

Easy nLC 1000 Check Valve Evaluation

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Symptom:

If a chromatography complaint of wide/broad peaks or retention time fluctuations or even sensitivity issues is stated on an Easy nLC then there is a possibility that there could be a check valve that is misbehaving, it could be a “Solvent Side” or “Waste Side” Check Valve for either channel “A” or “B”, a bad valve would not only allow for backflow of solvent back into the solvent bottles but it could also allow air to seep in around the check valve diaphragm which could result in broad peaks and elution time variations and if bad enough it may cause the syringe to run empty on a regular run as it may not have filled properly due to the bad check valve or air leak, this though typically results in an error message.

Some simple tests can be done to evaluate for bad check valves for Solvent Side or Waste Side;

Goal:

- To insure for both channel “A” & “B” (one at a time) that there are not a lot of air bubbles observed in the clear tubing connected to the “T”.
- To visually verify on a syringe Fill cycle that there is no liquid pulling back the waste line towards the “T”.
- To visually verify on a syringe purge cycle that there is no liquid going back towards the solvent “B” bottle.

“Check Valve” Locations:

- Open the right side panel (looking at the face of the Easy nLC), then look up in the upper right region of the plumbing, there you will see 2 peek “T”s”, one is for Channel “A” & one is for Channel “B”. While looking at the “T” you will see three lines in, one will be to waste, one goes up to the solvent supply & the other down to the 6 port valve. On this “T” you will see 2 large fittings attached, both with directional arrows, these are the check valves, the check valve positioned between the “T” and the solvent bottle is the “Solvent Side Check Valve”, the one that sits between the “T” and the waste line is the “Waste Side Check Valve”, if they are not sealing properly then it could allow for solvent flow in the direction they are suppose to be blocking. Warning: there is a high chance of complete failure of the check valves once they have been opened.

Evaluations to test integrity of Check Valves:

- 1) Focus on one channel at a time, start with channel “B”. First manually set the syringe B to purge itself empty, during this process look to see if air is observed between the 6 port valve & the “T”, carefully look for any sign of air bubbles, air is not desirable and should not be seen although it is possible to see some small amount of air during normal operation which could be the result of the air in the solvent that is released as a result of this area being exposed momentarily to high pressure during a valve switch, if there is a substantial amount of air bubbles then that could be a sign of a leak, the leak could be the fitting into the 6 port valve from the “T” or it could be the check valve is leaking.
- 2) The visual test to see if the check valves are not blocking solvent properly in the reverse direction;
 - a) With the Syringe now purged put it into a refill cycle, what should happen is the solvent in channel “B” should pull in and go down into the syringe, again observe for air bubbles anywhere along that clear tubing, during this refill process locate the other end of the waste line near the waste cup, look at the end of the line closely, look to see if you observe if any solvent or air is pulling back into the tubing and flowing towards the “T”, if it is then this tells you that the “Waste Side Check Valve” is bad and needs to be replaced. If that looks Ok then it is most likely fine, allow the syringe to finish its fill cycle.
 - b) Next you will want to do another syringe purge, and again look for any signs of air bubbles in the clear tubing, this time also look to insure solvent is flowing normally out of the waste line into the waste cup, now unscrew the cap from the solvent bottle “B” & lift the line up so you can observe the end of the line in the solvent bottle, here you will want to insure you do not see any liquid flowing back towards the solvent bottle, if you see it accumulating and a liquid ball developing on the end of the line then you have a bad “Solvent Side Check Valve” and it will need to be replaced.