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The realities behind the flow rate guarantee

All Maratek equipment are backed up with comprehensive testing, hard science, and money back guarantee based on total daily 95% ethanol extraction solution processed. A 24 hour cycle includes filling, heating up, continuously topping off the still, and finally a full boil-down to solvent free oil, which is typically unachievable with falling film systems.

To quote a wise man "Facts are stubborn things". Claims of equipment performance should always be reviewed considering basic thermodynamic laws. Boiling solvents is an energy intensive processes, evaporating a 1 kilogram sample of 95% ethanol 5% water requires about 920 kJ of energy.

$$\frac{\textbf{Boil 1 gallon 95\% Ethanol}}{\textbf{hour}} \rightarrow 8.4\text{x}10^{-4}\frac{\textbf{kg}}{\textbf{s}} \text{ x } 920 \frac{\textbf{kJ}}{\textbf{kg}} = 0.773 \frac{\textbf{kW}}{\textbf{gallon}}$$

To boil 1 gallon of low water content extraction solvent per hour requires 0.773 kilowatts of heat input continuously. This assumes perfect insulation and the lowest water content in your solvent practically possible, in other words this value is a good place to start but it is **unrealistically optimistic**.

If a company claims they can process 75 gallons per hour and their heating power is 45 kilowatts, it is simple to check if that is possible using the factor calculated above. 75 gallons of extraction solution is around 67 to 72 gallons of solvent depending on the oil concentration.

$$\frac{45 \text{ kW}}{0.773 \frac{\text{kW}}{\text{gallon}}} = 58 \text{ gallons}$$

Using these assumptions this should not be possible, and you should be skeptical of any company claiming high performance without a guarantee.

The following is a good rule of thumb to quickly assess real world performance of a solvent recovery system based on heat input.

$$\textbf{1kW heat input} = \textbf{1 gallon per hour (95\% Ethanol, 5\% Water)}$$

$$\textbf{1kW heat input} = \textbf{0.8 gallon per hour (75\% Ethanol, 25\% Water)}$$

Maratek OERS equipment has been engineered to minimize the effects of heat loss and improved heat transfer efficiencies, and Maratek's line of ethanol de-watering distillation column systems can close your solvent loop and minimize water content to boost performance.

Taking our analysis a step further, we use boiling power data based on real world testing and feed that into our in-house custom simulation software to calculate daily and average hourly performance for each unit at various ethanol/water mixtures.
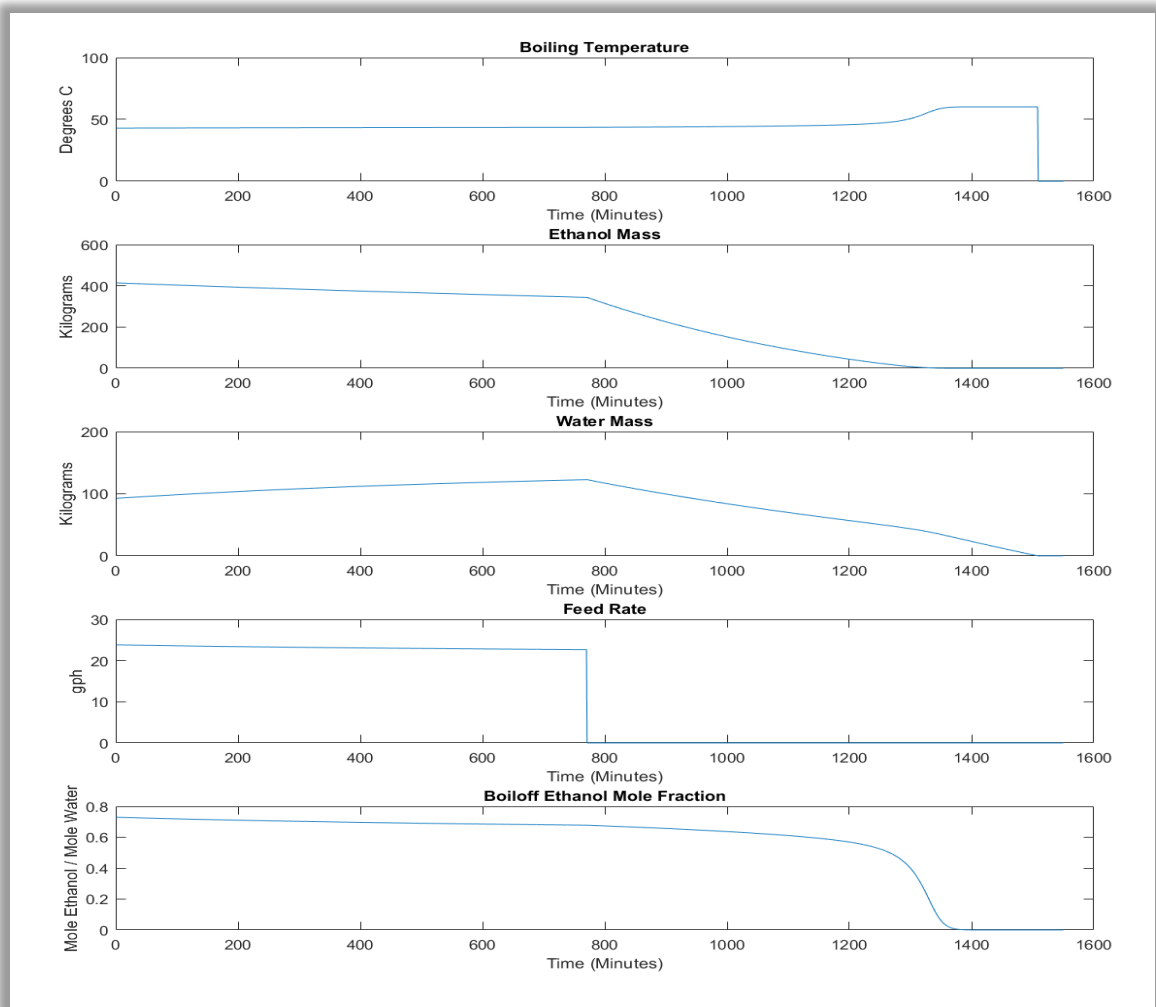
Following is a representative case for 85% ethanol 15% water over a 24 hour cycle that processed 484 gallons

Maratek flow rate guarantees are based on highly reliable data generated by taking into consideration all process parameters including feed solution ethanol/water/oil content, the evolving composition of the still over time, and reduction in boiling power at the end of the cycle to give our clients certainty in our performance specifications.

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OERS-SC & OERS-C
Automatic Ethanol Recovery and Decarboxylation

TAWS
Turnkey Automatic Winterization Systems

F-SERIES
Fractional Distillation and Dewatering Systems

TURNKEY FACILITIES
Turnkey Extraction Facilities and Engineering