STANDARD STEAM COIL

Technical Sheet

Standard Steam (STD) coils are designed differently than coils using single phase fluids and refrigerants. The combination of high steam temperatures, chemicals to control lime and scale on boiler surfaces, dissolved air in the steam, and the velocity of the steam through tube openings, creates a corrosive fluid that thins the tubing material and corrodes brazed/welded joints. This mix becomes more destructive if a steam coil is cycled on then off, allowing potentially corrosive condensate to sit on internal coil surfaces. Cycling also work hardens the tube material as it is flexed from thermal expansion then contraction. Eventually the material succumbs to this corrosion, erosion and embrittlement.

To help ensure a steam coil achieves an acceptable service life under these adverse conditions at a reasonable cost:

- They are built with thicker than normal materials
- They have a more resilient alloy as part of the brazed or welded joints
- The finned tubes can move within the coil casing, minimizing thermal induced stresses at critical points
- They are designed to hold the maximum amount of steam in the coil tubes for peak performance and displace/force out damaging steam condensate that has less heat value/lb than steam.

To get the most steam possible into the coil tubes, ***all*** the tubes are connected to the steam supply header. To quickly remove the less efficient and damaging condensate, ***all*** the tubes are connected to the condensate return header. This creates a once-through flow path in the coil with steam entering at one end and leaving as condensate at the opposite end. If the coil is properly sized for the operating conditions the steam condensate accumulates only in the last several inches of the tube.

Some steam coils are designed similar to water coils, having return bends at one coil end to place steam supply and condensate return connections on the same end of the coil. This may be required for a coil mounting and/or piping requirement. But doing so degrades thermal efficiency and accumulates more condensate in the longer tubes. Also coil freeze up can occur if the steam pressure is low or modulated, the coils' finned length is long, and sub freezing air enters the coil side with tubes containing substantial amounts of condensate.

The tube opening in the steam supply header will limit how much steam can enter that tube. If the volume of steam that can pass through the tube opening is less than what the tube could actually condense, then the remaining tube heat transfer surface is wasted on sub-cooling lower heat value condensate than the higher heat value and efficient steam. The best way to ensure the amount of steam, that can enter a tube, comes close to matching that tubes' ability to condense it, is to feed all the coil tubes, keep the finned tube lengths appropriately short and select the best fins per inch and tube OD combination.

The following sketches show three tube arrangements used with steam. Each has the same amount of finned heat transfer surface. Only the short, 2 row, Standard Steam coil design has the most open tubes to take in the largest amount of steam, while holding the least amount of condensate in the coil tubes.

If same end pipe connections are critical, then a Steam Distributing coil may be more appropriate. Its unique (tube inside a tube) design allows all the coil tubes to be connected to the steam header, minimizes the potential for condensate freeze-up, and places the condensate connection on the same end of the coil.

It is recommended that steam coil tubes be pitched to drain toward the condensate header with an approximate drop rate of 1/8" per foot of finned tube length. The standard coil design does not provide this: SRC suggests the pitch be achieved when mounting the coil. SRC does offer an option to incorporate this pitch in the coil, but it must be part of the request for quote.