TECH TIP # 16

HEATING, AIRCONDITIONING & REFRIGERATION DISTRIBUTORS INTERNATIONAL

One of a series of dealer contractor technical advisories prepared by HARDI wholesalers as a customer service.

TROUBLESHOOTING HEAT PUMPS (Heating Cycle)

The following material is taken from HARDI's accredited home study course *Installation and Repair of Unitary Systems.*

Common causes of unsatisfactory operation of heat pumps:

***A. Dirty Filters or Inadequate Air Volume Through Indoor Coil*:** When the heat pump is on the heating cycle, the indoor coil is functioning as a condenser. Therefore, the filter must always be clean, and there must be sufficient air volume through the indoor coil to prevent excessive discharge pressure, and high pressure cutout.

B. Outside Air into Return Duct: Cold outside air should be blended well with return air before circulating over the indoor coil. There is a tendency for very cold air moving through the indoor coil to reduce the discharge pressure which in turn can cause a slight reduction in suction pressure. Depending upon the defrost methodology employed, some redundant defrost cycles may occur.

C. Undercharge: A slight undercharge on the heating cycle will cause low discharge pressure, thus frost accumulation on the lower part of the outdoor coil, and excessive defrost cycling, with resultant low heating output. In this case, since there may be very little frost on the coil, it melts quickly; and, since the fan is not running, the discharge pressure may reach the high pressure cutout setting before the terminating thermostat reaches 60º F. This is especially true if the thermostat is not making good thermal contact with the liquid header. An undercharge may also cause defrost cycling when there is no frost on the outdoor coil.

D. Poor "Terminating" Thermostat Contact with Liquid Header: The thermostat must make good thermal contact with the liquid header. Otherwise it may not initiate the defrost cycle, or it may not terminate the defrost cycle quickly enough to prevent the unit from cutting out on high discharge pressure during the defrost cycle. For good thermal contact, put a thin layer of thermal mastic between the terminating thermostat and the liquid header.

E. High Cold Wind: Some heat pumps are wired so that the indoor blower stops when the unit goes into the defrost cycle unless the room thermostat is calling for supplementary heat. This condition would cause very low suction pressure, thus very low discharge pressure, thus the temperature of the terminating thermostat would not rise to 60º F to terminate the defrost cycle. This would be more pronounced if the unit were slightly undercharged, and especially so if the outdoor coil were facing the wind. In this case, the unit should be wired for operation of the indoor blower and the supplementary heat when the unit goes into the defrost cycle.

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***F. Malfunctioning of Reversing Valve*:** This may be due to:

1. ***Solenoid not energized*.** In some reversing valves, the solenoid is energized on the cooling cycle; in others, on the heating cycle. In order to determine if the solenoid is energized, touch the nut that holds the solenoid coil in place with a screwdriver. If the nut magnetically holds the screwdriver, the solenoid is energized. Make this check on both heating and cooling positions of the room thermostat to determine on which cycle the solenoid is energized.

2. ***No voltage to solenoid*:** Check voltage. If no voltage, check wiring circuit.

3. ***Valve will not shift*:**

a. Undercharged: (1) Check for leaks. (2) Recover refrigerant slowly to prevent removal of oil. (3) Repair leak. (4) Install new filter drier in its original position. If no drier was originally used and failure occurred during the heating season, install the drier between the check valve and the indoor coil with the flow arrow pointing toward the check valve. If failure occurs during the cooling season, install the drier between the check valve and the outdoor coil with the flow arrow pointing toward the check valve. (5) If these two methods (4) and (5) are not possible, install a bi-flow drier in the liquid line as close as possible to the indoor coil. (6) Pressurize system to 75 psi and check for leaks. (6) Evacuate system three times. The first two times should be to a level of 28" of mercury, breaking vacuum each time with refrigerant and raising pressure to 5 psi. The final evacuation should be to a minimum vacuum level of 1500 microns and held for 20 minutes. **(Do not use refrigeration system compressor to evacuate)** (7) Recharge to manufacturers specifications.

***b. Valve body damaged*:** Replace valve and install new filter drier. Follow instructions in item F3a. Wrap valve body with a wet cloth and keep it saturated to prevent its overheating and distorting interior components.

***c. Unit properly charged*:** If it is on the heating cycle, raise discharge pressure by restricting air flow through the indoor coil. If it does not shift, tap it lightly on both ends with a screwdriver handle. **Do not tap the valve body.** If unit is on the cooling cycle, raise discharge pressure by restricting air flow through the outdoor coil. If it does not shift, tap it lightly on both ends. If it does not shift after the above attempts, cut the unit off and wait until the discharge and suction pressure equalize, and repeat above attempts. If it does not then shift, replace it and install a new filter drier. Follow instructions in items F3a and F3b.

***G. Condensate Drain Trap*:** The indoor coil of heat pumps generally has a "draw through" coil; thus the condensate on the cooling cycle is in a negative pressure area. Therefore, the condensate drain must be trapped to prevent condensate overflow.

H. Compressor Burnout: Follow instructions for burnouts. When burnouts occur, the reversing valve should be replaced and a new filter drier installed. Follow instructions in items F3a and F3b.