



# Opteon™ XP40

## Refrigerant

## Opteon™ XP40 Retrofit Guidelines to Replace R-404A/R-507

### Introduction

Opteon™ XP40 is a low global warming potential (GWP) hydrofluoro-olefin (HFO)-based refrigerant developed as a direct replacement for R-404A/R-507 and R-22 in positive displacement, direct expansion, low- and medium-temperature, commercial and industrial applications.

Opteon™ XP40 is the registered trade name for a blend of HFC-32/HFC-125/HFC-134a/HFO-1234yf (24.3/24.7/25.7/25.3 wt%) with an ANSI/ASHRAE Standard 34 refrigerant designation of R-449A. It is commercially available for both retrofit of existing R-404A/R-507 or R-22 equipment, as well as a suitable replacement option for these refrigerants in new equipment.

Opteon™ XP40 offers improved energy efficiency and environmental properties versus R-404A/R-507, with a GWP\* of 1282 (vs. 3943 for R-404A and 3985 for R-507), and has a zero ozone depletion potential (ODP).

Using these retrofit guidelines, existing R-404A/R-507 systems can be converted to operate using Opteon™ XP40, allowing the equipment to continue to function safely and efficiently with a greatly reduced environmental impact.

### Important Safety Information

Like all Freon™ refrigerants, Opteon™ XP40 is safe to use when handled properly. However, any refrigerant can cause injury or even death when mishandled. Please review the following guidelines and consult the product Safety Data Sheet (SDS), including proper personal protective equipment recommendations, before using any refrigerant. At a minimum, appropriate hand (gloves) and eye (safety glasses) protection should be used.

\*GWP = IPCC Fifth Assessment Report (AR5)

- Do not work in high concentrations of refrigerant vapors. Always maintain adequate ventilation in the work area. Do not breathe vapors. Do not breathe lubricant mists from leaking systems. Ventilate the area well after any leak before attempting to repair equipment.
- Do not use handheld leak detectors to check for breathable air in enclosed working spaces. These detectors are not designed to determine if the air is safe to breathe. Use oxygen monitors to ensure adequate oxygen is available to sustain life.
- Do not use flames or halide torches to search for leaks. Open flames (e.g., halide torches or brazing torches) in the presence of any fluorocarbon refrigerant can decompose the refrigerant, forming hazardous acidic compounds. Halide torches are not effective as leak detectors for HFO or HFC refrigerants, as they only detect the presence of chlorine in the refrigerant. Chlorine is not present in Opteon™ XP40, R-404A, or R-507; and, consequently, these detectors will not detect the presence of these refrigerants. Use an electronic leak detector designed to find the refrigerants you are using.

If you detect a visible change in the size or color of a flame when using brazing torches to repair equipment, stop work immediately and leave the area. Ventilate the work area well, and stop any refrigerant leaks before resuming work. These flame effects may be an indication of very high refrigerant concentrations, and continuing to work without adequate ventilation may result in injury or death.

**Table 1:** Comparison of Performance Data

R-404A Alts - Low-Temperature Conditions									
Condenser = 104 °F; Evaporator = -22 °F; Subcool amount = 7 °R; Return Gas T = 14 °F; Comp Eff = 70%									
	Evap (psig)	Cond (psig)	Disch T (°F)	Avg Glide (°R)	Vol Cap (Btu/ft <sup>3</sup> )	Cap vs. R-404A	EER (Btu/watt-hr)	EER vs. R-404A	Mass Flow vs. R-404A
<b>R-404A</b>	15	251	189	0.7	29.3	100%	5.452	100%	100%
<b>Opteon™ XP40</b>	10.5	238	223	7.6	28.6	98%	5.746	105%	75%
R-404A Alts - Medium-Temperature Conditions									
Condenser = 104 °F; Evaporator = 14 °F; Subcool amount = 7 °R; Return Gas T = 50 °F; Comp Eff = 70%									
<b>R-404A</b>	48.5	251	171	0.7	66.8	100%	9.294	100%	100%
<b>Opteon™ XP40</b>	41.5	238	192	7.7	66.2	99%	9.625	104%	75%

Note: Any refrigerant can be hazardous if used improperly. Hazards include liquid or vapor under pressure as well as frostbite from the escaping liquid.

Overexposure to high concentrations of refrigerant vapor can cause asphyxiation or cardiac arrest. Please read all safety information before handling any refrigerant.

Refer to the Opteon™ XP40 SDS for more specific safety information. Chemours Safety Bulletin AS-1 also gives additional information for safe handling of refrigerants.

**Flammability**

Opteon™ XP40 is nonflammable. It has been assigned an A1 safety classification under the ANSI/ASHRAE Standard 34. However, as with all HFC-containing blends, Opteon™ XP40 should not be mixed with air to check for system leaks.

**General Retrofit Information - R-404A/R-507 to Opteon™ XP40**

**Expected Performance of Opteon™ XP40 vs. R-404A**

Table 1, based on thermodynamic cycle analysis, provides a comparison of R-404A and Opteon™ XP40 across a number of key performance factors. Actual performance for a specific system depends on a number of factors, including equipment conditions and operating environment.

**System Modifications**

**Lubricant**

For most systems operating on R-404A/R-507, the polyolester (POE) lubricant currently in the system should be suitable for use with Opteon™ XP40. If there are questions about the lubricant, or tests indicate it is contaminated or has a high acid number, then the lubricant should be changed. Consult with the compressor manufacturer for specific recommendations on viscosity and brand of lubricant.

**Compressor**

Overall system performance (capacity and energy efficiency) will be similar when operating on Opteon™ XP40 as to that when using R-404A/R-507.

Compressor suction and discharge pressures for Opteon™ XP40 will differ from R-404A/R-507, and it may be necessary to adjust set points and cutouts to avoid exceeding the operating limits of the compressor. Consult with the specific system manufacturer for guidance.

Opteon™ XP40 also has a modestly higher (+18-36 °R) discharge temperature than R-404A/R-507. Again, you should consult with your compressor manufacturer for details regarding operation of your specific compressor on Opteon™ XP40.

## Expansion Device

Opteon™ XP40 has a lower mass flow rate (-20-25%) than R-404A/R-507, but should be within the usable range of a properly sized and installed R-404A/R-507 expansion device and not require replacement. Due to the suction pressure differences between R-404A/R-507 and Opteon™ XP40, mechanical expansion valves will need to be adjusted to reach the same evaporator superheat as before. Field trials suggest that mechanical valves should be closed 1-2 turns during the actual conversion before the unit starts operation with Opteon™ XP40. Once the system is running with Opteon™ XP40, it is recommended that a technician measure the evaporator superheat and continue to adjust as necessary. If the valve is non-adjustable or there is not enough adjustable range in the valve to reach target superheats, then it would be recommended to replace the powerhead of the valve to an R-22 or R-449A model. Use Table 6, pressure-temperature chart (dew point [saturated vapor] values), at the end of this guide for correct measurement and setting of evaporator superheat. Electronic expansion valves (EEVs) can also be used with R-449A. It is recommended that an R-449A pressure/temperature curve be programmed to the valve for the most accurate superheat control. If R-449A pressure/temperature data is not programmable into the controls of the EEV in use, then an R-407A pressure/temperature curve will be the closest match to R-449A. If you have further questions, consult with the expansion device manufacturer for correct valve sizing and superheat adjustments.

## Line Sizing

Opteon™ XP40 has lower mass flow rates and density than R-404A/R-507. It is recommended that the existing refrigerant line sizing be checked to verify that the system pressure drops and line velocities are acceptable with the new refrigerant. Correct pipe sizing is important in order to ensure adequate refrigeration capacity and sufficient oil return to the compressor.

## Condenser and Evaporator

Due to the differences in suction pressure between Opteon™ XP40 and R-404A/R-507, it may be necessary to reset evaporator pressure regulators (EPR) and cutouts to properly operate the system. The discharge pressure of Opteon™ XP40 is slightly lower than R-404A/R-507, and may require slight adjustments to condenser fans and head pressure controls.

Opteon™ XP40 is a blend refrigerant; therefore, when setting superheat, the dew point (saturated vapor) in the pressure-temperature chart should be used. Similarly, the bubble point (saturated liquid) should be used for measuring subcooling.

## System Controls

Many supermarkets use refrigeration control systems and methodologies that rely on the pressure-temperature relationship of a specific refrigerant for proper operation. During conversions from R-404A/R-507 to Opteon™ XP40, although the controls will likely function adequately, for optimal performance they should be updated for operation using Opteon™ XP40 (R-449A) refrigerant properties. Consult with the control system manufacturer for guidance on updating refrigerant data or operating instructions when using Opteon™ XP40.

## Retrofit of R-404A/R-507 Systems to Opteon™ XP40

The following detailed steps are the recommended procedure for retrofitting R-404A/R-507 systems to Opteon™ XP40:

### 1. Establish Baseline Performance with R-404A/R-507

Collect system performance data while R-404A or R-507 refrigerant is in the system. Check for correct refrigerant charge and operating conditions. The baseline data of temperatures and pressures at various points in the system (evaporator, condenser, compressor suction and discharge, evaporator vapor superheat, and condenser liquid subcool) at normal operating conditions will be useful in noting any deficiencies in system operation and when optimizing operation of the system with Opteon™ XP40. A System Data Sheet is included at the back of this bulletin to record baseline data.

### 2. Check Lubricant

For most systems operating on R-404A/R-507, the POE lubricant currently in the system should be suitable for use with Opteon™ XP40. If there are questions about the lubricant, or tests indicate it is contaminated or has a high acid number, then the lubricant should be changed. Consult with the compressor manufacturer for specific recommendations on viscosity or brand of lubricant.

### 3. Remove the R-404A/R-507 Charge into Recovery Cylinders

Remove the entire R-404A/R-507 refrigerant from the system into a recovery cylinder(s). Use a recovery device capable of pulling 10-15 in Hg vacuum (50- 67 kPa absolute). Weigh the amount removed to use as a guide for the quantity of Opteon™ XP40 to be charged to the system.

### 4. Replace Filter Drier

It is routine practice to replace the filter drier during system maintenance.

### 5. Perform Other System Modifications

Perform any system modifications or upgrades as needed for the system.

### 6. Evacuate System and Check for Leaks

To remove air or other non-condensable gases and any residual moisture from the system, evacuate the system to full vacuum (<1000 microns [<29.88 in Hg vacuum] [<1.33 mbar]). If the system is not able to hold vacuum, it may be an indication of a leak. After vacuum test, pressurize the system with dry nitrogen, taking care not to exceed the system design maximum pressure, and check for leaks. Do not use mixtures of refrigerant and air to check for leaks, as these mixtures can become combustible. After leak checking, remove residual nitrogen with a vacuum pump.

### 7. Charge System with Opteon™ XP40

Opteon™ XP40 is a blend; so, it is important to remove liquid only from the charging cylinder. (If the cylinder does not have a valve with a dip tube, invert the cylinder so that the valve is underneath the cylinder.) The proper cylinder position is often indicated by arrows on the cylinder and the cylinder box. Once liquid is removed from the cylinder, the refrigerant can be allowed to enter the refrigeration system as liquid or vapor as desired.

*Warning: Do not charge liquid refrigerant into the suction line. This can cause irreversible damage to the compressor. Use the manifold gauges or a throttling valve to flash the liquid refrigerant to a vapor prior to entering the suction line.*

In general, refrigeration systems will require a slightly larger charge size of Opteon™ XP40 than the original R-404A or R-507 charge. The optimum charge will vary depending on the system design and operating conditions. The initial charge should be approximately 85% of the standard charge size for R-404A or R-507. After startup and adjustment, the final charge amount will be approximately 105% of the R-404A or R-507.

### 8. Start Up System and Check Operation

- Monitor and adjust TXV and/or charge size to achieve optimum superheat/subcooling.
- Monitor oil levels in compressor. Add oil as required to maintain proper levels.

### 9. Label System with New Refrigerant and Lubricant

**Table 2:** Physical Properties of Opteon™ XP40

Physical Property	Condition	Opteon™ XP40	R-404A
Boiling Point	1 atm (101.3 kPa)	-50.7 °F	-49.8 °F
Vapor Pressure	70 °F	144.0 psia	162.1 psia
Liquid Density	70 °F	69.5 lb/ft <sup>3</sup>	66.3 lb/ft <sup>3</sup>
Density Sat Vapor	70 °F	2.73 lb/ft <sup>3</sup>	3.63 lb/ft <sup>3</sup>
GWP AR5	CO <sub>2</sub> = 1.0	1282	3922

**Table 3:** Composition of Opteon™ XP40 (wt%)

	HFC-32	HFC-125	HFO-1234yf	HFC-134a
Opteon™ XP40	24.3	24.7	25.3	25.7

## Appendix A.

**Table 4:** Condenser Pressure Set Points

R-404A psig	Average Condenser Temp (°F)	Opteon™ XP40 psig
174.4	80	166.4
177.2	81	168.8
180.0	82	171.2
182.8	83	174.6
185.7	84	178.2
188.5	85	180.4
191.5	86	182.6
194.4	87	186.2
197.4	88	189.0
200.4	89	192.0
203.4	90	194.4
206.5	91	197.8
209.6	92	201.2
212.8	93	203.6
215.9	94	207.1
219.2	95	210.6
222.4	96	213.5
225.7	97	217.6
229.0	98	219.9
232.3	99	223.4
235.7	100	226.8
239.1	101	230.4
242.6	102	233.8
246.1	103	237.4
249.6	104	240.8
253.1	105	244.4
256.7	106	247.9
260.3	107	251.4
264.0	108	254.8
267.7	109	258.4
271.5	110	261.9
275.2	111	266.6

R-404A psig	Average Condenser Temp (°F)	Opteon™ XP40 psig
279.0	112	270.1
282.9	113	273.6
286.8	114	278.2
290.7	115	281.8
294.7	116	285.3
298.7	117	290.0
302.7	118	293.6
306.8	119	297.0
311.0	120	301.8
315.1	121	306.4
319.4	122	310.0
323.6	123	314.6
327.9	124	318.2
332.2	125	322.9
336.6	126	327.6
341.0	127	332.4
345.5	128	335.8
350.0	129	340.6
354.6	130	345.3
359.2	131	350.0
363.8	132	354.8
368.5	133	359.5
373.3	134	364.2
378.1	135	369.0
382.9	136	375.0
387.8	137	378.4
392.7	138	383.2
397.7	139	388.0
402.7	140	394.0

After converting from R-404A to Opteon™ XP40, the condensing pressure can be determined by locating the desired average condenser temperature (or R-404A pressure setting) on this chart and determining the new set point required for equivalent operation with Opteon™ XP40.

**Table 5:** Evaporator Suction Pressure Set Points

R-404A psig	Average Evaporator Temp (°F)	Opteon™ XP40 psig
13.0	-25	8.9
13.6	-24	9.5
14.3	-23	10.1
15.0	-22	10.7
15.7	-21	11.3
16.4	-20	11.9
17.1	-19	12.6
17.8	-18	13.2
18.5	-17	13.9
19.3	-16	14.6
20.0	-15	15.3
20.8	-14	16.0
21.6	-13	16.7
22.4	-12	17.4
23.2	-11	18.1
24.0	-10	18.9
24.9	-9	19.7
25.7	-8	20.5
26.6	-7	21.2
27.5	-6	22.1
28.4	-5	22.9
29.3	-4	23.7
30.2	-3	24.6
31.2	-2	25.4
32.1	-1	26.3
33.1	0	27.2
34.1	1	28.1
35.1	2	29.0
36.1	3	30.0
37.1	4	30.9
38.2	5	31.9
39.3	6	32.9
40.3	7	33.9
41.4	8	34.9
42.6	9	36.0
43.7	10	37.0

R-404A psig	Average Evaporator Temp (°F)	Opteon™ XP40 psig
44.8	11	38.1
46.0	12	39.2
47.2	13	40.3
48.4	14	41.4
49.6	15	42.5
50.8	16	43.7
52.1	17	44.9
53.4	18	46.1
54.7	19	47.3
56.0	20	48.5
57.3	21	49.7
58.6	22	51.0
60.0	23	52.3
61.4	24	53.6
62.8	25	54.9
64.2	26	56.3
65.6	27	57.6
67.1	28	59.0
68.6	29	60.4
70.1	30	61.8
71.6	31	63.3
73.1	32	64.7
74.7	33	66.2
76.3	34	67.7
77.9	35	69.3
79.5	36	70.8
81.2	37	72.4
82.8	38	74.0
84.5	39	75.6
86.2	40	77.2
88.0	41	78.9
89.7	42	80.5
91.5	43	82.2
93.3	44	84.0
95.1	45	85.7

After converting from R-404A to Opteon™ XP40, the evaporator temperature can be set by locating the desired average evaporator temperature or (R-404A evaporator pressure) on this chart and determining the new set point required for Opteon™ XP40 in order to achieve an equivalent average evaporator temperature.

## Appendix B.

**Table 6:** Opteon™ XP40 Pressure-Temperature Data (Eng)

P (psig)	Sat Liq T (°F)	Sat Vap T (°F)	P (psig)	Sat Liq T (°F)	Sat Vap T (°F)	P (psig)	Sat Liq T (°F)	Sat Vap T (°F)
-4.7	-64.6	-53.5	145.3	67.4	76.6	295.3	114.6	122.3
-1.7	-55.3	-44.3	148.3	68.6	77.8	298.3	115.3	123.0
1.3	-47.6	-36.7	151.3	69.8	79.0	301.3	116.1	123.8
4.3	-41.0	-30.1	154.3	71.0	80.2	304.3	116.8	124.5
7.3	-35.1	-24.3	157.3	72.1	81.3	307.3	117.5	125.2
10.3	-29.8	-19.1	160.3	73.3	82.4	310.3	118.3	125.9
13.3	-25.0	-14.4	163.3	74.4	83.5	313.3	119.0	126.6
16.3	-20.6	-10.0	166.3	75.6	84.6	316.3	119.7	127.2
19.3	-16.5	-6.0	169.3	76.7	85.7	319.3	120.4	127.9
22.3	-12.7	-2.2	172.3	77.8	86.8	322.3	121.1	128.6
25.3	-9.1	1.4	175.3	78.9	87.8	325.3	121.8	129.3
28.3	-5.7	4.7	178.3	79.9	88.9	328.3	122.5	129.9
31.3	-2.5	7.9	181.3	81.0	89.9	331.3	123.2	130.6
34.3	0.5	10.9	184.3	82.0	90.9	334.3	123.9	131.3
37.3	3.5	13.8	187.3	83.1	91.9	337.3	124.6	131.9
40.3	6.2	16.5	190.3	84.1	92.9	340.3	125.3	132.6
43.3	8.9	19.2	193.3	85.1	93.9	343.3	126.0	133.2
46.3	11.5	21.7	196.3	86.1	94.9	346.3	126.6	133.8
49.3	14.0	24.2	199.3	87.1	95.9	349.3	127.3	134.5
52.3	16.4	26.5	202.3	88.1	96.8	352.3	128.0	135.1
55.3	18.7	28.8	205.3	89.1	97.8	355.3	128.6	135.7
58.3	20.9	31.0	208.3	90.0	98.7	358.3	129.3	136.4
61.3	23.1	33.1	211.3	91.0	99.6	361.3	130.0	137.0
64.3	25.2	35.2	214.3	91.9	100.5	364.3	130.6	137.6
67.3	27.2	37.2	217.3	92.9	101.4	367.3	131.3	138.2
70.3	29.2	39.2	220.3	93.8	102.3	370.3	131.9	138.8
73.3	31.2	41.1	223.3	94.7	103.2	373.3	132.5	139.4
76.3	33.0	43.0	226.3	95.6	104.1	376.3	133.2	140.0
79.3	34.9	44.8	229.3	96.5	105.0	379.3	133.8	140.6
82.3	36.7	46.5	232.3	97.4	105.8	382.3	134.4	141.2
85.3	38.4	48.3	235.3	98.3	106.7	385.3	135.1	141.8
88.3	40.2	50.0	238.3	99.2	107.5	388.3	135.7	142.4
91.3	41.9	51.6	241.3	100.1	108.4	391.3	136.3	143.0
94.3	43.5	53.2	244.3	100.9	109.2	394.3	136.9	143.5
97.3	45.1	54.8	247.3	101.8	110.0	397.3	137.5	144.1
100.3	46.7	56.4	250.3	102.6	110.9	400.3	138.1	144.7
103.3	48.2	57.9	253.3	103.5	111.7	403.3	138.7	145.2
106.3	49.8	59.4	256.3	104.3	112.5	406.3	139.3	145.8
109.3	51.3	60.9	259.3	105.1	113.3	409.3	139.9	146.4
112.3	52.7	62.3	262.3	105.9	114.1	412.3	140.5	146.9
115.3	54.2	63.7	265.3	106.8	114.8	415.3	141.1	147.5
118.3	55.6	65.1	268.3	107.6	115.6	418.3	141.7	148.0
121.3	57.0	66.5	271.3	108.4	116.4	421.3	142.3	148.6
124.3	58.4	67.8	274.3	109.2	117.1	424.3	142.9	149.1
127.3	59.7	69.1	277.3	109.9	117.9	427.3	143.5	149.7
130.3	61.0	70.4	280.3	110.7	118.7	430.3	144.1	150.2
133.3	62.3	71.7	283.3	111.5	119.4	433.3	144.6	150.7
136.3	63.6	73.0	286.3	112.3	120.1	436.3	145.2	151.3
139.3	64.9	74.2	289.3	113.0	120.9	439.3	145.8	151.8
142.3	66.1	75.4	292.3	113.8	121.6	442.3	146.3	152.3

**Table 7:** Opteon™ XP40 Temperature-Pressure Data (Eng)

Temp (°F)	Sat Liq P (psig)	Sat Vap P (psig)	Temp (°F)	Sat Liq P (psig)	Sat Vap P (psig)	Temp (°F)	Sat Liq P (psig)	Sat Vap P (psig)
-40	4.8	-0.1	25	64.0	50.4	90	208.2	181.6
-39	5.3	0.3	26	65.5	51.7	91	211.4	184.5
-38	5.8	0.8	27	67.0	52.9	92	214.5	187.5
-37	6.3	1.2	28	68.5	54.3	93	217.7	190.5
-36	6.8	1.6	29	70.0	55.6	94	221.0	193.6
-35	7.4	2.0	30	71.5	56.9	95	224.3	196.6
-34	7.9	2.5	31	73.1	58.3	96	227.6	199.8
-33	8.5	2.9	32	74.6	59.7	97	230.9	202.9
-32	9.0	3.4	33	76.2	61.1	98	234.3	206.1
-31	9.6	3.9	34	77.9	62.6	99	237.7	209.3
-30	10.2	4.4	35	79.5	64.0	100	241.1	212.6
-29	10.8	4.9	36	81.2	65.5	101	244.6	215.9
-28	11.4	5.4	37	82.8	67.0	102	248.1	219.2
-27	12.0	5.9	38	84.5	68.5	103	251.7	222.6
-26	12.7	6.4	39	86.3	70.0	104	255.3	226.0
-25	13.3	6.9	40	88.0	71.6	105	258.9	229.4
-24	14.0	7.5	41	89.8	73.2	106	262.5	232.9
-23	14.7	8.0	42	91.6	74.8	107	266.2	236.4
-22	15.3	8.6	43	93.4	76.4	108	270.0	240.0
-21	16.0	9.2	44	95.2	78.0	109	273.7	243.6
-20	16.7	9.8	45	97.1	79.7	110	277.5	247.2
-19	17.5	10.4	46	99.0	81.4	111	281.4	250.9
-18	18.2	11.0	47	100.9	83.1	112	285.2	254.6
-17	18.9	11.6	48	102.8	84.8	113	289.1	258.3
-16	19.7	12.3	49	104.8	86.6	114	293.1	262.1
-15	20.5	12.9	50	106.8	88.4	115	297.1	266.0
-14	21.3	13.6	51	108.8	90.2	116	301.1	269.8
-13	22.1	14.2	52	110.8	92.0	117	305.2	273.7
-12	22.9	14.9	53	112.9	93.9	118	309.3	277.7
-11	23.7	15.6	54	115.0	95.8	119	313.4	281.7
-10	24.6	16.3	55	117.1	97.7	120	317.6	285.7
-9	25.4	17.0	56	119.2	99.6	121	321.8	289.8
-8	26.3	17.8	57	121.4	101.6	122	326.0	294.0
-7	27.2	18.5	58	123.5	103.5	123	330.3	298.1
-6	28.1	19.3	59	125.8	105.5	124	334.7	302.4
-5	29.0	20.1	60	128.0	107.6	125	339.0	306.6
-4	29.9	20.8	61	130.3	109.6	126	343.5	310.9
-3	30.8	21.7	62	132.5	111.7	127	347.9	315.3
-2	31.8	22.5	63	134.9	113.8	128	352.4	319.7
-1	32.8	23.3	64	137.2	116.0	129	356.9	324.1
0	33.8	24.1	65	139.6	118.1	130	361.5	328.6
1	34.8	25.0	66	142.0	120.3	131	366.1	333.2
2	35.8	25.9	67	144.4	122.5	132	370.8	337.8
3	36.8	26.8	68	146.8	124.8	133	375.5	342.4
4	37.9	27.7	69	149.3	127.0	134	380.3	347.1
5	39.0	28.6	70	151.8	129.3	135	385.0	351.8
6	40.0	29.5	71	154.4	131.7	136	389.9	356.6
7	41.1	30.5	72	156.9	134.0	137	394.7	361.5
8	42.3	31.4	73	159.5	136.4	138	399.7	366.3
9	43.4	32.4	74	162.2	138.8	139	404.6	371.3
10	44.6	33.4	75	164.8	141.3	140	409.6	376.3
11	45.7	34.4	76	167.5	143.7	141	414.7	381.3
12	46.9	35.4	77	170.2	146.2	142	419.8	386.4
13	48.1	36.5	78	172.9	148.8	143	424.9	391.6
14	49.4	37.6	79	175.7	151.3	144	430.1	396.8
15	50.6	38.6	80	178.5	153.9	145	435.3	402.1
16	51.9	39.7	81	181.3	156.6	146	440.6	407.4
17	53.1	40.8	82	184.2	159.2	147	445.9	412.8
18	54.4	42.0	83	187.1	161.9	148	451.2	418.2
19	55.7	43.1	84	190.0	164.6	149	456.6	423.7
20	57.1	44.3	85	193.0	167.4	150	462.1	429.3
21	58.4	45.5	86	196.0	170.1			
22	59.8	46.7	87	199.0	173.0			
23	61.2	47.9	88	202.0	175.8			
24	62.6	49.1	89	205.1	178.7			



### System Data Sheet

Type of System/Location: \_\_\_\_\_

Equipment Mfg.: \_\_\_\_\_ Compressor Mfg.: \_\_\_\_\_

Model No.: \_\_\_\_\_ Model No.: \_\_\_\_\_

Serial No.: \_\_\_\_\_ Serial No.: \_\_\_\_\_

Date of Manufacture: \_\_\_\_\_ Date of Manufacture: \_\_\_\_\_

Original Charge Size: \_\_\_\_\_ Lubricant Type: \_\_\_\_\_

Lubricant Charge Size: \_\_\_\_\_ Drier Mfg.: \_\_\_\_\_

Drier Type: \_\_\_\_\_ Condenser Cooling Medium: \_\_\_\_\_

Expansion Device (check one):

Capillary Tube: \_\_\_\_\_  Expansion Valve: \_\_\_\_\_

If Expansion Valve:

Manufacturer: \_\_\_\_\_ Model No.: \_\_\_\_\_

Control/Set Point: \_\_\_\_\_ Location of Sensor: \_\_\_\_\_

Other System Controls (e.g., head pressure control): \_\_\_\_\_

Date/Time				
Refrigerant				
Charge Size (lb)				
Ambient Temperature (°F)				
Compressor				
Suction Temperature (°F)				
Suction Pressure (psig)				
Discharge Temperature (°F)				
Discharge Pressure (psig)				
Evaporator				
Coil Air/H <sub>2</sub> O In T (°F)				
Coil Air/H <sub>2</sub> O Out T (°F)				
Operating Service Temperature (°F)				
Condenser				
Coil Air/H <sub>2</sub> O In T (°F)				
Coil Air/H <sub>2</sub> O Out T (°F)				
Superheat and Subcool (derived values)				
Refrigerant T at Superheat Ctl. Pt. (°F)				
Calculated Superheat (°R)				
Expansion Device Inlet T (°F)				
Calculated Subcool (°R)				
Motor Amps (if rack: total)				

## Checklist for Opteon™ XP40 Retrofit

- Establish baseline performance while operating on R-404A/R-507 (see data sheet for recommended data)
- Consult the original equipment manufacturer of the system components for their recommendation on the following:
  - Plastics compatibility
  - Elastomeric compatibility
  - Lubricant (viscosity, manufacturer, additives)
  - Thermal expansion device sizing
  - Retrofit procedures to sustain warranty, if applicable
- Check quality of existing POE oil, and change if necessary
- Complete system modifications (TXV, line sizing, etc.) based on engineering analysis
- Replace filter drier with new drier approved for use with retrofit refrigerant
- Reconnect system, and evacuate with vacuum pump to full vacuum (<1000 microns [ $<29.88$  in Hg vacuum] [ $<1.33$  mbar])
- Leak check system (re-evacuate system following leak check)
- Charge system with Opteon™ XP40 (R-449A) refrigerant
  - Initially charge -85% by weight of original equipment manufacturer specified R-404A/R-507 charge
  - Amount of refrigerant charged: \_\_\_\_\_
- Start up equipment, and adjust charge until desired operating conditions are achieved
  - If low in charge, add in increments of 2–3% by weight
  - Amount of refrigerant charged: \_\_\_\_\_
  - Total refrigerant charged: \_\_\_\_\_
- Label components and system for type of refrigerant and lubricant
- Conversion is complete!



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**For more information on the Opteon™ portfolio of refrigerants , or other Chemours refrigerants products, visit [opteon.com](http://opteon.com), call (800) 235-7882, or follow us on [Twitter@RefrigChemours](https://twitter.com/RefrigChemours).**

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Replaces: K-28829  
C-10023 (2/18)