the end of September to mid April. Obviously in colder regions, there would be a wider span of months in which the system can be used with greater advantages in the amount of energy saved.

technical details

MODEL	RATING*		WATER FLOW	SUMMER INSTALLED POWER	MINIMUM RATING FREE C.		WINTER INSTALLED POWER	CIRCUITS	WATER TANK	OVERAL DIMENSIONS				VACUUM WEIGHT
	KW	Kcal/h	m ³ /h @ 3 bar	n°	KW	Kcal/h	KW	n°	lL	L	h	I	units mod.n°	Kg
RACA/E 302 F.C	100	86.000	18	34	65	56.000	7	2	400	4000	2200	2000	1	2500
RACA/E 402 F.C	135	115.000	24	40	85	73.000	8	2	400	4000	2200	2000	1	2700
RACA/E 502 F.C	152	130.000	26	49	95	82.000	10	2	700	4000	2200	2000	1	3200
RACA/E 602 F.C	180	155.000	31	56	110	95.000	10	2	700	4000	2200	2000	1	3400
RACA/E 702 F.C	223	190.000	38	65	160	138.000	15	2	700	5000	2200	2200	1	4000
RACA/E 802 F.C	267	230.000	46	75	180	155.000	16	2	700	5000	2200	2200	1	4300
RACA/E 1002 F.C	325	280.000	56	88	210	182.000	20	2	1000	6000	2300	2400	1	5000
RACA/E 1202 F.C	390	335.000	67	110	250	215.000	26	2	1000	7000	2300	2400	1	5600
RACA/E 1404 F.C	448	380.000	76	130	300	260.000	30	4	1200	7500	2300	2400	1	6300
RACA/E 1604 F.C	534	460.000	92	150	340	293.000	35	4	1200	8700	2300	2400	1	7200
RACA/E 2004 F.C	650	560.000	112	190	420	360.000	54	4	1200	11000	2300	2400	1	9000
RACA/E 2404 F.C	780	670.000	134	225	550	475.000	60	4	1500	11000	2900	2400	1	11000

* This is valid under the following conditions: Water leaving at + 12°C; ambient temperature at max + 25°C

Dual Free Cooling



FRIGOSYSTEM has developed its project even further was presented a double free cooling machine. This system features two cooled water circuits: the first at a temperature of 10-15°C for cooling moulds of the plastic processing machines, while the second circuit in which temperatures can be up to 25° C, serves for cooling the heat exchangers of the hydraulic system on the presses. The new machine enables considerable energy saving which could be up to 70% as the higher temperature circuit can operate over a longer seasonable period. The refrigerator unit is provided with an electronic microprocessor-based control and regulating system designed to carry out the changes in operation between the compression cycle and the air cycle in fully automatic mode. This means that the integral refrigerant system automatically cutters for low and peak loads requirements.

The control system, which handles the two circuits in the double free cooling version, permits partial energy saving when the surrounding atmospheric conditions are not sufficient for the water in the circuits to reach the pre-set temperature.

In this case, the compressors for the cooling cycle are actuated, but they only perform part of the work necessary for cooling the water.

technical details

MODEL	RATING*		WATER FLOW m ³ /h @ 3 bar	SUMMER INSTALLED POWER n°	MINIMUM RATING FREE C.		WINTER INSTALLED POWER KW	CIRCUITS n°	WATER TANK lL	OVERAL DIMENSIONS				VACUUM WEIGHT Kg
	KW	Kcal/h			KW	Kcal/h				L	h	I	units mod.n°	
RACA/E 302 F.C	100	86.000	18	34	65	56.000	7	2	400	4000	2200	2000	1	2500
RACA/E 402 F.C	135	115.000	24	40	85	73.000	8	2	400	4000	2200	2000	1	2700
RACA/E 502 F.C	152	130.000	26	49	95	82.000	10	2	700	4000	2200	2000	1	3200
RACA/E 602 F.C	180	155.000	31	56	110	95.000	10	2	700	4000	2200	2000	1	3400
RACA/E 702 F.C	223	190.000	38	65	160	138.000	15	2	700	5000	2200	2200	1	4000
RACA/E 802 F.C	267	230.000	46	75	180	155.000	16	2	700	5000	2200	2200	1	4300
RACA/E 1002 F.C	325	280.000	56	88	210	182.000	20	2	1000	6000	2300	2400	1	5000
RACA/E 1202 F.C	390	335.000	67	110	250	215.000	26	2	1000	7000	2300	2400	1	5600
RACA/E 1404 F.C	448	380.000	76	130	300	260.000	30	4	1200	7500	2300	2400	1	6300
RACA/E 1604 F.C	534	460.000	92	150	340	293.000	35	4	1200	8700	2300	2400	1	7200
RACA/E 2004 F.C	650	560.000	112	190	420	360.000	54	4	1200	11000	2300	2400	1	9000
RACA/E 2404 F.C	780	670.000	134	225	550	475.000	60	4	1500	11000	2900	2400	1	11000

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(Any Specification FRIGOSYSTEM may be subject to change without notice)