

# USA COIL & AIR NEWSLETTER

## The Process of Building Coils

May, 2001

Most H.V.A.C people really aren't familiar with how coils are built. They know how they work, and they know how to size them, but the actual process of building a coil is not something that they have ever seen. We can't take you to one of our plants at USA Coil & Air to show you our coil manufacturing process, but we can explain it to you, so that you can better understand this process.

**FINS** - Fins are responsible for up to 70% of the heat transfer process on any coil, so as you can imagine, manufacturing fins is critical. USA has several fin dies that cut the fins to the proper height, and depth, based on the fin height and row depth. The fin die also does (4) other things when stamping out the fins:

(1) The edges of all fins are not straight. The leading edge of the fin is rippled to break up the air as it hits the fin.

(2) The fin is not flat. it is corrugated to make the air bounce back and forth as the air passes through the coil from front to back.

(3) Tube diameter holes are punched through the fins to match the tube diameter and the number of tubes that will be connected to the fin.

(4) A fin collar is produced when the tube hole is punched. This fin collar is extruded off the hole, and is used to both space fins from each other, and is also the connection point between the tubes and fins when the tube is inserted into the fins. Because 14 fins/inch is a closer fin spacing than 8 fins/inch, the fin collars are not as wide, and the fins can be slid onto the tubes closer to allow for more fins/inch.

A chilled water coil with 14 fins/inch that is 120" long has a total of 1,680 fins. All of these fins are cut at the same time and are identical to each other. The proper number of tubes are placed in a rack, and all 1,680 fins are slid onto the tubes, and are pressed tight against each other so that each fin is snug against the fin collar of the previous fin.

**EXPANSION** - At this point the tubes and fins begin to look a little bit like a coil, except fins are still loose on the tubes. In order to gain effective heat transfer, a bond must be created between the tubes and fins. An expansion ball is sent through the tubes and actually expands the tube into the fins. This process can also be done hydraulically rather than with a ball. The O.D. of the tube is expanded so that the diameter of the tube is .003 to .005 inches bigger than the I.D. of each fin connected to the tube. This expansion process creates a bond between the tube and fin that allows up to 70% of all heat transfer to take place. It is possible to over-expand and the tube wall thickness becomes too thin when this happens. It's a delicate balance to expand the tube properly to make it the right outside diameter, and keep the wall thickness uniform throughout the length of the tube.

**CASING** - The tubesheets and casing are installed around the coil to keep this large and heavy fin/tube core together. The casing and tube supports structurally support the fin/tube pack. The casing is generally 16 Ga. or 14 Ga. galvanized steel.

**BRAZING OR WELDING** - All return bends and manifolds must now be brazed or welded to the tubes, depending on the materials. Also, connection stubs must be attached to the manifolds. The coil is now fully built.

**TESTING** - Every coil is tested for leaks. Each coil is dropped into a tank of water and all connections are blocked off. A compressor is hooked up and the coil is leak tested at 300 P.S.I.G. (sometimes higher for industrial coils). The coil is left in the tank for up to 10 minutes to identify any leaks. It's similar to testing a tire for leaks under water. Any leaks in the brazing are identified, marked and repaired. The coil is again tested and will pass or fail.

**CRATING** - It doesn't do any good to build a great quality coil with a high degree of quality control, if you're going to be cheap when building the crate. All this does is encourage freight damage, and you're left with a coil that doesn't work. Crating on all coils should be heavy wood with very little or no cardboard. Coils should be "blocked" inside the crate to allow for very little movement.

We hope this helps you better understand how we build coils are USA Coil & Air. This process is not drastically different than at Carrier, Trane or McQuay or at any coil manufacturer. We just think that it's important for our customers to know how it's done.

USA Coil can build either 3/8", 1/2", 5/8" or 1" coils, because we have the fin dies to produce any of these tube diameter coils. We are not limited to tube diameter, fin spacing, circuiting or any of the other limitations imposed by other manufacturers. USA doesn't have to build large quantities of any coil. Just call us and give us the proper information, and USA will build the coil that you need.



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