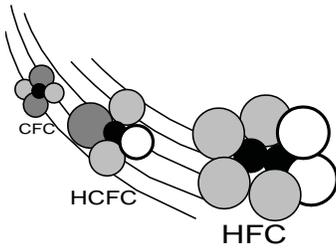


# Refrigerant Changeover Guidelines HFC R-404A/R-407A/C/F to R-448A/R-449A

Leading the Industry with Environmentally  
Responsible Refrigerant Solutions





Emerson Climate Technologies, Inc. does not advocate the wholesale changeover of CFC refrigerants to HCFCs or HFCs. If a system is not leaking

refrigerant to the atmosphere, and is operating properly, there is no technical reason to replace the CFC 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 404A or 407a to R-448A or R-449A, the following guidelines are recommended.

## 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 systems 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. Emerson Climate Technologies, Inc. lubricant recommendation for use with R-448A/R-449A is a Polyol Ester (POE). For a complete list of lubricants approved by Emerson Climate Technologies, Inc. refer to Form 93-11. These are the only POE lubricants approved for use in Copeland™ brand compressors and are available from all authorized Emerson Climate Technologies, Inc. wholesalers. The use of any other POE lubricant may void the compressor warranty.

3. R-448A/R-449A can be used in either low or medium temperature systems. **R-448A/R-449A should not be mixed with any other refrigerant!**

4. The expansion valve may need to be adjusted to have the correct evaporator superheat. Emerson recommends 20° superheat @ the compressor measured 6 inches from in the compressor suction inlet.

5. 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, Inc. ADK are compatible with either R-404A/R-407A or R-448A/R-449A.

b. Compacted bead type driers can use XH6 or XH9 molecular sieve material such as found in the Emerson Climate Technologies, Inc.

EK or EKH series.

c. If a loose fill type drier is to be used, XH9 molecular sieve material is required.

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

**WARNING: IT IS POSSIBLE THAT EXCESS PRESSURE BUILD-UP ON MODELS INDICATED COULD RESULT IN THE COMPRESSOR BURSTING UNLESS THE PRESSURE RELIEF VALVE SPECIFIED HAS BEEN PROPERLY INSTALLED ON THE ORIGINALLY BUILT COPELAND™ COMPRESSOR.**

7. 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-448A/R-449A does exhibit “glide”, the glide with R-448A/R-449A is approximately 8°F, please see PT Chart below for setting Cut-in and Cut-out pressures.

8. Mineral oil lubricants, such as 3GS, must not be used as the compressor lubricant with R-448A/R-449A. Polyol Ester (POE) lubricant, for a complete list of lubricants approved by Emerson Climate Technologies, Inc., refer to Form 93-11, are the only lubricants that can be used in a Copeland brand compressor when using R-448A/R-449A. 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 POE lubricant
13. R-448A/R-449A pressure temperature chart
14. R-448A/R-449A refrigerant

**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.

## CHANGEOVER PROCEDURE

**1. For low temperature Copeland compressors liquid injection may be required. Please review the application bulletin for the specific compressor in your system for part numbers and injection setup.**

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

2. The system should be thoroughly leak tested with the R-404A/R-407A refrigerant still in the system. All leaks should be repaired before the R-448A/R-449A refrigerant is added.

3. It is advisable that the system operating conditions be recorded with the R-404A/R-407A still in the system. This will provide the base data for comparison when the system is put back into operation with the R-448A/R-449A.

### ***I. Systems with service valves***

- a. Disconnect electrical power to system.
- b. Front seat the service valves to isolate the compressor.
- c. Properly remove the R-404A/R-407A from the compressor.
- d. Replace the liquid line filter-drier.
- e. Evacuate it to 250 microns. A vacuum decay test is suggested to assure the system is dry and leak free.
- f. Recharge the system with R-448A/R-449A.

### ***II. Systems without service valves***

- a. Disconnect electrical power to system.
- b. Properly remove the R-404A/R-407A from the system.
- c. Replace the liquid line filter-drier.
- d. Recharge the system with R-448A/R-449A.

4. Be advised that POEs are very hygroscopic. They will very quickly absorb moisture from the air once the container is opened.

5. Charge the system with the R-448A/R-449A.

Charge to 80% of the refrigerant removed in item 4. R-448A/R-449A 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.

6. 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-448A/R-449A may have to be added to obtain optimum system performance.

7. Properly label the components. Tag the compressor with the refrigerant used (R-448A/R-449A) and the lubricant used.

8. Clean up and properly dispose of the removed lubricant. Check local and state laws regarding the disposal of refrigerant lubricants. Recycle or reclaim the removed refrigerant.

***CAUTION: These guidelines are intended for use with R-448A and/or R-449A 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.***

## ADDENDUM

The contents of this publication are presented for informational purposes only and are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. Emerson Climate Technologies, Inc. and/or its affiliates (collectively "Emerson"), as applicable, reserve the right to modify the design or specifications of such products at any time without notice.

Emerson does not assume responsibility for the selection, use or maintenance of any product.

Responsibility for proper selection, use and maintenance of any Emerson product remains solely with the purchaser or end user.

**! CAUTION**

POE must be handled carefully and the proper protective equipment (gloves, eye protection, etc.) must be used when handling POE lubricant. POE must not come into contact with any surface or material that might be harmed by POE, including without limitation, certain polymers (e.g. PVC/CPVC and polycarbonate).

The information contained herein is based on technical data and tests which we believe to be reliable and is intended for use by persons having technical skill, at their own discretion and risk. Since conditions of use are beyond the control of Emerson Climate Technologies, Inc., we can assume no liability for results obtained or damages incurred through the application of the data presented.

## R-448A Temperature/Pressure Chart

Sat Temp	Pressure	
	Vapor	Liquid
°F		
-50	7.58	0.27
-48	6.26	1.09
-46	4.89	1.94
-44	3.44	2.83
-42	1.94	3.76
-40	0.36	4.72
-38	0.63	5.72
-36	1.47	6.77
-34	2.35	7.85
-32	3.27	8.98
-30	4.22	10.15
-28	5.21	11.37
-26	6.25	12.63
-24	7.32	13.93
-22	8.44	15.29
-20	9.60	16.70
-18	10.81	18.15
-16	12.06	19.66
-14	13.36	21.22
-12	14.71	22.83
-10	16.11	24.50
-8	17.57	26.23
-6	19.07	28.01
-4	20.63	29.86
-2	22.24	31.76
0	23.91	33.72
2	25.63	35.75
4	27.42	37.84
6	29.26	40.00
8	31.17	42.23
10	33.14	44.52
12	35.17	46.88
14	37.28	49.31
16	39.44	51.82
18	41.68	54.40
20	43.99	57.05
22	46.36	59.78
24	48.82	62.59
26	51.34	65.47
28	53.94	68.44
30	56.62	71.49
32	59.38	74.62
34	62.22	77.84
36	65.14	81.14
38	68.14	84.53
40	71.24	88.01
42	74.41	91.58
44	77.68	95.24
46	81.03	99.00
48	84.48	102.85
50	88.02	106.79
52	91.66	110.84

Sat Temp	Pressure	
	Vapor	Liquid
°F		
54	95.39	114.98
56	99.22	119.23
58	103.16	123.58
60	107.19	128.03
62	111.33	132.59
64	115.57	137.25
66	119.93	142.02
68	124.39	146.91
70	128.96	151.90
72	133.65	157.01
74	138.45	162.23
76	143.37	167.57
78	148.40	173.03
80	153.56	178.61
82	158.84	184.31
84	164.25	190.13
86	169.78	196.08
88	175.45	202.15
90	181.24	208.36
92	187.17	214.69
94	193.23	221.15
96	199.44	227.75
98	205.78	234.48
100	212.27	241.34
102	218.90	248.35
104	225.68	255.50
106	232.61	262.78
108	239.69	270.22
110	246.93	277.79
112	254.33	285.52
114	261.88	293.39
116	269.61	301.41
118	277.50	309.59
120	285.56	317.92
122	293.79	326.41
124	302.20	335.06
126	310.79	343.86
128	319.56	352.83
130	328.52	361.96
132	337.67	371.26
134	347.02	380.73
136	356.57	390.37
138	366.32	400.18
140	376.28	410.16
142	386.45	420.32
144	396.84	430.66
146	407.46	441.17
148	418.31	451.87
150	429.40	462.75

! RED (in of HG) = Vacuum

! Black (psig) = Vapor

! Bold (psig) = Liquid

## R-449A Temperature/Pressure Chart

Sat Temp	Pressure	
	Vapor	Liquid
°F		
-50	7.39	0.31
-48	6.06	1.12
-46	4.67	1.98
-44	3.22	2.87
-42	1.70	3.80
-40	0.12	4.76
-38	0.75	5.76
-36	1.60	6.81
-34	2.48	7.89
-32	3.40	9.02
-30	4.36	10.19
-28	5.36	11.41
-26	6.40	12.67
-24	7.48	13.98
-22	8.61	15.33
-20	9.77	16.74
-18	10.99	18.20
-16	12.25	19.70
-14	13.55	21.26
-12	14.91	22.88
-10	16.31	24.55
-8	17.77	26.27
-6	19.28	28.06
-4	20.84	29.90
-2	22.46	31.80
0	24.14	33.77
2	25.87	35.79
4	27.66	37.88
6	29.51	40.04
8	31.42	42.26
10	33.40	44.55
12	35.44	46.91
14	37.55	49.35
16	39.72	51.85
18	41.96	54.43
20	44.28	57.08
22	46.66	59.81
24	49.12	62.61
26	51.65	65.49
28	54.25	68.46
30	56.94	71.51
32	59.70	74.63
34	62.55	77.85
36	65.47	81.15
38	68.48	84.54
40	71.58	88.01
42	74.76	91.58
44	78.03	95.24
46	81.39	98.99
48	84.84	102.83
50	88.38	106.78
52	92.02	110.82

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	Vapor	Liquid
°F		
54	95.76	114.96
56	99.59	119.20
58	103.52	123.54
60	107.56	127.99
62	111.70	132.54
64	115.95	137.20
66	120.30	141.96
68	124.76	146.84
70	129.33	151.83
72	134.02	156.93
74	138.82	162.15
76	143.73	167.48
78	148.77	172.93
80	153.92	178.50
82	159.20	184.19
84	164.60	190.00
86	170.13	195.94
88	175.79	202.01
90	181.58	208.20
92	187.50	214.52
94	193.56	220.97
96	199.76	227.56
98	206.09	234.28
100	212.57	241.13
102	219.19	248.13
104	225.96	255.26
106	232.88	262.53
108	239.95	269.95
110	247.18	277.51
112	254.57	285.22
114	262.11	293.08
116	269.82	301.09
118	277.69	309.25
120	285.74	317.57
122	293.96	326.04
124	302.35	334.67
126	310.92	343.45
128	319.68	352.40
130	328.62	361.52
132	337.75	370.80
134	347.08	380.24
136	356.61	389.86
138	366.33	399.65
140	376.27	409.61
142	386.42	419.74
144	396.79	430.06
146	407.39	440.55
148	418.22	451.22
150	429.28	462.08

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