



### Next Generation of Porous Layer Open Tubular (PLOT) Columns

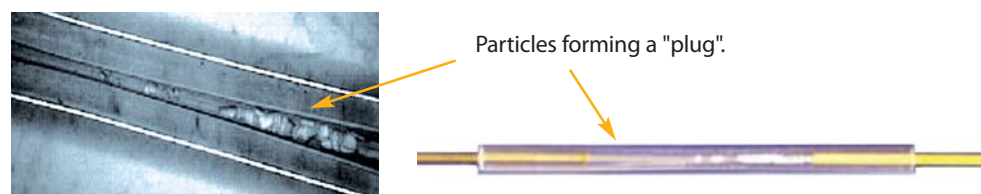
- Stabilized particle layers improve robustness and reproducibility of retention and flow.
- Fully compatible with valve switching and Deans switching systems.
- Highly efficient, reproducible analyses; ideal for permanent gases, solvents, and hydrocarbons.
- New manufacturing procedure reduces particle generation and improves performance of porous polymers, molecular sieves, and PLOT columns.

Porous layer open tubular (PLOT) columns are very beneficial for solving application problems, especially for the analysis of volatile compounds. PLOT columns have a unique selectivity, allowing for the separation of gaseous compounds at room temperature. Due to the adsorption mechanism of the supports used in PLOT columns, permanent gases and light hydrocarbons can be resolved at room temperature; columns can then be programmed to higher temperatures to elute higher boiling compounds.

### Traditional PLOT Columns Offer Poor Stability

The traditional PLOT column is built with a 5-50 $\mu$ m layer of particles adhered to the tubing walls. Because this layer of particles generally lacks stability, PLOT columns must be used very carefully, as particle release is common and can cause unpredictable changes in retention time and flow behavior. PLOT columns generally must be used in conjunction with particle traps to prevent the contamination of valves, injectors, and GC detectors. Figure 1 shows an example of particle accumulation resulting in a blockage inside a Press-Tight<sup>®</sup> liner. If particle traps are not used, particles will hit the detector resulting in electronic noise, seen as spikes on the baseline. In the case of valves, particles can become lodged in the valve and result in leaks.

**Figure 1** Particles released from traditional PLOT columns can cause blockages.



### New PLOT Columns Minimize Particle Release

Restek has developed new procedures to manufacture PLOT columns with concentric stabilized adsorption layers. These new generation PLOT columns show a constant flow behavior (permeability) and have significantly improved mechanical stability, resulting in easier operation, better chromatography, and reduced particle release. Greater particle stability means more reproducible retention times, virtually no spiking, and longer column lifetimes. This innovative stabilization chemistry technology is currently applied to Rt<sup>®</sup>-Alumina BOND, Rt<sup>®</sup>-Msieve 5A, Rt<sup>®</sup>-Q-BOND, Rt<sup>®</sup>-QS-BOND, Rt<sup>®</sup>-S-BOND, and Rt<sup>®</sup>-U-BOND fused silica columns. It is also available for select metal columns including MXT<sup>®</sup>-Alumina BOND and MXT<sup>®</sup>-Msieve 5A columns.

### Consistent Flow Restriction Factor (F) Guarantees Reproducible Flow

Thick layers of particles are difficult to deposit in a homogeneous layer and, in traditionally manufactured PLOT columns, this results in variable coating thicknesses. The positions where the layer is thicker act as restrictions and affect flow (Figure 2). Depending on the number and intensity of these restrictions, traditional PLOT columns often show greater variation in flow restriction than wall coated open tubular (WCOT) columns. In practice, conventional PLOT columns with the same dimensions can differ in flow by a factor of 4-6, when operated at the same nominal pressure. For applications where flow is important, such as with Deans switching, the nonreproducible flow behavior of most commercially available PLOT columns is a problem.

**Figure 2** Inconsistent coating thicknesses result in restrictions that cause significant variation in flow.

