# USA Coil & Air , Inc.

## October 2013



# **CHILLED WATER COILS**

USA Coil & Air manufactures coils for the replacement of chilled water cooling coils and many times, the reason for replacement can be traced back to the original design. Let's go over some of those reasons to get a better understanding on why many coils either fail or need to be replaced.

Cooling coils are different from other HVAC system coils in that they deal not only with sensible heat, but also latent heat. This is the reason a cooling coil can be sized between 4 and 12 rows deep. Latent heat obviously changes the coil from a dry coil to a wet coil. Many HVAC designers and installers don't understand that it takes more surface to remove moisture in the air then it does to lower dry bulb temperature. It is this moisture that forms on the surface of the coil that can cause systematic problems.

It is called "water carryover" and is a design whereby the air velocity is so high that the water that is formed on the fin surface is carried downstream of the coil. Many times, this carryover is beyond the drain pan length in direction of airflow. The design should never be over 550 feet/minute.

Many years ago, most designers never allowed more than 10 fins per inch on cooling coils. The reason for this is you already have a dense surface and if you allow 12-16 fins/inch selections, coil dirt laden problems will certainly crop up later. Most contractors will tell you that you can clean 2 rows on either side of the coil (or a total of 4 rows). The object of cleaning coils is to make sure there is never any foreign material lodged in the interior of the coil to reduce the coil efficiency. With more fins per inch, this process becomes much tougher. We replace a lot of coils simply because that foreign material has reduced the coil temperature control. Dirt and foreign material destroys heat transfer because it acts as an insulator between the transfer process of what is in the tube and what is flowing across the fins. It also diverts air flow to less clogged areas of the coil surface which means the entire effective area is not being used. This can reduce the coil efficiency of a coil by 30% and even as high as 50%.

There are many types of fins surface available to a designer. These fin surface alternatives can sometimes be misunderstood by many in this industry. The different fins surfaces are nothing more than designs to either maximize performance or to minimize air side resistance. How is this done?

# Did You Know?

## Did you know?

USA Coil & Air has a **SENTRY GUARD** coil design that can be guaranteed against coil freeze damage during a coil freeze event. Ask USA about it's burst proof design for those systems or applications where a freeze even is a common occurrence.

## Did you know?

Chilled Water Coil design has a lot to do with the longevity in any HVAC system. It's very important to understand the facility and the importance of a system and then make the proper selections that are most beneficial.

## Did you know?

Chilled Water coil water velocity should always be between 2 and 6 feet/second to allow for quality heat transfer and a reasonable water pressure drop.

### DID YOU FIND THIS ARTICLE HELPFUL???

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#### (Continued)

If a fin surface has more corrugation and ripple, it will have the air in contact with more of the fin surface. The result is a higher performance in heat transfer, but the downside is a higher air side resistance. More contact means better performance, but more drag against the air. The less corrugation and ripple , the less heat transfer, but also less air resistance. Because 95% of all cooling coils require same end coils connections, a designer should always look for the best design for his application.

Most selection programs select the rows and fins per inch for you at a set of conditions that were entered into the program. The program is actually selecting the "theoretical number of rows" and then displaying the next buildable coil to those theoretical calculated rows. I can give you a couple examples where you can reduce overall resistance, that meet conditions, and have the same number of rows and fins per inch on a coil.

### EXAMPLE # 1

A set of conditions for a manufacturer's most efficient design (maximum performance fins surface selects a 6 row– 8 fins/inch coil. It actually is selecting 4.7 theoretical rows to do the job, but you need a 6 row coil to have same end connections. Now you run a flat fin coil (no corrugation or ripple) and it also gives you a 6 Row– 8 fins/inch selection. It is actually selecting 5.6 theoretical rows and the next buildable coil is 6 Rows– 8 fins/inch coil. The difference is the corrugated and rippled fin selection has an air pressure drop of 0.92" and the flat fin coil has an air pressure drop of 0.67". Why wouldn't you select the flat fin coil?

### EXAMPLE # 2

A set of conditions yields a selection of 6 Row– 8 fins/inch coil with theoretical rows at 5.7. You select a flat fin coil and it selects an 8 Row– 10 fins/inch coil. Why? The theoretical rows for the flat fin coil is now 6.9. This bumps it up to an 8 Row coil for same end connections. If you don't look at both alternatives, then you will be supplying an 8 row vs. the 6 row. The 8 row flat fin has the same air pressure drop as the 6 row, but with two major drawbacks. The first is the cost of an 8 row coil vs. the 6 row coil. The second is the cost of pumping the system water through 8 rows vs. 6 rows.

# **Contact Us**

Thank you for allowing us to share with you. We'd be happy to answer any questions you may have from the services we offer to general product info.

USA Coil & Air, Inc.

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#### Did you Know ?

We fabricate coils in our standard 4 to 5 weeks year-round and then also offer our 5 and 10 working day shipment program. We can also build coils in 2 or 3 working days as well as expedite coatings for environmental condition.

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