



Application Bulletin

Processing Cost Control for High Quality Yogurts

Overview

Yogurts and other cultured products, associated with healthy nutrition and well-being benefits, have become one of the most successful dairy foods. Large volume continuous processing, which is typical of modern yogurt plants, requires critical attention to product quality from milk receipt to final packaging.

Filtration is a key element of process reliability, preventing contamination during milk treatment, fermentation or packaging operations.

The Challenge

A wide range of filter types are required to fit the numerous applications of a yogurt plant, from particle removal from water, steam or other utility fluids to microbial removal from air and product ingredients. About 2/3 of these applications are in overpressure systems, tank venting or compressed air.

If liquid filters typically have a life time of weeks or months, depending on the fluid to treat, and are replaced when pressure drop has reached recommended limits, air and gas filters can last more than a year with no increase of pressure drop. These are very often replaced according to a preventive maintenance plan, which takes into account the filtration time or a fixed number of steam sterilization cycles. Depending on how critical these filters are for the reliability of the process, such preventive plans can be overly conservative with the replacement of still highly effective filters.

A leading yogurt manufacturer selected Pall Emflon® PFRW filters to efficiently protect its process from airborne contamination. Different filter sizes and formats were installed at 175 air & gas critical control points, from the 50 m³ maturation tanks to the 800 L fruit containers in the packaging area, all requiring efficient microbial control.

In this user's application, sterilization of these microbial removal filters is achieved by applying 115°C (239°F) steam in 30 minute cycles. The frequency of sterilization cycles depends on the evaluated risk at each point, from several days a week up to once every 3 weeks. While Pall Emflon PFRW filters have been qualified in laboratory studies to retain integrity after repeated steaming-in-place cycles (up to 165 hours of cumulated exposure at 142°C (289°F)) filters never came close to these limits, due to typical preventive replacement schedules. Depending on the microbial risk, some are systematically changed after 50 steam cycles, others after 100 cycles and still others after 1 year of operation. While such a plan can be seen as very conservative, it doesn't take into account the risk of deviation of pressure and steam process parameters and its potential impact on filters.

Pall technology provided a solution to optimize filter use and support quality assurance.



Palltronic Flowstar Integrity Test Unit

The Solution: Palltronic® Flowstar Integrity Test Device for Critical Filter Monitoring

Emflon PFRW filters installed at the dairy plant are designed to provide exceptional removal efficiency of bacteriophages, bacteria and spores in dry gas, and bacteria in liquids, required to prevent contamination from condensates. Integrity testing of these 0.2 µm liquid rated, sterilizing grade filters at regular intervals provides verification for use throughout their operating life.

All Pall microbially rated filters go through an extensive qualification process during their development: resistance to mechanical stress and multiple steaming cycles as well as bacteria and/or virus challenge tests. Extensive data generated on several batches of filters builds the basis for their performance claims. The correlation between microbial retention and a non-destructive integrity test is an important aspect of the Pall microbial validation program, ensuring reproducible production performance by Emflon PFRW replacement filters.

By implementing an integrity test plan for each critical filter, adapted to the microbiological risk at point of use and to the frequency of steam sterilization cycles, the yogurt manufacturer was able to enhance the safety of its process and reduce operating costs.

The performance of each filter was documented on a regular basis, ranging from once a month to three times a week. This traceability file included operating parameters such as service and steam sterilization pressure, the number of sterilization cycles and test results. Consistent data enabled the QA department to adapt and further optimize the integrity test plan. Filters are now replaced according to integrity test results, which led to significant savings due to an extended operating life of >2 years.



The Palltronic Flowstar test device was the product of choice for the development of the test plan and its integration into the plant's operations program.

Integrity tests used during the Pall validation of the highly hydrophobic Emflon PFRW membrane filters are the Forward Flow Test and the Water Intrusion Test. While the Forward Flow Test measures a gas flow through the Emflon PFRW membrane wetted with hydroalcoholic mixtures at 1.1 bar, the Water Intrusion Test measures a water flow through the dry filter installed in a housing filled on the upstream side with water at 2.5 bar. The Water Intrusion Test, highly accurate and not requiring any solvent, has become the preferred test for all formats of air and gas membrane filters in dairies.

- Palltronic Flowstar integrity test devices are designed with constant pressure direct measurement technology, to perform Water Intrusion Test, Forward Flow Test and Bubble Point, for testing all membrane filters in the dairy plant
- Real time sensing of flow stability and automatic control of test times ensures safe and high accuracy results for every test in the shortest time possible
- Designed for production environments: fully automated, portable, splash-proof, easy to use touch screen and simple menu driven operation
- High resolution for high accuracy results (0.01mL/min for the Water Intrusion Test)
- A unique Multiplex unit enables the automated testing of up to 8 filters, with any combination of filter sizes and test types, minimizing operator involvement. Filters can be disconnected from the integrity tester immediately after each test for maximum flexibility
- Developed in accordance with Good Automated Manufacturing Practice (GAMP) Guidelines.

With the successful implementation of the integrity test program for the air and gas filters, the yogurt manufacturer subsequently added Forward Flow testing of critical liquid filters in the plant as well, using the same equipment. This completed their QA monitoring and documentation requirements.

About Pall Corporation

Pall Corporation is the largest and most diverse filtration, separation, and purification company in the world. Pall serves the food and beverage industries with advanced membrane filtration technology and systems engineered for reliability and cost-effectiveness. Easy to install and simple to use, our systems satisfy a wide range of filtration requirements.



Pall Emflon filters

The Benefits

Integrity test results provided by Palltronic Flowstar instruments confirm filters' ability to perform in accordance with their performance claims. It enables dairy processors to fully benefit from the extensive validation work performed by Pall on microbial rated filter types.

- Enhanced process safety with documented performance of filters at critical points of use, supporting the Total Quality Management plan
- Early detection of potential failure due to inadequate operating parameters (e.g. deviation of steam temperature and pressure parameters)
- Reduction of test costs thanks to equipment flexibility, designed for the rapid integrity measurement of both gas and liquid filters. Operator time savings using the Pall unique Multiplex version, capable of automated sequential testing of up to 8 filters
- Reduction of operating costs by avoiding premature filter change-out due to overly conservative preventive maintenance programs
- Efficient data generation from one device, designed for use with both gas and liquid filters.



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