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Refrigerant Changeover Guidelines HCFC R-22 to HFC R-422A/D

Leading the Industry with Environmentally Responsible Refrigerant Solutions

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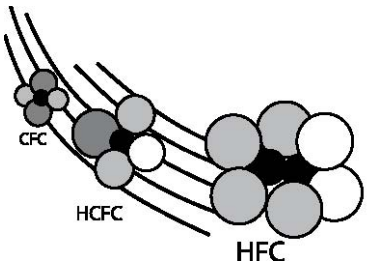

Emerson Climate Technologies, Inc. does not advocate the wholesale changeover of HCFCs to HFCs. If a system is not leaking refrigerant to the atmosphere, and is operating properly, there is no technical reason to replace the HCFC refrigerant. In fact, changing the refrigerant may void the U.L. listing of the system. However, once the decision has been made to make the change from HCFC R-22 to HFC R-422A/D, the following guidelines are recommended.

The following guidelines only apply to Copeland® brand Discus™ compressors. Copeland Scroll® compressors are being evaluated for their acceptance of these refrigerants. For any updates contact Emerson Climate Technologies, Inc.

CONSIDERATIONS

1. Retrofitting systems that employ compressors manufactured prior to 1973 is not recommended. This is due to the different materials used in motor insulation that have not been evaluated for compatibility with the new refrigerants and lubricants. Failure to heed this advice will violate the U.L. Standard For Field Conversion/Retrofit Of Alternate Refrigerants In Refrigeration and Air Conditioning Equipment (U.L.2170-2172).

2. HFC refrigerants have generally required the use of polyol ester (POE) lubricants in order to ensure oil return. However, R-422A/D contains a small percentage of isobutane that promotes adequate oil return in properly piped systems with oil separators and no change out of the mineral oil or alkylbenzene is required. Minor equipment modifications such as replacement or adjustment of the expansion device may be required in some applications.

   Oil return is determined by a number of design and operating conditions. In some systems a small amount, up to 5%, of POE may need to be added to assist in oil return.

   While 422A/D will operate properly with an oil charge of 100% POE, the POE can dislodge debris in older systems requiring liquid line filter drier change outs to keep the system free of this debris.

3. The system capacity and efficiency will be somewhat different with R-422A/D than with HCFC R-22. In most multiple compressor racks, there should still be adequate capacity. However, it is strongly recommended that system capacity verification be done using the refrigerant manufacturer published comparison factors.

   The RLA values for R-422A/D are higher than those for HCFC-22. The values are similar for those of HFC-404A. The sizing of wires, contactors, and breakers should be checked to ensure that they are adequate.

4. R-422A/D can be used in either low or medium temperature systems. **R-422A/D should not be mixed with any other refrigerant!**

5. When retrofitting from R-22 to R-422A the expansion valves will need to be replaced with a valve suitable for R-404A. In some cases only the power element of the expansion valve can be changed, but where this is not possible the entire valve must be replaced with the equivalent capacity R-404A model.

   When retrofitting from R-22 to 422D, the expansion valve will likely not require replacement; however, it is recommended that the valve loadings be evaluated to verify that they are adequate. Following the retrofit, superheat should be checked and adjusted if necessary.

6. Filter-driers must be changed at the time of conversion. This is proper air conditioning/ refrigeration practice.

   a. Solid core driers such as Emerson Climate Technologies ADK are compatible with either HCFC R-22 or R-422A/D.
   b. Compacted bead type driers such as the Emerson Climate Technologies EK series are also compatible.
   c. Loose fill type driers are not recommended and should be replaced with the types referenced in a. and b. above.

WARNING: Use only Emerson Climate Technologies Inc. approved refrigerants and lubricants in the manner prescribed by Emerson Climate Technologies Inc. In some circumstances, other refrigerants and lubricants may be dangerous and could cause fires, explosions or electrical shorting. Contact Emerson Climate Technologies Inc., Sidney, Ohio for more information.

7. Pressure regulators such as EPR valves may have to be reset. Contact the EPR manufacturer for the correct settings.

8. R-422A exhibit higher pressures than HCFC R22 at normal condensing temperatures. This may require that the high pressure safety controls be reset in order to operate as intended.

9. Systems that use a low pressure controller to maintain space temperature may need to have the cut in and cut out points changed. Although R-422A/D does exhibit "glide", the average evaporator or condenser temperature is within 0.5ºF of the saturated vapor temperature; therefore no correction is required.

10. Systems using R-422A/D should have approximately the same system pressure drop as with HCFC R-22. Check with the manufacturer of any pressure regulators and pilot operated solenoid valves used in the system to be sure that they will operate properly.

    NOTE: R-422A/D is not compatible with the seal material used in the HCFC R-22 Moduload Unloading system of 3D compressors. If your system has Moduload, the valve plate assembly MUST be changed.

Consult your Emerson Climate Technologies wholesaler for the proper part numbers.

Many other system seals such as elastomeric seals, gaskets, and valve packing may be affected by the change over from HCFC R-22 to R-422A/D. The part manufacturer should be contacted for their recommendations as to whether the seals need to be changed or replaced.

Before starting the changeover, it is suggested that at least the following items be readily available:

1. Safety glasses
2. Gloves
3. Refrigerant service gauges
4. Electronic thermometer
5. Vacuum pump capable of pulling 250 microns
6. Thermocouple micron gauge
7. Leak detector
8. Refrigerant recovery unit including refrigerant cylinder
9. Proper container for removed lubricant
10. New liquid control device
11. Replacement liquid line filter-drier(s)
12. New Mineral Oil lubricant
13. R-422A/D pressure temperature chart
14. R-422A/D refrigerant

CHANGEOVER PROCEDURE

1. The system should be thoroughly leak tested with the HCFC R-22 refrigerant still in the system. All leaks should be repaired before the R-422A/D refrigerant is added.

2. It is advisable that the system compressor operating conditions be recorded with the HCFC R-22 still in the system. This will provide the base data for comparison when the system is put back into operation with the R422A/D.

3. Disconnect electrical power to system.

4. Properly remove the HCFC R-22 from the compressor. Measure and note the amount removed.

5. Replace the liquid line filter-drier with one that is compatible with R-422A/D.

6. Replace the expansion valve or power element to a model approved for R-404A (only required when retrofitting from R-22 to R-422A).

7. Evacuate the system to 250 microns. A vacuum decay test is suggested to assure the system is dry and leak free.

8. Recharge the system with R-422A/D.

9. Charge the system with R-422A/D. Charge to 90% of the refrigerant removed in item 4. R-422A/D must leave the charging cylinder in the liquid phase. It is suggested that a sight glass be connected between the charging hose and compressor suction service valve. This will permit adjustment of the cylinder valve to assure the refrigerant enters the compressor in the vapor state.

10. Operate the system. Record the data and compare to the data taken in item 2. Check and adjust the TEV superheat setting if necessary. Make adjustments to other controls as needed. Additional R-422A/D may have to be added to obtain optimum system performance.

11. Properly label the components. Tag the compressor with the refrigerant used (R-422A/D) and the lubricant used. The proper color code for R-422A is Yellow PMS (Paint Matching System) 128; for R-422D, Green, PMS 375.

CAUTION: These guidelines are intended for use with R-422A/D only. *Other refrigerants may not be compatible with the materials used in our compressors or the lubricants recommended in this bulletin resulting in unacceptable reliability and durability of the compressor.*

HFC R-422A Saturated Vapor/Liquid Pressure/Temperature Chart								
Press. PSIG	**Vapor Temp. °F**	**Liquid Temp. °F**	**Press. PSIG**	**Vapor Temp. °F**	**Liquid Temp. °F**	**Press. PSIG**	**Vapor Temp. °F**	**Liquid Temp. °F**
3	-40	-44	80	38	35	230	99	97
4	-38	-42	85	41	38	235	100	98
6	-34	-38	90	44	41	240	102	100
8	-30	-34	95	47	44	245	103	101
10	-27	-31	100	49	46	250	105	103
12	-23	-27	105	52	49	255	106	104
14	-20	-24	110	54	51	260	107	105
16	-18	-21	115	57	54	265	109	107
18	-15	-19	120	59	56	270	110	108
20	-12	-16	125	61	59	275	111	110
22	-10	-13	130	63	61	280	113	111
24	-7	-11	135	66	63	285	114	112
26	-5	-9	140	68	65	290	115	113
28	-3	-6	145	70	67	295	116	115
30	-1	-4	150	72	69	300	118	116
32	1	-2	155	74	71	310	120	118
34	3	0	160	76	73	320	122	121
36	5	2	165	78	75	330	125	123
38	7	4	170	79	77	340	127	125
40	9	6	175	81	79	350	129	128
42	11	7	180	83	81	360	131	130
44	13	9	185	85	82	370	133	132
46	14	11	190	86	84	380	135	134
48	16	13	195	88	86	390	137	136
50	18	14	200	90	87	400	139	138
55	21	18	205	91	89			
60	25	22	210	93	91			
65	29	25	215	94	92			
70	32	29	220	96	94			
75	35	32	225	97	95			

HFC R-422D Saturated Vapor/Liquid Pressure/Temperature Chart								
Press. PSIG	**Vapor Temp. °F**	**Liquid Temp. °F**	**Press. PSIG**	**Vapor Temp. °F**	**Liquid Temp. °F**	**Press. PSIG**	**Vapor Temp. °F**	**Liquid Temp. °F**
2.5”	-40	-48						
0	-36	-45						
2	-32	-40	80	49	43	230	110	106
4	-27	-36	85	52	46	235	111	107
6	-23	-32	90	55	49	240	113	109
8	-20	-28	95	57	52	245	114	110
10	-16	-24	100	60	54	250	116	112
12	-13	-21	105	63	57	255	117	113
14	-10	-18	110	65	59	260	118	114
16	-7	-15	115	67	62	265	120	116
18	-4	-12	120	70	64	270	121	117
20	-2	-9	125	72	67	275	122	119
22	1	-7	130	74	69	280	124	120
24	3	-4	135	76	71	285	125	121
26	6	-2	140	79	73	290	126	123
28	8	0	145	81	76	295	127	124
30	10	3	150	83	78	300	129	125
32	12	5	155	85	80	310	131	128
34	14	7	160	87	82	320	133	130
36	16	9	165	88	84	330	136	132
38	18	11	170	90	85	340	138	135
40	20	13	175	92	87	350	140	137
42	21	15	180	94	89	360	142	139
44	23	16	185	96	91	370	144	141
46	25	18	190	97	93	380	146	144
48	27	20	195	99	94	390	148	146
50	28	21	200	101	96	400	150	148
55	32	25	205	102	98			
60	36	29	210	104	99			
65	39	33	215	105	101			
70	43	36	220	107	103			
75	46	40	225	108	104			

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