

What is Capillary Tube Refrigeration: A Complete Guide

 linquip.com/blog/capillary-tube-refrigeration/

April 14, 2021

Capillary tubes are the most simple refrigerant metering device used in many pieces of equipment. So it is of great importance to understand what capillary tube refrigeration is and how it works. In this article from Linquip, we want to dive deeper into the world of the capillary tubes and their functions. Keep on reading to learn more.

What is Capillary Tube Refrigeration?

The capillary tube is one of the most commonly used throttling devices in refrigeration and air conditioning systems. The capillary tube is a copper tube with a very small internal diameter. It is of very long length and it is coiled to several turns so that it would occupy less space.

How Does Capillary Tube Work?

When the refrigerant leaves the condenser and enters the capillary tube, its pressure drops down suddenly due to the very small diameter of the capillary.

In the capillary, the fall in pressure of the refrigerant takes place due to the small opening of the capillary.

The capillary tube is a non-adjustable device that means one cannot control the flow of the refrigerant through it as one can do in the automatic throttling valve. So the flow of refrigerant would change according to the variation in the surrounding. That is why the capillary tube is designed for certain ambient conditions. However, if it is selected properly, it can work reasonably well over a wide range of conditions.



Capillary Tube Size

The size of the capillary tube is fairly critical. Unlike orifices, such as expansion valve seats, capillary tubes depend on their length as well as their diameter to determine their total restriction. A capillary tube is 1–6 m long with an inside diameter generally from 0.5–2.28 mm (0.020–0.09 inches).

A change in diameter on a percentage basis can change the flow more than an equal change in length. Restriction can also be changed by lengthening or shortening the capillary tube. The longer the tube, the slower the flow; the shorter the tube, the faster the flow.

Capillary Tube Function

The capillary tube actually meters the refrigerant from the condenser to the evaporator. The diameter and length of the tube would determine the flow at a given pressure.

Because the capillary tube restricts and meters the flow of liquid to the evaporator, it helps maintain the needed pressure difference for proper system operation. The capillary tube and compressor are the two components that separate the high side from the low side of the refrigeration system.

The capillary tube is used when the load is relatively constant. Capillary tubes are used as the throttling device in domestic refrigerators, deep freezers, water coolers, and air conditioners.

Advantages Of The Capillary Tube

The advantages of using the capillary tube as the throttling device in the refrigeration and the air conditioning systems are as follows.

- The capillary tube is a very simple device that can be manufactured easily and it is not very costly.
- The capillary tube has no moving parts. Therefore it doesn't need maintenance.
- The capillary tube limits the maximum amount of the refrigerant that can be charged in the refrigeration system due to which the receiver is not required in these systems.
- The capillary tube provides an open connection between the condenser and the evaporator hence during off-cycle, pressure equalization occurs between condenser and evaporator. This reduces the starting torque requirement of the motor since the motor starts with the same pressure on the two sides of the compressor. Hence, a motor with low starting torque (squirrel cage Induction motor) can be used.
- It can be used for hermetic compressor-based systems that are critically charged and factory assembled.
- It is compact in size.



Disadvantages Of The Capillary Tube

Some of the disadvantages of a capillary tube are:

- These valves are not capable of adjusting themselves to the change of flow as per changing ambient temperature and load.
- It is susceptible to clogging because of the narrow bore of the tube, hence, utmost care is required at the time of assembly. A filter-drier should be used ahead of the capillary to prevent the entry of moisture or any solid particles
- During off-cycle liquid refrigerant flows to evaporator because of pressure difference between condenser and evaporator. The evaporator may get flooded and the liquid refrigerant may flow to the compressor and damage it when it starts. Therefore critical charge is used in capillary tube based systems. Further, it is used only with hermetically sealed compressors where refrigerant does not leak so that critical charge can be used. Normally an accumulator is provided after the evaporator to prevent slugging of the compressor.

Now that you know the answer to the question of what is capillary tube refrigeration, how about sharing your thoughts and comments on the subject with us? Comment below and let us know what you think! And if you have any questions about the capillary tubes, [sign up on Linqup](#) right now and we'll help you in the blink of an eye!