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**Erratum**

The heading of Figure 1 on page 8 of the 2007.03 issue of the Restek Advantage incorrectly describes the column internal diameter as 0.18mm. The correct internal diameter is 0.32mm.

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# Using Guard Columns and Retention Gaps in GC (Part 1)

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Guard columns and retention gaps are used widely in gas chromatography (GC). Many users have difficulty understanding the difference between these two products, even though there is a significant difference in application. Retention gaps mainly are used for focusing the sample components when introducing a large (liquid) sample directly onto the column. Guard columns are used to protect the analytical column from contamination.

When using a retention gap system, the retention gap will also act as a guard column, but its primary function is to create a focusing effect.

Guard columns and retention gaps both must be coupled to the analytical column, and this connection introduces a potential point of risk. A new approach is to integrate the retention gap directly into the analytical column. By applying a “segment” coating technology, the stationary phase can be deposited in a certain part of the column allowing a deactivated section at the beginning. Column coupling is not required, and maintenance is greatly simplified. In Part 1 of this article, we will explore retention gaps and build a foundation for a comparison to guard columns. In Part 2, we will review guard columns and discuss the new segment coating technology.

## Use of retention gaps

In today’s laboratory, GC methods must be simple, fast, and low detection limits are required. Besides that, sufficient precision must also be obtained. It all starts by introducing the sample in the smallest possible injection band and making the band migrate through the capillary with minimal loss of the target components. With on-column injection, a liquid sample is directly introduced into the capillary column as a liquid while the capillary column is kept at a temperature 10-15°C below the boiling point of the solvent. During this process, the sample components are spread in an unreproducible way over the first 20-100cm of capillary while the solvent is evaporating. Parameters like injection speed, carrier gas flow, temperature of solvent and column, type of solvent and pressure all will affect the injection band width. Additionally, when nonbonded stationary phases are used, the direct contact with liquids will result in a distortion of the stationary phase film and very short column lifetime. The majority of today’s stationary phases, like the Rtx® and Rxi® phases, are immobilized by cross- and surface bonding techniques.

For proper application of the on-column injection technique, the use of retention gaps is essential.<sup>1,2</sup> The retention gap consists of a 1-3m length of deactivated capillary that is positioned in front of the analytical column. All the processes described will still take place, but now the components are distributed over the retention gap. When the oven temperature is

*Continued on page 23.*

