

Problems with trying to run residential central air conditioning systems when outdoor air temperatures are too cold or setting the thermostat below 70 degrees.

Colorado has such a great climate. While we have very hot days during summer months, our evenings most always cool way down. We have a very low relative humidity. Both can cause problems with our residential air conditioning systems.

When properly charging an air conditioning system with refrigerant, most charging charts that come with the equipment do not go below 70 degrees outdoor air temperature. This makes it very difficult to charge or check the refrigerant charge on a system when outdoor temperatures are below 70 degrees.

When outdoor temperatures are cold, the liquid refrigerant migrates to the coldest part of the system, which is usually the outdoor condensing unit. The liquid refrigerant settles underneath the compressor oil. When the compressor is started, the bearings have no lubrication. Also, the liquid refrigerant can get sucked into the compressor cylinder and damage the reed valves and possibly the pistons.

Refrigerant boils at different temperatures that depend on the system pressures. When outdoor temperatures are below 70, the system will not have a high enough pressure to keep the evaporator coil temperature above freezing - the higher the temperature, the higher the pressure. When the refrigerant boils in the evaporator that is located indoors, it will absorb the heat from the air. If that refrigerant is boiling at less than 32 degrees, the moisture on the evaporator coil turns into ice as it condenses from the air. Ice clogs the coil and prevents air from passing through the coil into the home. This ice must be removed by thawing before the system will work again. If the ice is not allowed to completely thaw it will build back up again.

Turning thermostats below 70 degrees will cause the air conditioning system to run continually and while during a hot day our pressure may stay high enough. However, during colder outdoor temperatures the system will ice up as it will never reach the set point. Thermostats are not like gas pedals. The home will not get colder faster by lowering the thermostat. The system is designed to drop the temperature of the indoor air that is passing over the evaporator coil 15 to 20 degrees. For example, if the return air temperature of the home is 80, the supply temperature should be between 65 and 60 degrees. As the home cools off, the discharge air temperature will drop accordingly. Again, the thermostat has no control over this.

It's always best to leave the thermostat set to your desired temperature and not try to fluctuate it. Always allow the system to bring the home temperature down and then it's easier to maintain it. Once a home becomes too hot, the system may take a very long time to cool the home.

Understand that there is a 20 to 25-degree difference between indoor air and outside temperatures. For example, when it is 92 degrees outside, you can expect to get your indoor temperature to 72 degrees if desired. However, if it is 102 degrees outside, your air conditioner

may struggle to meet 72 or run all the time trying to meet the demand. Don't come home in the evening to a hot home, turn the air conditioner on and expect it to cool the home down quickly.

Multi-level homes with warmer temperatures on upper floors.

Heat rises, we all know that. I encounter problems where the thermostat located on the first floor of the home is set at 70 degrees. It is 70 degrees at the location of the thermostat, but what about the 2nd floor bedrooms?

The upper floor can be as much as 15 degrees warmer than the first floor where the thermostat is located. Most people make the mistake by trying to lower the thermostat below the design operating setting of 70 degrees thinking if it's colder the upper floor will be cooler. The problem is the system will ice up and then nothing gets cool.

- A good suggestion is the fan setting on the thermostat. If you switch the "fan" setting from auto to the "on" position, the blower in the furnace will operate continually. Then set the thermostat to cool and the temperature to 70. The outdoor condensing unit will operate only when the home temperature is above 70, but the blower will circulate the air from the hot upper floors and mix that hot air with the cold main floor air.
- The pro is that the above suggestion results in the upper floors staying much cooler and many people have told me that the outdoor condensing unit actually runs less therefore their utility bill is less (it works in my home!).
- The con is that operating the blower continually means your furnace filter will get dirty much quicker and you will need to keep an eye on it and replace it more often. I do not recommend the expensive filters, but rather the pleated type at Home Depot where they usually have a 3-pack for about \$8.00.

Air conditioning tips and troubleshooting

- If your ac is not operating at all, check the breaker for the outdoor condensing unit. Make sure it is in the ON position. Also check the power switch for your furnace. The furnace must have power to send power out to the condensing unit telling it to operate. This switch is usually in the furnace closet/area. It looks like a regular light switch.
- Don't forget that on some thermostats you must turn the system switch from Heat to the Cool setting. You may need to replace the batteries if your thermostat has a little battery symbol icon or if the battery icon is flashing.

If your ac is not cooling enough, the **two easiest and most important** things you can do on your own are: change your filter and clean your outdoor condenser as noted below. If these two things do not remedy the problem, call your property manager and place a work order for service.

Note: There is a possibility that your ac system may be doing all it can do during extreme heat conditions.

Air Conditioners must have a filter. The filter will be located inside your home usually inside your furnace or inside a grill that opens. It is very important that the filter is changed or cleaned regularly in order to filter the air properly and prevent the indoor coil from getting dirty.

- Most equipment manufactures recommend filters get replaced monthly. I like the pleated style filters as they have more surface area and last usually three times longer.
- I do not recommend the more expensive filters as they catch more particles and become clogged much quicker which restricts air flow and creates problems with the heating and cooling equipment.
- I also like writing the date on the filter, this way when I check on it I know how long it's been in service and then I get an idea of how often I need to replace them.
- Keep in mind filters will get dirtier faster if there are multiple pets, there is a dusty outdoor environment such as dirt roads, fields, construction, etc. or if carpets are not vacuumed frequently.

Be sure to keep the outdoor condenser clean. This means ALL sides should have nothing clinging to them (the sides look like radiator fins or sometimes they are "spiny" looking).

- If you do see dirt, leaves, grass clippings, cottonwood, etc., use a water hose with spray nozzle to rinse the sides off starting at the top and working your way down.
- This is a great tip as this outdoor condensing unit is what removes the heat from your home.
- The cleaner it is the more efficient the system operates which equates to lower operating costs. I rinse my unit off whenever I am outdoors and happen to have a hose in my hand.

During the summer, if you see frost on the outdoor or indoor pipes, your system is frozen and will not cool properly. The system must be completely thawed in order to solve this issue.

- The quickest way to thaw the system is to turn the ac off at the thermostat but turn the FAN to ON.
- This will force warm air over the ice to thaw it quicker. It may still take hours to thaw.
- NOTE: After the air conditioner is thawed and you turn it back on, it may start cooling again and continue to cool until it freezes up again- maybe a day or two. This freezing up and thawing will continue until the root problem is resolved. It is not good for this to continue for days. The root problem could be a dirty filter, clogged or dirty condensing coil, setting thermostat too low.
- Do not set your thermostat below 70 degrees as it will not cool any faster and could freeze up the system causing more problems.