



Suva[®]
refrigerants



Retrofit Guidelines for Suva[®] HFC Refrigerants

Suva[®] 134a for R-12 Retrofit

Suva[®] HP62 and Suva[®] 507 for R-502 Retrofit

Retrofit Guidelines for Suva® HFC Refrigerants

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Introduction

With the phaseout of CFCs, existing refrigeration and air-conditioning equipment operating with CFCs will ultimately need to be either replaced with new equipment or retrofitted with alternative refrigerants. Some service technicians and equipment owners have elected to retrofit to hydrofluorocarbon (HFC) refrigerants such as Suva® 134a, Suva® HP62, or Suva® 507.

Using these procedures, R-12 and R-502 equipment can be safely and efficiently retrofitted with HFC-based Suva® refrigerants, allowing the equipment to continue in service for the remainder of its useful life. These retrofit guidelines are intended for equipment containing positive displacement compressors with direct expansion evaporators.

R-12 Replacement Choices

Suva® 134a (R-134a) is the long-term HFC replacement for R-12 in new equipment and for retrofitting some R-12 systems such as supermarket display cases, commercial refrigeration and air-conditioning equipment, appliances, and transport refrigeration equipment. In stationary equipment Suva® 134a is recommended for retrofit of equipment with evaporator temperatures above 20°F (-7°C) to ensure best performance. Suva® 134a may be used in existing equipment at lower evaporator temperatures, but it can exhibit reduced capacity compared with R-12 unless system modifications are made.

R-502 Replacement Choices

- **Suva® HP62 (R-404A)** is widely recognized as the preferred HFC replacement for R-502 in new equipment and for retrofitting R-502 systems such as supermarket and food service, industrial freezing, and some transport refrigeration. Suva® HP62 offers the closest HFC match to R-502 performance and can be used over the full R-502 operating range. Suva® HP62 also provides lower compressor discharge temperatures than R-502, which can increase compressor reliability and life.
- **Suva® 507 (R-507)** is an HFC replacement option for R-502 in new equipment and for retrofitting R-502 systems. Suva® 507 can also be used over the full R-502 operating range, and provides lower compressor discharge temperatures than R-502, which can increase compressor reliability and life.

Using HFCs versus Service Refrigerants

Refrigerants such as Suva® MP39, Suva® 409A, Suva® HP80 and Suva® 408A are often selected

for retrofit instead of HFCs because these service refrigerants typically involve an easier and more cost-effective retrofit procedure while providing improved performance over the CFCs they replace. The compressor oil change procedures are typically less complicated with the service refrigerants, which results in lower retrofit costs. Refer to DuPont bulletin ART-36 “Retrofit Guidelines for Suva® Service Refrigerants” for full details.

Important Safety Information

Like CFCs, Suva® refrigerants are safe when handled properly. However, any refrigerant can cause injury or even death when mishandled. Please review the following guidelines before using *any* refrigerant.

- **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.** 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 torches to search for leaks.** Do not use flames in high concentrations of refrigerant. Open flames release large quantities of acidic compounds in the presence of all refrigerants, and these compounds can be hazardous. Do not use torches as leak detectors. Old halide torches detect chlorine, which may not be present with new 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 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.

Note: Any refrigerant can be hazardous if used improperly. Hazards include liquid or vapor under pressure, and frostbite from the escaping liquid. Overexposure to high concentrations of vapor can cause asphyxiation and cardiac arrest. Please read all safety information before handling any refrigerant.

For more detailed information on the properties, uses, storage, and handling of Suva® refrigerants, see DuPont Technical Bulletin P-134a or P-HP, or other literature specific to these products. Refer to the appropriate Material Safety Data Sheet (MSDS) for more safety information about each refrigerant. DuPont Safety Bulletin AS-1 gives additional information for safe handling of refrigerants.

Lubricant and Filter Drier Information

Lubricants

Lubricant selection is based on many factors, including compressor wear characteristics, material compatibility, and lubricant/refrigerant miscibility that can affect oil return to the compressor. Before starting a retrofit, consult the compressor manufacturer to determine the correct lubricant for your compressor. Other information sources are DuPont Authorized Distributors, lubricant manufacturers, and system manufacturers.

Polyol ester (POE) lubricants must be used with Suva® 134a, Suva® HP62 or Suva® 507 refrigerants. These lubricants are available from DuPont Authorized Distributors. To provide optimum oil return, equipment using mineral oil or alkylbenzene must be flushed to remove at least 95% of these oils. See the retrofit procedures below for more information.

Special care should be taken when handling POE lubricants because of their tendency to absorb water. Minimize contact with air and store the lubricant in a sealed container.

Filter Drier

Change the filter drier during the retrofit. This is a routine practice following system maintenance. There are two types of filter driers commonly used, solid core and packed bead.

Replace the drier with the same type you currently use. The drier label will show which refrigerants can be used with that drier. Check with your DuPont Authorized Distributor for the correct drier to use in your system.

General Retrofit Information

System Modifications

The compositions of these Suva® refrigerants have been selected to provide performance comparable with the refrigerants they are replacing in terms of both capacity and energy efficiency. As a result, minimal system modifications are anticipated

with retrofitting. Suva® HP62 and Suva® 507 are near-azeotropes at most temperatures, therefore the vapor composition in the refrigerant cylinder is slightly different from the liquid composition. This small difference will not affect performance in direct expansion systems, but it could affect performance in systems with flooded evaporators.

You should consult the original equipment manufacturer for recommendations concerning the compatibility of elastomers and plastics used in their system and the new refrigerant. Although many system components used with CFCs are also compatible with Suva® refrigerants, there are exceptions that, if not replaced, can cause refrigerant leakage or system failure.

Field experience has shown that some systems retrofitted directly from R-502 to Suva® HP62 or Suva® 507 can have increased leakage due to shrinkage of elastomers (o-rings, gaskets) following removal of the R-502. Replacement of these elastomers may add additional cost and time to the retrofit.

Retrofits of R-12 or R-502 systems with other alternative refrigerants such as HCFC-22 may require more extensive modifications to the existing equipment, such as replacement of the compressor with multistage compressors or use of liquid injection. For some systems this additional cost may be large. Suva® refrigerants provide the service contractor and equipment owner with a cost-effective way to retrofit an existing system.

Note: Suva® refrigerants were not designed for use in conjunction with other refrigerants or additives that have not been clearly specified by DuPont or the equipment manufacturer. Mixing Suva® refrigerants with the CFC refrigerant, or mixing two different alternative refrigerants, may have an adverse effect on system performance. “Topping off” a CFC refrigerant with any Suva® refrigerant is not recommended.

Refrigerant Recovery Information

Most recovery or recycle equipment used for R-12 and R-502 can be used for Suva® refrigerants. Use standard procedures to avoid cross-contamination when switching from one refrigerant to another. Consult the equipment manufacturer for specific recommendations.

In the United States, DuPont will take back for reclaim the Suva® refrigerants discussed in this bulletin.

What to Expect Following a Retrofit

This table shows approximate system performance changes following a retrofit. These values are general guidelines for system behavior, and actual performance will vary with each system.

Suva® 134a is compared to R-12, Suva® HP62 and Suva® 507 are compared to R-502.

Suva® Refrig.	Disch. Press. psi (kPa)	Suct. Press. psi (kPa)	Disch Temp. °F (°C)	Refrig Cap'y. (%)	Expect S-Heat °F (°C)
134a	10 (69.8)	-2 (-13.8)	-10 (-5.6)	-10	-4 (-2.2)
HP62	20 (137.9)	Same	-10 (-5.6)	Same	2 (1.1)
507	30 (206.8)	Same	-15 (8.3)	Same	4 (2.2)

How to read this table

Example: R-12 to Suva® 134a retrofit. Discharge pressure with 134a will be in the range of 10 psig higher than R-12 (using discharge pressure column above). Superheat will be 4°F less with 134a.

Retrofit Summary for HFC Refrigerants

Select the **Retrofit Checklist** from the Appendix for the refrigerant you are replacing.

1. Establish baseline performance with CFC.
2. Drain mineral oil or alkylbenzene (MO/AB) from the system and measure the volume removed. Leave the CFC refrigerant in the system.
3. Add POE lubricant; use the same volume as removed in Step 2. Start up system and operate for at least 24 hours, or more if system has complex piping.
4. Drain POE, and repeat steps 2 and 3 at least two more times. Continue flushing until MO/AB is less than 5% by weight or as recommended by compressor manufacturer.
5. Recover the CFC charge into a proper recovery cylinder.
6. Replace the filter/drier.
7. Evacuate system and check for leaks.
8. Charge with Suva® refrigerant. Remove liquid only from charging cylinder for Suva® HP62 or Suva® 507. Typical charge is 75–90% by weight of CFC charge.
9. Start up system, adjust charge size. Label system for the refrigerant and lubricant used.

Retrofit Complete

Retrofit of R-12 Systems to Suva® 134a

The following detailed discussion is the recommended procedure for retrofitting R-12 systems to Suva® 134a.

1. **Establish baseline performance with CFC.**
Collect system performance data while the R-12 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, superheat and subcool, etc.) at normal operating conditions will be useful when optimizing operation of the system with the Suva® refrigerant. A **System Data Sheet** is included at the back of this document to record baseline data.
2. **Drain mineral oil or alkylbenzene from the system and measure the volume removed. Leave the CFC refrigerant in the system.**
If mineral oil or alkylbenzene is the existing lubricant, it will have to be drained. This may require removing the compressor from the system, particularly with small hermetic compressors that have no oil drain port. In this case, the lubricant should be drained from the suction port on the compressor after the R-12 has been properly recovered. For an effective flush, it is important to remove at least 50% of the lubricant in all cases. Larger systems may require drainage from additional points in the system, particularly low spots around the evaporator. In systems with an oil separator, any lubricant present in the separator should also be drained.

In all cases, measure the volume of lubricant removed from the system. Record this information on the Retrofit Checklist (see Appendix). Compare this volume with the compressor/system specifications to ensure that the majority of lubricant has been removed. Consult the compressor manufacturer for recommendations on allowable residual MO/AB in POE lubricant. If poor system performance is noted on start-up, an additional lubricant change may be required.
3. **Add POE lubricant; use the same volume as removed in Step 2. Start up system and operate for at least 24 hours, or more if system has complex piping.** Charge the compressor with the same volume of new lubricant as the amount you removed from the system in step 2. Use a lubricant viscosity and grade recommended by the compressor manufacturer for the Suva® refrigerant you are using;

or use a similar viscosity to the oil you removed if compressor information is not available. A typical viscosity is 150 SUS or ISO 32 for many compressors.

4. **Drain POE, and repeat steps 2 and 3 at least two more times. Continue flushing until MO/AB is less than 5% by weight or as recommended by compressor manufacturer.** For an HFC refrigerant to operate properly in a retrofitted system, the residual MO/AB concentration must be very low. Repeatedly removing and replacing the POE will flush the old oil from the refrigeration system, providing that enough time is allowed with each change to circulate oil through the entire system.
5. **Recover the CFC charge into a proper recovery cylinder.** Use normal service practices. If the correct charge size is not known, weigh the amount of refrigerant recovered.
6. **Replace the filter/drier.** It is routine practice to replace the filter/drier following system maintenance. Replacement driers are available that are compatible with Suva® refrigerants. See page 2 of this manual for additional information on driers.
7. **Evacuate system and check for leaks.** To remove air or other noncondensables in the system, evacuate the system to near full vacuum (29.9 inHg vacuum [500 microns] or less than 10 kPa).
8. **Charge with Suva® refrigerant.** In general, the refrigeration system will require less weight of the Suva® 134a than of R-12. The optimum charge will vary depending on the system design and operating conditions. For most systems the best charge size will be 75–90% by weight of the original R-12 charge.

For best results:

- It is recommended that the system be initially charged with about 75% by weight of the original charge.
 - Add the initial charge of Suva® refrigerant to the high-pressure side of the system (compressor *not* running) until the system and cylinder pressures equalize. Then connect to the low-pressure side of the system, start the compressor, and load the remainder of the refrigerant slowly to the suction side of the system.
9. **Start up system, adjust charge size. Label system for the refrigerant and lubricant used.** Start the system and let conditions stabilize. If the system is undercharged, add Suva® 134a in small amounts until the system conditions reach the desired level. See the

Pressure/Temperature Charts in this bulletin to compare pressures and temperatures.

Suva® refrigerants are more sensitive to charge size than CFCs. System performance will change quickly if the system is overcharged or undercharged. Sight glasses in the liquid line can be used in most cases as a guide, but system charge should also be determined by measuring system operating conditions (discharge and suction pressures, suction line temperature, compressor motor amps, superheat, etc.). **Attempting to charge until the sight glass is clear may result in overcharging the refrigerant.** Please read “How to Determine Suction Pressure, Superheat and Subcool.”

Retrofit of R-502 Systems to Suva® HP62 or Suva® 507

The following detailed discussion is the recommended procedure for retrofitting R-502 systems to Suva® HP62 or Suva® 507.

1. **Establish baseline performance with CFC.** Collect system performance data while the R-502 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, superheat and subcool, etc.) at normal operating conditions will be useful when optimizing operation of the system with the Suva® refrigerant. A **System Data Sheet** is included at the back of this document to record baseline data.
2. **Drain mineral oil or alkylbenzene from the system and measure the volume removed. Leave the CFC refrigerant in the system.** If mineral oil or alkylbenzene is the existing lubricant, it will have to be drained. This may require removing the compressor from the system, particularly with small hermetic compressors that have no oil drain port. In this case, the lubricant should be drained from the suction port on the compressor after the R-502 has been properly recovered. For an effective flush, it is important to remove at least 50% of the lubricant in all cases. Larger systems may require drainage from additional points in the system, particularly low spots around the evaporator. In systems with an oil separator, any lubricant present in the separator should also be drained.

In all cases, measure the volume of lubricant removed from the system. Record this information on the Retrofit Checklist (see Appendix). Compare this volume with the compressor/system specifications to ensure that the majority of lubricant has been removed. Consult the compressor manufacturer for recommendations on allowable residual MO/AB in POE lubricant. If poor system performance is noted on start-up, an additional lubricant change may be required.

3. **Add POE lubricant; use the same volume as removed in Step 2. Start up system and operate for at least 24 hours, or more if system has complex piping.** Charge the compressor with the same volume of new lubricant as the amount you removed from the system in step 2. Use a lubricant viscosity and grade recommended by the compressor manufacturer for the Suva® refrigerant you are using; or use a similar viscosity to the MO/AB you removed if compressor information is not available. A typical viscosity is 150 SUS or ISO 32 for many compressors.
4. **Drain POE, and repeat steps 2 and 3 at least two more times. Continue flushing until MO/AB is less than 5% by weight or as recommended by compressor manufacturer.** For an HFC refrigerant to operate properly in a retrofitted system, the residual MO/AB concentration must be very low. Repeatedly removing and replacing the POE will flush the old oil from the refrigeration system, providing that enough time is allowed with each change to circulate oil through the entire system.
5. **Recover the CFC charge into a proper recovery cylinder.** Use normal service practices. If the correct charge size is not known, weigh the amount of refrigerant recovered.
6. **Replace the filter/drier.** It is routine practice to replace the filter/drier following system maintenance. Replacement driers are available that are compatible with Suva® refrigerants. See page 2 of this manual for additional information on driers.
7. **Evacuate system and check for leaks.** To remove air or other noncondensables in the system, evacuate the system to near full vacuum (29.9 inHg vacuum [500 microns] or less than 10 kPa).
8. **Charge with Suva® refrigerant. Remove liquid only from charging cylinder.** *The proper cylinder position for liquid removal is indicated by arrows on the cylinder and cylinder box.* Once liquid is removed from the cylinder, the refrigerant can be charged to the system as liquid or vapor as desired. Use the manifold gauges or a throttling valve to flash the liquid to vapor if required.

In general, the refrigeration system will require less weight of the Suva® refrigerant than of R-502. The optimum charge will vary depending on the system design and operating conditions, but for most systems the best charge size will be 75–90% by weight of the original charge.

For best results:

 - It is recommended that the system be initially charged with about 75% by weight of the original charge.
 - Add the initial charge of Suva® refrigerant to the high-pressure side of the system (compressor *not* running) until the system and cylinder pressures equalize. Then connect to the low-pressure side of the system, start the compressor, and load the remainder of the refrigerant slowly to the suction side of the system. You should be removing liquid from the charging cylinder, and therefore should charge slowly to allow the refrigerant to flash (vaporize) before entering the compressor suction and avoid compressor damage.
9. **Start up system, adjust charge size. Label system for the refrigerant and lubricant used.** Start the system and let conditions stabilize. If the system is undercharged, add Suva® HP62 or Suva® 507 in small amounts (still removing liquid from the charging cylinder) until the system conditions reach the desired level. See the Pressure/Temperature Charts in this bulletin to compare pressures and temperatures for the Suva® refrigerant you are using.

Suva® refrigerants are more sensitive to charge size than CFCs. System performance will change quickly if the system is overcharged or undercharged. Sight glasses in the liquid

line can be used in most cases as a guide, but system charge should also be determined by measuring system operating conditions (discharge and suction pressures, suction line temperature, compressor motor amps, superheat, etc.). **Attempting to charge until the sight glass is clear may result in overcharging the refrigerant.** Please read “How to Determine Suction Pressure, Superheat, and Subcool.”

Pressure/Temperature Charts—Introduction

How to Read the Pressure/Temperature Charts

The following pages contain pressure/temperature charts for the Suva® refrigerants discussed in this bulletin.

Three temperatures are shown at a given pressure:

- Saturated Liquid Temperature (Bubble Point)—In the condenser, this is the temperature at which the last bit of vapor has condensed. Below this temperature, the refrigerant will be subcooled liquid. This temperature should also be used when determining the pressure/temperature value of product in a refrigerant cylinder.
- Saturated Vapor Temperature (Dew Point)—In the evaporator, this is the temperature at which the last drop of liquid has just boiled. Above this temperature, the refrigerant will be superheated vapor.

How to Determine Suction Pressure, Superheat, and Subcool

Suction Pressure

Determine the expected evaporator temperature using the R-12 or R-502 column (from the baseline data you collected prior to the retrofit). Find the same expected evaporator temperature in the Saturated Vapor Temperature column for Suva® 134a, Suva® HP62 or Suva® 507. Note the corresponding pressure for this temperature. This is the suction pressure at which the system should operate.

Superheat

Using the Saturated Vapor Temperature column for the Suva® refrigerant, the amount of vapor superheat is calculated in the same manner as for a CFC refrigerant.

Subcool

Using the Saturated Liquid Temperature column for the Suva® refrigerant, the amount of liquid subcool is calculated in the same manner as for a CFC refrigerant.

Retrofit Checklist for Suva® 134a, Suva® HP62, or Suva® 507

- _____ 1. Establish baseline performance with CFC-12 or R-502. (See data sheet for recommended data.)
- _____ 2. Consult the original equipment manufacturer of the system components for recommendations on the following:
 - Plastics compatibility
 - Elastomers compatibility
 - Lubricant (viscosity, manufacturer)
 - Retrofit procedure to sustain warranty
- _____ 3. Drain lubricant charge from the refrigerant system (unless polyol ester lubricant is already in the system).
 - Remove majority of lubricant from system.
 - Measure amount of lubricant removed and record: _____.
- _____ 4. Charge polyol ester lubricant using amount equivalent to amount of mineral oil removed. Run system with CFC-12 or R-502 for 24 hours, minimum.
- _____ 5. Repeat lubricant drain and POE charging two more times or until mineral oil content is less than 5%.
- _____ 6. Remove CFC-12 or R-502 charge from system. (Need 10–20 inHg vacuum [34–67 kPa].)
- _____ 7. Replace filter drier with new drier approved for use with Suva® 134a, Suva® HP62, or Suva® 507.
- _____ 8. Reconnect system and evacuate with vacuum pump. (Evacuate to full vacuum [29.9 inHg vacuum/0.14 kPa].)
- _____ 9. Leak-check system. (Reevacuate system following leak check.)
- _____ 10. Charge system with Suva®.
 - Initially charge 75% by weight of original equipment manufacturer CFC-12 or R-502 charge.
 - Amount of refrigerant charged: _____.
- _____ 11. Start equipment and adjust charge until desired operating conditions are achieved. If low in charge, add in increments of 2–3% of original CFC-12 or R-502 charge.
 - Amount of refrigerant charged: _____.
 - *Total refrigerant charged:* _____.
- _____ 12. Label components and system for type of refrigerant (Suva® 134a, Suva® HP62, or Suva® 507) and lubricant (polyol ester).

Retrofit is complete.

Appendix

Table 1
Pressure/Temperature Chart
Suva® 134a Saturation Properties

English Units			SI Units		
Pressure, psi	R-12 Saturation Temperature, °F	HFC-134a Saturation Temperature, °F	Pressure, kPa	R-12 Saturation Temperature, °C	HFC-134a Saturation Temperature, °C
15*	-49	-40	25	-59	-53
10*	-38	-30	50	-45	-40
5*	-29	-22	75	-37	-32
0	-22	-15	100	-30	-26
5	-9	-3	125	-24	-21
10	2	7	150	-20	-17
15	10	15	175	-16	-13
20	18	22	200	-12	-10
25	26	29	225	-9	-7
30	32	35	250	-6	-4
35	38	40	275	-4	-2
40	43	45	300	-1	1
45	48	50	325	2	3
50	53	54	350	4	5
55	58	58	375	6	7
60	62	62	400	8	9
65	66	66	450	12	12
70	70	69	500	16	16
75	74	73	550	19	19
80	77	76	600	22	22
85	81	79	650	25	24
90	84	82	700	28	27
95	87	85	750	30	29
100	90	88	800	33	31
110	96	93	900	37	36
120	102	98	1000	42	39
130	107	103	1200	49	46
140	112	107	1400	56	52
150	117	112	1600	62	58
165	123	118	1800	68	63
180	130	123	2000	73	67
195	136	129	2200	78	72
210	141	134	2400	82	76
225	147	139	2600	86	79
240	152	143	2800	90	83
255	157	148	3000	94	86
270	162	152	3200	98	89
285	166	156	3400	101	93
300	170	160	3600	104	95

*inHg, vacuum

Table 2
Pressure/Temperature Chart
Suva® HP62 Saturation Properties

English Units

Pressure, psi	R-502 Sat. Temp, °F	HP62 Temp, °F	Pressure psi	R-502 Sat. Temp, °F	HP62 Temp, °F
25*	-108	-107	58	24	22
20*	-88	-87	60	26	23
15*	-75	-75	62	27	25
10*	-65	-65	64	29	26
5*	-56	-57	66	30	28
4*	-55	-56	68	32	29
3*	-54	-54	70	33	30
2*	-53	-53	72	34	32
1*	-52	-52	74	36	33
0	-50	-50	76	37	34
2	-45	-45	78	38	35
4	-40	-41	80	40	36
6	-36	-37	82	41	37
8	-32	-33	84	42	38
10	-29	-30	86	43	40
12	-25	-26	88	45	41
14	-22	-23	90	46	43
16	-19	-20	92	47	44
18	-16	-18	94	48	45
20	-13	-15	96	49	46
22	-11	-12	98	50	47
24	-8	-10	100	51	48
26	-6	-7	105	54	51
28	-3	-5	110	57	53
30	-1	-3	115	60	56
32	1	-1	120	62	58
34	3	2	125	64	60
36	5	3	130	67	63
38	7	5	135	69	65
40	9	7	140	71	67
42	11	9	145	73	69
44	13	11	150	75	71
46	15	12	175	85	81
48	16	14	200	95	89
50	18	16	250	111	104
52	20	17	300	125	118
54	21	19	350	137	129
56	23	20	400	148	140

SI Units

Pressure, kPa	R-502 Sat. Temp, °C	HP62 Temp, °C	Pressure kPa	R-502 Sat. Temp, °C	HP62 Temp, °C
25	-72	-71	1450	34	31
50	-60	-59	1500	35	32
75	-52	-52	1550	37	34
100	-46	-46	1600	38	35
125	-41	-41	1650	39	36
150	-37	-37	1700	41	37
175	-33	-34	1750	42	38
200	-30	-30	1800	43	40
225	-27	-28	1900	46	42
250	-24	-25	2000	48	44
275	-22	-22	2100	50	46
300	-19	-20	2200	52	48
325	-17	-18	2300	54	50
350	-15	-16	2400	56	52
375	-13	-14	2500	58	54
400	-11	-12	2600	60	56
425	-9	-10	2700	62	57
450	-8	-9	2800	64	59
475	-6	-7	2900	65	61
500	-4	-6			
550	-1	-3			
600	2	0			
650	4	2			
700	7	5			
750	9	7			
800	11	9			
850	13	11			
900	15	13			
950	17	15			
1000	19	17			
1050	21	19			
1100	23	20			
1150	25	22			
1200	26	24			
1250	28	25			
1300	29	27			
1350	31	28			
1400	32	30			

*inHg, vacuum

Table 3
Pressure/Temperature Chart
Suva® 507 Saturation Properties

English Units						SI Units					
Pressure, psi	R-502 Sat. Temp, °F	507 Temp, °F	Pressure psi	R-502 Sat. Temp, °F	507 Temp, °F	Pressure, kPa	R-502 Sat. Temp, °C	507 Temp, °C	Pressure kPa	R-502 Sat. Temp, °C	507 Temp, °C
25*	-108	-110	58	24	19	25	-72	-72	1000	19	16
20*	-88	-90	60	26	21	50	-60	-61	1050	21	17
15*	-75	-77	62	27	22	75	-52	-53	1100	23	19
10*	-65	-67	64	29	24	100	-46	-47	1150	25	21
5*	-56	-61	66	30	25	125	-41	-43	1200	26	22
4*	-55	-59	68	32	26	150	-37	-39	1250	28	24
3*	-54	-58	70	33	28	175	-33	-35	1300	29	25
2*	-53	-57	72	34	29	200	-30	-32	1350	31	27
1*	-52	-56	74	36	30	225	-27	-29	1400	32	28
0	-50	-54	76	37	32	250	-24	-26	1450	34	30
2	-45	-48	78	38	33	275	-22	-24	1500	35	31
4	-40	-44	80	40	34	300	-19	-22	1550	37	32
6	-36	-39	82	41	35	325	-17	-19	1600	38	34
8	-32	-36	84	42	37	350	-15	-17	1650	39	35
10	-29	-32	86	43	38	375	-13	-15	1700	41	36
12	-25	-29	88	45	39	400	-11	-14	1750	42	37
14	-22	-26	90	46	40	425	-9	-12	1800	43	38
16	-19	-23	92	47	41	450	-8	-10	1900	46	41
18	-16	-20	94	48	42	475	-6	-9	2000	48	43
20	-13	-17	96	49	43	500	-4	-7	2100	50	45
22	-11	-15	98	50	44	550	-1	-4	2200	52	47
24	-8	-12	100	51	46	600	2	-2	2300	54	49
26	-6	-10	105	54	48	650	4	1	2400	56	51
28	-3	-8	110	57	51	700	7	4	2500	58	53
30	-1	-6	115	60	53	750	9	6	2600	60	54
32	1	-3	120	62	55	800	11	8	2700	62	56
34	3	-1	125	64	58	850	13	10	2800	64	58
36	5	1	130	67	60	900	15	12	2900	65	59
38	7	3	135	69	62	950	17	14			
40	9	4	140	71	64						
42	11	6	145	73	66						
44	13	8	150	75	69						
46	15	10	175	85	78						
48	16	11	200	95	87						
50	18	13	250	111	102						
52	20	15	300	125	115						
54	21	16	350	137	127						
56	23	18	400	148	137						

*inHg, vacuum

Table 4
Suva® 134a (R-134a) Physical Properties

Physical Property	Unit	Suva® 134a (R-134a)	R-12
Boiling Point at 1 atm	°F	-14.9	-21.6
	°C	-26.1	-29.8
Vapor Pressure Sat'd Liquid at 77°F (25°C)	psi	96.61	94.51
	kPa	666.1	651.6
Liquid Density at 77°F (25°C)	lb/ft ³	75.28	81.84
	kg/m ³	1,206	1,311
Density Sat'd Vapor at 77°F (25°C)	lb/ft ³	2.02	2.32
	kg/m ³	32.4	37.2
Ozone-Depletion Potential Compared with CFC-12	CFC-12 = 1	0	1
Halocarbon Global Warming Potential Compared with CFC-11	CFC-11 = 1	0.28	3.1

Table 5
Suva® HP62 (R-404A) and Suva® 507 (R-507) Physical Properties

Physical Property	Unit	Suva® HP62 (R-404A)	Suva® 507 (R-507)	R-502
Boiling Point at 1 atm	°F	-51.6	-52.1	-49.8
	°C	-46.5	-46.7	-45.4
Vapor Pressure Sat'd Liquid at 77°F (25°C)	psi	182	187	168
	kPa	1,255	1,287	1,162
Liquid Density at 77°F (25°C)	lb/ft ³	65.45	65.5	75.9
	kg/m ³	1,048	1,049	1,217
Density Sat'd Vapor at 75°F (15°C)	lb/ft ³	1.14	1.23	1.30
	kg/m ³	18.20	19.6	19.99
Ozone-Depletion Potential Compared with R-12	R-12 = 1	0	0	0.23
Halocarbon Global Warming Potential Compared with R-11	R-11 = 1	0.94	1.0	3.75

Table 6
Compositions of Suva® Refrigerants

Compositions, wt%	HFC-125	HFC-143a	HFC-134a
Suva® HP62 (R-404A)	44	52	4
Suva® 507 (R-507)	50	50	
Suva® 134a (R-134a)			100

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