

Refrigerants are the back bone of any heating and cooling system making use of a vapor compression cycle and can not operate without it.

The impact of chemical-based refrigerants on the environment is massive and there simply is not a vapor compression system that will ever be 100% sustainable, unless it utilizes a natural refrigerant, a substance that can be found naturally occurring in the environment.

A substance like CO₂.

Chemical based refrigerants contribute to global warming, this is depicted by the issuance of a global warming potential (GWP) of a refrigerant. Currently 90% of the equipment produced by PRORefrigeration uses R404A, one of the most common refrigerants used in the US, which has a GWP of 3922. CO₂ is the baseline for the GWP, with a rating of 1.

This means that every 1kg (2.2 lb) of R404a released into the atmosphere has the same impact as releasing 3922 kg (8,647 lb) of carbon dioxide. If that isn't enough justification, these synthetic refrigerants also react with water (and other chemicals) within the atmosphere to release toxic and acidic environments, polluting our environment.

To determine the effect a refrigeration system has on the environment, the following formula called the Total Equivalent Warming Impact (TEWI) is utilized: **TEWI = GWP (Direct emissions) + GWP (Indirect Emissions)**

- Direct emissions are due to refrigerant leaks over the lifetime of the product
- Indirect emissions are due to the operation or power consumption of the system as well as the type of power supplied (coal fired having the largest impact to GWP emissions)



PROGREEN SOLUTIONS : CO₂ CHILLER SYSTEM

100HP – Parallel 50HP Bitzer R744 compressors

750 gallon dual-chamber coolant vessel with external site tube & digital thermometer

Onboard heat recovery generating 180°F hot potable water supply

EC rated fan motors that ramp up and down to control pressures

V Series gas coolers with 304 SS-tube/AL-finned coils

Process pump supplied with variable frequency drive

Standby/backup stainless steel circulation pump

Standby/backup stainless steel process pump

Stainless steel service panels

Electronic glycol percentage tester

Panel-mount touchscreen interface

Danfoss refrigeration control with full electronic controls

Boxed steel frame outfitted with Conex corners for rigging, loading, and leveling

PROElliot Cold Chain Verification integration with a free 1-year subscription

PG-100VA750-TC-XX			SUBCRITICAL OPERATION							TRANSCRITICAL OPERATION						
AMBIENT TEMPERATURE	F	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110
	C	4	7	10	13	16	18	21	24	27	29	32	35	38	41	43
DB CONDENSING TEMP	F	51	56	61	66	71	76	81	79	84	89	94	99	104	109	114
	C	10	13	16	19	22	24	27	26	29	31	34	37	40	43	45
COOLANT TEMPERATURE	20 F	-6.7 C														
SUCTION PRESSURE	379 psi	26.1 bar														
EVAPORATING TEMPERATURE	13 F	-10.6 C														
DISCH PRES	bar	45.6	48.8	52.2	55.8	59.5	63.5	67.6	75	75	78	85.8	91.6	98.6	105.9	110.5
COOLING CAPACITY	kW	329.5	314.9	299.7	283.8	267.3	248.9	228.5	241.9	223.9	202.6	191.8	178	167.2	157.2	145.1
	BTU	1124000	1075000	1023000	968272	911956	849271	779676	825359	763873	691373	654545	607222	570386	536410	495078
POWER CONS	kW	57.16	62.22	67.38	72.62	77.76	83.04	88.17	96.69	96.69	99.89	107.6	112.7	118.3	123.4	126.2
	BHP	76.65	83.43	90.36	97.38	104.3	111.4	118.2	129.7	129.7	134	144.3	151.1	158.6	165.4	169.3
COOLANT TEMPERATURE	25 F	-3.9 C														
SUCTION PRESSURE	409 psi	28.2 bar														
EVAPORATING TEMPERATURE	18 F	-7.8 C														
DISCH PRES	bar	45.6	48.8	52.2	55.8	59.5	63.5	67.6	75	75	78	85.8	91.6	98.6	105.9	110.5
COOLING CAPACITY	kW	360	344.4	327.9	310.7	292.8	272.9	250.7	265.8	246	222.8	211.2	196.2	184.5	173.8	160.6
	BTU	1228000	1175000	1119000	1060000	999107	931114	855462	906907	839322	760085	720718	669394	629704	593122	547964
POWER CONS	kW	55.26	60.5	65.88	71.35	76.74	82.31	87.73	96.83	96.83	100.3	108.6	114.3	120.5	126.4	129.7
	BHP	74.11	81.13	88.34	95.68	102.9	110.4	117.7	129.9	129.9	134.5	145.7	153.3	161.6	169.5	174
COOLANT TEMPERATURE	30 F	-1.1 C														
SUCTION PRESSURE	441 psi	30.4 bar														
EVAPORATING TEMPERATURE	23 F	-5 C														
DISCH PRES	bar	45.6	48.8	52.2	55.8	59.5	63.5	67.6	75	75	78	85.8	91.6	98.6	105.9	110.5
COOLING CAPACITY	kW	392.4	375.5	357.8	339.2	319.9	298.4	274.3	291.3	269.5	244.2	231.9	215.7	203.2	191.7	177.3
	BTU	1339000	1281000	1221000	1157000	1092000	1018000	936003	993817	919686	833288	791373	735872	693261	654028	604824
POWER CONS	kW	53.03	58.44	64.01	69.7	75.33	81.17	86.88	96.53	96.53	100.2	109.2	115.4	122.2	128.8	132.6
	BHP	71.12	78.37	85.84	93.47	101	108.9	116.5	129.4	129.4	134.3	146.4	154.7	163.9	172.7	177.8
COOLANT TEMPERATURE	35 F	1.7 C														
SUCTION PRESSURE	477 psi	32.9 bar														
EVAPORATING TEMPERATURE	28 F	-2.2 C														
DISCH PRES	bar	45.6	48.8	52.2	55.8	59.5	63.5	67.6	75	75	78	85.8	91.6	98.6	105.9	110.5
COOLING CAPACITY	kW	429.6	411.4	392.2	372.1	351.2	327.7	301.5	320.7	296.7	269	255.9	238.2	224.8	212.4	196.7
	BTU	1466000	1404000	1338000	1270000	1198000	1118000	1029000	1094000	1013000	917869	873173	812925	767060	724889	671031
POWER CONS	kW	50.25	55.83	61.59	67.51	73.38	79.5	85.5	95.71	95.71	99.63	109.3	116	123.5	130.8	135.1
	BHP	67.39	74.87	82.6	90.53	98.41	106.6	114.7	128.3	128.3	133.6	146.6	155.5	165.6	175.4	181.2
COOLANT TEMPERATURE	40 F	4.4 C														
SUCTION PRESSURE	513 psi	35.4 bar														
EVAPORATING TEMPERATURE	33 F	0.6 C														
DISCH PRES	bar	45.6	48.8	52.2	55.8	59.5	63.5	67.6	75	75	78	85.8	91.6	98.6	105.9	110.5
COOLING CAPACITY	kW	467.2	447.6	427.1	405.4	382.8	357.5	329.1	350.7	324.4	294.2	280.3	261.2	246.9	233.7	216.5
	BTU	1594000	1527000	1457000	1383000	1306000	1220000	1123000	1196000	1107000	1004000	956380	891372	842303	797256	738681
POWER CONS	kW	47.26	52.98	58.92	65.03	71.12	77.48	83.75	94.47	94.47	98.61	108.9	116	124.2	132.1	136.9
	BHP	63.38	71.05	79.01	87.21	95.38	103.9	112.3	126.7	126.7	132.2	146	155.6	166.5	177.2	183.6
COOLANT TEMPERATURE	45 F	7.2 C														
SUCTION PRESSURE	551 psi	38 bar														
EVAPORATING TEMPERATURE	38 F	3.3 C														
DISCH PRES	bar	53	53	53	55.8	59.5	63.5	67.6	75	75	78	85.8	91.6	98.6	105.9	110.5
COOLING CAPACITY	kW	458.6	458.6	458.6	440.4	416.1	388.8	358.2	382.2	353.5	320.7	306	285.5	270.2	256.1	237.5
	BTU	1565000	1565000	1565000	1503000	1420000	1327000	1222000	1304000	1206000	1094000	1044000	974179	921816	873828	810274
POWER CONS	kW	57.33	57.33	57.33	62.22	68.5	75.1	81.62	92.8	92.81	97.16	108	115.6	124.3	132.9	138.1
	BHP	76.88	76.88	76.88	83.43	91.87	100.7	109.4	124.5	124.5	130.3	144.8	155	166.7	178.3	185.2
COOLANT TEMPERATURE	50 F	10 C														
SUCTION PRESSURE	594 psi	41 bar														
EVAPORATING TEMPERATURE	43 F	6.1 C														
DISCH PRES	bar	53	53	53	55.8	59.5	63.5	67.6	75	75	78	85.8	91.6	98.6	105.9	110.5
COOLING CAPACITY	kW	497.4	497.4	497.4	481.2	454.9	425.3	392	419.2	387.6	351.6	336.1	313.9	297.4	282.4	262
	BTU	1697000	1697000	1697000	1642000	1552000	1451000	1338000	1430000	1322000	1200000	1147000	1071000	1015000	963447	894056
POWER CONS	kW	54.59	54.59	54.59	58.72	65.22	72.05	78.82	90.51	90.51	95.08	106.5	114.6	123.9	133.2	138.8
	BHP	73.21	73.21	73.21	78.74	87.46	96.62	105.7	121.4	121.4	127.5	142.8	153.7	166.2	178.6	186.2
COOLANT TEMPERATURE	55 F	12.8 C														
SUCTION PRESSURE	638 psi	44 bar														
EVAPORATING TEMPERATURE	48 F	8.9 C														
DISCH PRES	bar	54	54	54	55.8	59.5	63.5	67.6	75	75	78	85.8	91.6	98.6	105.9	110.5
COOLING CAPACITY	kW	536	536	536	522.4	494.1	462.2	426.1	456.5	421.9	382.8	366.4	342.5	324.9	308.9	286.8
	BTU	1829000	1829000	1829000	1783000	1686000	1577000	1454000	1558000	1440000	1306000	1250000	1169000	1109000	1054000	978655
POWER CONS	kW	51.7	51.7	51.7	55	61.69	68.73	75.73	87.87	87.87	92.63	104.6	113.1	123	132.9	138.9
	BHP	69.33	69.33	69.33	73.76	82.72	92.17	101.6	117.8	117.8	124.2	140.3	151.7	164.9	178.2	186.3