

Inlet Liners for Split Injection—Benefits & Drawbacks

Split liners are designed with mixing chambers and tortuous flow paths to fully vaporize the sample into a homogeneous vapor cloud before it reaches the split point. All Restek split liners are fully deactivated using a high-temperature silanizing reagent. This caps surface silanol groups so active compounds in the sample don't degrade or adsorb onto the hot glass surface.

To trap nonvolatile residue and prevent column contamination when analyzing dirty samples, pack split liners with wool, CarboFrit™ packing, or fused silica beads. Some of the more commonly used inlet liners are described below.

A) Split Liner with Wool

The wool provides a large surface area to allow rapid vaporization of the sample and deliver a uniform vapor cloud to the split point. The low mass of the wool fiber promotes complete vaporization.

Benefits:

- Low cost.
- Reproducible performance.

Drawbacks:

- Wool can be adsorptive, especially if fibers are broken.
- High maintenance requirements.

B) Laminar Cup Splitter

The sample flows through a small opening and encounters the head of the elongated glass cup. It then travels around the outside of the elongated cup; the flow is inverted twice. Larger volume injections are possible because the liquid is trapped at the inner base and cannot escape until vaporized.

Benefits:

- Recommended by chromatography expert Dr. Konrad Grob¹.
- Vaporizes up to 5µL samples.
- Best splitter liner for high molecular weight compounds.
- Laminar flow profile provides highest resolution.

Drawbacks:

- Costly.

C) Frit Splitter

The sample must pass through the porous ceramic frit. The high surface area and tortuous flow path ensure complete vaporization.

Benefits:

- Traps septum particles and residue.

Drawbacks:

- Ceramic frit can be active.
- Difficult to clean.

D) Cup Splitter

The sample flows through a mini-funnel and encounters a glass cup. The flow path then inverts twice before reaching the split point.

Benefits:

- Tortuous flow path aids in sample vaporization.
- Minimizes molecular weight discrimination.
- Can be packed with wool to trap particles.

E) Cycloplitter® (Patent # 5,119,669)

This patented design incorporates a cylindrical glass spiral in the sample pathway, providing a large area for sample vaporization.

Benefits:

- Ideal for dirty samples.
- Allows many injections of dirty samples before cleaning is required.
- Easy to clean.

Drawbacks:

- Not recommended for large volume injections.

F) Baffle Splitter

The baffle induces turbulent flow that directs the sample against the wall of the glass liner.

Benefits:

- Reproducible performance.

Drawbacks:

- Prone to molecular weight discrimination.
- Septum particles and residue can enter column.
- Subject to incomplete vaporization.

G) mini-Lam Split Liner

The flow principle is basically the same as in the laminar cup splitter. The *mini-Lam* liner design incorporates a shortened, inverted laminar cup. Use a two-hole ferrule to adapt the *mini-Lam* liner for dual-column analysis in a capillary injection port.

Benefits:

- Similar to laminar cup splitter, but less expensive.
- Vaporizes up to 4µL samples.
- Ideal for high molecular weight compounds.
- Easy to clean.

Drawbacks:

- No known drawbacks.

H) Precision™ Liner

Wool is placed at the injection point to maximize vaporization and help wipe the needle during injection. Wool stays in position during pressure pulses in the inlet and during injection.

Benefits:

- Maximizes vaporization.
- Improved reproducibility.

Drawbacks:

- No known drawbacks.

All liners are
100%
deactivated

All liners are shipped intermediate polarity (IP) deactivated unless otherwise requested.

A) Split Liner with Wool



B) Laminar Cup Splitter



C) Frit Splitter



D) Cup Splitter



E) Cycloplitter®



F) Baffle Splitter



G) mini-Lam Split Liner



H) Precision™ Liner



¹Injectors Providing Complete Sample Evaporation Above the Column Entrance in Vaporizing GC Injections, K. Grob and C. Wagner, HRC & CC, Vol. 16, p. 429.