Refrigeracion Verde

Industrial Refrigeration , Air Conditioning and Ventilation

Design and Manufacture of Engineered Equipment

Refrigeracion Verde S.A.S.
Office : Calle 73 62 - 50 , Barranquilla , Colombia
Tel +57 605 346 5312 , Mobile +57 310 617 7401
refriverde@gmail.com , www.refriverde.com

Milk Cooling System with Thermal Storage , Biogas Genset , Cold Room and Solar Energy Panels

Eight Refrigeration Systems from 64 to 412 kWh to Store 580 to 3770 **kg of Ice** overnight for **12 hours** using a Biogas-Powered Generator , and then during the day to Cool 1200 to 8800 **Liters of Milk** from 35°C to 4°C in **3 hours** and subsequent storage in 40 Liters Tanks in a Cold Room . A 90% Thermal Efficiency are considered for all Systems

COMPRESSOR : R410A at **Te - 8°C** , SH 10°K / **Tc 45°C** , SC 5K , Air Entering at 30°C

- Danfoss **Inverter Scroll Compressor** with its Driver for speeds from 1500 to 6000 rpm
- Condenser Coil with Liquid Receiver and Sub-Cooling circuit
- Oil Separator , Suction Liquid Separator
- Crankcase Heater , Discharge Gas Temperature Sensor

ICE BANK THERMAL STORAGE : Milk Cooler with Water at 0°C from the 65% Ice Storage

- Bank of copper tubes arranged for the formation of ice of optimal thickness
- Ice thickness control and inventory
- Tank with walls made of galvanized sheet metal and 100 mm of insulation

GENSET : Lister Petter Engine using Natural Gas or Biomethane for continuous use

COLD ROOM : DX Cold Unit of Cold Room for Milk Storage at 4°C all the time , dimensions with approximate 40% free for 40 Liters Milk Tanks of 0.35 M Diameter

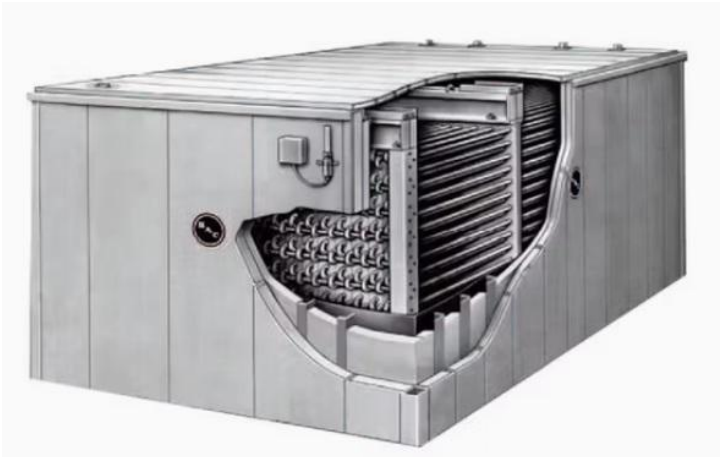
SOLAR ENERGY PANELS : Energy as a supplement for Solar 6 hours of for the operation of the Cold Room and the chilled water and milk Recirculation Pumps



MILK COOLING WITH SOLAR SYSTEM AND NIGHT ICE BANK WITH BIOMETANO GENSET

NIGHT OPERATION										DAYTIME OPERATION						
MODEL	DANFOSS COMPRESSOR @ 60RPS , 200-230V/3/60				**12 HR ICE STORAGE**		4°C COLD ROOM DX SYS	**BIOGAS** ENGINE GENSET		**3 HR MILK COOLING 35°C TO 4°C**		**PUMP + AUX**	4°C COLD ROOM DX SYS		**DAY TIME ENGY**	**SOLAR PANEL 550 W_P**
MCSyyy	MODEL **VZHxxx**	**KW_R**	**RT**	**KW_E**	**KW_RH**	**KG**	**KW_R**	**KW_E**	**KW_E**	**KW_RH**	**LTS**	**KW_E**	**KW_R**	**KW_E**	**KW_EH**	**QTY**
064	**028**	5.301	1.51	**2.392**	63.61	581	1.74	**0.58**	28	41.4	1197	**1.50**	1.83	**0.61**	11.82	4
081	**035**	6.710	1.91	**2.854**	80.52	736	1.74	**0.58**	28	52.3	1514	**1.90**	1.83	**0.61**	13.02	4
104	**044**	8.630	1.94	**3.584**	103.6	947	2.13	**0.71**	28	67.3	1949	**2.44**	2.24	**0.75**	16.32	5
113	052	9.410	2.67	4.289	112.9	1032	2.47	0.82	28	73.4	2124	2.66	2.60	0.86	18.30	6
142	065	11.834	3.37	5.351	142.0	1298	2.76	0.92	28	92.3	2671	3.34	2.91	0.97	21.66	7
212	**088**	17.625	5.01	**7.670**	211.5	1933	3.95	**1.32**	28	137.5	3979	**4.97**	4.16	**1.39**	31.59	10
296	**117**	24.650	7.01	**10.12**	295.8	2704	5.25	**1.75**	50	192.3	5564	**6.96**	5.53	**1.84**	42.96	13
412	**170**	34.341	9.77	**13.85**	412.1	3767	6.03	**2.01**	50	267.9	7752	**9.69**	6.35	**2.12**	54.51	17

PRELIMINARY





Ice : ρ = 917 Kg / M^3 , h_{if} = 333.55 KJ / Kg , 1 RT = 3.51685 KW

Milk : ρ = 975 Kg / M^3 , C_p = 4.116 KJ / Kg.K