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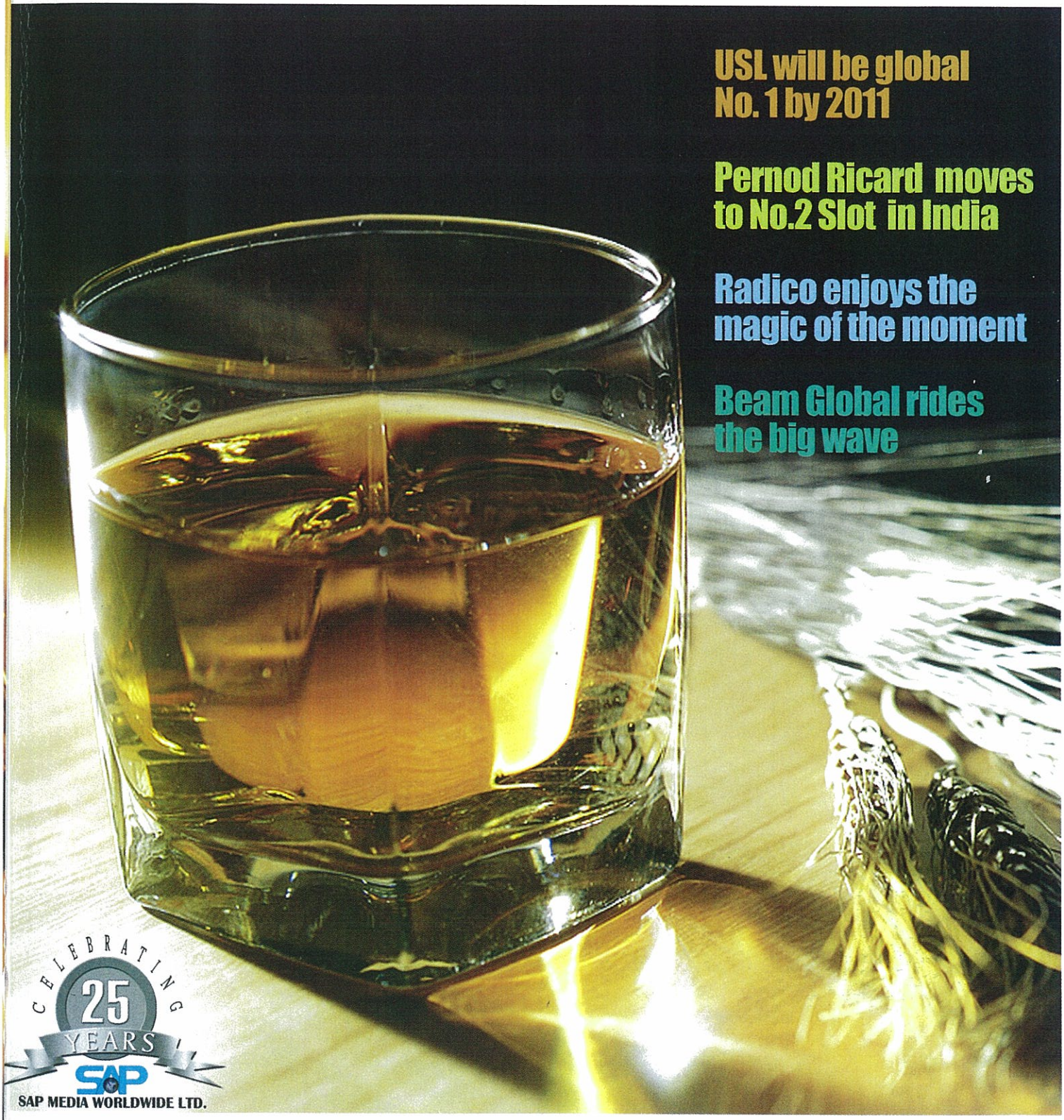

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PALL Pall Corporation

Pall SUPRApak™ Depth Filter Modules
Sheet Technology Goes Modular!

Pall introduces the new SUPRApak™ filter module based on proven Pall Seitz™ sheet technology, revolutionising the market for sheet filters with depth filtration.

- Increased process safety and product quality
- Ease of handling and filter change-out
- No time-consuming insertion of individual filter sheets
- Reduced operational costs
- Increased process times
- Large filtration area per unit results in reduced housing footprint
- Cost effective alternative to classical plate and frame filters

For more information on Pall SUPRApak™, go to www.pall.com/suprapak or contact your Pall sales office

SUPRApak™

Filtration. Separation. Solution.SM

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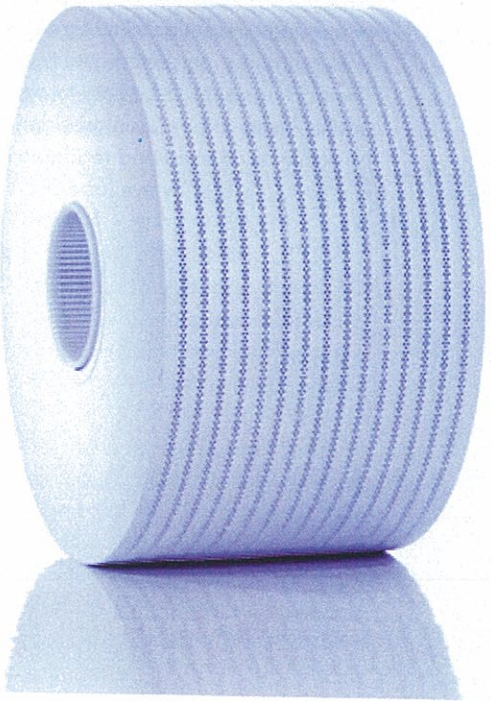
Modern Spirits Filtration Goes Edge Flow

Classical depth filter sheet material is used for final filtration of most clear distilled spirits. Creating a mark in this field, Pall India Pvt. Ltd has recently introduced SUPRApak™ which has the newest approach to eliminate the existing disadvantages of classical sheet filtration by using enclosed filter housings.

The existing filter equipment is linked to a number of important disadvantages like drip losses, labour intensive to load the filter with new filter sheets, problem of sheet filter which cannot be emptied completely resulting in additional work for re-circulating the dead volume, filters with very high hold-up volume and it requires long downtimes to prepare for operation.

SUPRApak™ is the newest approach to eliminate the existing disadvantages of classical sheet filtration by using enclosed filter housings. The design of the SUPRApak™ filter modules utilize "edge flow filtration", a new flow configuration through the filter media that offers significant benefits in comparison to traditional filter sheet material.

The following picture shows the SUPRApak™ design.



SUPRApak™ is assembled using a plastic core and punched sheet material that is rolled onto a central core during the manufacturing process. When the defined diameter is achieved, polyester straps fix around the outer diameter of the wrapped sheet material. SUPRApak™ is available both as SUPRApak™ L in 16 inches (400 mm) diameter and as SUPRApak™ XS in 7.5 inches (190 mm) diameter.

Diagram 1 shows the hole punching structure of the SUPRApak™ filter modules from the inner to the outer zone.

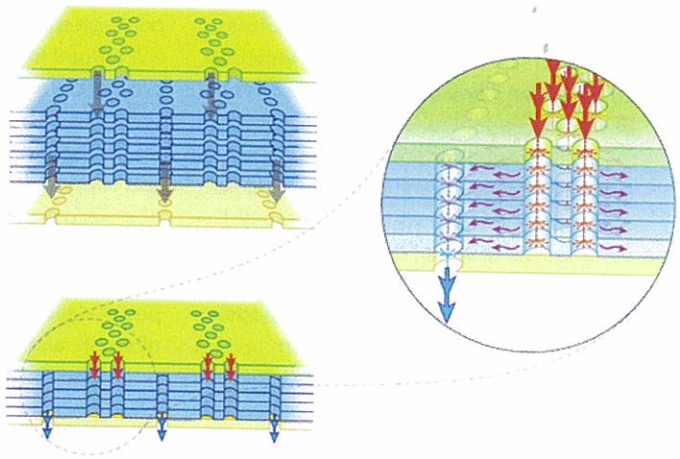


Diagram 1: Hole punching structure of SUPRApak™ filter modules

The hole punching structure is defined in such a way that after wrapping the sheet material, it is possible to separate filtrate and supply liquid. The supply liquid, shown as red arrows, penetrates the SUPRApak™ filter material from the outside. As the supply liquid channels are closed by the lower sheet layers, it is forced to flow to the edge of the sheets. The liquid flow according to the edge flow principle is shown by the purple arrows. The liquid to be filtered flows through the filter sheets and leaves the module through the filtrate channels (blue arrows).

The major advantage of the SUPRApak™ design, characterized by the punched wrapped sheet material is an

increased turbidity reduction and higher particle loading volume compared to classical flat sheets.

SUPRApak™: Modular Design:

This new method of packaging filter sheet material in a "wrapped" format results in a filter module offering a high density of filter sheet material.

Depending on the application, one SUPRApak™ L module is able to replace between 125 and 250 filter sheets size 200x200 mm, between 36 and 72 filter sheets size 400x400mm and between 15 and 32 filter sheets size 600x612mm.

SUPRApak™: Reduced Product losses:

We know from practical experience that liquid adsorption of the filter sheet material, results in about 2.5 litres of product loss per square metre.

Comparative tests and calculations for an equivalent SUPRApak™ module have shown that with the ability to completely empty the filter housing using inert gas, and furthermore, to press residual liquid out of the filter material, the product losses with SUPRApak™ modules are only 85% of that from a classical sheet filter.

Table 4 shows an example calculation of a sheet filter typically used in the distilled spirits industry.

SUPRApak™ product loss saving calculator	600x600
roughing sheets per filtration run	50
polishing sheets per filtration run	75
Area [m²]/ sheet	0,34
Area [m²]/filter run	43
product losses [liters/m² filter sheets]	2,5
product losses [liters per filter setup]	108
product losses SUPRApak [% of sheet product losses]	85%
product losses SUPRApak [liters per filter setup]	92
Product loss savings per filter run [liter]	16
Filter runs per week	2
Filter runs per month	8
Filter runs per year	88
Product loss savings per year [liter]	1.428
Value of 1 liter product	$5,00
SUPRApak added value of product loss savings per year	$7.141

Table 4

The product loss reduction of SUPRApak™ equals 7,141 USD under the above parameters. The value of savings is very much dependant on the parameters provided by the individual distilleries.

SUPRApak™: No Drip Losses:

Drip losses are associated with the traditional design of plate and frame filters. To calculate the drip losses, the data in the above example are taken for calculation in Table 5 below.

Filter Sheet drip loss calculator	600x600
roughing sheets per filtration run	50
polishing sheets per filtration run	75
Area [m²]/ sheet	0,34
Area [m²]/filter run	43
drip losses [liters/m²h]	0,1
running Time of sheet filter a day [h]	8
Drip losses [liters per day]	34
Drip losses [liters per week]	170
Drip losses [liters per month]	680
Drip losses [liters per year]	8.160
SUPRApak drip losses [liter]	0

Table 5

The drip losses are calculated with 0.1 litre losses per square metre of filter area per hour. This figure is at the lower limit of the real values experienced in practice. In the given example a significant amount of liquid, 8.160 litres accumulates which has to be returned to the production process. SUPRApak™ is a closed filter system therefore there are no drip losses. These are decisive advantages compared to classical sheet filtration.The SUPRApak™ technology presents real cost saving benefits for the replacement of classical sheet filtration in spirits applications with no drip losses, approximately 15% lower product losses, 80 % shorter set-up times, 80 % higher availability of the filter line and 80% lower hold up volumes in the filter. This technology allows approximately 70% smaller footprint of the housings compared to classical sheet filters, only 40% CAPEX in comparison to new traditional sheet filter hardware, dirt holding capacity on average of 250 per cent higher and improved haze reduction for increased filtrate quality.

(Compiled by Dr. Carsten Nissen, Gary Reeves, Pall Corporation)