Agilent Technologies

Troubleshooting the 6890/6850 GC Split/Splitless Inlet

Actual Pressure is Higher than the Setpoint

The purpose of this document is to outline a logical procedure for troubleshooting a 6890 or a 6850 series GC that will not equilibrate to the setpoint pressure of the capillary inlet system. The inlet over pressurizes and the actual pressure stays higher than the setpoint. The GC cannot become "Ready for Injection". This is a common problem in applications with high split vent flow **AND** low inlet pressure, as required by short 530uM or other bore capillary columns in split mode.

OVERVIEW

The 6890/6850 GC Capillary Inlet system uses pressure to control flow through open tubular columns. The capillary column flow is not measured directly, but is calculated from the column dimensions, inlet and exit pressures, temperature of the column, and carrier gas type.

The Capillary Inlet system can be run in two modes of operation—Split and Splitless. This problem occurs more frequently in the Split Mode of operation. The capillary inlet can equilibrate to the pressure setpoint if the following conditions are met:

1) The Capillary Inlet system is assembled correctly and is leak free.
2) The EPC control module is functioning properly.
3) There is sufficient carrier gas supply pressure applied to the inlet fitting of the EPC module.

-80-120 PSI for standard capillary EPC systems

-100-170 PSI for high pressure systems (20 PSI > inlet pressure setpoint)

4) The capillary column is installed and configured correctly.
5) The are no restrictions in the split vent flow path. This includes:
   - The interface between the bottom surface of the glass inlet liner and the gold seal.
   - The interface between the outside diameter of the glass inlet liner and the internal surface of the injection port body—***NOTE: Usually liners designed for splitless mode of operation will have a larger outside diameter and should not be used for Split applications.***
   - There is no buildup of condensed sample material in the split vent line between the injection port and the split vent trap.
   - The GC capillary inlet has the latest design "Cartridge Trap" installed in the split vent line and it is not plugged.
   - The total split vent flow is not too high for the pressure setpoint—in a new, clean capillary inlet with split components installed there will be about 1.5 PSI of inlet pressure developed with 400 ml/min of split vent flow (0 PSI inlet pressure setpoint)

   There is a **diagnostic** built into the hand-held controller for the 6850 GC that can help to determine if there is abnormal split vent flow path restriction. It is called the **"VENT TEST".** The test sets the inlet total flow to 400 ml/min and the inlet pressure to 0 PSI. Actual inlet pressure is then monitored. The test passes if the actual pressure is below 1.5 PSI.

   The test can be performed manually on the 6890 with the inlet in **SPLIT MODE** by removing the column and capping the inlet fitting, setting the inlet pressure to 0.1 PSI and the inlet total flow to 400 ml/min. The actual pressure should be about 1.1-1.5 PSI with split liner 5183-4647 installed and about 5-6 PSI with a splitless liner installed.

If the “VENT TEST” on the 6850 or the manual test on the 6890 fails the following are suggested solutions or places to check for possible restrictions:

1) Make sure that an appropriate liner is being used for the application. Depicted below are 2 liners that are shipped by Agilent Technologies with the 6850 or 6890 GC. One is for Split, and the other is for Splitless analysis. There are very specific differences in design between the two liners to make them optimum for their respective operating modes:

Deactivated splitless liner

-Part # 5062-3587
-900 Microliter internal volume.
-Glass wool at the base to filter non volatile components.

-Larger outside diameter to limit sample exposure to injection port body during splitless delay.

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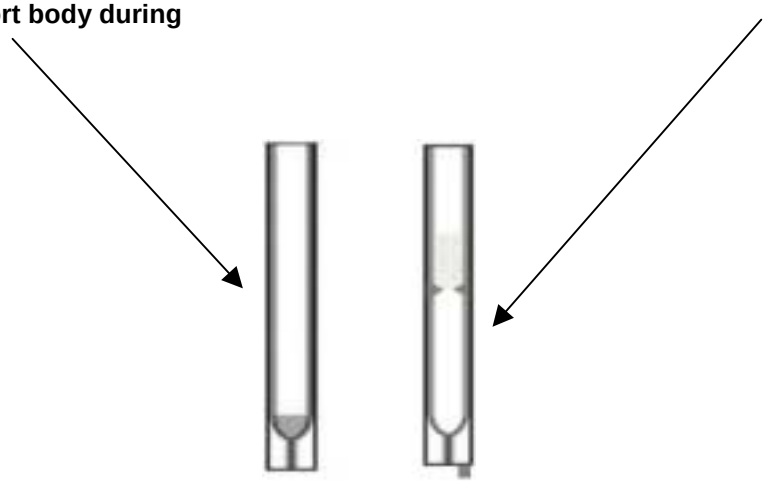
Deactivated Split Liner

Part # 5183-4647
Glass wool held place by indents to provide complete vaporization.

Glass bead at the base to provide clearence for split flow with minimal restriction.

Smaller outside diameter.

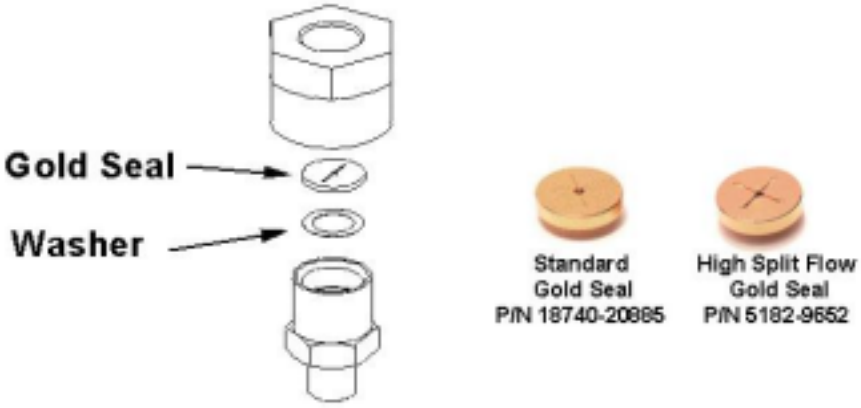


Liner selection for split application not only affects inlet back pressure at low operating pressures, but also split precision, linearity and boiling point discrimination. Any liner that has a restrictive design at the bottom, like a check valve, gooseneck or spiral will adversely affect the chromatographic performance.

2) Inspect and clean the split exit fitting of the injection port body and clean or replace the 1/8" copper tube between the split exit fitting and the split vent trap.
3) Replace the cartridge filter in the split vent trap assembly. If the trap design does not incorporate the replaceable cartridge filter, install the upgrade kit part # g1544-60610.

Replace the Split Vent Trap Assembly (6890 GC) (6850 GC)

4) If not using a recommended Agilent glass split injection port liner, there is an optional gold seal that accommodates higher split vent flow rates without developing unwanted inlet back pressure.



The high split vent seal should **NOT** be used with the recommended Agilent glass Split liner P/N 5183-4647 or if the inlet is being used in Splitless Mode.

If the over pressure problem persists after reviewing these suggestions, then it is recommended that Agilent Technical Service be contacted.