



Closed Systems for Small-Scale Single-Use Applications

Q Why would creating closed systems be important for research (R&D) and process development (PD) cell culture applications?

A Closed single-use systems reduce the risk of two critical forms of contamination: biological contamination and cross-contamination. Biological contamination includes competitive organisms such as bacteria, fungi and yeasts that are inadvertently introduced into cell culture processes. These organisms utilize culture nutrients, produce unwanted proteins and limit growth or destroy the intended cell culture. Most biological contaminations result in rapid growth and observable culture changes that indicate a culture must be discarded. However, slow growing contaminations can be subtle and may only become apparent when unwanted proteins are detected. In either case, biological contaminations are costly both in wasted time and materials. Cross-contamination results from protein residues from cell culture and processing equipment that is reused without proper cleaning. These residual proteins might inhibit proper cell growth or, if they are structurally and chemically similar to the target protein, they pass through purification with the target protein and yield inconsistent results. For R&D and PD applications, closed, single-use systems can protect against both biological and cross-contamination, saving valuable research time and money.



A broad range of single-use CPC connectors can be used to create closed systems.

Q Tube welders are one method to create closed-system connections. Are there alternatives to tube welders for R&D and PD scale cell culture?

A Tube welders may work well for some R&D scale applications, but are expensive to purchase and maintain, do not work with silicone tubing, typically require longer lengths of tubing, and may be difficult to operate in tight spaces. Single-use sterile connectors are a great alternative to tube welders for sterile connections. Until recently, sterile connectors were commonly used for medium-scale systems as most were designed around 1/2" ID tubing. The genderless AseptiQuik® S is the first sterile connector designed for small-scale connections in the 1/8" to 1/4" ID range and offers a lightweight, cost effective option for sterile connections. The success of the AseptiQuik S resulted in the development of a larger genderless connector, the AseptiQuik G (for ID's between 1/4" and 3/4").

Q Flexibility is critical for R&D applications. Open systems using luer fittings or closed systems using tube welders allow on-the-fly changes during cell culture. Can sterile connectors offer similar flexibility?

AseptiQuik S has several features that can provide even more flexibility. First, being genderless, any two AseptiQuik S connectors can interconnect independent of their termination size. This is a huge advantage over luer fittings and quick connects, which must connect male-to-female. Male-to-female connections require more part numbers both at the component level and the finished good level. Genderless connections simplify the supply chain ordering process as well as ensure that a connection can always be made at the user site. Issues of receiving single-use systems with incompatible types of connections (i.e. both have a male connector) can be eliminated with the use of a genderless connector. AseptiQuik S is available with multiple terminations including 1/8", 1/4" and 3/8" hose barbs, 3/4" sanitary and MPC quick connect insert. These options are useful for adapting tubing sizes, connecting

securely to filters and adapting quick connects to sterile connections. With an AseptiQuik S, several ports on a bioreactor can be used interchangeably for medium feed, sampling or harvests. Additional sterile connections can be added to a bioreactor at any time through the addition of a manifold with several genderless AseptiQuik S connectors.

Q How would you configure a single-use bioreactor for closed-system cell culture?

A Let's use a rocking bioreactor with a 10L working volume as an example. In addition to standard gassing/vent filters, probe access and syringe sample ports, three to five AseptiQuik S connectors allow closed-system connections for the following:

- 1) Cell culture medium and sterile supplement addition
- 2) Inoculum transfer from small spinner flasks
- 3) Samples for product testing/retain-samples
- 4) A closed-system filtration/harvest assembly

A model system like this eliminates contamination risks and allows practical flexibility.



Small-format 1/8" and 1/4" AseptiQuik S connectors provide easy sterile connections for small-flow applications, while MPC inserts (bottom right) offer flexibility for adapting quick connects to sterile connections.

About CPC

CPC (Colder Products Company), the leader in single-use connection technology, offers a wide variety of bioprocessing connection solutions that ensure reliable and sterile connections. Innovative designs from Colder for sterile fluid transfer, even in non-sterile environments, now come in a range of sterile connections including 1/8", 1/4", 1/2", 3/4" and 1" flow configurations. For applications where reliability and sterility are a must, Connect with Colder.

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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