

Profiling: The Science and the Art of a Good Pressure Decay Test

A problem occurs when a unit under test, a refrigerant coil for instance, fails the initial pressure decay test but after the coil has undergone subsequent cooling, passes a retest.

Temperature's impact on the test results is important, but what one is really looking for is consistency. Letting the coils cool down immediately after brazing is a good idea, but it doesn't end there.

Profiling is a task that involves creating unit-specific parameters for the leak test, including testing pressure, injection pressure, the injection speed of the dry air or nitrogen, stabilization time and test time.

Testing Pressure: The testing pressure is usually decided by the user's design specification and is more than likely the operating pressure of the system.

Injection Pressure: Based on the size of the coil, the pressure will need to be set a little higher than the testing pressure. This is to allow for stabilization of the pressure inside the coil or system. The injection pressure is determined for each specific coil and requires some trial and error. Once the pressure in the circuit stabilizes, it should level out at the desired test pressure.

Injection Speed: The speed at which the circuit is pressurized can have an effect on stabilization time. Pressurizing it too fast will show you larger fluctuations during stabilization and will increase the temperature of the coil.

Stabilization Time: During stabilization, the pressure may fluctuate wildly. This may make the operator think there is a large leak and be tempted to stop the test. It should be made clear that this is normal.

Test Time: The test time is the length of time the system monitors for any pressure drops (the VTech 50 system can detect .010 psig drops in pressure). While the curve of the pressure drop will continue to fall incrementally the longer the test, there comes a point when the line is primarily flat. Depending again on the size of the coil, the profiler can fine tune the test time so that no extra time is wasted. See the graph below for more information on pressure decay curves.

Profiling for each individual coil is a critical step in fine-tuning your pressure decay leak test. While it is part trial and error, and part craft, there are a few concrete ideas that one must apply when profiling.

The first is that one must assume the coil or part they have is a good unit. Next, make sure the fittings aren't leaking. You can run a "blank" test without the couplers hooked up to a coil to see if perhaps the couplers are leaking.

Sample Test and Pressure Decay Curve

As an example, let's say we have a coil whose test pressure is 450 psig and we have determined that the injection pressure should be 465 psig. The following graph shows the pressure curve of a coil that is obviously leaking badly, one that fails over time and a coil that passes:

