

Yellowstone
EXTRACTION COMPANY

2021 PRODUCT CATALOG

●○○○ innovation explained within our FFE series



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YELLOWSTONE EXTRACTION CO.



Since its inception in 2015, Yellowstone Extraction Co. has used a multidisciplinary approach to create effective and scalable solutions to many of the common issues and bottlenecks in industrial processing and extraction. We combine a strong knowledge of chemistry, manufacturing, and engineering sciences to design and engineer systems which provide processors with high volumes of pure concentrated products.

Our Yellowstone Falling Film Evaporators provide customers with one of the fastest, most energy efficient, and easy to use solvent recovery systems on the market. Through the use of superior technology and purposeful design, our systems ensure an efficient separation in the most economical way possible.

FFE MODELS



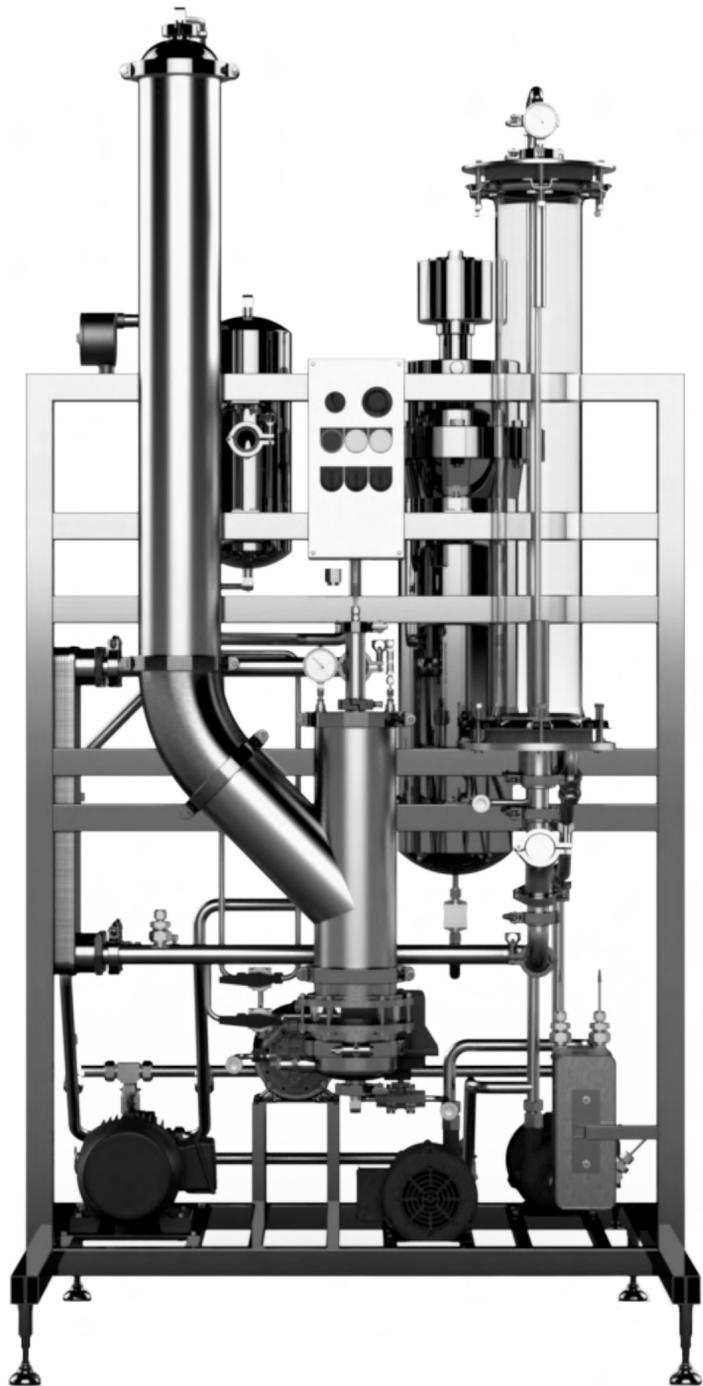
FFE O-SERIES



FFE S-SERIES



FFE S-SERIES PRO



FFE O-SERIES

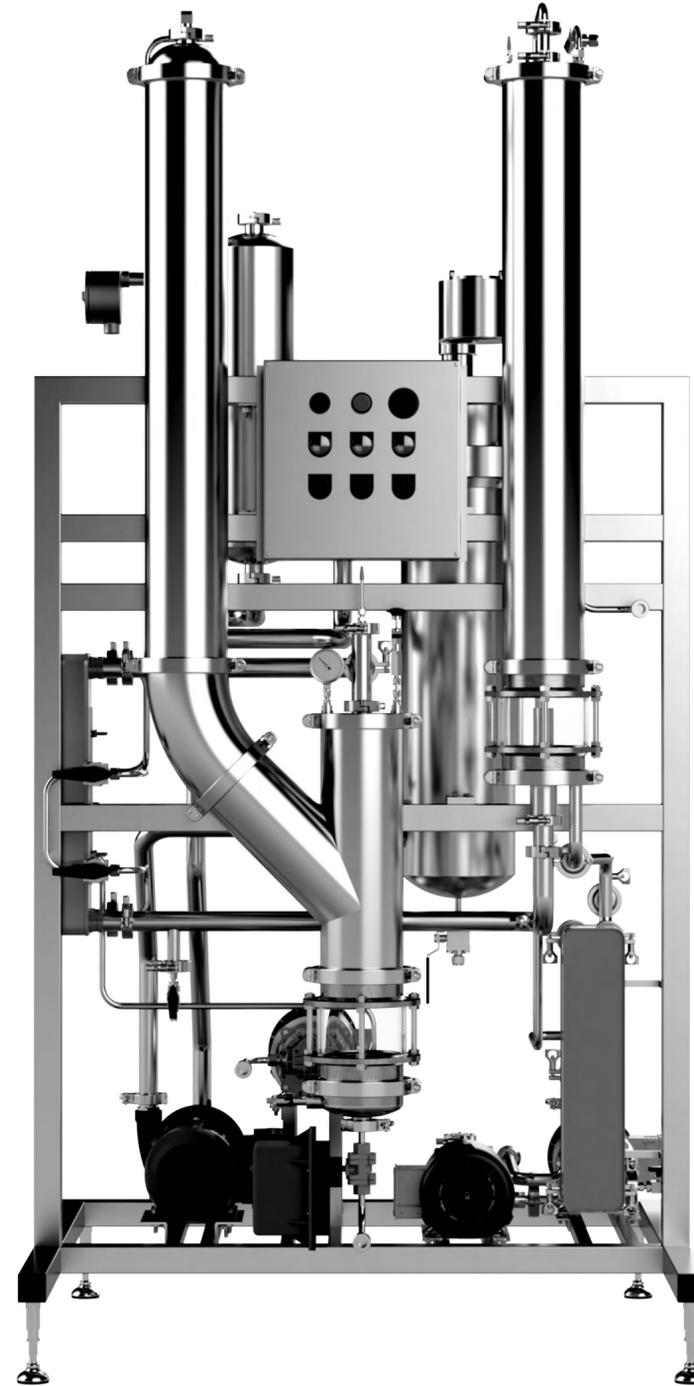
THE OLD FAITHFUL MODEL

The O-Series is our classic design. Revolutionary condensing technology make the O Series the most efficient evaporator on the market.

250-300 LPH

60 kW

75.5-82.2 A



FFE S-SERIES

THE SPECIALIZED MODEL

The FFE S-Series provides customers with the same great performance as the O series with upgraded pumping and control options. The S-Series is a reliable solution for any facility

250-300 LPH

60 kW

75.5-82.2 A



FFE S-SERIES PRO

THE GMP MODEL

Traceability, drainability, and high quality materials make the S-Series Pro the right choice for GMP processing facilities.

250-300 LPH

60 kW

75.5-82.2 A



FFE O-SERIES

FFE S-SERIES

FFE S-SERIES PRO

CAPACITY

250-300 LPH

250-300 LPH

250-300 LPH

CLASSIFICATION

C1D2

C1D2

C1D2

SOLVENT COMPATIBILITY

ETHANOL, ISOPROPYL ALCOHOL, METHANOL

ETHANOL, ISOPROPYL ALCOHOL, HEXANE, HEPTANE, METHANOL

ETHANOL, ISOPROPYL ALCOHOL, HEXANE, HEPTANE, METHANOL

OIL PUMP

GEAR PUMP

CENTRIFUGAL PUMP

CENTRIFUGAL PUMP

GMP COMPLIANT

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ADDITIONAL FEATURES

- FULL VIEW BOROSILICATE SIGHT GLASS
- LOW COST DOWNTIME PREVENTION & EASY TO SERVICE COMPONENTS
- HIGHLY EFFICIENT INSULATION
- UP TO 2 M² SURFACE AREA ON HEAT EXCHANGERS

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- LOW COST DOWNTIME PREVENTION & EASY TO SERVICE COMPONENTS
- HIGHLY EFFICIENT INSULATION
- UP TO 2 M² SURFACE AREA ON HEAT EXCHANGERS
- THERMAL FLUID FILLING SIGHTGLASS
- MANUAL VACUUM BREAK
- ADDITIONAL DRAINAGE POINTS
- PROPORTIONATE TEMPERATURE CONTROLLER
- HMI COMPATIBLE

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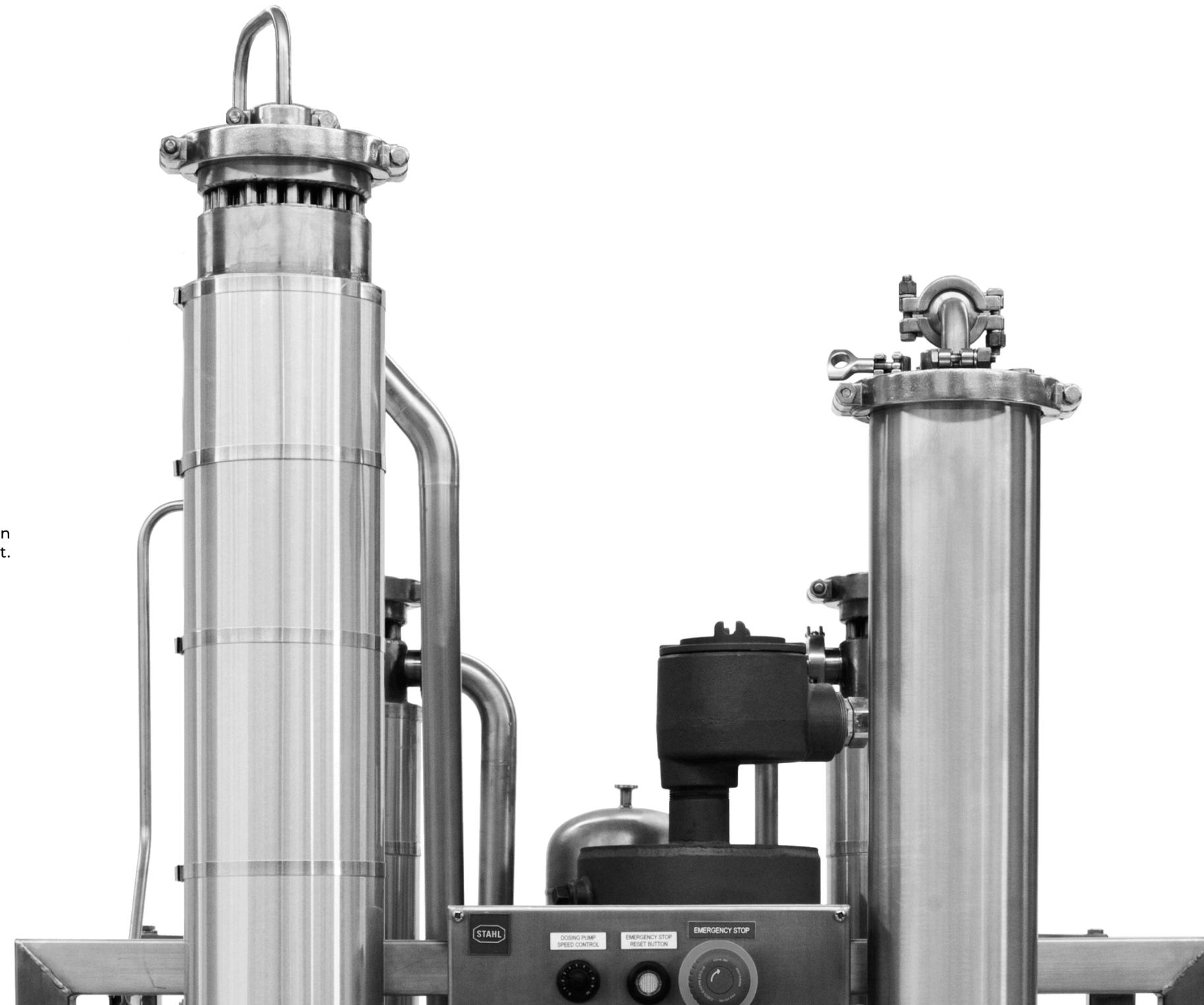
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- MANUAL VACUUM BREAK
- ADDITIONAL DRAINAGE POINTS
- PROPORTIONATE TEMPERATURE CONTROLLER
- HMI COMPATIBLE
- DOUBLE TUBE SHEET HEAT EXCHANGER FOR CONTAMINATION PREVENTION
- 316 STAINLESS STEEL INTERIOR WITH POLISHED SURFACE ON ALL PRODUCT CONTACT
- ADDED DRAINABILITY IN LINES FOR EASY SANITATION PROCESS
- WELD CERTIFICATES & 3RD PARTY BOROSCOPE INSPECTION
- DESIGNED TO BPE STANDARDS
- ELECTROPOLISHED & PASSIVATED
- COMPLETE MATERIAL TRACEABILITY

DIFFERENT BY DESIGN™

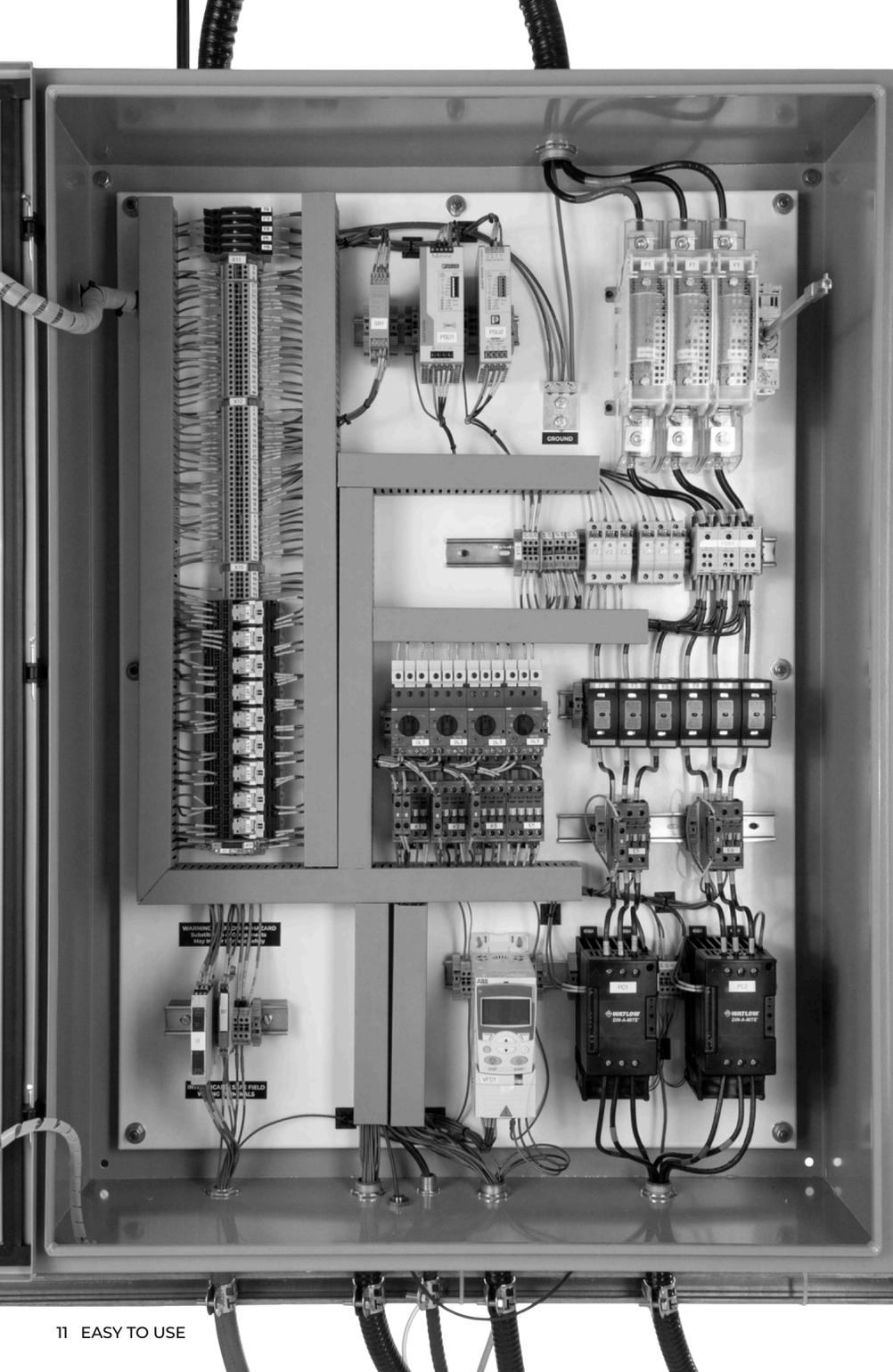
Unit throughput and efficiency are the most important things to consider when building a processing facility. This is where the Yellowstone FFE sets itself apart.

- 250-300 LPH**
- 99% RECOVERY**
- SPACE SAVING DESIGN**
- QUALITY BUILD**
- 316 STAINLESS**
- NO CHILLER REQUIRED**



CONTINUOUS OPERATION

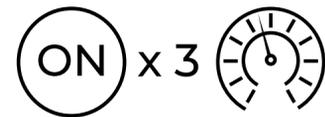
Our Falling Film Evaporator integrates automatic control systems for ease of use and to decrease processing times. The dosing pump and automated draining systems allow for continuous operation with minimal operator input. Our proven evaporation and condensation rates ensure that you will be left with high purity concentrates and solvents, achieved at rapid speeds.



EASY TO USE

SWITCH IT ON AND TURN IT UP, IT'S THAT EASY.

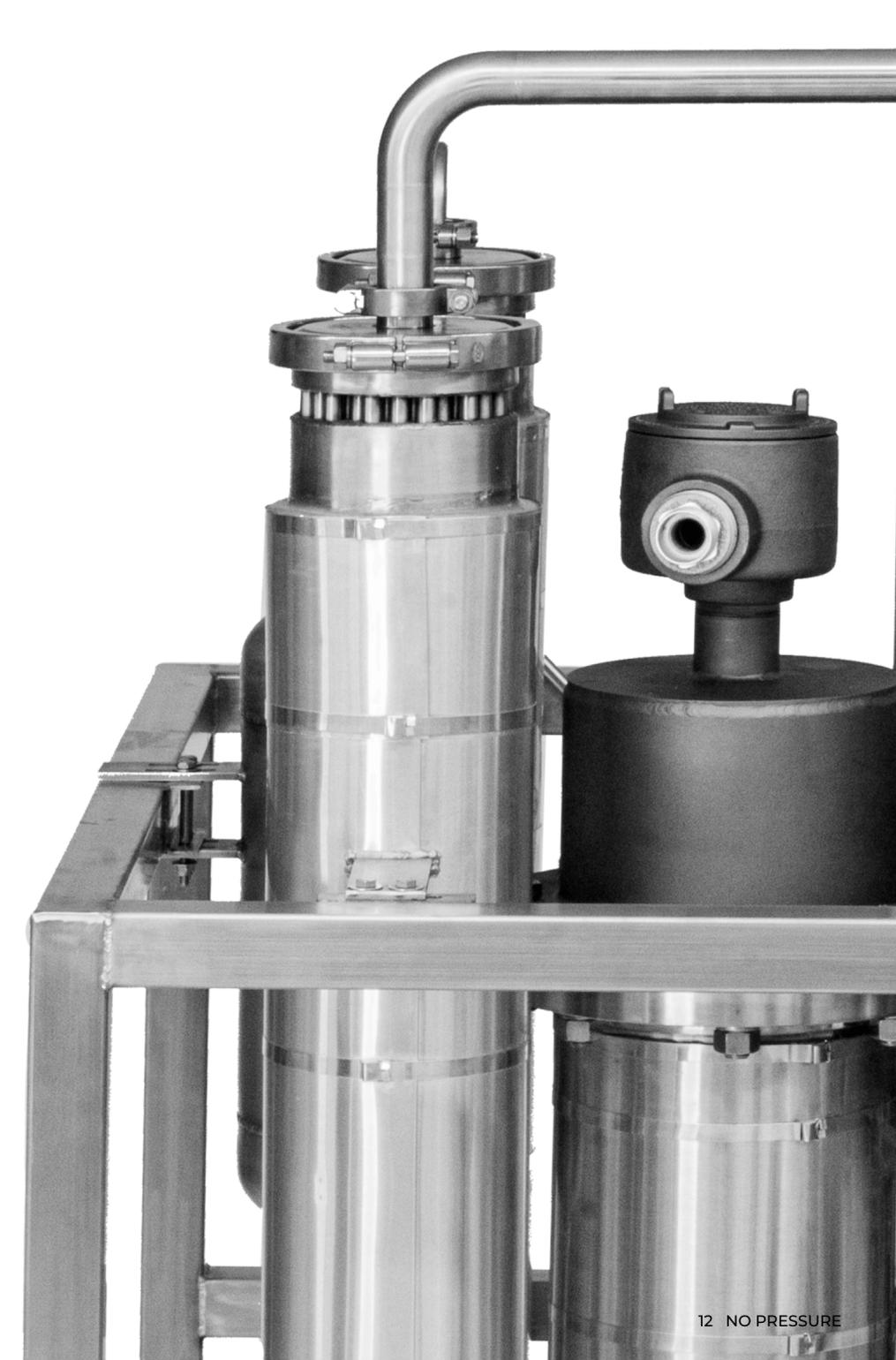
Startup of a Yellowstone FFE requires turning a couple switches and setting the dosing rate. After that, operators just need to monitor and tweak system conditions to optimize the product output. Automatic unloading of concentrate and recovered solvent make the FFE truly continuous.



NO PRESSURE

NO STEAM, NO ADDED COSTS, NO PRESSURE.

Unlike steam generators, Yellowstone's on board heating system isn't subject to pressure vessel regulations, doesn't require additional investment, doesn't expand the machine's footprint, and does not require complicated installs and servicing.



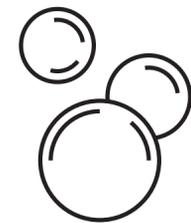
UNIQUE BUILD & INNOVATION

Yellowstone FFE units outperform the competition for a reason. Through our proprietary modular approach to design, our teams consistently innovate at every stage the FFE process (heating, evaporation, cooling) and output industry leading technology at every stage of the evaporation process.

Because others do everything. We do FFE.

1

Cleanability. The product contact surfaces of the Yellowstone Extraction Falling Film Evaporator are designed to be easily cleaned using an integrated cleaning cycle. Frequent cleaning using our cleaning cycle is intuitive and simple. A clean process optimizes efficiency and eliminates contamination between batches.



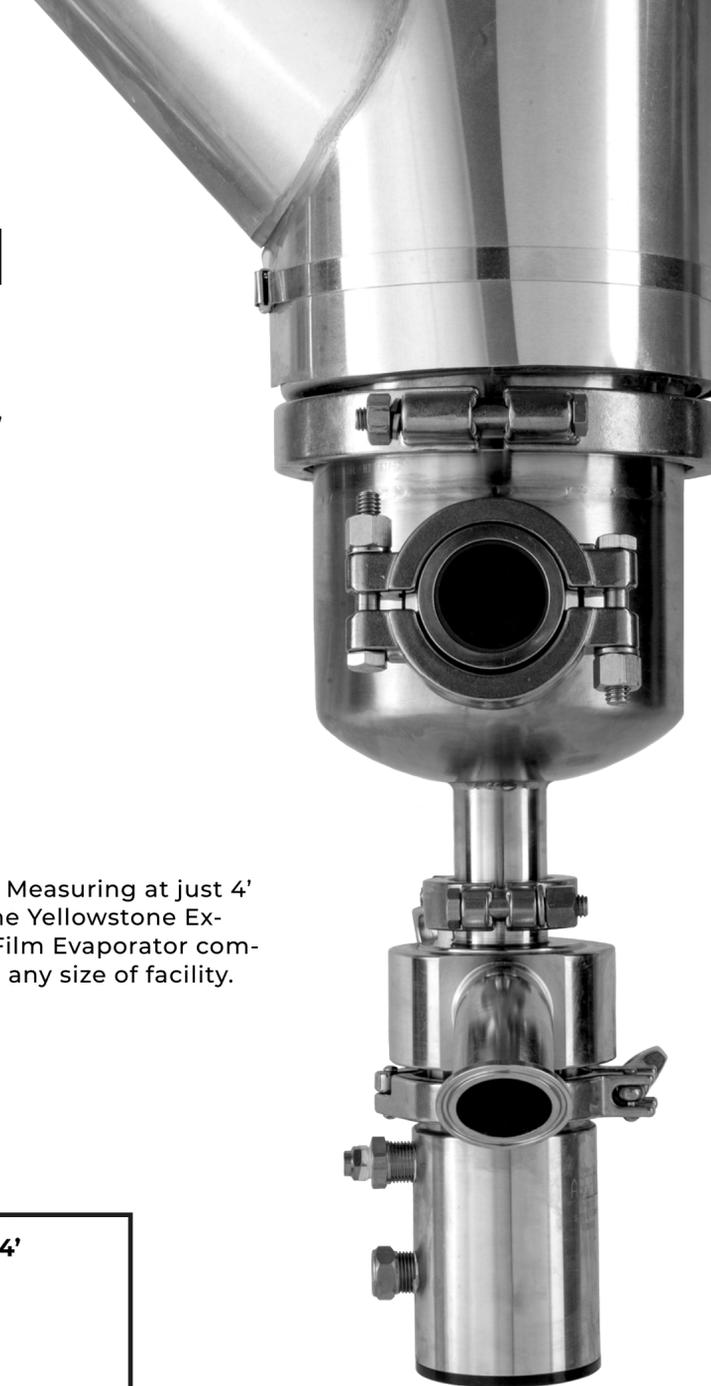
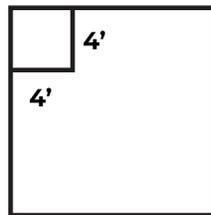
2

Safety. The Yellowstone Extraction Falling Film Evaporator has been engineer peer reviewed and is approved for installation in Class I, Division 2/ Zone 2 hazardous locations across North America.

C1D2

3

Small Footprint. Measuring at just 4' x 4' and 8' tall, the Yellowstone Extraction Falling Film Evaporator comfortably fits into any size of facility.

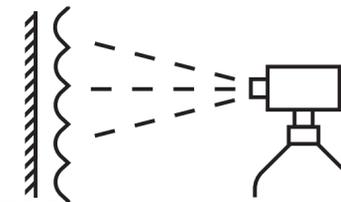


S-SERIES PRO EXCLUSIVE

The following features are exclusive to the FFE S-Series Pro model.

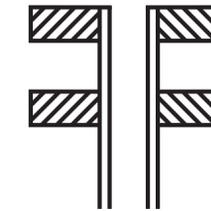
6

Exterior Cleanability. The Yellowstone FFE is made almost entirely out of stainless steel and PTFE, meaning it will withstand some of the harshest cleaning chemicals which may be used in a GMP facility. Additionally, all electronic components area all rated to NEMA 4X or higher, allowing for the system to be easily sprayed down with cleaners.



4

Double Tubesheet Heat Exchangers are an important part of quality control in GMP processes. The separation of the tubesheets insures that there is no fluid mixing in the unlikely event of a leak, as well as allowing the leak to be visually identified. By utilizing double tubesheet exchangers on Yellowstone systems, we eliminate the potential risk of product spoiling as the result of leakage.



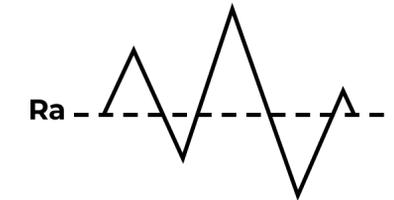
7

Traceability. Our GMP models come with an extensive turnover package, containing the necessary documentation to validate the quality of materials. Thorough documentation ensures that Yellowstone systems will be easily implemented into GMP facilities.



5

Surface Finish. In order to verify that Yellowstone machinery is cleanable and not additive to the process, we exclusively use 316L stainless steel for metallic product contact surfaces. Stainless steel is highly polished, limiting areas where bacteria and particulate can accumulate. High quality materials and smooth surface finishes ensure that Yellowstone machinery is easily validated in GMP facilities.



8

Drainability in Lines. In order for processes to be validated, it is important to ensure that product is not being contaminated by outside contaminants, past batches, or cleaners. One of the ways this is accomplished in a Yellowstone system is with fully drainable lines. Through use of angled lines, strategic drain ports, and careful design, all Yellowstone lines are fully drainable.





CHILL WITHOUT THE CHILLER

Patent- pending technology works to rapidly condense all the solvent vapor. This is by far the most economical and energy efficient condenser available in the industry, as it replaces pricey chillers with a radiator requiring less energy input.

LOW OPERATING COSTS

65% LESS ENERGY

PATENT PENDING TECHNOLOGY

OUR CONDENSER

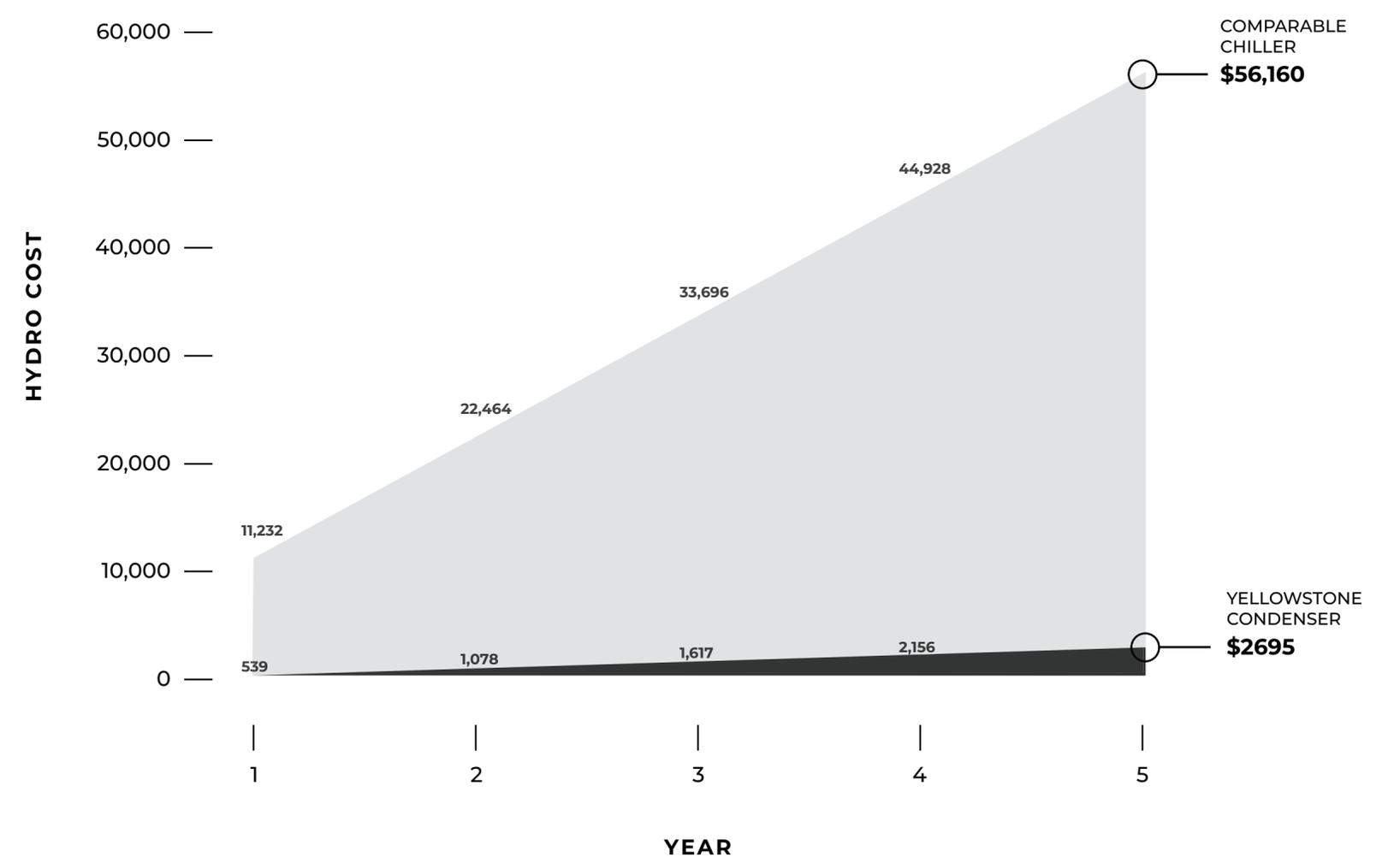
Higher surface area means more effective heat transfer. This is what makes our Diffusion Condenser the most efficient condenser on the market. Vapor droplets are completely enveloped in cooling media, creating the highest possible surface interaction. This drastically reduces the cooling required, completely eliminating the need for chillers.

PAIRED WITH

OUR FLUID COOLER

In order to maintain the condenser temperature, the condenser reservoir is constantly cooled with a circulated water loop. The system heat is then removed as the water travels through an outdoor radiator assembly. This is a much more efficient and affordable cooling method than chiller-based systems

5 YEAR COST COMPARISON

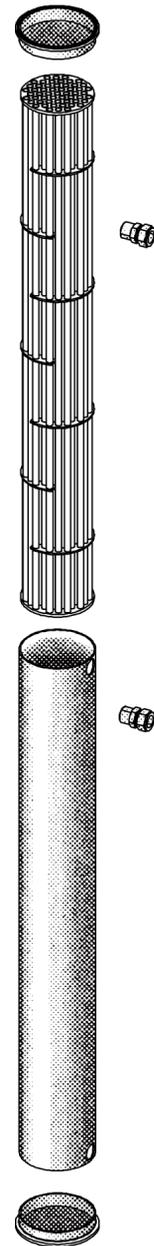


OUR CONDENSER'S ENERGY USAGE
 2.16kw @ \$0.12/kWh @ 40 hrs/wk for 52 weeks/year = **\$539**

COMPARABLE CHILLER'S ENERGY USAGE
 45kw @ \$0.12/kWh @ 40 hrs/wk for 52 weeks/year = **\$11,232**

*based on average 2020 hydro rates of \$0.12/kWh
 † assuming chiller energy usage of 45kW
 ‡ assuming a chiller COP of 1.35
 (the ratio of refrigeration capacity to energy input)

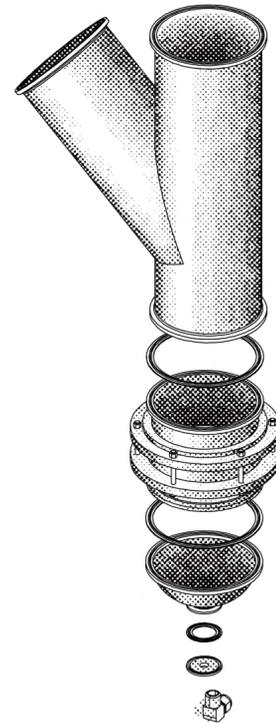
HOW OUR FFE WORKS



1

EVAPORATE.

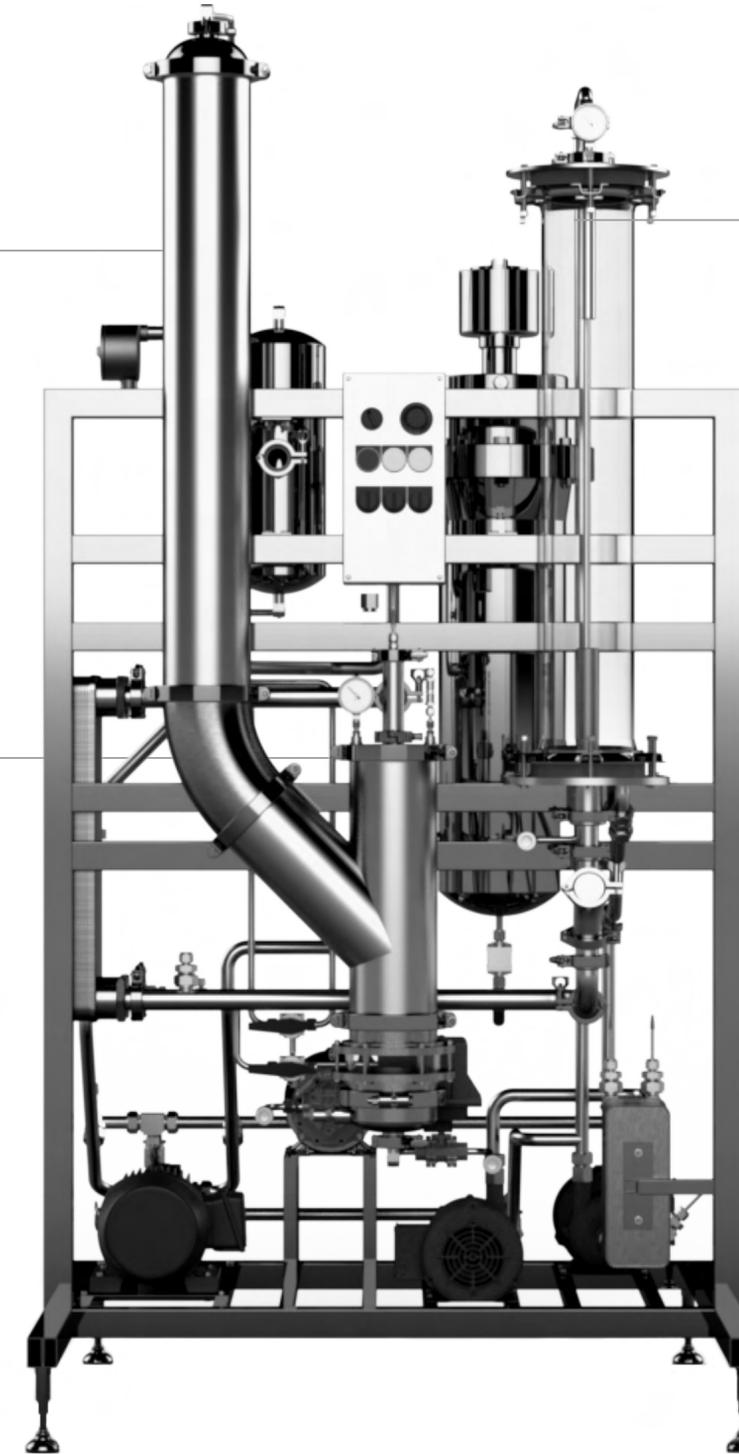
Evaporation in our 60 kW Falling Film Evaporator happens at nearly 20 times the speed of a 20L rotary evaporator. The oil and solvent mixture is pumped into the top of the Falling Film Evaporator where it is dispersed over the tube openings. As the mixture falls down the inner surfaces of the heated tubes, the solvent boils off by the time it has reached the bottom.



2

PURIFY.

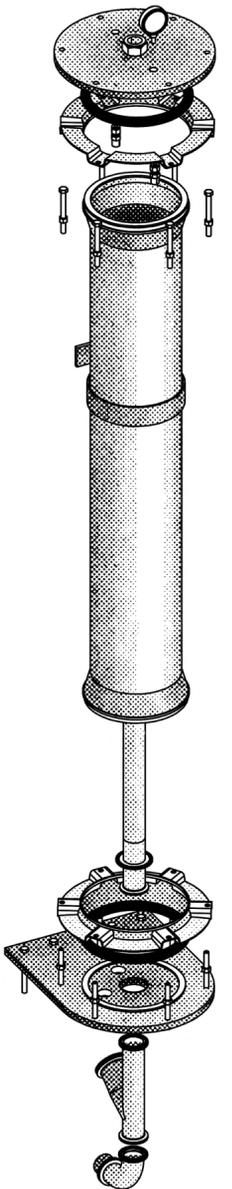
Contact with heated components is gentle and fast, ensuring that the oils are purified without degradation to the desirable compounds. Once the solvent and oil are separated, the oil drains from the system automatically and the purified solvent easily passes through as vapor before it is condensed.



3

CONDENSE.

Patent pending technology works to rapidly condense all the solvent. This is by far the most economical and energy efficient condenser available in the industry, as it replaces pricey chillers with a radiator requiring less energy input.



MACHINE SPECIFICATIONS

VOLTAGE	480 V 3 PHASE
AMPERAGE	75.5-82.2 A
WATTAGE	60 kW
ALCOHOL RECOVERY RATE	250-300 LPH (66-79 GPH)
OPERATIONAL FOOTPRINT	4' x 4' x 8'
SOLUTE MAX TEMPERATURE	194 F (90 C)
DWELL TIME	5 Seconds
ADDITIONAL EQUIPMENT INCLUDED	Radiator & Control Panel

NORTH AMERICAN MADE

Yellowstone equipment is fabricated, assembled, and tested in the United States & Canada. Quality is at the forefront of our manufacturing process, which is why we only source high quality materials from reputable suppliers.



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