

# TENUTA TECH

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The selection of coils initially by designers of a project can cause real problems down the road when these coils actually try to function in a HVAC system. Many times, the true aspects of the HVAC system are not known until well after the coils have been installed for a few years.

## Performance Issues with New & Existing Coils

### Modern Day Coil Selection

Almost all coils today are selected by company issued computer selection programs. Many times, the actual person doing the selection is a novice at the art of selecting coils. Most companies would lead you to believe that their selection program can be used by anyone and that quality selections can be produced regardless of what the user knows about coil selections. This simply isn't true.

Coil selection needs to look at many project aspects before they ever sit down to use the program. Aspects such as air and fluid side clean-ability from corrosion, accessibility, maximum air resistance, max side fluid pressure drop and many other factors that can determine quality coil selection. Steam coils require special knowledge just on coil lengths and tube diameters that can be the difference between a coil that works in the system and one that may cause performance and systematic failures. Let's get more specific about these issues.

If a system may be prone to corrosion or needs to be especially clean, then the selector must understand that they may need to use flat fins rather than a corrugated and rippled fin surface.

You might think, "Why not just offer all coils with a flat fin surface"? The answer is simply that a flat fin surface does a good and a bad thing to your selection. The good is that by having a fin surface that is flat back through the rows, you have a very cleanable coil and very low air resistance. The bad side is that your performance is less because the secondary surface is not as efficient since the air is not in contact as much. It takes a knowledgeable expert to properly select the best and most efficient coil in this case. We have seen many times 8 row coils selected that only need to be 6 rows.

Therefore, the system water side will have to pump water through two extra tubes for the next 20 years. Not to mention, you end up paying more for a coil you don't need.

Water side pressure drop is a big issue when selecting coils. Many coils selections have water pressure drops much higher than needed because the selector was not familiar with coil circuitry. If you understand the circuiting of a coil, this can reduce your cost by reducing the rows or fins per inch. And, it will also lower air resistance.

Steam coil selection is a specialty that you can only learn by dealing with the ups and downs of steam systematic performance. Many heating systems using steam have low pressure steam (2-10 psig). These types of systems require maximum coil lengths and larger tube diameters based on the size of the systems. If the wrong tube diameter is selected and/or the coil length is too long, the coil will go into negative pressure, condensate will be held in the coil, and performance will be greatly affected. Another aspect will be the steam hammer and freeze events that quickly reduce the life of the coil.

### Existing Coil Performance Issues

When a coil becomes filled with dirt, it can have a direct effect on the performance of the coil. We have seen dirt laden coils have a drop of 30% in performance. This may be due to the original coil selection. If you add too many fins/inch to "boost performance" without filter maintenance or cleaning the surface of the coil, you could fall into this category. Once dirt or foreign material gets into the inner core of a coil, there is really nothing in our industry that you can do to remove it. The drop in performance is two-fold. The amount of airflow is reduced because the fan produces less air with more resistance and the amount of heat transfer is reduced because the dirt is like an insulator that prevents transfer of BTUs between what is flowing through the tubes and over the fins.

Coils also have water side fouling problems where cleanable tube coils may have been required with the original coil selection. Water side fouling can cause a huge drop in heat transfer because the foreign material acts like an insulator between the two streams. The water side pressure drop is also affected and therefore, the pump may produce less water flow to the coil which also decreases performance.

Steam heating coils have problems when steam flow is impeded across the entire effective length of the coil tube. This is usually determined by the lack of removal of condensate as quickly as it's formed. Condensate and steam can't take up the same space at the same time and thus, you get large areas of the coil with hot and cold spots.

Wherever the steam can't flow will be a cold spot and the entire performance is drastically reduced. There are a few reasons condensate is not being removed in a coil. But more often than not, the original coil design didn't provide large enough tube diameters that give the steam more room to flow and more room for the condensate to leave the coil. The difference between standard tube and larger tube diameters in our industry can be 30%-40% more area for steam and condensate flow.