

Physical Characteristics of Eight Common Refrigerants

Selected Physical Data (Performance based on evaporator pressure @ 5° F = 0.02396 psia and condensing pressure @ 86° F = 0.6154 psia)	Refrigerant R-11	Refrigerant R-503	Refrigerant 12**	Refrigerant 22	Ammonia R-717	Water R-718	Carbon Dioxide R-744	-R-502 Mixture of CHClF ₂ and CClF ₂ CF ₃
1. Chemical Formula	CCl ₃ F	CHF ₃ /CClF ₃	CCl ₂ F ₂	CHClF ₂	NH ₃	H ₂ O	CO ₂	
2. Molecular Weight	137.4	87.5	120.9	86.5	17.0	18	44.0	1.6
3. Boiling Pt. (° F) at 1 Atm. Pressure	74.9	-126.1	-21.6	-41.4	-28.0	212	-109.3	-49.8
4. Evaporator Pressure at 5° F (psig)	123.9	16.9	11.8	28.3	19.6	129.6	316.8	15.3*
5. Condensing Pressure at 86° F (psig)	3.49	132.9	93.3	159.8	154.5	128.8	1028.3	282.7*
6. Critical Temperature (° F)	388	67	234	205	271.4	706.1	87.8	179.9
7. Critical Pressure (psi absolute)	640	632	597	716	1651.0	3208	1069.9	591.0
8. Compressor Discharge Temp. (° F)	111	14	101	131	210.0	25.68	151.0	99
9. Compression Ratio (86° F/5° F)	6.19	4.65	4.08	4.06	4.94	6.95	3.10	9.9*
10. Specific Volume of Saturated Vapor at 5° F (cu. ft./lb.)	12.2	1.30	1.46	1.25	8.150	1.155×10^{-4}	0.27	0.82
11. Latent Heat of Vaporization at 5° F (Btu/lb.)	83.5	72.7	68.2	93.2	565	1219.9	117	70.75
12. Net Refrig. Effect of Liquid— 86° F/5° F (Btu/lb.)	66.8	53.7	50.0	69.3	474.4	1009	55.5	45.3
13. Specific Heat of Liquid at 86° F	0.21	0.28	0.24	0.34	1.10	1.0	.77	
14. Specific Heat of Vapor at Constant Pressure of 1 Atm. & 86° F	0.14	0.14	0.15	0.15	0.52	0.5	0.2	
15. Coefficient of Performance	5.03	4.10	4.70	4.66	4.76	4.10	2.56	2.01*
16. Horsepower/Ton Refrigeration	0.938	1.16	1.002	1.011	.99	0.62	1.6	2.35*
17. Refrigerant Circulated/Ton Refrig. (lb./min.)	2.99	3.73	4.00	2.89	0.422	0.196	3.6	4.42*
18. Liquid Circulated/Ton Refrig. (cu. in./min.)	56.6	81.6	85.6	68.0	19.6	5.4	167.0	
19. Compressor Displacement/Ton Refrig. (cfm)	36.5	4.63	5.83	3.60	3.44	476.6	0.97	7.17*
20. Toxicity (Underwriter's Laboratories Group No.)	5	6	6	5A	2 Mod.	No.	No. 5	5A
21. Flammability & Explosivity	None	None	None	None	Yes	No	No	
22. Type of Suitable Compressor	Centrif.	Recip.	Recip./Centrif.	Recip.	Recip.	Centrif.	Recip.	Recip.

† inches of mercury vacuum.
* for evaporating temp. -20° F
condensing temp. 120° F
return gas temp. 65° F

⊗ @ -30°

** R-12 is rapidly being replaced.
Physical data is included
pending complete changeover.

ภาพที่ 3 เปรียบเทียบแสดงคุณลักษณะทางกายภาพของสารทำความเย็นแต่ละชนิด

ที่มา: Olivo (1990)