PALL

Food and Beverage

Flexible New Solutions for Craft Distillers

Overview

Filter sheet technology is the most common form of filtration at large distillers, rectifiers and multi-beverage companies. The sheet media has a unique matrix of components that remove unwanted contaminants while maintaining the quality-enhancing components that result in a clear, bright product. In applications from particle filtration to chill haze removal in brown spirits and activated carbon treatment to final polishing in white spirits, filter sheets provide an excellent combination of adsorption and depth filtration making them the ideal solution. Sheets are available in multiple grades and configurations including sheets with low extractable ions or those impregnated with activated carbon to cover the wide range of applications.

In recent years, the number of craft distillers is on the rise. While the filtration targets for turbidity reduction and haze removal are similar to the larger producers, the operating requirements are quite different. As a result, filtration at many small producers is often overlooked or underspecified. Or where traditional sheet filters are employed, the existing technology can create obstacles for the craft producers. Oversized plate and frame assemblies generate large hold-up volumes, low yields and unnecessary capital costs. Additionally, with multiple sheets assembled in parallel, installation and assembly can be labor intensive. Finally, smaller and less frequent batches coupled with increased product changes can result in premature filter disposal.

The Challenge

With the craft movement gaining popularity, producers are under more pressure to improve quality and filtration techniques. Craft distillers need filter assemblies that are easy to use and cost effective for smaller batches while providing similar filtration characteristics as sheet filters. The technology should alleviate weaknesses with the existing plate and frame assemblies like drip losses and dead volumes and also provide craft distillers with the flexibility to expand as production demand increases.

The Solution

By combining the strong points of sheet filters with the specific requirements of craft distillers, Pall's new enclosed solutions provide the small batch producers with flexible and cost effective filtration operations. Our module housings are designed to accommodate three different formats of filter modules including SUPRAdisc™ II, SUPRApak™ and SUPRAdisc AKS Series modules. All are constructed from the same sheet media already used in traditional spirits filtration applications but in cleaner, more compact formats. Modules can be easily substituted to allow distillers to change filters depending on the application, batch size or flow rate. Additionally, with simple changes in hardware, the housing can be fitted to hold from 1 up to 4 modules to allow room for future expansion.

WFSZ Series Housings

Pall's WFSZ Series Stainless steel module housings maximize product protection and minimize product losses. The closed assembly eliminates drip losses resulting in higher yields than traditional sheet filter assemblies. Furthermore, when a batch is complete, gas can be used to push out the remaining liquid in the housing which results in up to 15% more recovered product.

The housings have a clamp closure for quick and easy installation and assembly. The light weight dome has two lifting handles to facilitate module changes. A typical module change takes about 15 minutes compared to about 1 hour for a similar filter area flat sheet set-up. Additionally, for distillers with varying batch sizes, the center spindle of a larger housing can be changed to a smaller spindle in order to modify the number of modules that the housing can accommodate.

Figure 1: WFSZ Housing – The center spindle can be changed in order to modify the number of SUPRAdisc II or AKS modules that the housing can hold. An adaptor kit allows accommodation of the SUPRApak modules.

Main benefits to craft distiller:

- Flexibility to accommodate multiple modules and future growth
- No drip losses for increased yield
- Quick and easy module change-outs

SUPRAdisc II Modules

SUPRAdisc II depth filter modules offer distillers a modern approach for small batch or single barrel filtration. The modules have a double separator design which provides both upstream and downstream support. Sheet media is individually sealed and separated between polypropylene plates which results in optimal flow through the available surface area and a mechanically robust module. Flow is possible in either the forward or reverse direction. For particle removal applications like barrel char removal, backflushing can help improve module regeneration and increase service life.

Figure 2: SUPRAdisc II Module

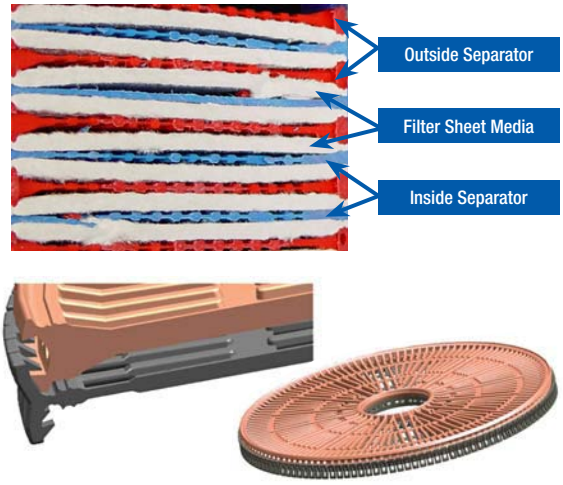

Figure 3: Module cutaway and separators

Unlike standard flat filter sheets, in between batches, SUPRAdisc II modules can be stored for reuse at a later date making them cost effective for craft size batches. The modules can be stored in the housing itself or in a separate vessel in high proof alcohol.

Twelve inch SUPRAdisc II modules are available in all the same grades as the standard flat sheets used in spirits applications including those with low extractable ions for spirits that are sensitive to precipitation in the presence of calcium or magnesium ions. Typical module flow rates range from 3 gpm (11.4 lpm) for chill filtration of brown spirits up to 6.5 gpm (24.6 lpm) for polishing of white spirits.

Main benefits to craft distiller:

- Backflushable for increased service life
- Cost effective due to capability to store and re-use modules
- Robust design for quick and easy module handling

SUPRApak Modules

When increased filter area is required, either to address production growth or a difficult to filter spirit, SUPRAdisc II modules can be substituted with SUPRApak modules.

Figure 4: SUPRApak module

SUPRApak modules are Pall's newest innovation in depth filtration with an entirely unique design and flow configuration. SUPRApak modules consist of filter sheet material wrapped around a central permeable core with external straps that attach the sheet material to the core. The sheet material is punched with an intricate pattern of feed and filtrate channels which direct fluid flow through the module. The unfiltered fluid enters the module from the outside through feed channels. The differential pressure pushes the fluid flow through the sheet media in a direction toward the filtrate channels. The filtrate channels then carry the fluid toward the center core where it exits the modules.

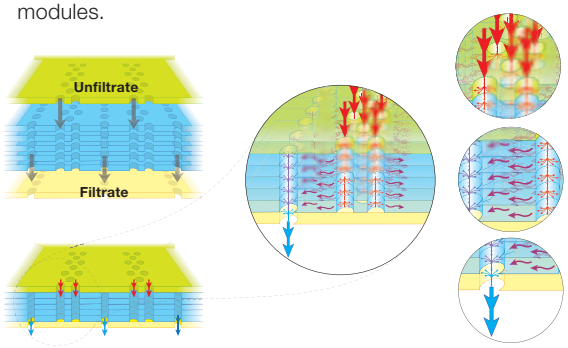

Figure 5: SUPRApak module flow configuration

Main benefits to craft distiller:

- Higher filter area than typical lenticular modules to accommodate distillery growth and difficult to filter products
- Unique flow configuration that maximizes filtration and adsorption
- Available in smaller size for new products or test runs

The high packing density of SUPRApak modules make them economical and a good fit for distilling applications. Twelve inch SUPRApak modules have about 1.7 times the filter area of typical competitive 12 inch lenticular modules and would replace about twenty 40x40 flat sheet filters. Also, the unique flow configuration maximizes the adsorption capability of the sheets. This enhances removal of substances like fusel oils, proteins, terpenes, essential oils, polysaccharides, and pectin, as well as fatty acids and their esters that can cause turbidity in distillates.

Twelve inch SUPRApak modules are also available in the same grades as the standard flat sheets including the ion reduced grades. Typical module flow rates range from 4.5 gpm (17 lpm) for chill filtration of brown spirits up to 9 gpm (34 lpm) for polishing of white spirits. For new

product test runs or extremely small batches, SUPRApak modules are also available in 7.5 inch size for flow rates ranging from 0.7 gpm (2.6 lpm) to 1.3 gpm (5 lpm).

SUPRAdisc AKS Series Modules

Activated carbon treatment has long been used in distilleries for removal of off color, taste and flavor of vodka and other spirits. There are different methods available including manual addition of carbon powder or granules and carbon packed columns. Manual addition of carbon is frequently used for large batch or continuous operation. While low cost and effective, it is labor intensive and messy. Carbon columns, while easier to use, often bleed carbon downstream and can require frequent regeneration. As an alternative, carbon impregnated SUPRAdisc AKS Series filter modules make for easier to handle and more hygienic carbon treatment of small spirit batches with modules that fit directly into the WFSZ filter housing.

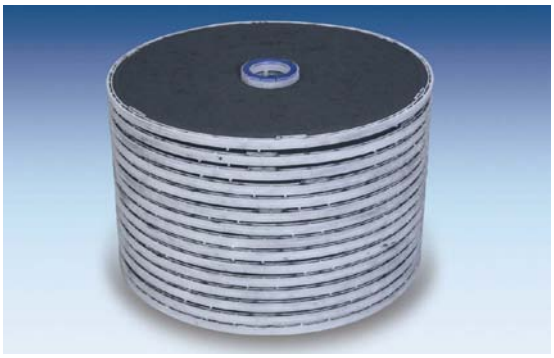

Figure 6: SUPRAdisc AKS module

SUPRAdisc AKS modules are available in different grades with up to 60 percent activated carbon in the filter sheet matrix. Carbon is integrated into the filter matrix without the use of any binding agents. This maintains the adsorptive capacity and does not introduce any materials that might degrade or negatively impact the spirits.

For the AKS modules, two layers of the filter media are joined to form a cell. The cell is sealed around the edges and then assembled into a stack to form the module. See Figure 6.

The typical recommended flow rate per twelve inch module is from 1.5 gpm (5.7 lpm) to 2.5 gpm (9.5 lpm). Over time, the activated carbon in the modules will become exhausted and the modules should be changed. Measuring conductivity of the filtrate can help determine when a module needs to be replaced.

Main benefits to craft distiller:

- No new hardware required; modules fit into existing depth filter housings
- Easy and hygienic alternative to manual carbon addition or packed columns
- Reduced carbon bleed or carryover

The Benefits

With Pall's enclosed filter solutions, craft distillers can now have cost effective and quality filtration to meet their specific operating requirements. By implementing, Pall's modular technology, craft distilleries can realize the following benefits:

- A single housing provides the flexibility to perform multiple distillery filtration processes utilizing Pall's innovative SUPRAdisc II, SUPRApak and SUPRAdisc AKS Series modules
- The enclosed housing increases process security
- The enclosed assembly increases yield by eliminating drip losses and enabling a gas blow down at the end of a batch
- Module change-outs are quicker and easier than traditional sheet filter changes
- The center spindle of the filter housing can be changed in order to modify the number of modules that the housing can hold. This allows flexibility in the batch sizes or future increased capacity.

About Pall Corporation

Pall Corporation is a global filtration, separation and purification leader providing solutions to meet the critical fluid management needs of customers across the broad spectrum of life sciences and industry. We work with our customers to advance health, safety and environmentally responsible technologies. Pall Food and Beverage provides products and services to ensure product quality and maintain process reliability in beverage and food production. Our solutions also assist in consumer protection, the reduction of operating costs and waste minimization.

PALL® Pall Corporation

Pall Food and Beverage

New York – USA
+1 516 484 3600 telephone
+1 866 905 7255 toll free

foodandbeverage@pall.com

Visit us on the Web at www.pall.com/foodandbev

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