

Fin Design & Water Carryover

Fin Design - Coils

There are two major fin designs that are commonly used on HVAC coils. The most common is the "plate fin" design which most of the big coil companies use to build their coils. Carrier, Trane, McQuay, York, and most independent manufacturers use this fin design on any coil that they build. The other type of fin design that you sometimes see in the replacement market is the "spiral fin" which was used by older manufacturers like Aerofin. Clearly, the plate fin coil is the choice of the vast majority of customers in the HVAC industry. Most of the manufacturers have standardized on the plate fin and it really is a better design. Still, you will run across older coils from the 60's and 70's that are the spiral fin design and you really should understand the disadvantages of the design so that you can properly select your coil. Below is a list of advantages that plate fins have over spiral fins.

- Easier to Clean - Spiral fins catch any airborne material as it washes through the coil. Most spiral fin coils are impossible to clean because there is no straight thru airflow. The fin has edges in the air stream that catch just about everything.
- Stronger Surface - Plate fin coils are far stronger and resist warping and tube sagging better than spiral fin coils. On plate fin coils every tube is expanded into every fin. This interlocking of fins and tubes provides support for the tubes. Sagging tubes can present a host of problems including corrosion and improper performance.
- Fin / Tube Bond - The bond between a plate fin and tube is created either mechanically or hydraulically. The tube diameter is expanded into the fin collar so that the tube is .003" to .005" larger than the fin collar. The bond is permanent and everlasting. Spiral fin coils have each fin wrapped individually around each tube in a spiral pattern. With expansion and contraction of tubes and fins over time, the bond between the fin and tubes becomes loose. The fins account for 60% to 70% of the overall heat transfer on most HVAC coils. When this bond becomes loose then you lose a high percentage of heat transfer ability. Contact between fins and tubes is the most important construction feature of any coil.

Only a couple of companies even make the spiral fin anymore. If it's such a great design, then why aren't most companies using it anymore? The real reason is that spiral fins are an old technology whose time has passed. There is very little reason to use spiral fins on any of your applications.

Water Carryover on Cooling Coils

Water carryover happens on chilled water coils or DX coils where dehumidification takes place. Drain pans are placed under these coils to take care of any water but there are situations when water is carried past the drain pan and down the system. The amount and distance of water carryover is influenced by the following: (fin design has nothing to do with water carryover)

- Sometimes air velocity across a coil exceeds the maximum 550 ft. / minute allowed. It's usually bad coil design and will almost always cause a problem.
- 100% outside air carries a lot more moisture than re-circulated air. Some areas like Houston or New Orleans need larger and wider drain pans just to handle normal conditions.
- Multiple coils in a bank stacked 3 or 4 high. Water carryover at the top of the bank travels a longer distance downstream because of the arc that it travels. These systems often require intermediate drain pans under each coil to catch the water.
- New coils carry water farther than old coils, because there is less air resistance than older, dirty coils. Because systems are "tweaked" to increase airflow by speeding up drives, etc., over time, these increased R.P.M.'s increase air velocity on older coils. High velocity carries water carryover. Often you must rebalance fan drives when installing new coils to prevent water carryover.

The most important thing to remember is not to exceed 550 feet / minute across the face area of any chilled water coil or DX coil. If you limit the face velocity to between 500 and 550 feet / minute, you should be ok. Also, it doesn't really matter which fin design the coils are constructed of.



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