

Vacuumping Line or Purging?

AN ARTICLE

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To Vacuum or not to Vacuum? This should not even be a consideration. This topic is one of those things that tries to tell me that some people still think that it is 1930. Purge, or Vacuum. No matter which way you place the verb, noun, or adjective, this is a topic that I have steered clear of for many years in my series of "Don't Do That" articles, though I maintain a vehement stance, it has come to a point with the Re-Pack that one of my customers sent me a PDF of a set of instructions on how to remove moisture from your brand new antenna system using an air conditioning Vacuum Pump along with a gaggle of dangerous caveats. This hideous primer was written by a major super power and I am appalled. My Customer wanted to know if this was safe, and not tantamount to a bad joke



Let's establish some guide lines here. I do not own these images, they are borrowed without permission.

The ubiquitous, generic Refrigeration Vacuum Pump should only be used for one purpose. This purpose is pumping down your gas based cooling system where pulling a negative pressure of 24 to 30 inches of Mercury can be tolerated with a positive goal in sight.

Now that I have hackled every hair on you, Let's get started. A vacuum level of -30 inches of Mercury is relative to about -15 psi. Yes, vacuum is often expressed in inches of mercury and many people do not know how it relates to pressure so now you know. Most pressurized R.F. systems are meant to run at between 5psi and 15psi. Elliptical Waveguide is operated at 3 psi and rectangular WR series high power Waveguide often runs at .5 psi maximum with a high precision regulator. This vacuuming primer that was sent to me is vague to say the least, but it insinuates that "systems" which might mean Heliax, and it might mean Rigid, should be vacuumed down to -28 to -30 inches of Mercury and held there for some length of time that is unspecified at which time great caution should be observed not to allow air of any kind back in to the system, and dry Nitrogen should be introduced up to a suitable and still unspecified pressure.

Yes, I am paraphrasing a bit to keep from being verbose but you get the gist.

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Vacuumping a line exposes your new system to a host of destructive issues. This equipment is NOT built to withstand negative internal vacuum environments. This equipment IS built to withstand positive internal pressure environments. The typical R.F. system is designed to operate between 5psi and 15 psi positive pressure. Cylindrical objects such as tubing, and other components are designed for positive pressure. These same objects when subjected to the stresses of a negative pressure or vacuum environment can warp, deform, or damage welds.

I submit the popular video of the Rail car implosion which is widely available on line. Yes it is dramatic but I want to make a lasting impression on you.

Insulators in most R.F. systems are designed to be captured in a positive pressure environment. Placing a vacuum on insulators that breach conductors to the outside such as arm feed or coax feed eggs, can be dislodged, or have their seals sucked inward which will cause a permanent leak to be inflicted on the components. If damaged gaskets are the worst that happened, good on ya, but you also risk damaging the insulators. Warped insulators and breached seals are a permanent damage point. Gasketed EIA O-rings in flanges subjected to high vacuum levels can be sucked in past their capture groove and any Silicon Grease that is there can be sucked in to the line. If a "O" ring is damaged or sucked in to the line and cracked or torn, the Silicon Grease on that "O" ring can corrupt the associated Teflon components or the associated bullet anchor inner. Aside from your new leak, this can set up an arc path going forward that could fail at any time short or long term resulting in an inspirational burnt offering.

This document that is skulking around the internet has a huge number of dangerous caveats in it. Compared to the widely accepted Nitrogen Purge method which has been overwhelmingly popular, and has no dangerous caveats, the simple question is Why Risk It? Nitrogen comes in two basic flavors. Liquid Dewar and High pressure gas. The liquid Dewar is about 22 H type bottles in quantity. You order the high pressure version which operates at a fitting level of about 250psi. This pressure will still operate a conventional regulator. This is obviously a lot of gas and will purge even the largest Television installation several times over. Nitrogen makers are wonderful and of course standard bottles are the old standby.



The theory of atomizing moisture down to a micron level in a vacuum environment works great for refrigeration equipment where the materials are robust and designed to operate at pressure and vacuum levels that are wildly fluctuating and dramatic. R.F. systems are not designed like this.

Purging R.F. systems depends on the ability to dump the moisture laden gas from inside of the system. Self purging Pop Off valves come in dozens of configurations.



They are all spring loaded and made of resilient materials such as Brass or Stainless Steel. These nifty labor saving devices eliminate the need for a tower climber and allow you to purge your system at will, any time you desire. These poppers are ordered with specific "crack open" pressure levels that range from 1 psi to 200 psi. If your Nitrogen gets stinky, just purge it. Poppers are available with rain hats that keep contaminants out of the seals and the seal types are also selectable.

What is also interesting is that this vacuuming article though written by a major manufacturer, also admits that they build this equipment, but it is often delivered tarnished, patina'd or dirty inside which necessitates the need for cleaning of the equipment prior to use. While many of the un-washed still use alcohol instead of a more effective nasty chemical, this alcohol vapor is not something that you want to run through the vacuum pump oil either. This cleaning also is affected by their vacuum method. I find all of this very strange. While they mention that oxides of copper are non-conductive, they gloss over the silver oxide issue.

While performing their procedure for vacuuming, they are quick to warn the reader that any failure of the procedure can come with (unmentioned) "serious" consequences.

I am particularly fond of the warning that says that if the vacuum level of -24 inches of Mercury can not be achieved, there must be a leak that the prior pressurization test failed to show,, OR you sucked in a gasket and now good luck finding that little devil.

Why mess with success. If you follow my articles, you will see that I have successfully dried out tens of thousands of feet of Heliac and Rigid line over the years from every malady from old cracked neoprene gaskets to lead poisoning. The Videos page of my web site has some of the water works highlights on it.

<http://www.radioworksrfconsulting.com/videos.htm>

If purging with heated high volume manifold fed air followed up with a popper based nitrogen purge is so successful drying up the tadpole pond from a high calibre round, why on earth would you risk utter catastrophe and damage by pulling a vacuum on your new system. That ranks right up there with flooding the system with greasy Freon based refrigerant to use a leak detector to find your leak instead of bubbles or an Ultrasonic Leak Detector.

Go in peace.