RSL
Refrigerant Solutions Limited

RS-100 (R464A)

RETROFIT PROCEDURE TO REPLACE R404A OR R507

Replacing R404A or R507 with RS-100 (R464A) essentially will follow the procedure specified by the equipment manufacturer for a refrigerant change. Since RS-100 (R464A) is zeotropic it is very important that liquid refrigerant, not vapour, be removed from the container and added to the system.

1. Ensure the right equipment is available, eg recovery unit and cylinders, container for recovered lubricant, vacuum pump, weighing scales, replacement drier etc.

2. Before removing the R404A or R507A, operate the unit under standard operating conditions and record the pressures, temperatures and any other relevant measurable data to establish unit performance. Typically, the appropriate standard conditions for setting up the unit will have already been specified by the equipment supplier.

3. Recover and weigh the R404A or R507A from the unit. The weight should be within the range specified by equipment manufacturer.

4. Replace the filter/drier and evacuate the system.

5. As in the case of R404A and R507, RS-100 (R464A) should be used with a polyol ester lubricant.

6. Before operating the unit, charge the unit with **liquid** RS-100 (R464A). The weight added at this stage should be approximately 10% lower than the R404A or R507 charge specified by the equipment manufacturer.

7. Operate the unit under conditions similar to those used in Step 2, closely watching the liquid line sight glass, the compressor oil level sight glass and the suction superheat.

8. RS-100 (R464A) has a liquid flow rate that is ~ 25% lower than that of R404A and R507, so that it may be necessary to fit a smaller orifice plate to the expansion valve, or if necessary replace the latter with a smaller valve.

9. The evaporator superheat should be checked and changed as necessary by adjusting the TX valve. To determine evaporator superheat, measure the suction line temperature and pressure at the evaporator outlet pipe. Using the Pressure/Temperature chart, determine the dew point for the measured suction pressure. Subtract the determined dew point from the actual temperature and this difference is the evaporator superheat.

   With pure fluids or (near)azeotropes the dew point is essentially the same as the evaporating temperature. With zeotropic RS-100 (R464A) it is necessary to allow for the glide in calculating its midpoint evaporating temperature by subtracting 3 C from the measured dew point. For example, if the dew point determined from the suction gas pressure is -32 degC, then the RS-100 glide midpoint evaporating temperature will be -35 degC and its performance will be similar to that of R404A or R507 evaporating at the same temperature.

10. If a liquid line sight-glass is fitted, charge to a full glass gradually adding more liquid RS-100 (R464A) until only liquid is passing through the expansion valve. **Do not overcharge the system.**

    In the case of the condenser, the measured pressure will indicate the refrigerant bubble point. The difference between this temperature and the evaporator exit temperature will be the liquid subcool, as with any refrigerant. However, with zeotropic RS-100 its midpoint condensing temperature is the bubble point plus 3 degC. For example, if the bubble point is 42 degC the midpoint condensing temperature is 45 degC. The performance of RS-100 will be equivalent to R404A or R507 condensing at the same temperature.

11. Check system thoroughly for leaks.

12. Remove all R404A or R507A labels and clearly label system RS-100 (R464A).

Warning: It is highly recommended that the thermostatic expansion valve be checked and adjusted to compensate for small differences in the pressure temperature relationship of the replacement refrigerant when compared to the original refrigerant. Failure to check and adjust the valve could allow liquid refrigerant to enter the compressor and damage bearings and other compressor components.

RS SERIES OF REFRIGERANTS PRESSURE/TEMPERATURE CHARTS

RS Series Pressure/Temperature charts indicate both liquid bubble point and vapour dew point of the RS Series Refrigerant.

Bubble Point: this is the temperature which the liquid refrigerant will begin to vaporize at the given pressure. Below this temperature the liquid refrigerant will be sub-cooled.

Dew Point: this is the temperature at which refrigerant vapour will begin to condense at the given pressure. Above this temperature the refrigerant vapour will be superheated.

Evaporator Superheat:

To determine evaporator superheat, measure the suction line temperature and pressure at the evaporator outlet pipe. Using the Pressure/Temperature chart, determine the dew point for the measured suction pressure. Subtract the determined dew point from the actual temperature and this difference is the evaporator superheat.

Condenser Sub-Cooling:

To determine condenser sub-cooling, measure the temperature of the outlet pipe of the condenser and measure the condenser pressure at the outlet pipe of the condenser. Using the Pressure/Temperature chart, determine the liquid bubble point for the measured condenser pressure. Subtract the measured temperature from the determined bubble point and this difference is the condenser liquid sub-cooling.

Midpoint Temperatures

At constant pressure, zeotropic refrigerants boil~~ing~~ and condense over temperature ranges, in contrast to pure fluids and (near) azeotropes that boil and condense at constant temperature. Using the midpoint evaporating/condensing temperatures of zeotropes enables their performances to be compared with those of single fluids and azeotropes on a common basis.

Condenser midpoint is the average of the bubble and dew points at the condenser pressure.

Evaporator midpoint is the average of the evaporator entry temperature and the dew point at the evaporator pressure.