

Gas Filtration - Keeping Calibrations Clean



Insufficient filtration in gas supply systems may lead to a “sticky” piston in your DryCal piston prover. The gap between the piston and the cell glass is measured in microns, so small amounts of particulate matter can make a big difference on your piston’s performance. We recommend adding filters for any gas flow into the units to prevent the buildup of particulate matter. If particulate matter continues to be a concern, replacing old tubing may be a simple, low cost solution to lowering particulate loads. Old tubing may be contaminated with debris and could be a source of particulate matter. The smaller the flow cell, the more often the tubing will need to be replaced. This is due to the smaller gap between the cell and the piston, which leads to higher sensitivity to particulate loads. Note that Mesa also recommends using the 2 micron filter that comes with the DryCal 800-3 Ultra-Low Flow cell at all times.

Remember that different particulate filters will result in different pressure drops in your lab’s setup. Factors such as filter construction, composition and physical size can influence the pressure drop. This means that you may need to measure the drop in pressure to ensure the inlet pressure to the flow cells meets the recommended 35 PSI.

Mesa’s metrology lab uses a 5 micron filter to keep the incoming gas clean and free of particulate matter. Any buildup of material smaller than the threshold of the filter can be cleaned out during the annual calibration and re-certification of the piston prover, and likely will not affect the performance of the unit depending on the sampling load.

Although rare, condensation can also cause “sticky” piston problems, even if the condensation cannot be seen with the naked eye. Transporting your piston prover from one temperature environment to another may cause condensation, and condensed moisture combined with microscopic debris may turn into “microscopic paste”, resulting in problematic piston movement. To prevent condensation, follow all of Mesa recommended best practices. Keep the seal caps on the inlet and outlet ports during transportation, and allow the instrument to sit in each new environment for some time so it can reach thermal equilibrium.

When determining whether there is particulate matter contamination in your flow system, begin by asking these three questions:

1. How good is the filter?

Particle size matters. We recommend using a 5 micron pore size filter.

2. How dry is the inlet gas?

We recommend using non-condensing gasses at less than 70% humidity. Condensation can also occur when transporting the unit from one temperature environment to another. Allow the unit to attain thermal equilibrium after transportation before use.

3. How often is my DryCal piston prover being used?

There is a direct relationship between the level of use and the amount of particulate matter exposure to the piston and cell. If the instrument is being used 24 hours a day, 7 days a week in 3 shifts of production, particulate matter accumulation will occur rapidly. If a “sticky” piston is a recurring issue, send the unit to Mesa for manufacturer cleaning.