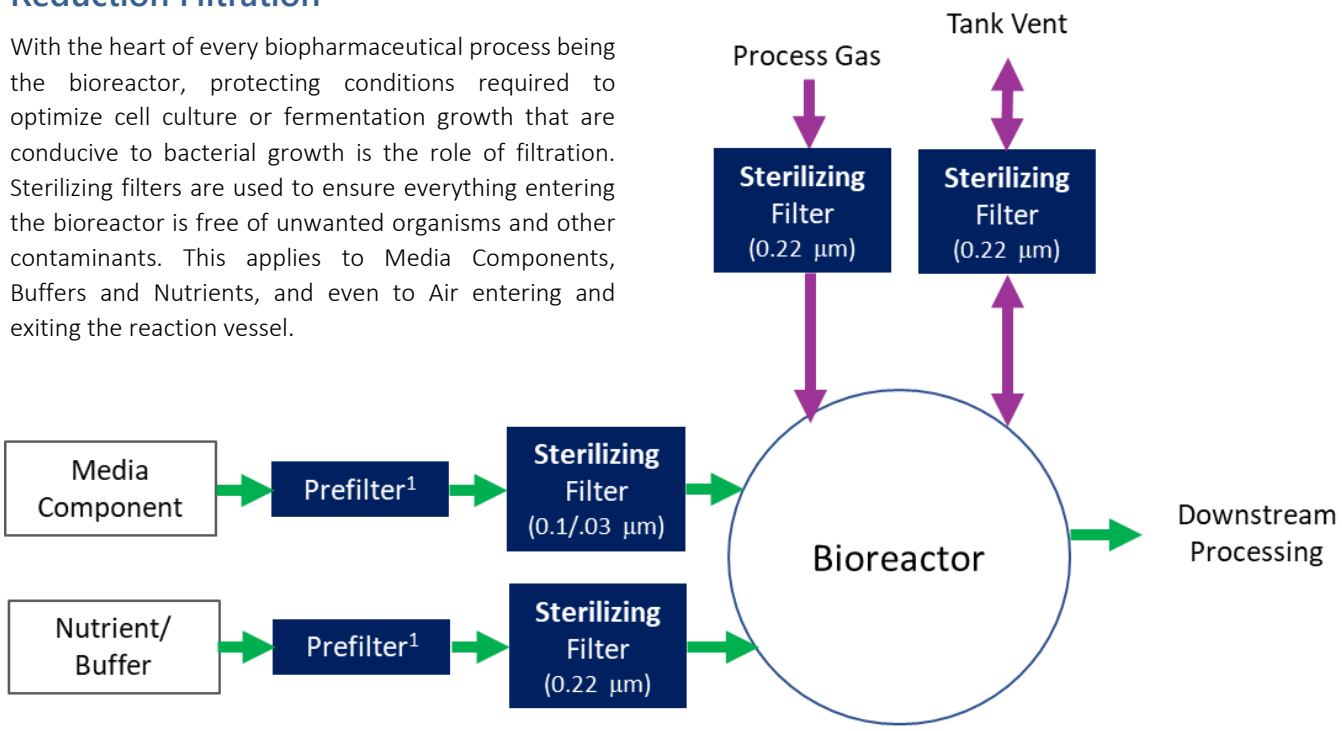
CRITICAL PROCESS FILTRATION, INC.

Application Summary

Sterilizing and Bioburden Reduction Filtration in Biopharmaceutical Processes

Upstream Sterilizing and Bioburden Reduction Filtration

With the heart of every biopharmaceutical process being the bioreactor, protecting conditions required to optimize cell culture or fermentation growth that are conducive to bacterial growth is the role of filtration. Sterilizing filters are used to ensure everything entering the bioreactor is free of unwanted organisms and other contaminants. This applies to Media Components, Buffers and Nutrients, and even to Air entering and exiting the reaction vessel.



[1] Prefilter optional: May be incorporated as a layer in sterilizing filter

Note that the diagram above shows sterilizing filters as the best option. Based on proper risk assessment of filtration requirements, some systems may utilize bioburden reduction filters instead.

Media Components

Many media components are derived from living organisms. As such they must be filtered to remove bacteria and mycoplasma that could interfere with the bioreactor process. Appropriately sized 0.1 or 0.03 micron sterilizing filters validated for mycoplasma removal should be employed for all components entering the reactor. It may also be necessary to install prefiltration - either as a layer in the sterilizing filter or a separate standalone - to maximize process efficiency.

Nutrients and Non-biologic Components

As these components are non-biologic they are less likely to contain mycoplasma but may still contain bacteria or other contaminants. These are adequately filtered using 0.22 micron sterilizing filters, with prefiltration as required. In cases where risk assessment shows potential mycoplasma contamination, the 0.1- or 0.03-micron filters should be employed.

Process Air and Vent Filters

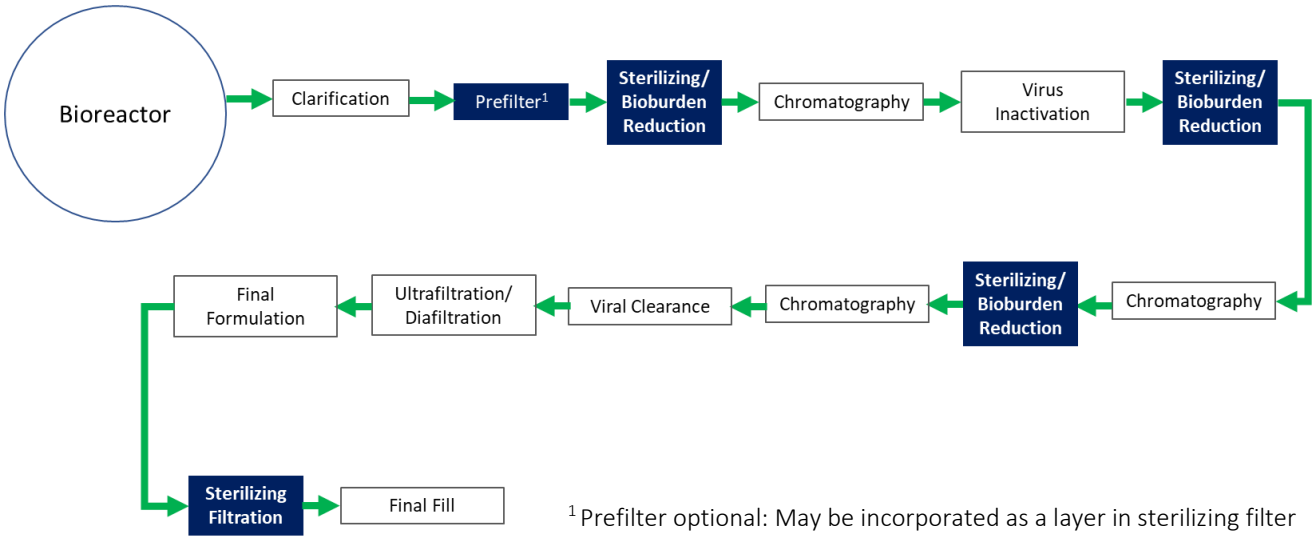
Incoming process air must be sterile filtered using an appropriate 0.22 micron hydrophobic filter to prevent bacteria from entering the process. The same filter can be utilized on any vent lines allowing air to enter and leave the tank during filling and cell harvesting.

Options for Upstream Biopharmaceutical Process Filtration

Critical Process Filtration provides multiple filter options for sterilizing and prefiltration. Membrane Materials include PES, Nylon 6,6, and PTFE. PES exhibits low protein binding for use with aqueous solutions. Nylon 6,6 has broad chemical compatibility for solvent filtration. PTFE is hydrophobic for gas/vent applications and has excellent chemical resistance. Depth Media Materials include Polypropylene and Fiberglass. Filter Configurations include Cartridge, Capsule and Laboratory Scale. Capsule filters are autoclavable or can be supplied pre-sterilized (gamma).

Downstream Sterilizing and Bioburden Reduction Filtration

After the bioreactor there are multiple steps where sterilizing filters are employed. In some cases, the goal may be bioburden reduction, but use of sterilizing grade filters is recommended to minimize the possibility of bacterial contamination. The filters described above for upstream processing can be installed wherever sterilizing or bioburden reduction filtration is required.



[1] Prefilter optional: May be incorporated as a layer in sterilizing filter

Products

Sterilizing Options (liquid)

- PPS (Dual layer PES membrane)
- SPS (Single layer PES membrane)
- HPPS (PES membrane with high capacity PES prefilter)
- PNM (Nylon 6,6 membrane)

Sterilizing Options (gas)

- PTM / PTR (PTFE membrane)

Bioburden Reduction Options (liquid)

- BPS (PES membrane; High capacity PES prefilter layer optional)
- BNM (Nylon 6,6 membrane)
- BPVWL (PVDF membrane

Bioburden Reduction Options (gas)

- BTM (PTFE membrane)
- BPVWB (Hydrophobic PVDF membrane)

Prefilter Options

- PPD (polypropylene depth filter)
- PGD (fiberglass depth filter)
- BCWPS (high capacity PES)

Validation

- 0.22 micron membrane filters are validated for > 7-log reduction of Brevundimonas diminuta
- 0.1 micron membrane filters are validated for > 7-log reduction of Brevundimonas diminuta and reduction of Acholeplasma laidlawii (mycoplasma)
- 0.03 micron membrane filters are validated for > 7-log reduction of Acholeplasma laidlawii (mycoplasma)

Conclusion and Summary

Biopharmaceutical processes require multiple steps, each of which present an opportunity for bacteria to enter the process. Installation of the proper Prefilter, Bioburden Reduction and Sterilizing filters will ensure product sterility, guaranteeing product quality and patient safety. Critical Process Filtration supplies a wide range of filter materials and configurations allowing optimization of your filtration process while minimizing filtration costs. For more information, please contact the Critical Process Filtration Technical Service team.

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