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HEAT EXCHANGE · AIR HANDLING

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Steam Coils & Pressure Ratings

This is the time of year when owners/contractors begin testing their heating systems to find out if everything still works. Because of the erosive nature of steam, it's not uncommon to have to regularly replace steam coils. This newsletter will be devoted to things that will help you understand how steam coils work and suggestions on how to effectively replace them.

There are 2 kinds of basic steam coils:

Standard Steam – 40°F and Above Entering Air

This coil looks and operates very much like a hot water coil. It's almost always a 1 or 2 row coil, and the steam enters and leaves just like hot water. The major difference in the construction is that the tubes and return bends are heavier wall copper and the brazing process is upgraded. Always remember that even low pressure steam is more erosive than hot water and a steam coil needs to be built accordingly. Also, Standard Steam coils must be used with entering air above 40°F. If you pass colder air across this type of coil, you will freeze it immediately.

Steam Distributing – Below 40°F Entering Air

The construction of a Steam Distributing Coil is entirely different than that of a Standard Steam coil. Every place that you see an outside tube or header, there is an inside tube and header that you can't see. All steam is distributed through these inside tubes and headers and slowly released to the outside tubes as the steam turns to condensate. The condensate then flows back down the outside tubes in the same direction that the entering steam comes from. The idea is that all the steam in the inside tubes keeps the condensate in the outside tubes from

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freezing when the air passes across the coil at less than 32°F.

An interesting note to this coil is that it was not designed to be non-freeze. The idea behind the coil was to keep an even flow of steam across the whole length of the coil, so that there were no uneven heating spots. On long coils it's very difficult to get steam to the far end of the coil, hence the name "Steam Distributing." Soon, however, manufacturers determined that these coils don't freeze easily and they became known as "non-freeze." This really is a slight misnomer, because under the exactly correct conditions, even non-freeze coils can freeze. If you don't believe this call up your contractor friends in Minnesota or Maine and ask them. They'll tell you that it's possible to freeze any coil. In most commercial applications, however, Steam Distributing coils are used successfully to handle all outside air preheat applications where the entering air is 40°F or below.

Steam vs. Hot Water

Steam is not hot water and even low pressure steam needs to be handled completely differently than hot water. When you build steam coils, you have several different options regarding the construction. All have brazing that includes a higher percentage of silver solder or even becomes welded joints rather than brazed. The point is that steam coils require a little more thought than the average coil. You cannot just interchangeably use a hot water coil for steam, because it will fail almost immediately.

Traps, Vacuum Breakers, etc.

Steam requires a whole set of controls and valves that are not present with hot water. This is important, because both performance and life expectancy of steam coils is directly tied into how well these controls are designed. This is not true of any other type of coil. If you select the wrong type of trap or place it incorrectly in the system, then the coil will probably fail prematurely. Often you will also require vacuum breakers.

Tube Diameter

Steam distributing coils come in two different diameters, either 5/8" or 1". Standard steam coils are available only in 5/8". There are many 100% outside air preheat applications that require a large lbs./hr. of steam input. As a result, these applications develop a lot of condensate, and it's impossible to evacuate this amount of condensate from a small 5/8" tube. The coils just backup the steam, because the condensate has nowhere to go. When you have this kind of job, a 1" steam distributing coil is what you want to use. Basically steam coils fail more often than other types of coils, because everything about them is more complicated. In the plan & spec market, everybody is trying to take "shortcuts" to get the job, and as a result, there are many misapplications. If ever you have any questions or need advice on steam coils, please call Coil Company. We've been building these coils for decades and we have a pretty good feel for what needs to be done.

Please let us know if we can help you with any of your coil selections or problems — call Coil Company at 800-523-7590.