

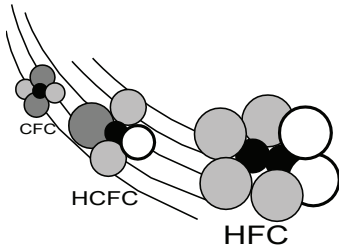
Refrigerant changeover guidelines

HFCR-404A to R-407H/R-448A/R-449A/R-452A for medium and low temperature applications

Leading the industry with environmentally
responsible refrigerant solutions

COPELAND™


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Emerson 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 R-404A to R-407H/R-448A/R-449A/R-452A, 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 lubricant recommendation for use with R-407H/ R-448A/ R-449A/ R-452A is a Polyol Ester (POE). For a complete list of lubricants approved by Emerson 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 wholesalers. The use of any other POE lubricant may void the compressor warranty.
3. R-407H/R-448A/R-449A/R-452A can be used in either low or medium temperature systems. **R-407H/R-448A/R-449A/R-452A should not be mixed with any other refrigerant!**

Note: Refrigerant migration of R-452A into the compressor crankcase could cause low oil viscosity, which could lead to compressor damages.

When using R-452A it is critical to meet the following requirements:

- Maintain adequate superheat settings with a minimum superheat of 20°F at the compressor.
- No liquid refrigerant migration into the compressor at any time, especially during standstill or during or after defrost.
- Pump down is recommended
- The use of a crankcase heater is recommended.
- Retrofit to R-452A is only allowed for compressors which are approved for this refrigerant.

R-407H has been approved for retrofit applications only in refrigerated rack applications for Discus, ZB and ZF compressors.

4. The expansion valve may need to be adjusted to have the correct evaporator superheat. Emerson recommends 20° superheat at the compressor, measured 6 inches from 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 ADK are compatible with R-407H/ R-448A/ R-449A/ R-452A.
 - b. Compacted bead type driers can use XH6 or XH9 molecular sieve material such as found in the Emerson 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.
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-407H/ R-448A / R-449A / R-452A does exhibit “glide”, 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-407H/ R-448A/ R-449A/ R-452A. Polyol Ester (POE) lubricant, for a complete list of lubricants approved by Emerson, refer to Form 93-11, are the only lubricants that can be used in a Copeland brand compressor when using R-407H/ R-448A / R-449A / R-452A. Before starting the changeover, it is suggested that at least the following items be readily available:
 - a. Safety glasses
 - b. Gloves
 - c. Refrigerant service gauges
 - d. Electronic thermometer
 - e. Vacuum pump capable of pulling 250 microns
 - f. Thermocouple micron gauge
 - g. Leak detector
 - h. Refrigerant recovery unit including refrigerant cylinder
 - i. Proper container for removed lubricant
 - j. New liquid control device
 - k. Replacement liquid line filter-driers(s)
 - l. New (POE) lubricant
 - m. R-407H/ R-448A/ R-449A/ R-452A pressure temperature chart
 - n. R-407H/ R-448A/ R-449A/ R-452A refrigerant

WARNING: Use only Emerson approved refrigerants and lubricants in the manner prescribed by Emerson. In some circumstances, other refrigerants and lubricants may be dangerous and could cause fires, explosions or electrical shorting. Contact Emerson, 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 wholesaler for the proper part numbers.
2. The system should be thoroughly leak tested with the R-404A refrigerant still in the system. All leaks should be repaired before the R-407H/R-448A/R-449A/R-452A refrigerant is added.
3. It is advisable that the system operating conditions be recorded with the R-404A still in the system. This will provide the base data for comparison when the system is put back into operation with the R-407H/R-448A/R-449A/R-452A.

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 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-407H/R-448A/R-449A/R-452A .

Systems without service valves

- a. Disconnect electrical power to system.
 - b. Properly remove the R-404A from the system.
 - c. Replace the liquid line filter drier.
 - d. Recharge the system with R-407H/R-448A/R-449A/R-452A.
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-407H/R-448A/R-449A/R-452A. Charge 80% of the refrigerant volume from item 4 into the high side of the system to prevent liquid damage to the compressor at start up. R-407H/R-448A/R-449A/R-452A must leave the charging cylinder in the liquid phase.
 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. Adjust other controls as needed. Additional R-407H/R-448A/R-449A/R-452A may have to be added to obtain optimum system performance.

7. Properly label the components. Tag the compressor with the refrigerant used (R-407H/R-448A / R-449A / R-452A) 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

CAUTION: These guidelines are intended for use with R-407H/ R-448A / R-449A / R-452A 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.

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

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).

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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
-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

Red (in of HG) = Vacuum
 Black (psig) = Vapor
 Bold (psig) = Liquid

R-449A Temperature/Pressure Chart

Sat Temp	Pressure	
	Vapor	Liquid
-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

Red (in of HG) = Vacuum
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 Bold (psig) = Liquid

R-407H Temperature/Pressure Chart

Sat Temp	Pressure	
	Vapor	Liquid
-50	9.76	14.02
-48	10.35	14.80
-46	10.98	15.61
-44	11.63	16.46
-42	12.31	17.34
-40	13.02	18.26
-38	13.77	19.21
-36	14.55	20.21
-34	15.37	21.24
-32	16.22	22.32
-30	17.10	23.44
-28	18.03	24.60
-26	19.00	25.81
-24	20.00	27.06
-22	21.05	28.36
-20	22.14	29.71
-18	23.27	31.11
-16	24.45	32.56
-14	25.67	34.06
-12	26.94	35.61
-10	28.26	37.22
-8	29.63	38.88
-6	31.06	40.60
-4	32.53	42.38
-2	34.06	44.22
0	35.64	46.11
2	37.28	48.07
4	38.98	50.10
6	40.74	52.18
8	42.56	54.34
10	44.44	56.56
12	46.38	58.85
14	48.39	61.21
16	50.47	63.64
18	52.61	66.14
20	54.82	68.72
22	57.11	71.37
24	59.46	74.10
26	61.89	76.91
28	64.40	79.80
30	66.98	82.77
32	69.64	85.83
34	72.38	88.96
36	75.21	92.19
38	78.11	95.50
40	81.10	98.90
42	84.18	102.39
44	87.35	105.97
46	90.61	109.64
48	93.95	113.41
50	97.39	117.28
52	100.93	121.24

Red (in of HG) = Vacuum
 Black (psig) = Vapor
 Bold (psig) = Liquid

R-452A Temperature/Pressure Chart

Sat Temp	Pressure	
	Vapor	Liquid
-50	1.44	1.20
-48	0.71	2.06
-46	0.06	2.95
-44	0.86	3.88
-42	1.69	4.85
-40	2.56	5.85
-38	3.47	6.90
-36	4.41	7.98
-34	5.40	9.11
-32	6.42	10.29
-30	7.48	11.51
-28	8.58	12.77
-26	9.73	14.08
-24	10.92	15.44
-22	12.16	16.85
-20	13.44	18.31
-18	14.77	19.82
-16	16.14	21.38
-14	17.57	23.00
-12	19.05	24.67
-10	20.58	26.40
-8	22.17	28.19
-6	23.81	30.04
-4	25.50	31.94
-2	27.25	33.91
0	29.06	35.94
2	30.93	38.03
4	32.87	40.19
6	34.86	42.42
8	36.92	44.72
10	39.04	47.08
12	41.23	49.51
14	43.49	52.02
16	45.81	54.60
18	48.21	57.25
20	50.68	59.98
22	53.22	62.79
24	55.84	65.67
26	58.53	68.64
28	61.30	71.68
30	64.15	74.81
32	67.08	78.02
34	70.10	81.32
36	73.19	84.71
38	76.37	88.18
40	79.64	91.75
42	83.00	95.40
44	86.45	99.15
46	89.99	102.99
48	93.62	106.92
50	97.34	110.96
52	101.17	115.09

Red (in of HG) = Vacuum
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