

msac MANUFACTURERS' SERVICE ADVISORY Council HOTLINE

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Depth of vacuum

I always thought I was going the extra mile pulling down to 50 microns; yet I recently heard from factory reps that 500 microns is correct—any deeper and system components may get ruined. Please describe all aspects of vacuum so this is clarified.

500 microns has been and still is the industry standard. This ensures that the system is dry and leak-free. Always follow the manufacturer's installing and operating instructions.

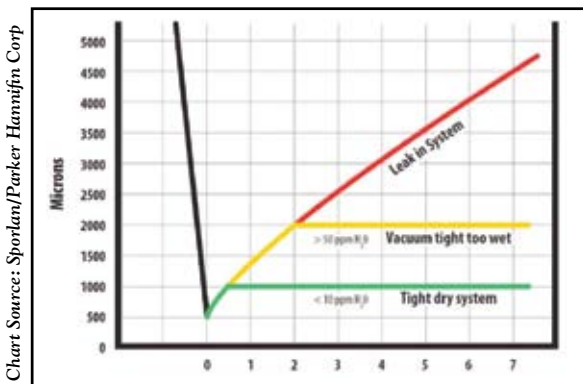
Pulling a **system** down to 50 microns will degas particles from the compressor oil; doing this will change the makeup and it will no longer be a good lubricating oil. If you pull a 50-micron vacuum on the piping or another component other

weight for water, and 1.5% by volume for air and other non-condensables. A micron level of 1,000 is <10 ppm of moisture.

Moisture will be released from MO and AB oil with a deep vacuum. POE oil is not as forgiving, as it will hold the moisture under a deep vacuum. So, the only way to remove moisture is by using a filter-drier. The higher the moisture level, the more times the filter may need to be replaced. A moisture indicator in the liquid line after the drier will show if higher-than-normal moisture levels are still in the system.

If you pull and hold 500 microns on a system, that system will have <10 ppm of moisture and be leak-free. A good core filter-drier will hold moisture and keep it from circulating through the system.

Question from Rick Bergman, Morden, Manitoba, Canada. Answer by Jamey Hale, CM, Technical Support Supervisor, ICOR International.



Check vacuum pump to confirm that it will pull and hold a 250 micron vacuum.
Minimum Triple Evacuation
1500 microns; 1500 microns; 500 microns.
Pull and hold a 500 micron vacuum for 24 hours at the furthest point in the system.

than the compressor with oil in it, the amount of extra time it takes to go from 500 microns to 50 microns may give you a warm and fuzzy feeling but the end result will probably be the same as 500 microns held for 24 hours.

ARI 700 standard for Fluorocarbon Refrigerant states that maximum allowable levels of contaminants are 10 ppm by

Checking for grounded situations

When checking for grounded situations, where does the comfort area stop? I have had techs tell me they had 1.8 megohms to ground and had a grounded compressor. I do not feel this warrants a grounded situation. I would be looking at 100 ohms, and definitely between 5-20 ohms. This would include compressors and motors.

For years, technicians have used megohmmeters to evaluate compressor motor windings. However, most megohmmeter manufacturers publish guidelines that apply to open motors. For this reason, I want to investigate the use of megohmmeters on hermetic and semi-hermetic refrigeration and air-conditioning compressors.

When using megohmmeters to evaluate the motor insulation of compressors, it is important to understand that they should not be used as one would a volt-ohm [multi]meter. A single megohmmeter reading gives little insight into the condition of a motor's true insulation value.

Megohmmeters are best used as a part of a regular maintenance program to monitor trends—over several months. For example, one might record a megohm value and compare it to a previous reading. If subsequent readings show a trend of lower and lower values, then corrective action—such as system cleanup—should be taken.

Most compressor manufacturers do not incorporate the megohmmeter use into any quality checks. All UL-listed compressors must pass UL-required tests using high-potential current leakage testers called “hipot” meters. Studies performed by compressor manufacturers have found that compressors with megohmmeter readings as low as 0.5 megohms still pass hipot testing.

There are many factors that affect megohm readings, including contaminated refrigerant; oil level; refrigerant in oil; and current leakage through electrical fuses or terminal plates. In the process of manufacturing and remanufacturing a compressor, certain levels of ambient air moisture will remain within the compressor and the windings of the hermetic motor. Those moisture amounts will be removed during the installation and evacuation procedures.

Any external electrical components connected to the compressor terminals also affect megohm readings. Wires, contactors, and relays all leak current and will decrease compressor megohmmeter readings if not disconnected.

As mentioned earlier, a single megohm reading cannot be used to condemn a compressor since many other factors are involved. However, limits can be placed on megohm values that dictate action be taken. Carlyle Compressor Co. has found that these limits are related to the rated voltage of the compressor. Megohm values equal to or greater than 1,000 ohms/volt are probably acceptable. For example, a 460-V compressor might show a megohm reading of 460,000 ohms, or 0.46 megohm. Compressors with rated voltages of 208–230 V would then be operable at megohm values of 0.208–0.230 megohms; for simplicity, Carlyle has set the limit at 0.5 megohms before a compressor is condemned.

New compressors that have never been installed will not need any system cleanup procedures as long as the megohm reading is above 0.5 megohms. A baseline reading must be established for comparison purposes, and since this is its first reading, this will be its baseline value.

The megohm device uses a direct-current voltage; the hipot tester uses an alternating-current voltage; and the hermetic motor also operates on the ac voltage.

A common name used is the term “Megger,” which is a trade name of the J.G. Biddle Co. They publish a well-respected booklet—“A Stitch in Time...”—on the use of the megohmmeter. *Question from John. W. West, Jr., of Chester, VA. Answer by Wes Taylor, CMS, Training Manager, Carlyle Compressor Co.*

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