Case Study

Pall Laboratory Supor® PES Filters Provide Efficiency and Recovery Benefits for Laboratory's *Legionella* Testing

An accredited testing laboratory needed greater efficiency and faster throughput in its *Legionella* testing workflow. The regulation requires that *Legionella* water testing must comply with ISO 11731-2017. These requirements specify that water samples tested for *Legionella* bacteria using membrane filtration followed by a washing procedure must be filtered through sterilized polycarbonate (PC) or polyethersulfone (PES) filters.

The laboratory processes about 100 to 200 water samples and swabs per year for *Legionella* bacteria. The work primarily consists of testing samples from cooling towers, healthcare facilities, and apartment buildings and residences (plumbing and showers) associated with *Legionella* outbreaks.

The Process

The laboratory's *Legionella* testing procedure involves eluting bacteria from water samples for plate culturing. Before sample processing, the PC filter membrane employed in the testing methodology required time-consuming sterilization in an autoclave. The sterilized membrane was then placed in a glass filter funnel, and the water sample was poured through the funnel. The membrane captured the *Legionella* bacteria for further processing. Following a quick wash of the filter funnel, the membrane was removed from the funnel with forceps and placed in a 50 mL conical tube along with 10 mL to 12 mL of phosphate-buffered saline (PBS) and glass mixing beads. The filled tube was placed on a vortexer and processed for about 2 minutes. This procedure washed the filter, releasing the *Legionella* bacteria from the membrane into the PBS solution. The concentrated sample was then placed directly on plates for culturing.

The Challenge

The laboratory employed PC filters that required sterilization before use in its *Legionella* testing process. The necessity to perform bulk sterilization and quality-control on the filters required additional steps and time prior to the *Legionella* testing workflow.

The laboratory's staff embarked on a search for a pre-sterilized PC filter. But, had a very difficult time finding them. As a result, the laboratory explored alternative options to PC filtration that would ensure maintained compliance with ISO 11731. The answer: find a pre-sterilized PES filter membrane with equivalent or better performance than PC filtration.

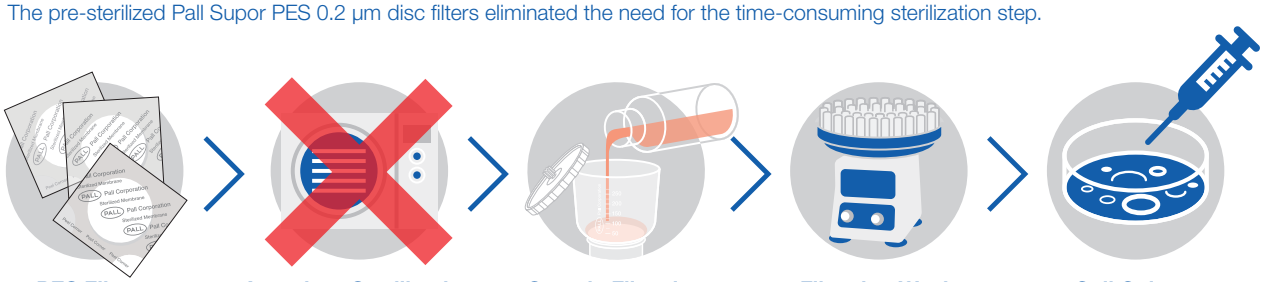
The Solution

In their search for an alternative to PC filtration, the lab discovered the Pall Laboratory pre-sterilized Supor PES 0.2 µm disc filters. The polyethersulfone membranes are white with black gridding for easy colony counts and gamma irradiated, so ready to use. The low-binding Supor membrane is known for its excellent flow rates, reproducibility, repeatability, and low extractables.

Pall provided free samples to the laboratory for evaluation and to perform a head-to-head comparison with the PC filters currently in use.

The Lab's *Legionella* Testing Workflow

The pre-sterilized Pall Supor PES 0.2 µm disc filters eliminated the need for the time-consuming sterilization step.



The Results

The laboratory conducted a preliminary screening test evaluating *Legionella* bacteria recovery with a spiked matrix using the lyophilized organism in PBS. The pre-sterilized Supor filter was found to achieve noticeably greater bacteria recovery than the PC filtration.

Next, the laboratory tested the two filter types for bacteria recovery in its real-world elution process using 60 mL potable water samples. In this head-to-head testing, the *Legionella* counts were the same between the PC and Supor PES membranes.

Several additional advantages were revealed during the testing process:

- When water samples with sediment were poured through the PC membrane, the filter would clog very quickly. This problem caused a significant slowdown in filtering time and in some cases required a change-out of the filter. The PES membrane did not exhibit any sediment clogging and flow-through was excellent.
- When the PC filters were handled with forceps, they tended to blow around the exhaust hood due to air flow. This made it difficult to place the filters on the bottoms of the filter funnels. The PES membrane incorporated a stiffer, more solid construction that made it easier to apply and remove the filters.
- When the PC filters were washed by vortexing, they had a tendency to collapse or crumple inside the tube. This caused the laboratory's staff to question whether a complete release of the bacteria occurred. The PES filters retained their shape and appeared to be getting a more thorough wash. The laboratory surmised this may be the reason it was achieving higher bacteria counts on non-selective plates with the PES filters.
- Filter packaging proved helpful to efficient processing. For each water sample, the laboratory used three filters – one for pre-filtration control to detect filter funnel contamination, one for the test, and one for a post test to ensure significant numbers of bacteria from the sample were not lost by adherence to the filter funnel. The PC filters were packed in bulk, making them more cumbersome to remove and manipulate. The individually wrapped PES filters made it easy to pull three out of the box at a time and avoid contamination from handling.

As a result of the evaluation, the laboratory switched from PC to Supor PES filters for the elution workflow of its *Legionella* test. ISO 11731 permits the use of both PC and PES membranes for this testing methodology. Once the decision was made to use PES filters, the laboratory revised its testing SOPs to allow utilization of the new material.

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