



## Technical Bulletin

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### CIRCUITING “RULES OF THUMB”

#### Introduction

Circuiting coils can be intimidating to the novice, but is really not as difficult as it may seem. It is important to understand circuiting because coil performance and life can be dramatically affected by it. Often feeds, passes, and dropped tubes are used to describe circuiting. Just what does it all mean?

Circuits and feeds are often used interchangeably at coil manufacturers. In water coils the number of feeds is the number of tubes that leave the supply header and go into the coil. Many coil companies also call these feeds “circuits”. At Colmac we prefer to reserve the term “circuits” to mean fluids that circulate through a common coil but will never come into contact with each other in the coil or in the rest of the system. Like in a direct expansion coil, each compressor is on a separate circuit, so if one compressor “burns-up” it doesn’t destroy the other compressor because the two refrigerant loops are on separate “circuits”.

The number of times each feed travels up and down the length of the coil is referred to as “passes”. The number of feeds times the number of passes has to equal the total number of tubes in the entire coil. The only time this would not be true is if you choose to “drop” tubes in your coil. Why would you want to drop tubes? Generally dropping tubes is not desirable. However, sometimes due to the physical size of the coil, or due to the number of tubes high and rows deep, no common integers exist to express the circuiting so tubes must be dropped. For example: (1-row deep coil, 13-tubes high, same end connections, 1 feed-12 passes, with one tube dropped.)

Coil circuiting, as a rule, should be drainable. A drainable circuit can keep the customer out of trouble if he does not follow-up with a glycol flush. It also helps return refrigerant oil to the compressor at “low-load” conditions. Circuiting coils properly insures the correct fluid velocities in the coil tubes. Fluid velocities that are too low result in poor heat transfer. Tube velocities that are too high can lead to premature failures from velocity erosion.

#### Rules of Thumb

1. If you want connections on the same end of the coil you must have an even number of passes.
2. If you want connections on the opposite ends of the coil you must have an odd number of passes.
3. The number of tubes high times the rows deep must equal the number of feeds times passes (plus any dropped tubes):
  - Double circuit is 1/2 the passes as rows;
  - Full circuit is same number of passes as rows;
  - 1/2 circuit is twice the number of passes as rows;
  - 1/4 circuit is four times the number of passes as rows;
  - 1/4 circuit must be in increments of 4 tubes high;
  - 1/2 circuit must be in increment of 2 tubes high.

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