

At every sales meeting or training session, there always seems to be a lot of confusion over the circuiting of coils. Circuiting is not really as mysterious as everyone makes it out to be. We're going to try and clear it up in this on-line newsletter.

What Is Circuiting?

Circuiting is nothing more than the number of tubes on any coil that are being fed from the header. If the header (manifold) is connected to (6) tubes, then that coil has (6) circuits. If the header is feeding 12 tubes, then that coil has (12) circuits.

Why Is Circuiting Necessary?

When water or refrigerant are passing through a coil, you must control the speed of the water or refrigerant. If water goes too slowly through the tubes, you get little or no heat transfer and you're in a condition called "laminar flow". When water passes too quickly through a coil, then you get little or no heat transfer and a huge pressure drop that is not practical. You circuit a coil to control the speed at which the heat transfer medium passes through the coil. If you feed multiple tubes, then the medium travels slowly through the coil, because you've spread the flow through a lot of tubes. If you feed *fewer* tubes, then you speed up the flow through the coil.

Are There Limits To Circuiting?

There are very few limits to circuiting. Most major manufacturers have "code names" for their circuiting patterns, such as: full circuit, half circuit, double circuit, etc. These are nothing more than standard patterns that these companies offer, but you certainly shouldn't be limited to these patterns. USA Coil & Air has the flexibility to offer other circuiting patterns than standard ones.

Example

Coil size = 30" F.H. x 96" F.L., 8 Rows
(20 tubes / rows) – 5/8" tubes
GPM = 75

Think of this coil in terms of the total tubes – that is, there are 20 tubes / row x 8 rows deep = 160 total tubes. Now how many can we feed? Well, you could feed any number of tubes that you choose, with the stipulation that it divides evenly into 160. Look at the table below for some of the combinations.

	#Tubes Fed	Total #Tubes	Passes
1	160	160	
2	160	80	
4	160	40	
8	160	20	
10	160	16 – Half Circuit	
16	160	10	
20	160	8 – Full Circuit	
40	160	4 – Double Circuit	

We could feed (1) tube, if we choose to do so. That would mean that 75 GPM is passing through 1 tube at a time and the pressure drop might be 40,000 feet. Needless to say, this is not a good selection. You could feed (2) tubes and have 37 ½ GPM going through each tube. This isn't a much better selection. The most common selections would be to feed 20 tubes, 8 pass (full circuit) or 40 tubes, 4 pass (double circuit). These are the selections that most of the time would be best, but you should not be limited strictly to these selections.

It's best to understand the concept of circuiting, rather than attempt to memorize circuiting patterns. You have (2) restrictions when selecting the number of tubes that you wish to feed:

- (1) The number of tubes that you feed must divide evenly into the total number of tubes in the coil. In the above example, you can't feed (9) tubes because 9 doesn't divide evenly into 160.
- (2) The number of passes that are generated through the coil must be an *even* number, if you wish to end up with the same end connections. If you start at one end of the coil and generate 1, 3, 5, 7, etc. passes, then you will have opposite end connections. The vast majority of coils must be same end connected. This is often a requirement to determine the number of tubes that you wish to feed. Therefore, you need 2, 4, 6, 8, passes etc. to get same end connections – 160 tubes with 40 circuits = 4 passes.

Computer Program

Also, it's impossible to fully utilize USA Coil & Air's selection program unless you understand the concept of circuiting. You will always get an answer, no matter what number of tubes that you feed. You just won't get a meaningful answer that you can use. There are no "red lights" or stop signs" in the program that will direct you to the right circuiting pattern. You must understand how a coil works to fully use our program or any manufacturer's program.



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