



## High-Flow Sterile Connectors for Single-Use Applications

When the first sterile connectors were launched in the early 2000s, single-use systems and bioreactors were focused on small-scale production at the lower end of plant range. Maximum single-use bioreactors ranged from 200 to 500L and, although sterile hold bags of 1000 to 2000L were used, flow rates of 20L per minute were sufficient in most cases. Sterile connectors designed around 1/2" ID formats performed well for the majority of single-use applications at that time.

Over the past decade, two developments have increased demand for high flow-rate connectors: 1) size advances in single-use bioreactors up to 2000L; and 2) implementation of single-use systems for downstream processes such as filtration requiring high flow rate circulation. As a result, today's bioprocessing market needs higher flow-rate connectors.



### What are the flow rate advantages of a large format connector?



Sterile connectors with 1" flow enable around three and a half times the flow of the 1/2" equivalent; 3/4" options attain approximately twice the flow rate of 1/2" alternatives. The new AseptiQuik® X connector from CPC features 1" and 3/4" hose barbs and 1-1/2" sanitary configurations that provide flow rates of up to 80L per minute.



### What are the challenges for scaling up sterile connectors?



The greatest challenge for design engineers when scaling up sterile connectors is achieving a user-friendly design with product robustness that ensures flow path sterility and reliability. When expanding the AseptiQuik line of sterile connectors, CPC's engineering team based the new design on its patent-pending silicone seals. Prior to connection, these specialty wide-format seals are hidden behind the sterile membrane; however, once connected the robust seal design provides flow path security at pressures up to 60 psi. The additional design objectives of minimizing connector size and connection force are achieved with an easy-to-use "Twist-Pull-Twist" assembly sequence that permanently locks the two connector halves together without the need for additional clamps or fixtures.



### What applications will benefit from high-flow connectors?



Harvesting from large single-use bioreactor is the application drawing strong interest. With a single 1/2" harvest line and 20L per minute flow rate, it takes almost an hour to harvest a 1000L bioreactor. For fast harvesting, many users are currently employing multiple sterile connectors in parallel — but this increases costs and the need for operators in order to reduce harvest time to less than 15 minutes.



Large-format sterile connectors provide 1" flow to meet the demands of higher-volume single-use bioreactors, transfer lines and downstream processes such as filtration.

Other applications that can benefit from high-flow connectors include:

- Buffer supply from large single-use bags to high capacity purification skids has increased significantly in the past decade. These bags systems can be as large as 3000L, making high speed flow for both filling and supply critical.
- Filter applications that require circulation such as tangential and cross-flow filtration benefit from both high flow rates and high pressure rating.
- High-speed vial filling lines have traditionally relied on reusable hoses to attach formulated product to the filling system. To minimize or eliminate cleaning validation, fill processing engineers can use high flow sterile connectors and large ID flexible tubing to create single-use replacements for 1” ID reusable hoses.



AseptiQuik X connectors enable sterile media transfer with flow rates of up to 80L per minute.

#### About CPC

CPC (Colder Products Company), the leader in single-use connection technology, offers a wide variety of bioprocessing connection solutions. Our innovative designs offer flexibility to easily combine multiple components and systems including process containers, tubing manifolds, transfer lines, bioreactors and other bioprocess equipment. Sterile fluid connections from CPC are available in a complete range of 1/8- up to 1-inch flow configurations.

#### About Todd Andrews

Todd Andrews is the Bioprocessing Global Sales and Business Development Manager at CPC. He has spent over 10 years in the bioprocessing field with expertise in single-use connection technology. During his tenure with CPC, he has held leadership positions in engineering, marketing, and business development. Todd is an active member with the BPSA, ASME-BPE and ASTM E55 committees. He holds a Bachelor of Science in plastics engineering from the University of Massachusetts – Lowell and a Masters of Business Administration from the University of St. Thomas in St. Paul, Minn.



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