near UHPLC Classification for Cogent TYPE-C 2.o Columns - Tech Information

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Are Cogent TYPE-C Silica 2.o Columns Considered UHPLC Phases?

The chromatography industry generally defines UHPLC columns as those packed with sub-2 µm particles, a threshold chosen because shrinking particle size dramatically increases theoretical plate count and improves efficiency. Cogent TYPE-C Silica 2.o™ columns use 2.2 µm particles, placing them slightly above the conventional UHPLC limit and classifying them as “near-UHPLC” phases.

This subtle difference carries important performance and practical implications for laboratories running method development, high-throughput workflows, and LC–MS analysis.

Why Particle Size Matters

Efficiency vs. Practicality

As particle size decreases, peak efficiency rises sharply, producing narrower peaks and higher resolving power. True UHPLC (<2 µm) takes this to the extreme—but not without cost:

- Substantially higher backpressure
- Greater stress on hardware
- Higher risk of frictional heating
- More sensitivity to extra-column broadening

Cogent 2.o columns strike a careful balance: offering much of the performance gain of UHPLC, but without pushing systems to their mechanical limits.

A Better Operational Window

At 2.2 µm, the Cogent TYPE-C 2.o stationary phase:

- Runs at lower pressure than sub-2 µm columns
- Reduces heat-related band broadening
- Provides more forgiving extra-column tolerance (tubing length, detector cell volume, etc.)
- Allows the use of standard HPLC or UHPLC systems

This makes them ideal for demanding work such as metabolomics, LC–MS, and ANP method development, without requiring system overhauls.

Pressure & Instrumentation Considerations

A key drawback of true UHPLC phases is high system pressure, which can:

- Exceed legacy HPLC limits

- Require UHPLC-rated pump seals
- Increase wear on check valves
- Demand upgraded capillaries with reduced ID

In contrast, Cogent TYPE-C 2.o columns often achieve nearly identical selectivity and efficiency but remain comfortably within pressure limits of:

- Standard HPLC instruments
- UHPLC systems
- High-performance LC–MS platforms

MICROSOLV explicitly notes that these columns are fully compatible with modern UHPLC instrumentation, even though they are not technically “UHPLC” by particle-size definition. [mtc-usa.com]

Frit Protection & Sample Cleanliness

With any small-particle column, the inlet frit becomes a vulnerability. For both UHPLC and near-UHPLC phases:

- 0.22 µm sample filtration is essential
- Frit blockage is more common due to reduced pore size
- Clogged frits cause sudden pressure spikes and efficiency loss

Therefore, Cogent 2.o users should maintain the same high sample-quality standards expected from full UHPLC systems.

Why a Near-UHPLC Phase Can Be Ideal

Cogent TYPE-C 2.o columns often represent the **best compromise** between efficiency and operational practicality:

Advantages Over Traditional UHPLC

- Lower system backpressure
- Less heat generation at high flow rates
- Greater tolerance for extra-column broadening
- No need to re-plumb systems with specialized low-ID tubing
- Reduced risk of frit blockage (relative to sub-2 µm)

Advantages Over Larger-Particle Columns

- Much higher efficiency
- Better peak shape
- Faster separations
- Improved resolution in both RP and ANP modes

Conclusion

While not officially UHPLC by the <2 µm definition, Cogent TYPE-C Silica 2.o™ columns deliver UHPLC-like performance with fewer drawbacks. Their 2.2 µm design offers exceptional efficiency,

improved robustness, and full compatibility with UHPLC systems, making them an excellent choice for laboratories seeking high performance without the overhead of true UHPLC operation.

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