Product Data Sheet

Sapphire Engineering™ Check Valve

30,000 psi for UHPLC

New Materials & Design

Within a pressurized fluidic system, inlet and outlet check valves help create and sustain the required system pressures within the fluidic circuit. When connected to a UHPLC pump, a check valve reliably prevents solvents or fluids from flowing backwards into the valve or the system, causing contamination and unacceptable fluctuations in pressure and flow.

These two port, one-way ball & seat cartridge check valves are rated to 30,000 psi for use in UHPLC systems where reliable closure and sealing of the ball with the seat is critical to the performance of the instrument.

Designed with a universal cartridge for variable orientation, these flexible cartridge check valves can be used in both inlet and outlet flow paths, helping to simplify the instrument by reducing component count. The innovative design of the ball and seat configuration, the ball cage, and the cartridge housing contribute to the valve's rugged construction and rapid, reliable performance.

Finite Element Analysis of the material forming the ball cage reveals the structural stress points that weaken and fail under increasing pressure. In Figure 1, at 30,000 psi, the original material exhibits extreme stress — precursor to check valve failure in competing designs. Similar analysis of the new, proprietary alloy in the same configuration (Figure 2) demonstrates significant lack of stress at 30,000 psi, further indicating at what pressure the new material would exhibit similar effect.

Features

- Compact design: 1.3" in length x 0.63" in width
- Easy to implement — standard and custom sizes available
- Compatible — incorporates into all standard pump head port configurations
- Designed for ultra-high pressures, yet still stable in low-pressure systems
- Universal cartridge allows various body configurations

UHPLC Check Valves

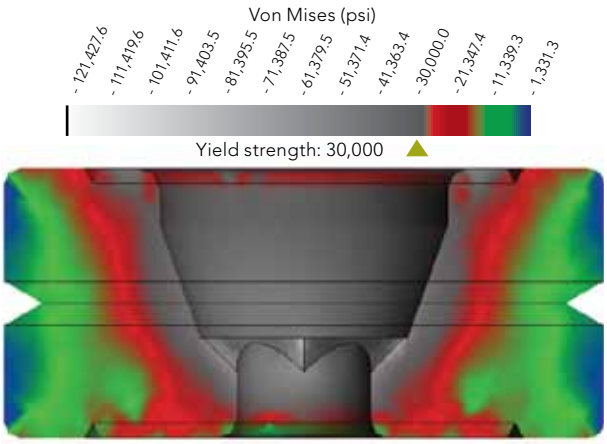


Figure 1. Yield Strength Analysis, Original Material

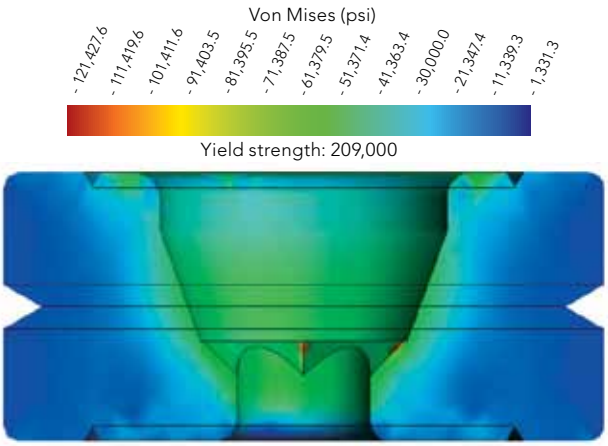
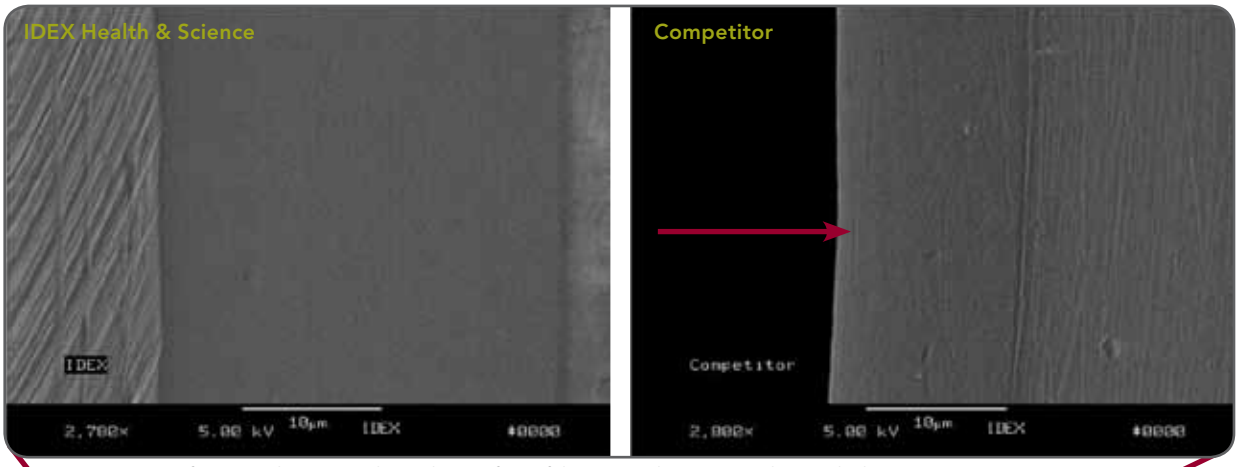
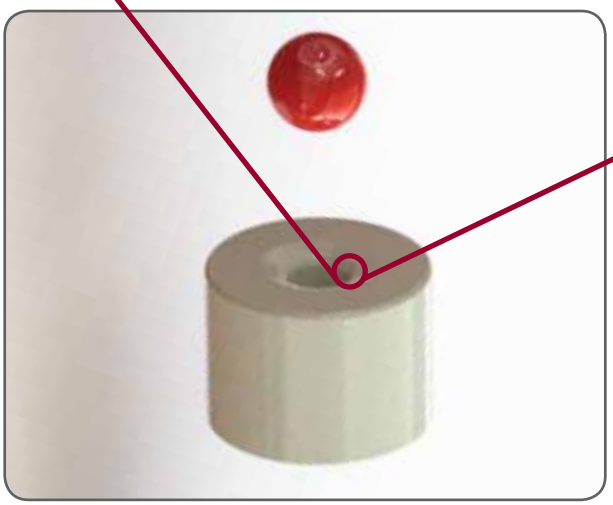


Figure 2. Yield Strength Analysis, Improved Proprietary Alloy

A comparative evaluation of the sealing surface on the check valve's seat utilizes Scanning Electron Microscopy (SEM) and reveals scratches from the manufacturing process in a competitive product that are not seen in the Sapphire Engineering check valve. This type of defect is associated with internal leakage and consequent check valve failure.



Surface scratches across the sealing surface of the seat (red arrow) contribute to leaks in a competitor's seat.



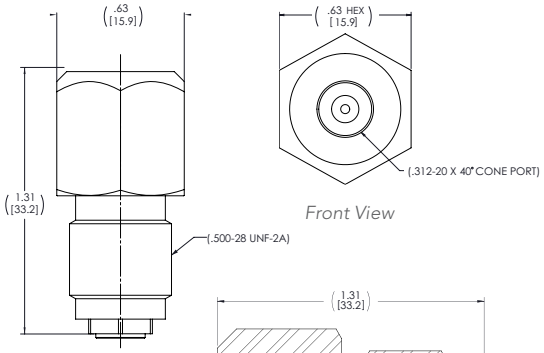
Sapphire Engineering ball seat

Technology Briefing

- 100% leak tested prior to assembly
- Stronger new alloy better absorbs structural stress, extending the life of the check valve
- Seal design enables high pressure limits with uncompromised performance
- Ruby ball and matched ceramic seat
- Surface finishes to 0.25 µin. (0.006 µm RA)

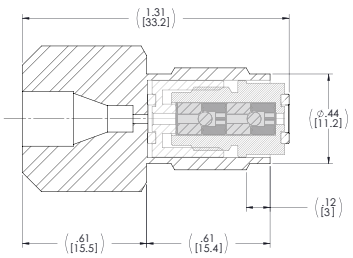
Overall Dimensions

Dimensions given in inches and [millimeters]



Front View

Top View



Side View

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