

CO₂ Refrigeration – Energy Considerations

Wynand Groenewald | Future Green Now | 14 September 2022

Typical high ambient technologies

Adiabatic Gas coolers

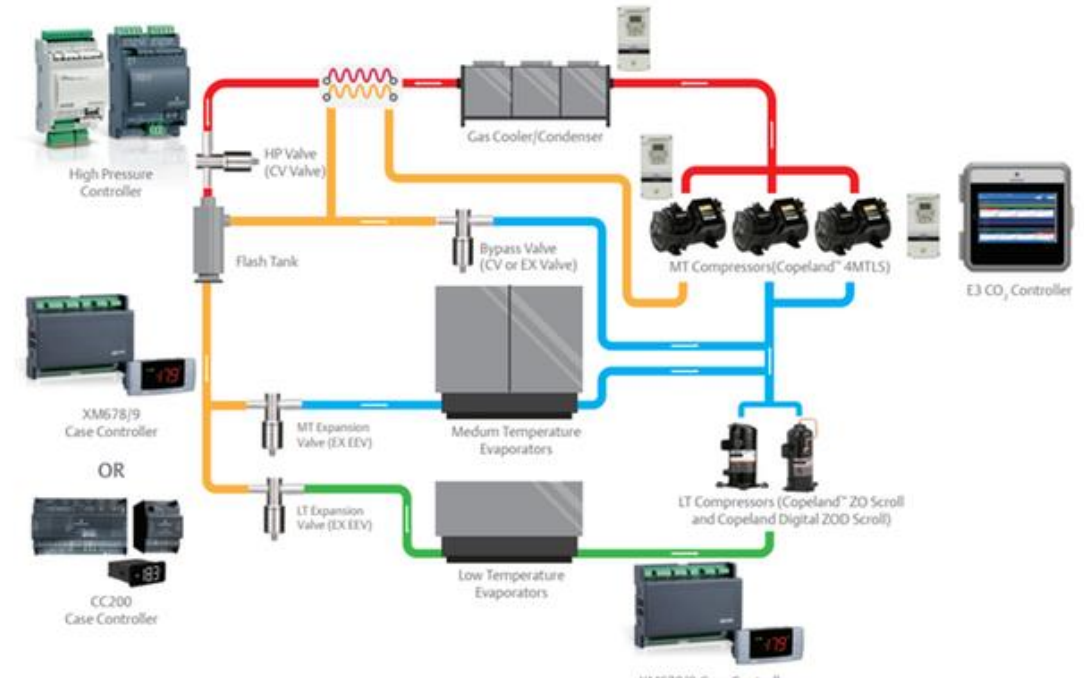
- Low pressure
- Humidity

Parallel Compression

- High pressure
- Flash gas

Ejectors

- High pressure
- Flash gas and suction pressure

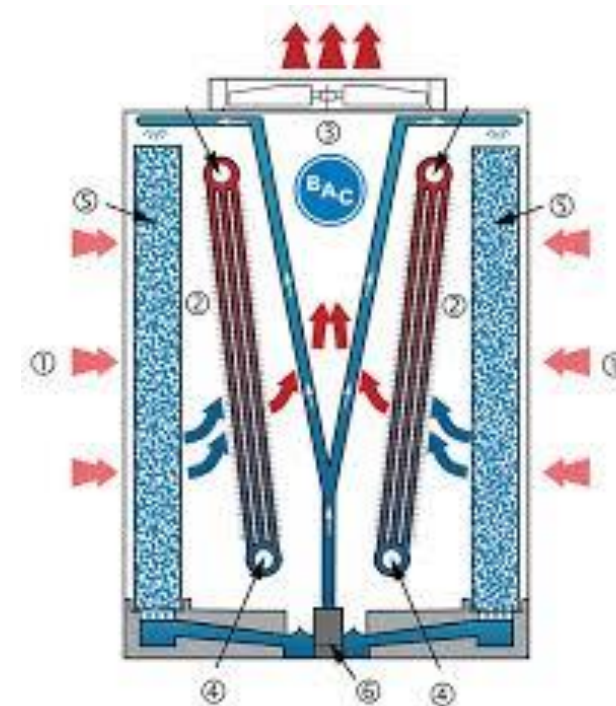


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Adiabatic Gas coolers

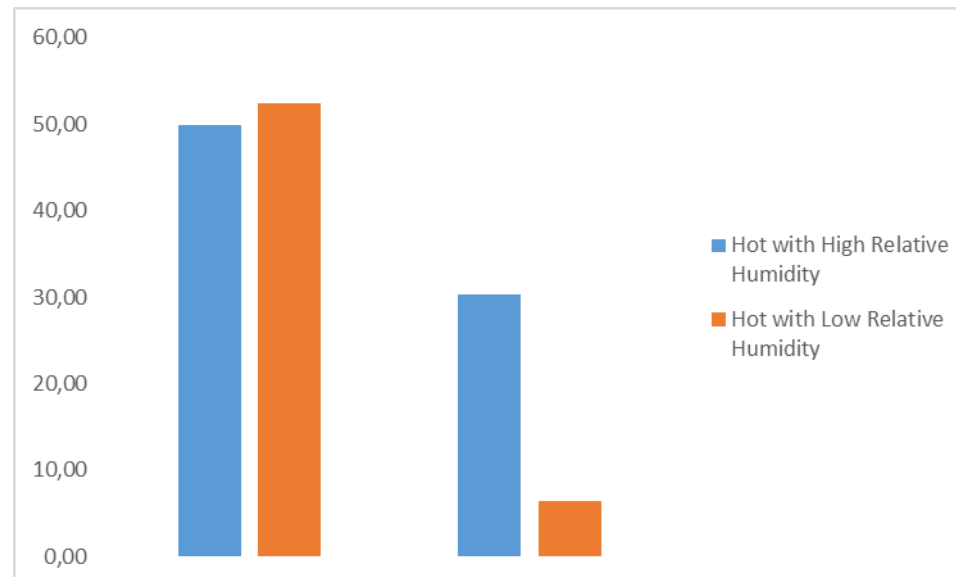
- Water over gas cooler reduce ambient temperature from dry bulb to wet bulb
- Lower RH, bigger differential between wet and dry bulb

Capture Condensate



Relative Humidity

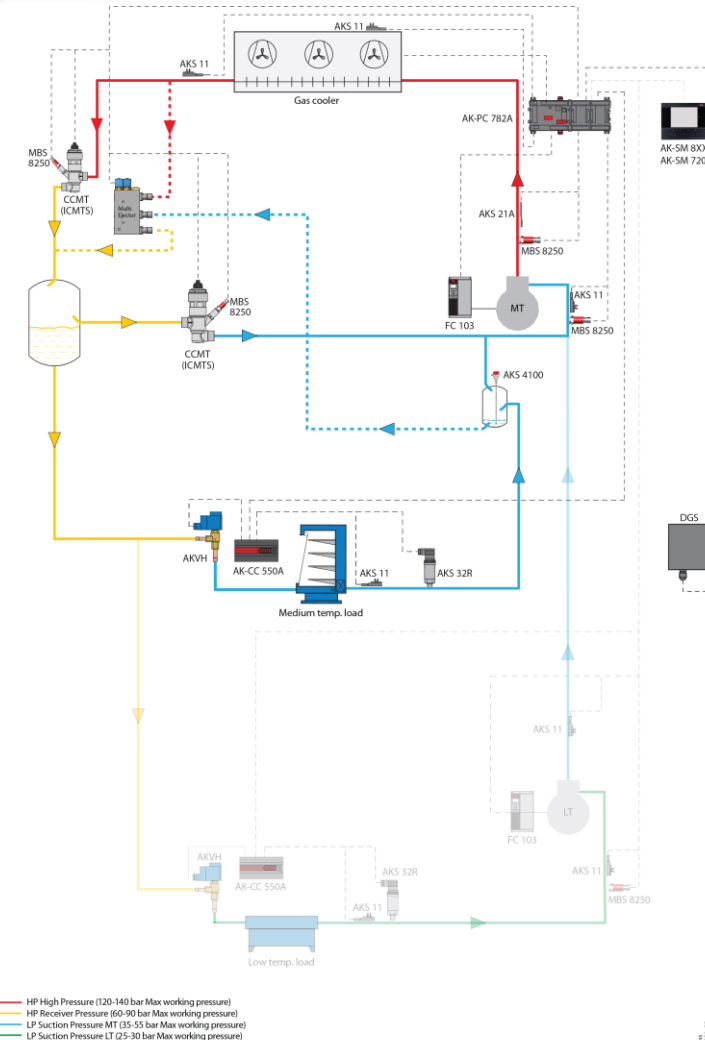
Hot with High Relative Humidity																		
Celcius	-6,7	-3,9	-1,1	1,7	4,4	7,2	10,0	12,8	15,6	18,3	21,1	23,9	26,7	29,4	32,2	35,0	37,8	Total Hours
Dry Bulb	3	17	56	122	185	309	433	577	667	884	1131	1722	1288	798	454	102	11	8760
Wet Bulb	3	17	56	122	185	309	437	615	805	1271	2284	2257	400	1	0	0	0	8760
	4384 hrs SC		4376 hrs TC		49,96 % TC													
	6102 hrs SC		2658 hrs TC		30,35 % TC													
Hot with Low Relative Humidity																		
Celcius	-6,7	-3,9	-1,1	1,7	4,4	7,2	10,0	12,8	15,6	18,3	21,1	23,9	26,7	29,4	32,2	35,0	37,8	Total Hours
Dry Bulb	0	0	0	0	12	168	449	816	653	1063	1005	860	967	498	851	536	882	8760
Wet Bulb	0	0	0	0	12	168	560	1461	1778	2393	1829	506	53	0	0	0	0	8760
	4166 hrs SC		4594 hrs TC		52,44 % TC													
	8201 hrs SC		559 hrs TC		6,38 % TC													



Other energy savers

Increase Suction Pressure

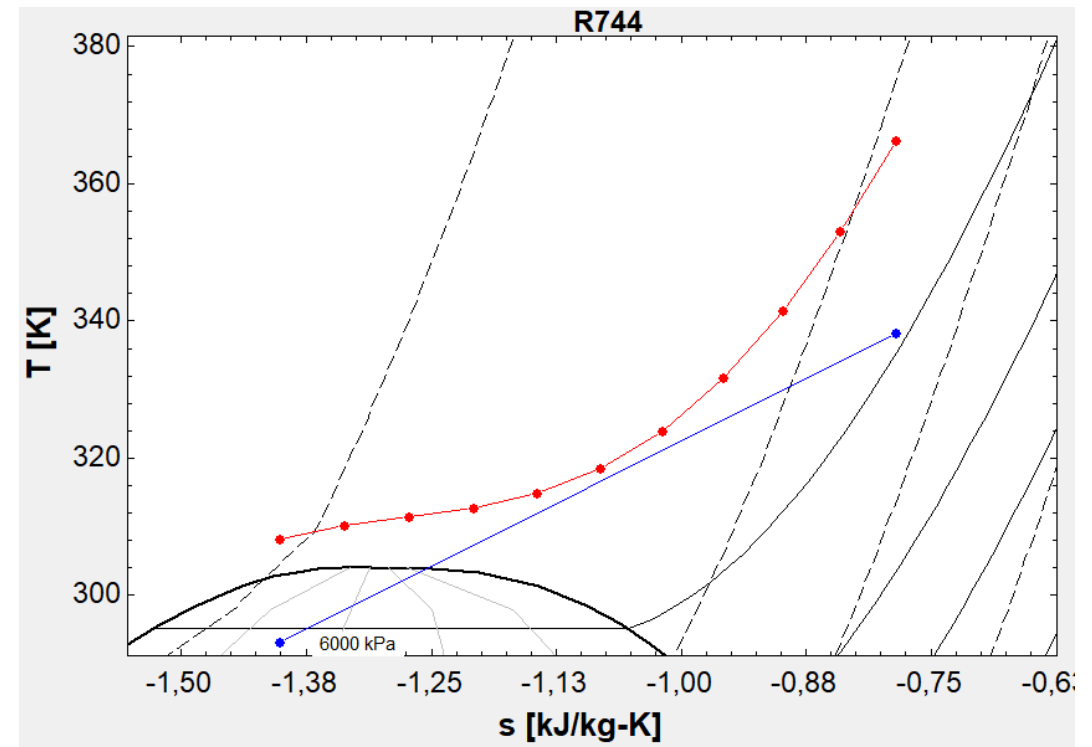
- 3% energy saving for every 1C lift
- Control Logic
- Low superheat or flooded
- Liquid ejectors
- All year saving



Other energy savers

Combined Heating and Cooling

- Heat reclaim for space heating and domestic hot water
- Air Conditioning





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