

**DuPont™ Suva®**  
refrigerants

# Retrofit Guidelines for **DuPont™ Suva®** Service Refrigerants

DuPont™ Suva® MP39, DuPont™ Suva® 409A, and DuPont™ Suva® MP66 for R-12 Retrofit  
DuPont™ Suva® MP66 for R-500 Retrofit  
DuPont™ Suva® HP80, DuPont™ Suva® 408A, and DuPont™ Suva® HP81 for R-502 Retrofit



*The miracles of science®*



# **Retrofit Guidelines for DuPont™ Suva® Service Refrigerants**

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## Introduction

Several million retrofits have been performed successfully with DuPont™ Suva® service refrigerants. These retrofitted systems provide equivalent or better system performance than the original CFC refrigerant. Using these retrofit guidelines, R-12, R-500, and R-502 systems can be easily and economically retrofitted to the appropriate Suva® service refrigerant. This allows existing equipment to continue operating safely and efficiently for the remainder of its useful life.

### R-12 Replacement Choices

These refrigerants replace R-12 in refrigeration and air conditioning applications using positive displacement compressors with direct expansion evaporators.

- **Suva® MP39 (R-401A)** and **Suva® 409A (R-409A)** are the recommended alternatives for medium- and low-temperature R-12 systems, such as reach-in and walk-in coolers, food and dairy display cases, beverage dispensers and vending machines, and home refrigerators.
- **Suva® MP66 (R-401B)** is available for R-12 systems operating at low evaporator temperatures below  $-15^{\circ}\text{F}$  ( $-26^{\circ}\text{C}$ ) where higher capacity is needed, such as some domestic and commercial freezers and some transport refrigeration equipment. MP66 is also the recommended replacement for existing R-500 systems.

### R-502 Replacement Choices

These refrigerants replace R-502 in refrigeration applications using positive displacement compressors with direct expansion evaporators.

- **Suva® HP80 (R-402A)** offers the best combination of properties for most applications. It has discharge temperatures and efficiency comparable to R-502, but with improved capacity. Suva® HP80 can be used in walk-in coolers and freezers, frozen food and dairy display cases, ice cream dispensers, beverage vending machines, and some transport refrigeration equipment.
- **Suva® 408A (R-408A)** has lower operating pressures than Suva® HP80 and Suva® HP81, with corresponding lower capacity and equal or higher compressor discharge temperatures than Suva® HP81. Suva® 408A is suitable for use in much of the same equipment as Suva® HP80 or Suva® HP81, and is most suited for use where

higher system capacity or pressure is undesirable, such as in older equipment where condenser size may be limited.

- **Suva® HP81 (R-402B)** is recommended for applications where an increase in compressor discharge temperature of  $10\text{--}20^{\circ}\text{F}$  ( $5.5\text{--}11.1^{\circ}\text{C}$ ) is acceptable, such as ice machines, open-drive compressor systems, water-cooled condensing units, and compressors operating in low ambient temperatures.

## 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.** Also 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. Also do not use torches as leak detectors. Old halide torches look for 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-MP 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 also 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 Distributors, lubricant manufacturers, and system manufacturers.

Either alkylbenzene (AB) lubricants or polyol ester (POE) lubricants can be used with Suva® service refrigerants. In some cases, mineral oil may be acceptable (see below). These lubricants are available from DuPont Distributors.

*Field experience has shown that Suva® MP39, 409A, MP66, HP80, 408A, and HP81 work successfully with the existing mineral oil in many unitary and other close-coupled systems where oil return is not a concern such as reach-in coolers, point-of-purchase display units, vending machines, beverage dispensers, and domestic refrigerators. An oil change may be necessary, however, in systems that have poor oil return if the evaporator is distant from the compressor, the evaporator is below the compressor, or if there are low line velocities.*

**To provide optimum oil return, a single compressor lubricant change from mineral oil to AB lubricant using the same viscosity is recommended. This process will normally replace 50–80% of the existing mineral oil, and satisfies the recommendations and requirements of most compressor manufacturers.**

### **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 loose filled.

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

## **General Retrofit Information**

### **System Modifications**

The compositions of the Suva® service refrigerants have been selected to provide performance comparable to the refrigerants they are replacing in terms of both capacity and energy efficiency. As a result, minimal system modifications are anticipated with retrofitting. The Suva® refrigerants discussed in this bulletin are near-azeotropes, therefore the vapor composition in the refrigerant cylinder is 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. In general, these refrigerants are not recommended for centrifugal compressor systems or for systems with flooded evaporators.

Retrofits of R-12, R-500, or R-502 systems with other alternative refrigerants such as HCFC-22 or HFC-134a may require multiple oil changes or more extensive modifications to the existing equipment. 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, R-500, and R-502 can be used for Suva® refrigerants. Use standard procedures to avoid cross-contamination when switching from one refrigerant to another. Most recovery or recycle machines can use the same compressor oil that was used for R-12, R-500, or R-502. However, some modifications may be necessary, such as a different kind of drier or a different moisture indicator. Consult the equipment manufacturer for specific recommendations.

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

Suva® MP39 and Suva® MP66 can be recovered into the same cylinder. Suva® HP80 and Suva® HP81 can be recovered into the same cylinder.

## 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® MP39, Suva® 409A, and Suva® MP66 are compared to R-12. Suva® HP80, Suva® 408A, and Suva® HP81 are compared to R-502.

Suva® Refrig.	Disch. Press. psi (kPa)	Suct. Press. psi (kPa)	Disch Temp. °F (°C)	Refrig Cap'y. (%)
MP39	20 (137.9)	Same	25 (13.9)	10
MP66	30 (206.9)	2 (13.8)	30 (16.7)	15
409A	25 (172.4)	Same	30 (16.7)	10
HP80	40 (275.8)	5 (34.5)	-5 (-2.8)	15
HP81	30 (206.9)	5 (34.5)	15 (8.3)	15
408A	5 (34.5)	Same	20 (11.1)	5

### How to read this table

*Example:* R-12 to Suva® MP39 retrofit. Discharge pressure with Suva® MP39 will be in the range of 20 psig higher than R-12 (using discharge pressure column above). Cooling capacity will be about 10% higher than R-12.

## The Eight Easy Steps to Retrofit

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

1. Establish baseline performance with CFC.
2. Remove CFC from the system into a recovery cylinder. Weigh the amount removed if possible.
3. Drain mineral oil from the system and measure the volume removed. (Skip steps 3 and 4 if AB lubricant is already in the system or you are not changing the mineral oil).
4. Add AB lubricant; use the same volume as removed in Step 3.
5. Replace the filter/drier.
6. Evacuate system and check for leaks.
7. Charge with Suva® refrigerant. Remove liquid only from charging cylinder. Typical charge is 75–90% of CFC charge.
8. Start up system, adjust charge size. Label system for the refrigerant and lubricant used.

*Retrofit Complete*

## Retrofit of R-12 Systems to Suva® MP39, Suva® 409A, or Suva® MP66 (and R-500 to Suva® MP66)

The following detailed discussion is the recommended procedure for retrofitting R-12 systems to Suva® MP39, Suva® 409A, or Suva® MP66, and for retrofitting R-500 systems to Suva® MP66.

1. **Establish baseline performance with CFC.** Collect system performance data while the old 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, 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. **Remove CFC from the system into a recovery cylinder.** The existing R-12 charge should be removed from the system and collected in a recovery cylinder using a recovery device capable of pulling 10–15 inHg vacuum (30–35 kPa). If the recommended existing

charge size for the system is not known, weigh the amount of refrigerant removed. The initial quantity of Suva® refrigerant to charge to the system can be determined from this figure.

Skip steps 3 and 4 if AB lubricant is already in the system, or if you have determined that an oil change is not required. (See Lubricants section on page 2 for more information.)

- 3. Drain mineral oil from the system and measure the volume removed.** *One quick oil change ensures that adequate mineral oil has been removed from the system (see Lubricants section for additional information).* If mineral oil 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, which will remove most of the lubricant. Larger systems may require drainage from additional points in the system, particularly low spots around the evaporator, which will remove 50–80% of the lubricant. 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 for R-12 Systems* (see page 7). 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 mineral oil in AB or POE lubricant. If poor system performance is noted on start-up, an additional lubricant change may be required. DuPont experience is that this occurs in less than 1% of retrofits.

- 4. Add AB lubricant; use the same volume as removed in Step 3.** In most cases, the lubricant replacement will be AB or perhaps POE. Charge the compressor with the same volume of new lubricant as the amount you removed from the system in step 3. 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 mineral oil you removed if compressor information is not available. A typical viscosity is 150 SUS or ISO 32 for many compressors.
- 5. 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.

- 6. Evacuate system and check for leaks.** Use normal service practices. 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). **Do not use mixtures of air and refrigerant under pressure to check for leaks; these mixtures can be combustible.**
- 7. 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-12. 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 R-12 charge. In retrofits of R-500 systems with Suva® MP66, the refrigeration system will require a slightly larger charge, about 105% of the original R-500 charge.

For best results:

- It is recommended that the system be initially charged with about 75% by weight of the original charge. For replacing R-500 with Suva® MP66, start with 100% by weight of the R-500 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.
- 8. 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 more Suva® refrigerant 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.”

## Retrofit of R-502 Systems to Suva® HP80, Suva® 408A, or Suva® HP81

The following detailed discussion is the recommended procedure for retrofitting R-502 systems to Suva® HP80, Suva® 408A, or Suva® HP81.

1. **Establish baseline performance with CFC.** Collect system performance data while the old 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, 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. **Remove CFC from the system into a recovery cylinder.** The existing R-502 charge should be removed from the system and collected in a recovery cylinder using a recovery device capable of pulling 10–15 inHg vacuum (20–35 kPa). If the recommended existing charge size for the system is not known, weigh the amount of refrigerant removed. The initial quantity of Suva® refrigerant to charge to the system can be determined from this figure.  
  
Skip steps 3 and 4 if AB lubricant is already in the system, or if you have determined that an oil change is not required. (See Lubricants section on page 2 for more information.)
3. **Drain mineral oil from the system and measure the volume removed.** *One quick oil change ensures that adequate mineral oil has been removed from the system (see Lubricants section for additional information).* If mineral oil 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, which will remove most of the lubricant. Larger systems may require drainage from additional points in the system, particularly low spots around the evaporator, which will remove 50–80% of the lubricant. 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 for R-502 Systems* (see page 8). 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 mineral oil in AB or POE lubricant. If poor system performance is noted on start-up, an additional lubricant change may be required. DuPont experience is that this occurs in less than 1% of retrofits.

4. **Add AB lubricant; use the same volume as removed in Step 3.** In most cases, the lubricant replacement will be AB or perhaps POE. Charge the compressor with the same volume of new lubricant as the amount you removed from the system in step 3. 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 mineral oil you removed if compressor information is not available. A typical viscosity is 150 SUS or ISO 32 for many compressors.
5. **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.
6. **Evacuate system and check for leaks.** Use normal service practices. 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). **Do not use mixtures of air and refrigerant under pressure to check for leaks; these mixtures can be combustible.**
7. **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 R-502 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.

8. **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 more Suva® refrigerant 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 Tables

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.
- **Average Coil Temperature** (for Suva® MP39, Suva® MP66, and Suva® 409A)—The evaporator or condenser will perform like it is operating at this constant temperature. Based on the suction or condenser pressure, use this average temperature to compare coil temperatures with the CFC refrigerant you are replacing.  
**Note:** For Suva® HP80, Suva® HP81, and Suva® 408A, the average coil temperature is about equal with the saturated vapor temperature shown for each refrigerant, and no average temperature is needed.

### How to Determine Suction Pressure, Superheat, and Subcool

#### Suction Pressure

Determine the expected evaporator temperature using the R-12, R-500, or R-502 column (from the baseline data you collected prior to the retrofit). Find the same expected evaporator temperature in the Average Coil Temperature column for Suva® MP39, Suva® MP66, or Suva® 409A, or the Saturated Vapor Temperature column for Suva® HP80, Suva® HP81, or Suva® 408A. 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 R-12 Systems** **(DuPont™ Suva® MP39, DuPont™ Suva® 409A, or DuPont™ Suva® MP66)**

- \_\_\_\_\_ 1. Establish baseline performance with CFC-12 or R-500.
- \_\_\_\_\_ 2. Remove CFC-12 or R-500 charge from system.  
(Need 10–15 inHg [50–67 kPa] vacuum to remove charge.)
- Use recovery cylinder (*do not vent to atmosphere*).
  - Weigh amount removed (if possible): \_\_\_\_\_
- \_\_\_\_\_ 3. Drain lubricant charge from compressor (where required).
- Measure amount of lubricant removed and record: \_\_\_\_\_
- \_\_\_\_\_ 4. Charge approved lubricant (alkylbenzene in most cases).
- Recharge with same amount removed in *step 3*.
  - Reinstall compressor (if removed).
- \_\_\_\_\_ 5. Replace filter drier with new drier approved for use with Suva® refrigerants.
- Loose-fill driers: use XH-9 desiccant or equivalent.
  - Compacted-bead driers: use XH-9 or XH-6 desiccant or equivalent.
  - Solid-core driers: check with drier manufacturer for recommendation.
- \_\_\_\_\_ 6. Reconnect system and evacuate with vacuum pump. Evacuate to full vacuum (29.9 inHg vacuum).
- Leak check system. (Reevacuate system following leak check.)
- \_\_\_\_\_ 7. Charge system with Suva® refrigerant.
- Remove *liquid only* from cylinder.
  - Initial charge 70–75% by weight of original CFC-12 charge, or 100% by weight of original R-500 charge.
  - Amount of refrigerant charged: \_\_\_\_\_
- \_\_\_\_\_ 8. Adjust charge until desired operating conditions are achieved.
- Remove *liquid only* from cylinder.
  - If charge is low, add in increments of 3–5% of original CFC-12 or R-500 charge.
  - Amount of refrigerant charged: \_\_\_\_\_
- Total Refrigerant Charged (add 7 and 8):* \_\_\_\_\_
- Label components and system for type of Suva® refrigerant and lubricant (alkylbenzene).

*Retrofit is complete!*

## **Retrofit Checklist for R-502 Systems** **(DuPont™ Suva® HP80, DuPont™ Suva® 408A, or DuPont™ Suva® HP81)**

- \_\_\_\_\_ 1. Establish baseline performance with R-502.
- \_\_\_\_\_ 2. Remove R-502 from system. (Need 10–15 inHg vacuum [50–67 kPa] to remove charge.)
- Use recovery cylinder (*do not vent to atmosphere*).
  - Weigh amount removed (if possible): \_\_\_\_\_
- \_\_\_\_\_ 3. Drain lubricant charge from compressor (unless alkylbenzene or polyol ester lubricant is already in compressor).
- Measure amount of lubricant removed and record: \_\_\_\_\_
- \_\_\_\_\_ 4. Charge alkylbenzene or polyol ester lubricant.
- Recharge with amount equivalent to amount removed in step 3.
- \_\_\_\_\_ 5. Reinstall compressor (if removed).
- \_\_\_\_\_ 6. Replace filter drier with new drier approved for use with Suva® refrigerants.
- Solid-core driers: check with drier manufacturer for recommendation.
  - Loose-fill driers: use XH-9 desiccant or MS-594 desiccant or equivalent.
- \_\_\_\_\_ 7. Reconnect system and evacuate with vacuum pump. (Evacuate to full vacuum [approach 30 inHg/0 kPa/0 bar]).
- \_\_\_\_\_ 8. Leak check system. (Reevacuate system following leak check.)
- \_\_\_\_\_ 9. Charge system with Suva® refrigerant.
- Remove *liquid only* from cylinder.
  - Initially charge 75–80% by weight of original R-502 charge.
  - Amount of refrigerant charged: \_\_\_\_\_
- \_\_\_\_\_ 10. Start up equipment and adjust charge until desired operating conditions are achieved.
- Remove *liquid only* from cylinder.
  - If low in charge, add in increments of 2–3% of original R-502 charge.
  - Amount of refrigerant charged: \_\_\_\_\_
- Total Refrigerant Charged* (add 9 and 10): \_\_\_\_\_
- \_\_\_\_\_ 11. Label components of system for type of refrigerant and lubricant (alkylbenzene or polyol ester).

*Retrofit is complete!*

## System Data Sheet

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

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

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

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

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

\_\_\_\_\_ Lubricant Charge Size: \_\_\_\_\_

Drier Mfg.: \_\_\_\_\_ Drier Type (check one): \_\_\_\_\_

Model No.: \_\_\_\_\_ Loose Fill: \_\_\_\_\_

\_\_\_\_\_ Solid Core: \_\_\_\_\_

Condenser Cooling Medium (air/water): \_\_\_\_\_

Expansion Device (check one):                      Capillary Tube: \_\_\_\_\_

   Expansion Valve: \_\_\_\_\_

If Expansion valve:

Manufacturer: \_\_\_\_\_

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

Control/set Point: \_\_\_\_\_

Location of Sensor: \_\_\_\_\_

Other System Controls (ex.: head press control), Describe: \_\_\_\_\_

\_\_\_\_\_

(circle units used where applicable)

Date/Time				
Refrigerant				
Charge Size (lb, oz/g)				
Ambient Temp. (°F/°C)				
Relative Humidity				
Compressor:				
Suction T (°F/°C)				
Suction P (psi/kPa/bar)				
Discharge T (°F/°C)				
Discharge P (psi/kPa/bar)				
Box/Fixture T (°F/°C)				
Evaporator:				
Refrigerant Inlet T (°F/°C)				
Refrigerant Outlet T (°F/°C)				
Coil Air/H <sub>2</sub> O In T (°F/°C)				
Coil Air/H <sub>2</sub> O Out T (°F/°C)				
Refrigerant T at Superheat Ctl. Pt. (°F/°C)				
Condenser:				
Refrigerant Inlet T (°F/°C)				
Refrigerant Outlet T (°F/°C)				
Coil Air/H <sub>2</sub> O In T (°F/°C)				
Coil Air/H <sub>2</sub> O Out T (°F/°C)				
Exp. Device Inlet T (°F/°C)				
Motor Amps				
Run/Cycle Time				
Comments: _____				
_____				

## Appendix

**Table 1**  
**Pressure–Temperature Chart (English Units)**  
**DuPont™ Suva® MP39 (psi/°F)**

Pressure, psi	R-12 Sat. Temp., °F	Suva® MP39 Sat. Liquid Temp., °F	Suva® MP39 Sat. Vapor Temp., °F	Suva® MP39 Avg. Coil Temp., °F	Pressure, psi	R-12 Sat. Temp., °F	Suva® MP39 Sat. Liquid Temp., °F	Suva® MP39 Sat. Vapor Temp., °F	Suva® MP39 Avg. Coil Temp., °F
20*	-63	-67	-55	-60	130	107	94	103	99
15*	-49	-53	-42	-47	135	109	96	105	101
10*	-38	-43	-32	-37	140	112	99	107	103
5*	-29	-35	-23	-28	145	114	101	110	106
0	-22	-27	-16	-21	150	117	103	112	108
2	-16	-22	-11	-15	155	119	105	114	110
4	-11	-17	-6	-10	160	121	108	116	112
6	-7	-13	-2	-6	165	123	110	118	114
8	-2	-9	2	-2	170	125	112	120	116
10	2	-5	6	2	175	128	114	122	118
12	5	-2	9	5	180	130	116	124	120
14	9	2	13	9	185	132	117	126	122
16	12	5	16	12	190	134	119	127	123
18	15	8	19	15	195	136	121	129	125
20	18	11	21	17	200	138	123	131	128
22	21	14	24	20	205	139	125	133	129
24	24	16	27	23	210	141	126	134	130
26	27	19	29	25	215	143	128	136	132
28	29	21	32	28	220	145	130	138	134
30	32	24	34	30	225	147	131	139	135
32	34	26	36	32	230	148	133	141	137
34	37	28	38	34	235	150	135	142	139
36	39	30	40	36	240	152	136	144	140
38	41	32	42	38	245	154	138	145	142
40	43	34	44	40	250	155	139	147	143
42	45	36	46	42	255	157	141	148	145
44	47	38	48	44	260	158	142	150	146
46	49	40	50	46	265	160	144	151	148
48	51	42	52	48	270	162	145	153	149
50	53	44	54	50	275	163	147	154	151
55	58	48	58	54	280	165	148	155	152
60	62	52	62	58	285	166	150	157	154
65	66	56	66	62	290	168	151	158	155
70	70	59	69	65	295	169	152	159	156
75	74	63	73	69	300	170	154	161	158
80	77	66	76	71	310	173	156	163	160
85	81	69	79	74	320	176	159	166	163
90	84	73	82	78	330	179	162	168	165
95	87	76	85	81	340	182	164	170	167
100	90	78	88	83	350	184	167	173	170
105	93	81	90	86	360	187	169	175	172
110	96	84	93	89	370	189	171	177	174
115	99	87	96	92	380	192	174	180	177
120	102	89	98	94	390	194	176	182	179
125	104	92	101	97	400	196	178	184	181

\* inHg Below One Atmosphere

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point

**Table 2**  
**Pressure–Temperature Chart (SI Units)**  
**DuPont™ Suva® MP39 (kPa/°C)**

Pressure, kPa	R-12 Sat. Temp., °C	Suva® MP39 Sat. Liquid Temp., °C	Suva® MP39 Sat. Vapor Temp., °C	Suva® MP39 Avg. Coil Temp., °C
10	-73.1	-74.7	-67.9	-71.3
20	-62.1	-64.0	-57.4	-60.7
30	-55.0	-57.1	-50.6	-53.9
40	-49.6	-51.9	-45.4	-48.7
50	-45.2	-47.7	-41.3	-44.5
60	-41.4	-44.1	-37.7	-40.9
70	-38.1	-40.9	-34.6	-37.8
80	-35.2	-38.1	-31.8	-35.0
90	-32.5	-35.6	-29.3	-32.5
100	-30.1	-33.3	-27.0	-30.1
110	-27.8	-31.1	-24.9	-28.0
120	-25.7	-29.1	-22.9	-26.0
130	-23.8	-27.2	-21.1	-24.2
140	-21.9	-25.5	-19.3	-22.4
150	-20.1	-23.8	-17.7	-20.7
160	-18.5	-22.2	-16.1	-19.2
170	-16.9	-20.7	-14.6	-17.7
180	-15.4	-19.3	-13.2	-16.2
190	-13.9	-17.9	-11.9	-14.9
200	-12.5	-16.6	-10.5	-13.6
210	-11.2	-15.3	-9.3	-12.3
220	-9.9	-14.0	-8.1	-11.1
230	-8.6	-12.9	-6.9	-9.9
240	-7.4	-11.7	-5.8	-8.7
250	-6.2	-10.6	-4.7	-7.6
260	-5.1	-9.5	-3.6	-6.6
270	-4.0	-8.4	-2.6	-5.5
280	-2.9	-7.4	-1.6	-4.5
290	-1.9	-6.4	-0.6	-3.5
300	-0.8	-5.5	0.3	-2.6
310	0.2	-4.5	1.3	-1.6
320	1.1	-3.6	2.2	-0.7
330	2.1	-2.7	3.0	0.2
340	3.0	-1.8	3.9	1.0
350	3.9	-1.0	4.7	1.9
360	4.8	-0.1	5.6	2.7
370	5.7	0.7	6.4	3.5
380	6.5	1.5	7.2	4.3
390	7.4	2.3	7.9	5.1
400	8.2	3.1	8.7	5.9
410	9.0	3.8	9.4	6.6
420	9.8	4.6	10.2	7.4
430	10.5	5.3	10.9	8.1
440	11.3	6.0	11.6	8.8
450	12.1	6.7	12.3	9.5
460	12.8	7.4	13.0	10.2
470	13.5	8.1	13.6	10.9
480	14.2	8.8	14.3	11.5
490	14.9	9.5	14.9	12.2
500	15.6	10.1	15.6	12.8
510	16.3	10.8	16.2	13.5
520	17.0	11.4	16.8	14.1
530	17.6	12.0	17.5	14.7
540	18.3	12.6	18.1	15.3
550	18.9	13.2	18.6	15.9
560	19.6	13.8	19.2	16.5
570	20.2	14.4	19.8	17.1
580	20.8	15.0	20.4	17.7
590	21.4	15.6	20.9	18.3
600	22.0	16.1	21.5	18.8
610	22.6	16.7	22.0	19.4
620	23.2	17.3	22.6	19.9
630	23.8	17.8	23.1	20.5
640	24.4	18.4	23.7	21.0
650	24.9	18.9	24.2	21.5
660	25.5	19.4	24.7	22.1
670	26.0	19.9	25.2	22.6
680	26.6	20.5	25.7	23.1
690	27.1	21.0	26.2	23.6
700	27.7	21.5	26.7	24.1
710	28.2	22.0	27.2	24.6
720	28.7	22.5	27.7	25.1
730	29.3	23.0	28.2	25.6
740	29.8	23.4	28.6	26.0
750	30.3	23.9	29.1	26.5

Pressure, kPa	R-12 Sat. Temp., °C	Suva® MP39 Sat. Liquid Temp., °C	Suva® MP39 Sat. Vapor Temp., °C	Suva® MP39 Avg. Coil Temp., °C
760	30.8	24.4	29.6	27.0
770	31.3	24.9	30.0	27.4
780	31.8	25.3	30.5	27.9
790	32.3	25.8	30.9	28.4
800	32.8	26.3	31.4	28.8
810	33.2	26.7	31.8	29.3
820	33.7	27.2	32.2	29.7
830	34.2	27.6	32.7	30.1
840	34.7	28.0	33.1	30.6
850	35.1	28.5	33.5	31.0
860	35.6	28.9	34.0	31.4
870	36.0	29.3	34.4	31.9
880	36.5	29.8	34.8	32.3
890	36.9	30.2	35.2	32.7
900	37.4	30.6	35.6	33.1
910	37.8	31.0	36.0	33.5
920	38.3	31.4	36.4	33.9
930	38.7	31.8	36.8	34.3
940	39.1	32.2	37.2	34.7
950	39.6	32.6	37.6	35.1
960	40.0	33.0	38.0	35.5
970	40.4	33.4	38.4	35.9
980	40.8	33.8	38.8	36.3
990	41.3	34.2	39.1	36.7
1000	41.7	34.6	39.5	37.1
1050	43.7	36.5	41.3	38.9
1100	45.6	38.3	43.1	40.7
1150	47.5	40.1	44.8	42.5
1200	49.3	41.8	46.5	44.1
1250	51.1	43.5	48.1	45.8
1300	52.8	45.1	49.7	47.4
1350	54.5	46.6	51.2	48.9
1400	56.1	48.1	52.6	50.4
1450	57.7	49.6	54.1	51.9
1500	59.2	51.1	55.5	53.3
1550	60.7	52.5	56.8	54.7
1600	62.2	53.9	58.2	56.0
1650	63.6	55.2	59.5	57.3
1700	65.1	56.5	60.7	58.6
1750	66.4	57.8	62.0	59.9
1800	67.8	59.1	63.2	61.1
1850	69.1	60.3	64.4	62.3
1900	70.4	61.5	65.5	63.5
1950	71.7	62.7	66.7	64.7
2000	72.9	63.9	67.8	65.8
2050	74.1	65.0	68.9	67.0
2100	75.3	66.1	70.0	68.1
2150	76.5	67.2	71.0	69.1
2200	77.7	68.3	72.1	70.2
2250	78.8	69.4	73.1	71.2
2300	79.9	70.4	74.1	72.3
2350	81.0	71.5	75.1	73.3
2400	82.1	72.5	76.1	74.3
2450	83.2	73.5	77.0	75.3
2500	84.2	74.5	78.0	76.2
2550	85.3	75.5	78.9	77.2
2600	86.3	76.4	79.8	78.1
2650	87.3	77.4	80.7	79.0
2700	88.3	78.3	81.6	79.9
2750	89.3	79.2	82.5	80.8
2800	90.2	80.1	83.3	81.7
2850	91.2	81.0	84.2	82.6
2900	92.1	81.9	85.0	83.5
2950	93.1	82.8	85.8	84.3
3000	94.0	83.7	86.6	85.2
3050	94.9	84.5	87.4	86.0
3100	95.8	85.4	88.2	86.8
3150	96.7	86.2	89.0	87.6
3200	97.6	87.1	89.8	88.4
3250	98.4	87.9	90.6	89.2
3300	99.3	88.7	91.3	90.0
3350	100.1	89.5	92.1	90.8
3400	101.0	90.3	92.8	91.5
3450	101.8	91.1	93.5	92.3
3500	102.6	91.8	94.3	93.0

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point

**Table 3**  
**Pressure–Temperature Chart (English Units)**  
**DuPont™ Suva® 409A (psi/°F)**

Pressure, psi	R-12 Sat. Temp., °F	Suva® 409A Sat. Liquid Temp., °F	Suva® 409A Sat. Vapor Temp., °F	Suva® 409A Avg. Coil Temp., °F
20*	-63	-70	-55	-61
15*	-49	-56	-41	-49
10*	-38	-46	-31	-39
5*	-29	-37	-22	-30
0	-22	-30	-15	-23
2	-16	-25	-10	-18
4	-11	-20	-5	-13
6	-7	-16	-1	-9
8	-2	-12	3	-5
10	2	-8	7	0
12	5	-4	10	3
14	9	-1	13	6
16	12	2	17	10
18	15	5	20	13
20	18	8	22	15
22	21	11	25	18
24	24	13	28	21
26	27	16	30	23
28	29	18	33	26
30	32	21	35	28
32	34	23	37	30
34	37	25	39	32
36	39	27	41	24
38	41	30	43	37
40	43	32	45	39
42	45	33	47	40
44	47	35	49	42
46	49	37	51	44
48	51	39	53	46
50	53	41	55	48
55	58	45	59	52
60	62	49	63	56
65	66	53	66	60
70	70	57	70	64
75	74	60	73	67
80	77	64	77	71
85	81	66	80	73
90	84	70	83	77
95	87	73	86	80
100	90	76	89	83
105	93	79	92	86
110	96	81	94	88
115	99	84	97	90
120	102	87	99	93
125	104	89	102	96

Pressure, psi	R-12 Sat. Temp., °F	Suva® 409A Sat. Liquid Temp., °F	Suva® 409A Sat. Vapor Temp., °F	Suva® 409A Avg. Coil Temp., °F
130	107	92	104	98
135	109	94	106	99
140	112	96	109	103
145	114	99	111	105
150	117	101	113	107
155	119	103	115	109
160	121	105	117	111
165	123	107	119	113
170	125	109	121	115
175	128	111	123	117
180	130	113	125	119
185	132	115	127	121
190	134	117	129	123
195	136	119	130	125
200	138	121	132	126
205	139	123	134	129
210	141	124	136	130
215	143	126	137	133
220	145	128	139	134
225	147	129	140	135
230	148	131	142	136
235	150	133	144	139
240	152	134	145	140
245	154	136	147	142
250	155	138	148	143
255	157	139	150	145
260	158	141	151	146
265	160	142	153	143
270	162	144	154	144
275	163	145	155	150
280	165	147	157	152
285	166	148	158	153
290	168	149	159	154
295	169	151	161	156
300	170	152	162	157
310	173	155	165	160
320	176	158	167	162
330	179	160	170	165
340	182	163	172	168
350	184	165	174	170
360	187	168	177	173
370	189	170	179	175
380	192	172	181	177
390	194	175	183	179
400	196	177	185	183

\* inHg Below One Atmosphere

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point



**Table 4**  
**Pressure–Temperature Chart (SI Units)**  
**DuPont™ Suva® 409A (kPa/°C)**

Pressure, kPa	R-12 Sat. Temp., °C	Suva® 409A Sat. Liquid Temp., °C	Suva® 409A Sat. Vapor Temp., °C	Suva® 409A Avg. Coil Temp., °C	Pressure, kPa	R-12 Sat. Temp., °C	Suva® 409A Sat. Liquid Temp., °C	Suva® 409A Sat. Vapor Temp., °C	Suva® 409A Avg. Coil Temp., °C
10	-73.1	-76.1	-67.3	-71.7	760	30.8	22.9	30.1	26.5
20	-62.1	-65.5	-56.8	-62.1	770	31.3	23.4	30.6	27.0
30	-55.0	-58.6	-50.1	-54.4	780	31.8	23.9	31.0	27.5
40	-49.6	-53.4	-44.9	-49.2	790	32.3	24.3	31.5	27.9
50	-45.2	-49.2	-40.8	-45.0	800	32.8	24.8	31.9	28.4
60	-41.4	-45.6	-37.2	-41.4	810	33.2	25.2	32.4	28.8
70	-38.1	-42.5	-34.1	-38.3	820	33.7	25.7	32.8	29.3
80	-35.2	-39.7	-31.3	-35.5	830	34.2	26.1	33.2	29.7
90	-32.5	-37.1	-28.8	-33.0	840	34.7	26.6	33.7	30.2
100	-30.1	-34.8	-26.5	-30.7	850	35.1	27.0	34.1	30.6
110	-27.8	-32.7	-24.4	-28.6	860	35.6	27.5	34.5	31.0
120	-25.7	-30.7	-22.4	-26.6	870	36.0	27.9	34.9	31.4
130	-23.8	-28.8	-20.6	-24.7	880	36.5	28.3	35.4	31.9
140	-21.9	-27.0	-18.8	-22.9	890	36.9	28.7	35.8	32.3
150	-20.1	-25.4	-17.2	-21.3	900	37.4	29.2	36.2	32.7
160	-18.5	-23.8	-15.6	-19.7	910	37.8	29.6	36.6	33.1
170	-16.9	-22.3	-14.1	-18.2	920	38.3	30.0	37.0	33.5
180	-15.4	-20.8	-12.7	-16.8	930	38.7	30.4	37.4	33.9
190	-13.9	-19.4	-11.4	-15.4	940	39.1	30.8	37.8	34.3
200	-12.5	-18.1	-10.0	-14.1	950	39.6	31.2	38.2	34.7
210	-11.2	-16.8	-8.8	-12.8	960	40.0	31.6	38.6	34.2
220	-9.9	-15.6	-7.6	-11.6	970	40.4	32.0	39.0	35.5
230	-8.6	-14.4	-6.4	-10.4	980	40.8	32.4	39.3	35.9
240	-7.4	-13.3	-5.3	-9.3	990	41.3	32.8	39.7	36.3
250	-6.2	-12.1	-4.2	-8.2	1000	41.7	33.2	40.1	36.7
260	-5.1	-11.1	-3.1	-7.1	1050	43.7	35.1	42.0	38.6
270	-4.0	-10.0	-2.1	-6.1	1100	45.6	37.0	43.7	40.4
280	-2.9	-9.0	-1.1	-5.1	1150	47.5	38.8	45.5	42.2
290	-1.9	-8.0	-0.1	-4.1	1200	49.3	40.5	47.1	43.8
300	-0.8	-7.0	0.8	-3.1	1250	51.1	42.2	48.8	45.5
310	0.2	-6.1	1.8	-2.2	1300	52.8	43.8	50.3	47.1
320	1.1	-5.2	2.7	-1.3	1350	54.5	45.4	51.9	48.7
330	2.1	-4.3	3.6	-0.4	1400	56.1	46.9	53.3	50.1
340	3.0	-3.4	4.4	0.5	1450	57.7	48.4	54.8	51.6
350	3.9	-2.5	5.3	1.4	1500	59.2	49.9	56.2	53.1
360	4.8	-1.7	6.1	2.2	1550	60.7	51.3	57.6	54.5
370	5.7	-0.9	6.9	3.0	1600	62.2	52.7	58.9	55.8
380	6.5	-0.1	7.7	3.8	1650	63.6	54.1	60.2	57.2
390	7.4	0.7	8.5	4.6	1700	65.1	55.4	61.5	58.5
400	8.2	1.5	9.2	5.4	1750	66.4	56.7	62.7	59.7
410	9.0	2.3	10.0	6.2	1800	67.8	58.0	64.0	61.0
420	9.8	3.0	10.7	6.9	1850	69.1	59.3	65.2	62.3
430	10.5	3.8	11.4	7.6	1900	70.4	60.5	66.3	63.4
440	11.3	4.5	12.1	8.3	1950	71.7	61.7	67.5	64.6
450	12.1	5.2	12.8	9.0	2000	72.9	62.9	68.6	65.8
460	12.8	5.9	13.5	9.7	2050	74.1	64.0	69.7	66.9
470	13.5	6.6	14.2	10.4	2100	75.3	65.2	70.8	68.0
480	14.2	7.2	14.8	11.0	2150	76.5	66.3	71.9	69.1
490	14.9	7.9	15.5	11.7	2200	77.7	67.4	72.9	70.2
500	15.6	8.6	16.1	12.4	2250	78.8	68.5	73.9	71.2
510	16.3	9.2	16.7	13.0	2300	79.9	69.6	75.0	72.3
520	17.0	9.8	17.4	13.6	2350	81.0	70.6	75.9	73.3
530	17.6	10.5	18.0	14.3	2400	82.1	71.7	76.9	74.3
540	18.3	11.1	18.6	14.9	2450	83.2	72.7	77.9	75.3
550	18.9	11.7	19.2	15.5	2500	84.2	73.7	78.8	76.3
560	19.6	12.3	19.8	16.1	2550	85.3	74.7	79.8	77.3
570	20.2	12.9	20.3	16.6	2600	86.3	75.7	80.7	78.2
580	20.8	13.5	20.9	17.2	2650	87.3	76.6	81.6	79.1
590	21.4	14.0	21.5	17.8	2700	88.3	77.6	82.5	80.1
600	22.0	14.6	22.0	18.3	2750	89.3	78.5	83.4	81.0
610	22.6	15.2	22.6	18.9	2800	90.2	79.4	84.2	81.8
620	23.2	15.7	23.1	19.4	2850	91.2	80.4	85.1	82.8
630	23.8	16.3	23.7	20.0	2900	92.1	81.3	85.9	84.1
640	24.4	16.8	24.2	20.5	2950	93.1	82.1	86.7	84.4
650	24.9	17.4	24.7	21.1	3000	94.0	83.0	87.6	85.3
660	25.5	17.9	25.2	21.6	3050	94.9	83.9	88.4	86.2
670	26.0	18.4	25.7	22.1	3100	95.8	84.8	89.2	87.0
680	26.6	18.9	26.2	22.6	3150	96.7	85.6	89.9	87.8
690	27.1	19.5	26.7	23.1	3200	97.6	86.4	90.7	88.6
700	27.7	20.0	27.2	23.6	3250	98.4	87.3	91.5	89.4
710	28.2	20.5	27.7	24.1	3300	99.3	88.1	92.2	90.2
720	28.7	21.0	28.2	24.6	3350	100.1	88.9	93.0	91.0
730	29.3	21.5	28.7	25.1	3400	101.0	89.7	93.7	91.7
740	29.8	22.0	29.2	25.6	3450	101.8	90.5	94.4	92.5
750	30.3	22.4	29.6	26.0	3500	102.6	91.3	95.1	93.2

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point

**Table 5**  
**Pressure–Temperature Chart (English Units)**  
**DuPont™ Suva® MP66 (psi/°F)**

Pressure, psi	R-12 Sat. Temp., °F	R-500 Sat. Temp., °F	Suva® MP66 Sat. Liquid Temp., °F	Suva® MP66 Sat. Vapor Temp., °F	Suva® MP66 Avg. Coil Temp., °F	Pressure, psi	R-12 Sat. Temp., °F	R-500 Sat. Temp., °F	Suva® MP66 Sat. Liquid Temp., °F	Suva® MP66 Sat. Vapor Temp., °F	Suva® MP66 Avg. Coil Temp., °F
20*	-63	-69	-70	-59	-64	130	107	95	90	99	94
15*	-49	-55	-56	-45	-50	135	109	97	93	101	97
10*	-38	-44	-46	-35	-40	140	112	99	95	103	99
5*	-29	-36	-37	-27	-31	145	114	102	97	105	101
0	-22	-28	-30	-20	-24	150	117	104	99	107	103
2	-16	-23	-25	-14	-18	155	119	106	101	109	105
4	-11	-18	-20	-10	-14	160	121	108	103	111	107
6	-7	-14	-16	-6	-10	165	123	110	106	113	110
8	-2	-10	-12	-2	-6	170	125	112	108	115	112
10	2	-6	-8	2	-2	175	128	114	109	117	113
12	5	-2	-5	6	2	180	130	116	111	119	115
14	9	1	-1	9	5	185	132	118	113	121	117
16	12	4	2	12	8	190	134	120	115	123	119
18	15	7	5	15	11	195	136	122	117	125	121
20	18	10	8	18	14	200	138	124	119	126	123
22	21	13	10	20	16	205	139	126	121	128	125
24	24	16	13	23	19	210	141	128	122	130	126
26	27	18	15	25	21	215	143	129	124	131	128
28	29	21	18	28	24	220	145	131	126	133	130
30	32	23	20	30	26	225	147	133	127	135	131
32	34	26	22	32	28	230	148	134	129	136	133
34	37	28	25	34	30	235	150	136	130	138	134
36	39	30	27	37	33	240	152	138	132	139	136
38	41	32	29	39	35	245	154	139	134	141	138
40	43	34	31	41	37	250	155	141	135	142	139
42	45	36	33	42	38	255	157	142	137	144	141
44	47	38	35	44	40	260	158	144	138	145	142
46	49	40	37	46	42	265	160	145	140	146	143
48	51	42	38	48	44	270	162	147	141	148	145
50	53	44	40	50	46	275	163	148	142	149	146
55	58	48	44	54	50	280	165	150	144	151	148
60	62	52	48	58	54	285	166	151	145	152	149
65	66	56	52	61	57	290	168	153	147	153	150
70	70	60	56	65	61	295	169	154	148	155	152
75	74	63	59	68	64	300	170	155	149	156	153
80	77	67	63	72	68	310	173	158	152	158	155
85	81	70	66	75	71	320	176	161	155	161	158
90	84	73	69	78	74	330	179	163	157	163	160
95	87	76	72	81	77	340	182	166	160	166	163
100	90	79	75	83	79	350	184	168	162	168	165
105	93	82	77	86	81	360	187	171	164	170	167
110	96	84	80	89	84	370	189	173	167	172	170
115	99	87	83	91	87	380	192	176	169	175	172
120	102	90	85	94	89	390	194	178	171	177	174
125	104	92	88	96	92	400	196	180	174	179	177

\* inHg Below One Atmosphere

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point

**Table 6**  
**Pressure–Temperature Chart (SI Units)**  
**DuPont™ Suva® MP66 (kPa/°C)**

Pressure, psi	R-12 Sat. Temp., °C	R-500 Sat. Temp., °C	Suva® MP66 Sat. Liquid Temp., °C	Suva® MP66 Sat. Vapor Temp., °C	Suva® MP66 Avg. Coil Temp., °C	Pressure, psi	R-12 Sat. Temp., °C	R-500 Sat. Temp., °C	Suva® MP66 Sat. Liquid Temp., °C	Suva® MP66 Sat. Vapor Temp., °C	Suva® MP66 Avg. Coil Temp., °C
10	-73.1	-76.1	-75.9	-69.5	-72.7	760	30.8	24.6	22.3	27.2	24.8
20	-62.1	-65.2	-65.4	-59.0	-62.2	770	31.3	25.1	22.8	27.7	25.2
30	-55.0	-58.2	-58.5	-52.3	-55.4	780	31.8	25.6	23.2	28.1	25.7
40	-49.6	-52.8	-53.4	-47.2	-50.3	790	32.3	26.0	23.7	28.6	26.1
50	-45.2	-48.5	-49.2	-43.0	-46.1	800	32.8	26.5	24.1	29.0	26.6
60	-41.4	-44.8	-45.6	-39.5	-42.6	810	33.2	26.9	24.6	29.4	27.0
70	-38.1	-41.6	-42.5	-36.4	-39.5	820	33.7	27.4	25.0	29.9	27.5
80	-35.2	-38.8	-39.7	-33.7	-36.7	830	34.2	27.8	25.5	30.3	27.9
90	-32.5	-36.2	-37.2	-31.2	-34.2	840	34.7	28.3	25.9	30.7	28.3
100	-30.1	-33.8	-34.9	-28.9	-31.9	850	35.1	28.7	26.3	31.2	28.8
110	-27.8	-31.6	-32.7	-26.8	-29.8	860	35.6	29.2	26.8	31.6	29.2
120	-25.7	-29.6	-30.7	-24.9	-27.8	870	36.0	29.6	27.2	32.0	29.6
130	-23.8	-27.7	-28.9	-23.0	-26.0	880	36.5	30.0	27.6	32.4	30.0
140	-21.9	-25.9	-27.1	-21.3	-24.2	890	36.9	30.5	28.0	32.8	30.4
150	-20.1	-24.2	-25.5	-19.7	-22.6	900	37.4	30.9	28.5	33.2	30.8
160	-18.5	-22.6	-23.9	-18.1	-21.0	910	37.8	31.3	28.9	33.6	31.2
170	-16.9	-21.0	-22.4	-16.7	-19.5	920	38.3	31.7	29.3	34.0	31.6
180	-15.4	-19.6	-21.0	-15.2	-18.1	930	38.7	32.1	29.7	34.4	32.0
190	-13.9	-18.2	-19.6	-13.9	-16.8	940	39.1	32.6	30.1	34.8	32.4
200	-12.5	-16.8	-18.3	-12.6	-15.4	950	39.6	33.0	30.5	35.2	32.8
210	-11.2	-15.5	-17.0	-11.3	-14.2	960	40.0	33.4	30.9	35.6	33.2
220	-9.9	-14.3	-15.8	-10.1	-13.0	970	40.4	33.8	31.3	36.0	33.6
230	-8.6	-13.1	-14.6	-9.0	-11.8	980	40.8	34.2	31.7	36.3	34.0
240	-7.4	-11.9	-13.5	-7.9	-10.7	990	41.3	34.6	32.0	36.7	34.4
250	-6.2	-10.8	-12.4	-6.8	-9.6	1000	41.7	35.0	32.4	37.1	34.8
260	-5.1	-9.7	-11.3	-5.7	-8.5	1050	43.7	36.9	34.3	38.9	36.6
270	-4.0	-8.6	-10.3	-4.7	-7.5	1100	45.6	38.7	36.1	40.7	38.4
280	-2.9	-7.6	-9.3	-3.7	-6.5	1150	47.5	40.5	37.9	42.4	40.1
290	-1.9	-6.6	-8.3	-2.7	-5.5	1200	49.3	42.3	39.6	44.0	41.8
300	-0.8	-5.6	-7.3	-1.8	-4.6	1250	51.1	43.9	41.2	45.6	43.4
310	0.2	-4.6	-6.4	-0.9	-3.6	1300	52.8	45.6	42.8	47.2	45.0
320	1.1	-3.7	-5.5	0.0	-2.7	1350	54.5	47.2	44.3	48.7	46.5
330	2.1	-2.8	-4.6	0.9	-1.8	1400	56.1	48.7	45.9	50.1	48.0
340	3.0	-1.9	-3.7	1.7	-1.0	1450	57.7	50.2	47.3	51.6	49.4
350	3.9	-1.1	-2.8	2.6	-0.1	1500	59.2	51.7	48.8	52.9	50.8
360	4.8	-0.2	-2.0	3.4	0.7	1550	60.7	53.1	50.2	54.3	52.2
370	5.7	0.6	-1.2	4.2	1.5	1600	62.2	54.5	51.5	55.6	53.6
380	6.5	1.4	-0.4	5.0	2.3	1650	63.6	55.9	52.9	56.9	54.9
390	7.4	2.2	0.4	5.7	3.1	1700	65.1	57.2	54.2	58.2	56.2
400	8.2	3.0	1.2	6.5	3.8	1750	66.4	58.5	55.4	59.4	57.4
410	9.0	3.8	1.9	7.2	4.6	1800	67.8	59.8	56.7	60.6	58.6
420	9.8	4.5	2.6	8.0	5.3	1850	69.1	61.1	57.9	61.8	59.8
430	10.5	5.3	3.4	8.7	6.0	1900	70.4	62.3	59.1	62.9	61.0
440	11.3	6.0	4.1	9.4	6.7	1950	71.7	63.5	60.3	64.1	62.2
450	12.1	6.7	4.8	10.1	7.4	2000	72.9	64.7	61.4	65.2	63.3
460	12.8	7.4	5.5	10.7	8.1	2050	74.1	66.9	62.6	66.3	64.4
470	13.5	8.1	6.2	11.4	8.8	2100	75.3	67.0	63.7	67.3	65.5
480	14.2	8.8	6.8	12.1	9.4	2150	76.5	68.1	64.8	68.4	66.6
490	14.9	9.5	7.5	12.7	10.1	2200	77.7	69.2	65.9	69.4	67.6
500	15.6	10.1	8.1	13.3	10.7	2250	78.8	70.3	66.9	70.4	68.7
510	16.3	10.6	8.8	14.0	11.4	2300	79.9	71.4	68.0	71.4	69.7
520	17.0	11.4	9.4	14.6	12.0	2350	81.0	72.4	69.0	72.4	70.7
530	17.6	12.1	10.0	15.2	12.6	2400	82.1	73.5	70.0	73.4	71.7
540	18.3	12.7	10.6	15.8	13.2	2450	83.2	74.5	71.0	74.3	72.7
550	18.9	13.3	11.2	16.4	13.8	2500	84.2	75.5	72.0	75.3	73.6
560	19.6	13.9	11.8	17.0	14.4	2550	85.3	76.5	72.9	76.2	74.6
570	20.2	14.5	12.4	17.5	15.0	2600	86.3	77.4	73.9	77.1	75.5
580	20.8	15.1	13.0	18.1	15.5	2650	87.3	78.4	74.8	78.0	76.4
590	21.4	15.7	13.6	18.7	16.1	2700	88.3	79.3	75.8	78.9	77.3
600	22.0	16.2	14.1	19.2	16.7	2750	89.3	80.3	76.7	79.8	78.2
610	22.6	16.8	14.7	19.8	17.2	2800	90.2	81.2	77.6	80.6	79.1
620	23.2	17.4	15.2	20.3	17.8	2850	91.2	82.1	78.5	81.5	80.0
630	23.8	17.9	15.8	20.8	18.3	2900	92.1	83.0	79.4	82.3	80.8
640	24.4	18.5	16.3	21.3	18.8	2950	93.1	83.9	80.2	83.1	81.7
650	24.9	19.0	16.8	21.9	19.4	3000	94.0	84.7	81.1	83.9	82.5
660	25.5	19.6	17.4	22.4	19.9	3050	94.9	85.6	81.9	84.7	83.3
670	26.0	20.1	17.9	22.9	20.4	3100	95.8	86.4	82.8	85.5	84.1
680	26.6	20.6	18.4	23.4	20.9	3150	96.7	87.3	83.6	86.3	84.9
690	27.1	21.1	18.9	23.9	21.4	3200	97.6	88.1	84.4	87.1	85.7
700	27.7	21.6	19.4	24.4	21.9	3250	98.4	88.9	85.2	87.8	86.5
710	28.2	22.1	19.9	24.9	22.4	3300	99.3	89.7	86.0	88.6	87.3
720	28.7	22.6	20.4	25.3	22.9	3350	100.1	90.5	86.8	89.3	88.1
730	29.3	23.1	20.9	25.8	23.3	3400	101.0	91.3	87.6	90.1	88.8
740	29.8	23.6	21.4	26.3	23.8	3450	101.8	92.1	88.4	90.8	89.6
750	30.3	24.1	21.8	26.7	24.3	3500	102.6	92.8	89.2	91.5	90.3

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point

**Table 7**  
**Pressure–Temperature Chart (English Units)**  
**DuPont™ Suva® HP80 (psi/°F)**

Pressure, psi	R-502 Temp., °F	Suva® HP80 Sat. Liquid Temp., °F	Suva® HP80 Sat. Vapor Temp., °F
20*	-88	-94	-89
15*	-75	-81	-77
10*	-65	-71	-67
5*	-56	-63	-59
0	-50	-57	-53
2	-45	-52	-48
4	-40	-47	-44
6	-36	-43	-40
8	-32	-39	-36
10	-29	-36	-33
12	-25	-33	-29
14	-22	-29	-26
16	-19	-26	-23
18	-16	-24	-21
20	-13	-21	-18
22	-11	-18	-15
24	-8	-16	-13
26	-6	-14	-11
28	-3	-11	-8
30	-1	-9	-6
32	1	-7	-4
34	3	-5	-2
36	5	-3	0
38	7	-1	2
40	9	1	4
42	11	3	6
44	13	5	7
46	15	6	9
48	16	8	11
50	18	10	12
52	20	11	14
54	21	13	15
56	23	14	17
58	24	16	18
60	26	17	20
62	27	19	21
64	29	20	23
66	30	22	24
68	32	23	25
70	33	24	27
72	34	26	28
74	36	27	29
76	37	28	31
78	38	30	32
80	40	31	33
82	41	32	34
84	42	33	35
86	43	34	37
88	45	36	38
90	46	37	39
92	47	38	40
94	48	39	41
96	49	40	42
98	50	41	43
100	51	42	44
105	54	44	46
110	57	47	49
115	60	50	52
120	62	52	54
125	64	54	56
130	67	57	59

Pressure, psi	R-502 Temp., °F	Suva® HP80 Sat. Liquid Temp., °F	Suva® HP80 Sat. Vapor Temp., °F
135	69	59	61
140	71	61	63
145	73	63	65
150	75	65	67
155	78	67	69
160	80	69	71
165	82	71	73
170	84	73	75
175	85	75	77
180	87	77	78
185	89	78	80
190	91	80	82
195	93	82	84
200	95	83	85
205	96	85	87
210	98	87	88
215	100	88	90
220	101	90	92
225	103	91	93
230	105	93	95
235	106	94	96
240	108	96	97
245	109	97	99
250	111	99	100
255	112	100	102
260	114	102	103
265	115	103	104
270	117	104	106
275	118	106	107
280	119	107	108
285	121	108	110
290	122	110	111
295	123	111	112
300	125	112	114
305	126	113	115
310	127	115	116
315	129	116	117
320	130	117	118
325	131	118	120
330	132	119	121
335	134	121	122
340	135	122	123
345	136	123	124
350	137	124	125
355	138	125	126
360	139	126	127
365	141	127	128
370	142	128	130
375	143	130	131
380	144	131	132
385	145	132	133
390	146	133	134
395	147	134	135
400	148	135	136
405	149	136	137
410	150	137	138
415	151	138	139
420	152	139	140
425	153	140	141
430	154	141	142
435	155	142	143
440	156	143	144
445	157	144	144

\* inHg Below One Atmosphere

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point

**Table 8**  
**Pressure–Temperature Chart (SI Units)**  
**DuPont™ Suva® HP80 (kPa/°C)**

Pressure, kPa	R-502 Temp., °C	Suva® HP80 Sat. Liquid Temp., °C	Suva® HP80 Sat. Vapor Temp., °C
10	-85.5	-88.3	-85.4
20	-75.2	-78.1	-75.6
30	-68.6	-71.6	-69.2
40	-63.6	-66.7	-64.4
50	-59.5	-62.7	-60.5
60	-56.1	-59.4	-57.2
70	-53.1	-56.4	-54.3
80	-50.4	-53.8	-51.7
90	-47.9	-51.4	-49.4
100	-45.7	-49.2	-47.2
110	-43.6	-47.2	-45.2
120	-41.7	-45.3	-43.4
130	-39.9	-43.5	-41.7
140	-38.3	-41.9	-40.0
150	-36.7	-40.3	-38.5
160	-35.1	-38.8	-37.0
170	-33.7	-37.4	-35.7
180	-32.3	-36.1	-34.3
190	-31.0	-34.8	-33.1
200	-29.7	-33.5	-31.8
210	-28.5	-32.3	-30.6
220	-27.3	-31.2	-29.5
230	-26.2	-30.1	-28.4
240	-25.1	-29.0	-27.3
250	-24.0	-27.9	-26.3
260	-23.0	-26.9	-25.3
270	-22.0	-25.9	-24.4
280	-21.0	-25.0	-23.4
290	-20.1	-24.1	-22.5
300	-19.2	-23.2	-21.6
310	-18.3	-22.3	-20.7
320	-17.4	-21.4	-19.9
330	-16.5	-20.6	-19.1
340	-15.7	-19.8	-18.3
350	-14.9	-19.0	-17.5
360	-14.1	-18.2	-16.7
370	-13.3	-17.4	-16.0
380	-12.5	-16.7	-15.2
390	-11.8	-15.9	-14.5
400	-11.0	-15.2	-13.8
410	-10.3	-14.5	-13.1
420	-9.6	-13.8	-12.4
430	-8.9	-13.1	-11.7
440	-8.2	-12.4	-11.0
450	-7.5	-11.8	-10.4
460	-6.9	-11.1	-9.7
470	-6.2	-10.5	-9.1
480	-5.6	-9.9	-8.5
490	-4.9	-9.2	-7.9
500	-4.3	-8.6	-7.3
510	-3.7	-8.0	-6.7
520	-3.1	-7.4	-6.1
530	-2.5	-6.8	-5.5
540	-1.9	-6.3	-5.0
550	-1.3	-5.7	-4.4
560	-0.7	-5.1	-3.8
570	-0.2	-4.6	-3.3
580	0.4	-4.1	-2.8
590	0.9	-3.5	-2.2
600	1.5	-3.0	-1.7
610	2.0	-2.5	-1.2
620	2.6	-1.9	-0.7
630	3.1	-1.4	-0.2
640	3.6	-0.9	0.3
650	4.1	-0.4	0.8
660	4.6	0.1	1.3
670	5.1	0.5	1.8
680	5.6	1.0	2.3
690	6.1	1.5	2.7
700	6.6	2.0	3.2
710	7.1	2.4	3.6
720	7.6	2.9	4.1
730	8.0	3.4	4.6
740	8.5	3.8	5.0

Pressure, kPa	R-502 Temp., °C	Suva® HP80 Sat. Liquid Temp., °C	Suva® HP80 Sat. Vapor Temp., °C
750	9.0	4.3	5.4
760	9.4	4.7	5.9
770	9.9	5.1	6.3
780	10.3	5.6	6.7
790	10.8	6.0	7.2
800	11.2	6.4	7.6
810	11.6	6.9	8.0
820	12.1	7.3	8.4
830	12.5	7.7	8.8
840	12.9	8.1	9.2
850	13.3	8.5	9.6
860	13.8	8.9	10.0
870	14.2	9.3	10.4
880	14.5	9.7	10.8
890	15.0	10.1	11.2
900	15.4	10.5	11.6
910	15.8	10.9	12.0
920	16.2	11.2	12.4
930	16.6	11.6	12.7
940	17.0	12.0	13.1
950	17.4	12.4	13.5
960	17.8	12.7	13.8
970	18.1	13.1	14.2
980	18.5	13.5	14.6
990	18.9	13.8	14.9
1000	19.3	14.2	15.3
1050	21.1	16.0	17.0
1100	22.9	17.7	18.7
1150	24.6	19.3	20.3
1200	26.3	20.9	21.9
1250	27.9	22.4	23.4
1300	29.4	23.9	24.9
1350	30.9	25.4	26.3
1400	32.4	26.8	27.7
1450	33.9	28.1	29.1
1500	35.3	29.5	30.4
1550	36.7	30.8	31.7
1600	38.0	32.1	33.0
1650	39.3	33.3	34.2
1700	40.6	34.5	35.4
1750	41.8	35.7	36.6
1800	43.1	36.9	37.7
1850	44.3	38.0	38.8
1900	45.5	39.1	39.9
1950	46.6	40.2	41.0
2000	47.8	41.3	42.1
2050	48.9	42.4	43.1
2100	50.0	43.4	44.1
2150	51.1	44.4	45.2
2200	52.1	45.4	46.1
2250	53.2	46.4	47.1
2300	54.2	47.4	48.1
2350	55.2	48.3	49.0
2400	56.2	49.3	49.9
2450	57.1	50.2	50.8
2500	58.1	51.1	51.7
2550	59.1	52.0	52.6
2600	60.0	52.9	53.5
2650	60.9	53.8	54.4
2700	61.8	54.6	55.2
2750	62.7	55.5	56.0
2800	63.6	56.3	56.9
2850	64.4	57.1	57.7
2900	65.3	57.9	58.5
2950	66.1	58.8	59.3
3000	66.9	59.5	60.0
3050	67.8	60.3	60.8
3100	68.6	61.1	61.6
3150	69.4	61.9	62.3
3200	70.1	62.6	63.1
3250	70.9	63.4	63.8
3300	71.7	64.1	64.5
3350	72.4	64.8	65.3
3400	73.2	65.6	66.0

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point

**Table 9**  
**Pressure–Temperature Chart (English Units)**  
**DuPont™ Suva® 408A (psi/°F)**

Pressure, psi	R-502 Temp., °F	Suva® 408A Sat. Liquid Temp., °F	Suva® 408A Sat. Vapor Temp., °F	Pressure, psi	R-502 Temp., °F	Suva® 408A Sat. Liquid Temp., °F	Suva® 408A Sat. Vapor Temp., °F
20*	-88	-85	-84	140	71	72	72
15*	-75	-72	-72	145	73	74	74
10*	-65	-62	-62	150	75	76	76
5*	-56	-54	-54	155	78	78	79
0	-50	-48	-47	160	80	80	81
2	-45	-43	-42	165	82	82	82
4	-40	-38	-37	170	84	84	84
6	-36	-34	-33	175	85	86	86
8	-32	-30	-29	180	87	88	88
10	-29	-27	-26	185	89	89	90
12	-25	-23	-23	190	91	91	92
14	-22	-20	-19	195	93	93	93
16	-19	-17	-16	200	95	95	95
18	-16	-14	-14	205	96	96	97
20	-13	-12	-11	210	98	98	98
22	-11	-9	-8	215	100	100	100
24	-8	-6	-6	220	101	101	102
26	-6	-4	-3	225	103	103	103
28	-3	-2	-1	230	105	104	105
30	-1	1	1	235	106	106	106
32	1	3	3	240	108	107	108
34	3	5	5	245	109	109	109
36	5	7	7	250	111	110	111
38	7	9	9	255	112	112	112
40	9	11	11	260	114	113	113
42	11	13	13	265	115	114	115
44	13	14	15	270	117	116	116
46	15	16	17	275	118	117	118
48	16	18	19	280	119	119	119
50	18	20	20	285	121	120	120
52	20	21	22	290	122	121	122
54	21	23	23	295	123	122	123
56	23	24	25	300	125	124	124
58	24	26	27	305	126	125	125
60	26	27	28	310	127	126	127
62	27	29	29	315	129	127	128
64	29	30	31	320	130	129	129
66	30	32	32	325	131	130	130
68	32	33	34	330	132	131	131
70	33	35	35	335	134	132	133
72	34	36	36	340	135	133	134
74	36	37	38	345	136	135	135
76	37	38	39	350	137	136	136
78	38	40	40	355	138	137	137
80	40	41	42	360	139	138	138
82	41	42	43	365	141	139	139
84	42	43	44	370	142	140	141
86	43	45	45	375	143	141	142
88	45	46	46	380	144	142	143
90	46	47	48	385	145	143	144
92	47	48	49	390	146	144	145
94	48	49	50	395	147	146	146
96	49	50	51	400	148	147	147
98	50	51	52	405	149	148	148
100	51	53	53	410	150	149	149
105	54	55	56	415	151	150	150
110	57	58	58	420	152	151	151
115	60	60	61	425	153	152	152
120	62	63	63	430	154	153	153
125	64	65	66	435	155	154	154
130	67	67	68	440	156	155	155
135	69	70	70	445	157	155	156
				450	158	156	157

\*inHg vacuum

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point

**Table 10**  
**Pressure–Temperature Chart (SI Units)**  
**DuPont™ Suva® 408A (kPa/°C)**

Pressure, kPa	R-502 Temp., °C	Suva® 408A Sat. Liquid Temp., °C	Suva® 408A Sat. Vapor Temp., °C
10	-88.5	-83.7	-83.1
20	-75.2	-73.6	-73.1
30	-68.6	-67.1	-66.6
40	-63.6	-62.2	-61.7
50	-59.5	-58.2	-57.7
60	-56.1	-54.8	-54.3
70	-53.1	-51.8	-51.3
80	-50.4	-49.1	-48.7
90	-47.9	-46.7	-46.3
100	-45.7	-44.5	-44.1
110	-43.6	-42.5	-42.0
120	-41.7	-40.6	-40.1
130	-39.9	-38.8	-38.4
140	-38.3	-37.1	-36.7
150	-36.7	-35.5	-35.1
160	-35.1	-34.0	-33.6
170	-33.7	-32.6	-32.2
180	-32.3	-31.2	-30.8
190	-31.0	-29.9	-29.5
200	-29.7	-28.7	-28.3
210	-28.5	-27.5	-27.1
220	-27.3	-26.3	-25.9
230	-26.2	-25.2	-24.8
240	-25.1	-24.1	-23.7
250	-24.0	-23.0	-22.6
260	-23.0	-22.0	-21.6
270	-22.0	-21.0	-20.6
280	-21.0	-20.0	-19.7
290	-20.1	-19.1	-18.7
300	-19.2	-18.2	-17.8
310	-18.3	-17.3	-16.9
320	-17.4	-16.4	-16.1
330	-16.5	-15.6	-15.2
340	-15.7	-14.8	-14.4
350	-14.9	-13.9	-13.6
360	-14.1	-13.1	-12.8
370	-13.3	-12.4	-12.0
380	-12.5	-11.6	-11.3
390	-11.8	-10.9	-10.5
400	-11.0	-10.1	-9.8
410	-10.3	-9.4	-9.1
420	-9.6	-8.7	-8.4
430	-8.9	-8.0	-7.7
440	-8.2	-7.3	-7.0
450	-7.5	-6.7	-6.3
460	-6.9	-6.0	-5.7
470	-6.2	-5.4	-5.0
480	-5.6	-4.7	-4.4
490	-4.9	-4.1	-3.8
500	-4.3	-3.5	-3.1
510	-3.7	-2.9	-2.5
520	-3.1	-2.3	-1.9
530	-2.5	-1.7	-1.4
540	-1.9	-1.1	-0.8
550	-1.3	-0.5	-0.2
560	-0.7	0.0	0.4
570	-0.2	0.6	0.9
580	0.4	1.2	1.5
590	0.9	1.7	2.0
600	1.5	2.2	2.6
610	2.0	2.8	3.1
620	2.6	3.3	3.6
630	3.1	3.8	4.1
640	3.6	4.3	4.6
650	4.1	4.8	5.1
660	4.6	5.3	5.6
670	5.1	5.8	6.1
680	5.6	6.3	6.6
690	6.1	6.8	7.1
700	6.6	7.3	7.6
710	7.1	7.8	8.1
720	7.6	8.2	8.5
730	8.0	8.7	9.0
740	8.5	9.1	9.4
750	9.0	9.6	9.9

Pressure, kPa	R-502 Temp., °C	Suva® 408A Sat. Liquid Temp., °C	Suva® 408A Sat. Vapor Temp., °C
760	9.4	10.0	10.3
770	9.9	10.5	10.8
780	10.3	10.9	11.2
790	10.8	11.4	11.7
800	11.2	11.8	12.1
810	11.6	12.2	12.5
820	12.1	12.7	12.9
830	12.5	13.1	13.4
840	12.9	13.5	13.8
850	13.3	13.9	14.2
860	13.8	14.3	14.6
870	14.2	14.7	15.0
880	14.5	15.1	15.4
890	15.0	15.5	15.8
900	15.4	15.9	16.2
910	15.8	16.3	16.6
920	16.2	16.7	17.0
930	16.6	17.1	17.4
940	17.0	17.5	17.8
950	17.4	17.9	18.1
960	17.8	18.2	18.5
970	18.1	18.6	18.9
980	18.5	19.0	19.3
990	18.9	19.3	19.6
1000	19.3	19.7	20.0
1050	21.1	21.5	21.8
1100	22.9	23.2	23.5
1150	24.6	24.9	25.2
1200	26.3	26.5	26.8
1250	27.9	28.1	28.3
1300	29.4	29.6	29.9
1350	30.9	31.1	31.3
1400	32.4	32.5	32.8
1450	33.9	33.9	34.2
1500	35.3	35.3	35.5
1550	36.7	36.6	36.9
1600	38.0	37.9	38.2
1650	39.3	39.2	39.4
1700	40.6	40.4	40.7
1750	41.8	41.7	41.9
1800	43.1	42.9	43.1
1850	44.3	44.0	44.2
1900	45.5	45.2	45.4
1950	46.6	46.3	46.5
2000	47.8	47.4	47.6
2050	48.9	48.5	48.7
2100	50.0	49.5	49.7
2150	51.1	50.6	50.8
2200	52.1	51.6	51.8
2250	53.2	52.6	52.8
2300	54.2	53.6	53.8
2350	55.2	54.5	54.7
2400	56.2	55.5	55.7
2450	57.1	56.4	56.6
2500	58.1	57.4	57.6
2550	59.1	58.3	58.5
2600	60.0	59.2	59.4
2650	60.9	60.1	60.3
2700	61.8	60.9	61.1
2750	62.7	61.8	62.0
2800	63.6	62.7	62.8
2850	64.4	63.5	63.7
2900	65.3	64.3	64.5
2950	66.1	65.1	65.3
3000	66.9	65.9	66.1
3050	67.8	66.7	66.9
3100	68.6	67.5	67.7
3150	69.4	68.3	68.4
3200	70.1	69.1	69.2
3250	70.9	69.8	70.0
3300	71.7	70.6	70.7
3350	72.4	71.3	71.4
3400	73.2	72.0	72.2
3450	73.9	72.7	72.9
3500	74.6	73.4	73.6

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point

**Table 11**  
**Pressure–Temperature Chart (English Units)**  
**DuPont™ Suva® HP81 (psi/°F)**

Pressure, psi	R-502 Temp., °F	Suva® HP81 Sat. Liquid Temp., °F	Suva® HP81 Sat. Vapor Temp., °F	Pressure, psi	R-502 Temp., °F	Suva® HP81 Sat. Liquid Temp., °F	Suva® HP81 Sat. Vapor Temp., °F
20*	-88	-91	-86	140	71	66	68
15*	-75	-78	-73	145	73	68	71
10*	-65	-68	-63	150	75	70	73
5*	-56	-60	-55	155	78	72	75
0	-50	-53	-49	160	80	74	77
2	-45	-48	-44	165	82	76	78
4	-40	-43	-39	170	84	78	80
6	-36	-39	-35	175	85	80	82
8	-32	-35	-32	180	87	82	84
10	-29	-32	-28	185	89	84	86
12	-25	-29	-25	190	91	85	87
14	-22	-25	-22	195	93	87	89
16	-19	-22	-19	200	95	89	91
18	-16	-20	-16	205	96	90	92
20	-13	-17	-13	210	98	92	94
22	-11	-14	-11	215	100	94	96
24	-8	-12	-8	220	101	95	97
26	-6	-9	-6	225	103	97	99
28	-3	-7	-4	230	105	98	100
30	-1	-5	-1	235	106	100	102
32	1	-3	1	240	108	101	103
34	3	-1	3	245	109	103	105
36	5	1	5	250	111	104	106
38	7	3	7	255	112	106	107
40	9	5	8	260	114	107	109
42	11	7	10	265	115	108	110
44	13	9	12	270	117	110	112
46	15	11	14	275	118	111	113
48	16	12	16	280	119	112	114
50	18	14	17	285	121	114	116
52	20	16	19	290	122	115	117
54	21	17	20	295	123	116	118
56	23	19	22	300	125	118	119
58	24	20	23	305	126	119	121
60	26	22	25	310	127	120	122
62	27	23	26	315	129	121	123
64	29	25	28	320	130	123	124
66	30	26	29	325	131	124	125
68	32	28	31	330	132	125	127
70	33	29	32	335	134	126	128
72	34	30	33	340	135	127	129
74	36	32	34	345	136	128	130
76	37	33	36	350	137	130	131
78	38	34	37	355	138	131	132
80	40	35	38	360	139	132	133
82	41	37	39	365	141	133	134
84	42	38	41	370	142	134	135
86	43	39	42	375	143	135	136
88	45	40	43	380	144	136	138
90	46	41	44	385	145	137	139
92	47	43	45	390	146	138	140
94	48	44	46	395	147	139	141
96	49	45	47	400	148	140	142
98	50	46	49	405	149	141	143
100	51	47	50	410	150	142	144
105	54	50	52	415	151	143	145
110	57	52	55	420	152	144	146
115	60	55	57	425	153	145	147
120	62	57	60	430	154	146	148
125	64	59	62	435	155	147	149
130	67	62	64	440	156	148	149
135	69	64	66	445	157	149	150

\*inHg vacuum

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point



**Table 12**  
**Pressure–Temperature Chart (SI Units)**  
**DuPont™ Suva® HP81 (kPa/°C)**

Pressure, kPa	R-502 Temp., °C	Suva® HP81 Sat. Liquid Temp., °C	Suva® HP81 Sat. Vapor Temp., °C	Pressure, kPa	R-502 Temp., °C	Suva® HP81 Sat. Liquid Temp., °C	Suva® HP81 Sat. Vapor Temp., °C
10	-88.5	-86.8	-83.7	760	9.4	7.0	8.5
20	-75.2	-76.6	-73.8	770	9.9	7.4	8.9
30	-68.6	-70.1	-67.4	780	10.3	7.8	9.3
40	-63.6	-65.1	-62.5	790	10.8	8.3	9.8
50	-59.5	-61.1	-58.6	800	11.2	8.7	10.2
60	-56.1	-57.7	-55.2	810	11.6	9.1	10.6
70	-53.1	-54.7	-52.3	820	12.1	9.6	11.0
80	-50.4	-52.0	-49.7	830	12.5	10.0	11.4
90	-47.9	-49.6	-47.3	840	12.9	10.4	11.8
100	-45.7	-47.4	-45.1	850	13.3	10.8	12.2
110	-43.6	-45.4	-43.1	860	13.8	11.2	12.6
120	-41.7	-43.5	-41.3	870	14.2	11.6	13.0
130	-39.9	-41.7	-39.5	880	14.5	12.0	13.4
140	-38.3	-40.0	-37.9	890	15.0	12.4	13.8
150	-36.7	-38.5	-36.3	900	15.4	12.8	14.2
160	-35.1	-37.0	-34.9	910	15.8	13.2	14.6
170	-33.7	-35.5	-33.5	920	16.2	13.6	15.0
180	-32.3	-34.2	-32.1	930	16.6	14.0	15.4
190	-31.0	-32.9	-30.8	940	17.0	14.3	15.7
200	-29.7	-31.6	-29.6	950	17.4	14.7	16.1
210	-28.5	-30.4	-28.4	960	17.8	15.1	16.5
220	-27.3	-29.2	-27.3	970	18.1	15.5	16.8
230	-26.2	-28.1	-26.2	980	18.5	15.8	17.2
240	-25.1	-27.0	-25.1	990	18.9	16.2	17.6
250	-24.0	-26.0	-24.1	1000	19.3	16.6	17.9
260	-23.0	-25.0	-23.1	1050	21.1	18.3	19.7
270	-22.0	-24.0	-22.1	1100	22.9	20.0	21.4
280	-21.0	-23.0	-21.1	1150	24.6	21.7	23.0
290	-20.1	-22.1	-20.2	1200	26.3	23.3	24.6
300	-19.2	-21.2	-19.3	1250	27.9	24.9	26.1
310	-18.3	-20.3	-18.4	1300	29.4	26.4	27.6
320	-17.4	-19.4	-17.6	1350	30.9	27.8	29.1
330	-16.5	-18.6	-16.8	1400	32.4	29.3	30.5
340	-15.7	-17.7	-15.9	1450	33.9	30.7	31.9
350	-14.9	-16.9	-15.1	1500	35.3	32.0	33.2
360	-14.1	-16.1	-14.4	1550	36.7	33.3	34.5
370	-13.3	-15.4	-13.6	1600	38.0	34.6	35.8
380	-12.5	-14.6	-12.8	1650	39.3	35.9	37.0
390	-11.8	-13.9	-12.1	1700	40.6	37.1	38.2
400	-11.0	-13.1	-11.4	1750	41.8	38.3	39.4
410	-10.3	-12.4	-10.7	1800	43.1	39.5	40.6
420	-9.6	-11.7	-10.0	1850	44.3	40.7	41.7
430	-8.9	-11.0	-9.0	1900	45.5	41.8	42.8
440	-8.2	-10.3	-8.6	1950	46.6	42.9	43.9
450	-7.5	-9.7	-8.0	2000	47.8	44.0	45.0
460	-6.9	-9.0	-7.3	2050	48.9	45.1	46.1
470	-6.2	-8.4	-6.7	2100	50.0	46.1	47.1
480	-5.6	-7.7	-6.1	2150	51.1	47.1	48.1
490	-4.9	-7.1	-5.4	2200	52.1	48.2	49.1
500	-4.3	-6.5	-4.8	2250	53.2	49.2	50.1
510	-3.7	-5.9	-4.2	2300	54.2	50.1	51.1
520	-3.1	-5.3	-3.6	2350	55.2	51.1	52.0
530	-2.5	-4.7	-3.1	2400	56.2	52.0	53.0
540	-1.9	-4.1	-2.5	2450	57.1	53.0	53.9
550	-1.3	-3.6	-1.9	2500	58.1	53.9	54.8
560	-0.7	-3.0	-1.4	2550	59.1	54.8	55.7
570	-0.2	-2.4	-0.8	2600	60.0	55.7	56.6
580	0.4	-1.9	-0.3	2650	60.9	56.6	57.4
590	0.9	-1.3	0.3	2700	61.8	57.5	58.3
600	1.5	-0.8	0.8	2750	62.7	58.3	59.1
610	2.0	-0.3	1.3	2800	63.6	59.2	60.0
620	2.6	0.2	1.8	2850	64.4	60.0	60.8
630	3.1	0.8	2.3	2900	65.3	60.8	61.6
640	3.6	1.3	2.8	2950	66.1	61.6	62.4
650	4.1	1.8	3.3	3000	66.9	62.4	63.2
660	4.6	2.3	3.8	3050	67.8	63.2	64.0
670	5.1	2.8	4.3	3100	68.6	64.0	64.7
680	5.6	3.3	4.8	3150	69.4	64.8	65.5
690	6.1	3.7	5.3	3200	70.1	65.6	66.2
700	6.6	4.2	5.7	3250	70.9	66.3	67.0
710	7.1	4.7	6.2	3300	71.7	67.0	67.7
720	7.6	5.1	6.7	3350	72.4	67.8	68.4
730	8.0	5.6	7.1	3400	73.2	68.5	69.2
740	8.5	6.1	7.6	3450	73.9	69.3	69.9
750	9.0	6.5	8.0	3500	74.6	70.0	70.6

**Note:** Saturated Liquid Temperature = Bubble Point  
Saturated Vapor Temperature = Dew Point

**Table 13**  
**Physical Properties and Composition of DuPont™ Suva® Refrigerants**

	Unit	R-12	MP39 (R-401A)	MP66 (R-401B)	409A (R-409A)	R-500	R-502	HP80 (R-402A)	HP81 (R-402B)	408A (R-408A)
<b>Property</b>										
Boiling Point, 1 atm	°F	-22	-27	-30	-30	-28	-50.1	-56.5	-53.2	-46.3
	°C	-30	-33	-34	-34	-33	-46	-49	-47	-44
Density, Saturated Liquid at 77°F (25°C)	lb/ft <sup>3</sup>	81.8	74.5	74.5	76.1	72.2	75.9	71.9	72.1	66.2
	kg/m <sup>3</sup>	1309.6	1192.7	1192.7	1218.4	1155.9	1215.2	1151.1	1154.3	1059.9
Density, Saturated Vapor at 77°F (25°C)	lb/ft <sup>3</sup>	2.32	1.81	1.92	1.86	2.29	4.16	1.24	1.05	3.63
	kg/m <sup>3</sup>	37.1	29.0	30.7	29.8	36.7	66.6	19.9	16.8	58.1
Vapor Pressure, Saturated Liquid at 77°F (25°C)	psia	95	112	119	118	112	168	194	182	170
	kpa	656	773	821	814	773	1159	1339	1256	1173
Ozone Depletion Potential vs. R-12	R-12 = 1	1	0.03	0.035	0.05	0.7	0.307	0.02	0.03	0.026
Halocarbon Global Warming Potential vs. R-11	R-11 = 1	3	0.22	0.24	0.3	2	4.1	0.63	0.52	0.75
<b>Composition, wt%</b>										
R-12		100				74				
R-22			53	61	60		49	38	60	47
R-115							51			
R-124			34	28	25					
R-125								60	38	7
R-142b					15					
R-143a										46
R-152a			13	11		26				
R-290								2	2	



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