Title A: The Definitive Guide to Rotovap vs. Falling Film for Ethanol Extraction

Subtitle A: Solvent recovery needs to accommodate growing production needs.

Title B: Ethanol Extraction for Hemp and CBD: Rotovap or Falling Film?

Subtitle B: Scale your solvent recovery method to meet production needs.

Title C: Solvent Recovery Equipment for Ethanol Extraction: Rotovap vs. Falling Film

Subtitle C: Find out which solvent recovery method offers the best results.

With the cannabis industry earning new legal status and growing by almost every measurable

parameter, hemp and CBD manufacturers are under increasing pressure to produce.

As the demand for high-quality cannabis-derived products rises, manufacturers need to accommodate increasing production capacities. But as with any industry, scalability can become an obstacle as production volume and process efficiency come into conflict.

For processors who specialize in ethanol extraction, solvent recovery is one of those obstacles. A processor that fails to recover solvent efficiently would be forced to continually use new solvent for every batch, which would drive the unit cost of concentrate through the roof and generate environmental concerns.

This is why professional concentrate processors use solvent recovery equipment. Until recently, there was only one suitably reliable method for solvent recovery available to hemp and CBD processors. Rotary evaporation remains the most popular method today.

The problem is that rotary evaporation equipment is designed to solve a particular cannabis extraction problem for a particular type of industry. It doesn't offer the kind of throughput that an industrial hemp or CBD facility needs, becoming a production bottleneck as a result.

However, the new falling film evaporators entering the market are drawing a great deal of attention. These devices promise greater production efficiency, lower operating costs, and longer equipment lifespans. Find out if falling film evaporators really deliver on their promises.

Rotary Evaporation Explained

Rotary evaporators – commonly called rotovaps – offer a reliable way to recover solvent from THC or CBD during the ethanol extraction process. These devices have become a mainstay of the concentrate industry, but they present obstacles to production facilities undergoing growth.

Rotovaps work by submerging a glass solvent flask in a temperature-controlled water bath and rotating the flask. A vacuum system routes the evaporated solvent into a condenser, which converts the vapor into liquid. This simple, effective system has been the backbone of the THC concentrate, hemp, and CBD

industry for years.

A generic 20-liter rotovap can recover approximately 1.5 gallons of solvent per hour. This is sufficient for a small-scale facility, but the output is quite low for a large-scale manufacturer. As a result, most large-scale manufacturers operate multiple rotovaps.

Rotary evaporation is a complex chemical process, but most rotovaps are relatively simple to operate with minimal training. The costs begin to stack when manufacturers need to use multiple rotary evaporators in parallel in order to meet production deadlines.

Industrial manufacturing professionals know that running a relatively large number of devices in parallel can create organizational problems. From quality control issues to preventative maintenance, administering a fleet of complex equipment takes time, energy, and money that a more centralized solution would solve.

Rotary evaporation exposes manufacturers to three significant costs:

• **Maintenance and Repair.** Rotary evaporators are made of glass and include multiple moving parts. Even the best devices will occasionally break down, but the widespread low-cost China-made models in use by the majority of hemp and CBD processors are especially susceptible to these issues.

• **Operator Salaries.** The average salary for an evaporation operator hovers around $15 per hour, although hemp and CBD industry specialists may rightfully demand higher wages. Compounded to a large-scale operation that needs solvent recovery performance of around 30 gallons per hour, rotovaps can easily cost upwards of $12,000 per week in employee salaries alone.

• **Long Residence Times.** Rotary evaporation can require a residence time of around one hour. This means your concentrate is exposed to heat this entire time, potentially affecting the quality of the final product. Shorter residence times reduce the risk of damaging the product.

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How Falling Film Works

Falling Film evaporation works in a fundamentally different way than rotary evaporation. Instead of rotating the solvent in a heat bath, the liquid product flows downwards through a tall vertical tube at boiling temperature, which is typically achieved using steam.

The product enters the heating tube at the top and forms a thin film along the tube's inner wall as it flows. At the same time, the steam vapor flow moves downwards towards a separator, which removes

the steam and solvent from the concentrate.

Falling film systems do not feature moving parts. High-quality falling film systems are made of robust stainless steel and high-grade glass. The only significant limit on the production capacity of a falling film evaporator is the size of the system and its evaporation tube. This makes falling film an ideal choice for large-scale operations.

A large-scale falling film evaporator can process up to 20 times the material that a single generic rotovap can process in a fraction of the time. The falling film process can take as little as 30 seconds, vastly reducing the amount of time during which products are exposed to high levels of heat.

Because there are no moving parts, it is possible to almost completely automate a falling film system. Its closed-loop extraction system reduces the need for manual operation. A single operator can recover a higher quantity of solvent at a greater speed than they could with a rotary evaporator.

Rotovaps vs. Falling Film: When to Upgrade?

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The decision to invest in a falling film evaporation system is a big one for any industry based on hemp or CBD. It represents a key step forward in the development of scalable infrastructure to meet demanding high-volume production quotas. For many processors, the question of *when* to upgrade is a crucial one.

Rotary evaporation remains the ideal choice for small-scale facilities with modest solvent recovery needs. While accessible, low-cost devices require less up-front investment, they are not a viable long-term solution for growing businesses.

Once production capacities reach the point where processors regularly need to recover more than 5-10 gallons of solvent per hour, upgrading to a more robust falling film evaporation system starts to become economically feasible. Processors planning on acquiring equipment that will remain viable five to ten years into the future are best-served by today's modern falling film solutions.

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