HOW LONG SHOULD YOU

EVACUATE A SYSTEM

Present day techniques of evacuation are meant to clean refrigeration and air conditioning systems to a degree never before reached in this trade. A good vacuum pump will eliminate 99.99% of the air and virtually all of the moisture in a system if used properly. Moisture within a system will eventually react chemically with the compressor oil to form sludge. Further, the water will react with the refrigerant to form hydrochloric acid. Any of these combinations will seriously effect the performance and longevity of the system.

The question of how long it will take a pump to accomplish this level of cleanliness is one being asked by every serviceman that ever picked up a vacuum pump. Unfortunately, there is no pat answer. "How long will evacuation take?" is like asking "How many pitches are there in a baseball game?" It depends on so many things. Factors that must be considered are: the size of the vacuum pump, whether it is a single stage or two-stage, the size of the hose connections, the size of the system, the contamination in the system, the application of the system, etc.

Knowing when to stop your evacuation requires an understanding of what's going on in the system when the vacuum pump is in operation. Removing air is an easy job. Evacuating down to 29 inches eliminates 97% of all air but less than 5% of the moisture.

For proper evacuation and dehydration of refrigeration and air conditioning systems an electronic vacuum gauge is an indispensable companion to a vacuum pump. Use of an electronic vacuum gauge is the only way to determine when dehydration is occurring and when it is complete. The vacuum gauge must be reading below 5000 microns before you can be sure that you are dehydrating the system. If your system will not pump down to this level something is wrong: there is a leak in your vacuum connections, the vacuum pump oil is contaminated, there is a leak in the system, etc.

When the vacuum reading is between 5000 microns and 1000 microns, you can be assured that dehydration is proceeding, that moisture in the system is being "boiled" off. Significant dehydration does not occur until a vacuum level of 1000 microns or less has been achieved.

Pulling a system down below 1000 microns is not a perfect test for cleanliness. If the vacuum pump is large enough to "overpower" the system, it may pull down to this level before all the moisture is removed. Another test is needed.

After the system is pulled down between 500 and 1000 microns, the system should be valved off from the vacuum pump and the pump turned off. There may be a rise in vacuum level. This is due to pressure equalization within the system. If the vacuum level remains between 500 and 1000 microns after 10 minutes, evacuation is complete. If the vacuum level rises above 1000 microns but stays below 5000 microns, the moisture was not completely removed. In this case reevacuate until the vacuum will hold. If the vacuum level rises above 5000 microns there is either a leak in your system or in your connections.

Sometimes evacuations take 15 minutes. Sometimes they may take weeks. The only way to know for sure is to know how to work with micron vacuum readings and to have a good electronic vacuum gauge to read them.

PRESSURE UNITS USED IN HIGH VACUUM

1 in Hg (mercury) = 25.4 mm Hg = 25400 microns
1 torr = 1 mm Hg = 1000 microns
1 millibar = 0.75 mm Hg
1 bar = 750 mm Hg = 29.53 in Hg

BOILING TEMPERATURES of WATER AT VARIOUS PRESSURES

Temp °F	Inches of Vacuum (Hg)	Microns
212	0.00	759968
80	28.92	25400
59	29.42	12700
34	29.72	5000
1	29.88	1000
-12	29.90	500
-28	29.91	200

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