SEVEN STEPS TO EFFECTIVE PRE-SEASON COOLING CHECKUPS

by Dennis Kalchuk

While temperatures are still tolerable, it's time to prepare your customers' systems to deal with the blasts of summer heat and humidity that are just around the corner.

With hot summer weather on the way, cooling is just a few weeks away. For many of you, preseason air conditioner check-ups will make up a major part of your business for the next few weeks. Now might be a good time to stop and rethink your approach to this service.

Here are the basic steps that a residential-cooling, maintenance plan needs to cover.

Step One: Ask "Why?"

Think about the reasons for a preseason check-up. You can design a better check-up plan if you have a clear understanding of the purpose for the check-up procedure. In most cases, there are three reasons &emdash; and only one involves improved operation of the air conditioner.

1. Enhanced performance. To operate properly, all mechanical devices require some form of maintenance on a routine basis. Cooling systems are no exception, routine maintenance can help keep them operating at top efficiency and prevent premature failure of major components, especially the compressor.

2. Warranty requirements. Just as automobile manufacturers' warranties require routine maintenance, most air conditioner producers now require annual maintenance by a qualified service technician, as well. Make sure your preseason check-up meets the manufacturer's warranty requirements.

3. Marketing opportunity. Preseason check-ups represent opportunities to build long-term relationships with homeowners. Do a good job now, and the homeowner is likely continue to calling you for service and ultimately for replacement of the system. A preseason check-up also provides a great opportunity to sell service agreements and/or accessories.

Step Two: Talk

Before you go to work on a system, take a couple of minutes with the homeowner to explain the preseason check-up and ask a few questions.

In describing your service it's a good idea to:

- Eliminate surprises &emdash; explain clearly what your basic fee covers - and what it doesn't.
- Obtain approval &emdash; ask for the homeowner's advance approval for each additional expense beyond the basic fee.
- Take a tip from the doctor &emdash; Just as a doctor asks for a health history of a new patient, you need to gather as much information as possible about an air conditioner's operational history.
- Operation &emdash; Did it operate properly at the end of the last cooling season?
- Leaks &emdash; does it have a history of losing refrigerant charge?
- Repairs &emdash; has it ever required any major repairs?
- Comfort &emdash; does the system keep all conditioned spaces comfortable?
- Changing needs &emdash; asking a few more questions demonstrates your interest in meeting the customer's personal needs and helps you learn about possible opportunities to sell additional products and services to enhance the operation of their cooling system.
- Remodeling &emdash; does the family plan additions or remodeling projects?
- Allergies &emdash; do any family members have allergies?
- Pets &emdash; do pets stay inside the house?
- Smokers &emdash; are there any smokers in the family?

Step Three: Look Around

Start with a visual check of the system to alert yourself to any obvious problems.

Once you've had a quick look, here's some things that should be checked outside:

- **Clearance** &emdash; is there enough space between the outdoor unit and shrubbery to allow for proper airflow?
- **Airflow** &emdash; is the coil clear of obstructions, such as grass clippings, dirt or leaves? Remove the top of the outdoor unit and check inside for airflow obstructions.
- **Wiring** &emdash; are electrical connections secure? Are there any breaks in the wiring insulation?

Now, here's a list of system components to check inside the home:

- Thermostat &emdash; check for proper location (approximately five feet above floor level in an area of average temperature with good air circulation). If it's a mercury bulb thermostat, make sure it's level.
- Wiring &emdash; examine electrical connections
- Filter &emdash; check the air filter to see if it needs replacing
- Coil &emdash; make sure the coil is clean and clear of airflow obstructions
- Ductwork &emdash; check duct connections
- Registers &emdash; make sure all registers are open and clear of obstructions
- Blower wheel &emdash; visually inspect the blower wheel for accumulations of dirt or lint which may cause reduced airflow
- Condensate drain &emdash; check for blockages and clear them, if necessary.

Step Four: Clear the Air

Next, make sure you check the following to ensure the airflow system is free of obstruction:

- **Air Filter** &emdash; If the unit is equipped with a disposable air filter, replace it. If the filter is washable, soak it in mild detergent and rinse it with cold water. Since they typically impose a greater pressure drop on the system, never replace a disposable filter with a washable one, unless the return air system is properly sized for it.

(Tip: Consider using this part of the inspection as an opportunity to sell the homeowner an add-on electrostatic air filter or maybe even an electronic air cleaner. Remind the homeowner that dirty air filters are the most common cause of inadequate cooling.

- Blower &emdash; if the blower wheel is dirty, clean it. You may need to remove the wheel to clean it completely.
- Indoor coil &emdash; if the coil is dirty, clean it while it's cold, using an alkaline cleaner.
- Blower motor &emdash; if the motor is equipped with oil ports, lubricate it by adding one-half teaspoon (2cc) of sae #10w30 motor oil to each motor bearing. If there are no oil ports, the motor is permanently lubricated, and no lubrication is required.
- (Caution: Don't over-oil or use 3-in-One oil, penetrating oil, WD40 or similar oils. These lubricants may damage the motor.)

Step Five: Check External

- Static Pressure
- Verify the system's airflow after completing the checks above and before checking the refrigeration system. It's easy to misdiagnose an air flow problem as a refrigerant system problem. Improper airflow can cause a variety of operating problems, including reduced capacity, evaporator coil freeze-up, and premature compressor failure.
- External static pressure is the difference in pressure between the intake and discharge sides of the blower. It's created by the blower as a result of the resistance to airflow in the air distribution system. Two factors influence external static pressure:
- Resistance to airflow. Coils, duct work, filters, humidifiers and strip heaters restrict air flow.
- Blower speed. Changing to a higher or lower blower speed tap will raise or lower the external static pressure.

To check external static pressure, follow these steps:

1. Set up to measure external static pressure at the supply and return duct connections.
2. Drill holes in the ducts for pressure taps, pilot tubes or other accurate pressure sensing devices.
3. Connect these taps to a level inclined manometer or magnehelic gauge. To get an accurate reading, all registers must be open and the coil and filter must be clean.
4. Turn on the blower and read the external static pressure.
5. Compare your actual readings to the manufacturer's airflow data for your particular indoor section.
6. Adjust the blower speed as necessary (higher or lower) to obtain proper static pressure and airflow. If you can't get the proper static pressure and airflow by the adjusting blower speed, changes to the air distribution system will be required.

If the manufacturer's data isn't available, you can calculate the approximate airflow by operating the system in heating mode, (on the cooling speed tap), then using the following formula(s):

Electric Furnace/Strip Heaters:

- Kilowatts x 3413
- Temp. Rise x 1.08 = cfm

Gas or Oil Furnace:

- Output btu
- Temp. Rise x 1.08 = cfm

Don't simply use the kilowatt rating of the heater (i.e., 5kw, 10kw, etc.), because it will result in a less-than-correct airflow calculation. Kilowatts may be calculated by multiplying the measured voltage to the unit (heaters) times the measured current draw of all heaters (only) in operation to obtain Watts. Kilowatts are then obtained by dividing by 1,000.

Step Six: Check the Charge

The method of charging and/or checking the refrigerant charge will vary from one manufacturer to another. It's best to check with them for their approved/recommended method.

The only method of charging that can be considered completely accurate for all equipment under any conditions, is to recover the refrigerant charge, evacuate the system, and re-charge it with a "measured" (weight/volume) charge. Remember, on split systems line length and the indoor coil must be considered, when you're calculating charge. Check with the equipment's manufacturer for more specific charging information.

Other methods of charging typically recommended by manufacturers are superheat and subcooling. Normally the type of refrigerant flow control device used in the air conditioner's evaporator coil determines which one to use. Whenever possible, use manufacturer's recommended method(s), since they'll be the most accurate for their equipment.

(Note: There are no magic numbers, or ranges, for superheat or subcooling. Both will vary based on operating conditions, equipment design, and/or seer of equipment. Allowable ranges "must" be obtained from the equipment's manufacturer.)

The Superheat Method for systems equipped with a fixed orifice or capillary tube flow control device:

- Measure and record the indoor wet bulb and dry bulb temperatures and outdoor dry bulb temperature
- Measure the suction line temperature within six inches of the suction line service valve
- Measure the suction line pressure at the service access port and determine the saturated suction temperature from the Saturated Temperature-Pressure Chart on this page
- Subtract saturated suction temperature from measured suction line temperature to obtain superheat.

Using a superheat chart, obtained from the equipment manufacturer, compare your superheat calculation with the allowable superheat range for current conditions. Adjust the charge as necessary until your superheat reading moves into the allowable range.

The Subcooling Method for systems with expansion valve flow control:

- Measure the outdoor ambient temperature &emdash; it must be between 65F and 115F
- Measure the liquid line temperature within six inches of the liquid line service valve
- Measure the liquid line pressure at the service access port and determine the saturated liquid temperature from the chart
- Subtract the measured liquid line temperature from the saturated liquid temperature to obtain subcooling
- Using subcooling information obtained from the equipment's manufacturer, compare your subcooling calculation with the allowable subcooling range for the current outdoor ambient temperature. Adjust the charge as necessary to obtain proper subcooling .
- If it's necessary to add refrigerant, either the system has a leak (likely) or it wasn't charged properly to begin with (less likely).

Step Seven: Talk to the Homeowner Again

Evaluate the system's operation and report your findings to the homeowner. Include any recommendations for system changes or repairs. Make a copy of the system's performance for your files. This information may prove invaluable in helping you diagnose a future problem.

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