

WIPED FILM STILLS

- ▶ **Gentlest Separations of Materials High in BP, MW, Heat Sensitivity And Viscosity**
- ▶ **High Vacuum Capability & Short Residence Time for Highest Product Quality & Yield**
- ▶ **Molecular (Short-Path) Still & Evaporator Configurations**
- ▶ **Scaleable Lab, Pilot & Production Systems**

Wide Application Range Includes: Fine & Specialty Chemicals, Pharmaceuticals, Cosmetics, Edible Oils, Esters, Foods, Flavors, Fragrances, Polymers, Biobased Chemicals & Fuels, Silicones, Others

Toll Services Offered

HYBRID WIPED FILM/FRACTIONAL STILLS

- ▶ **Combining the Multi-Plate Efficiency of Fractional Columns with the Gentle Reboiling Effect of Wiped Film Evaporators for Optimized Purity & Yield**
- ▶ **World Leader in this Technology**



Pope Scientific Wiped-Film Molecular Distillation Process and Product Applications



Oils & Fats

- Deodorization of Triglycerides
- Decolorization of Oils & Derivatives
- Separation of Esters from Fatty Acids & Oils
- Separation of Free Fatty Acids from Vegetable & Edible Oil
- Fractionation of Tall Oil
- Concentration of Glycerol
- Isolation of Monoglyceride, Diglyceride, Glycerine
- Purification & Deodorization of Fish Oil
- Elimination of Pesticides from Natural Oils
- Concentration of Natural Carotin
- Concentration of Omega-3 – Fatty Acids Distilled from Fish Oil
- Distillation of Fatty Acid Amides
- Distillation of Dimeric Fatty Acids
- Deodorization of Emu Oil
- Isolation of DHA & EPA
- Removal of Pesticides from Lanolin
- Isolation of Carotene, Vitamins, Sterols
- Separation of Cosmetic Compounds
- Distillation of Coconut Oils, Other Medium Chain Triglycerides
- Purification of Cannabinoids from Hemp and Cannabis Extracts

Chemical & Specialty

- Purification of Polyphenyl Compounds
- Separation of Aromatic Amines from Oxidized Components & By-products
- Separation of Long Chain Acid Chlorides from Impurities & Free Acids
- Solvent Separation from Silicon Oils
- Concentration & Purification of Esters
- Concentration of Herbicides & Insecticides
- Purification of Sorbitanic Esters
- Purification of Candelilla Wax & Other Natural Waxes
- Elimination of Solvents & Improvement of Color of Montan Wax
- Removal of Pesticides, PCB's and Heavy Metals
- Deodorization, Separation of Pesticides
- Decolorization of Lanolin
- Distillation of Acrylic Acid
- Distillation of Acid Amides
- Distillation of Pharmaceutical Active Substances (e.g. Pentoxifyllin)

Pharmaceutical

- Purification of Synthetic Intermediates
- Evaporation of Solvents from Process Chromatography
- Purification Operations
- Distillation of Components from Extracts
- Fractionation of Heat-Sensitive Compounds
- Separation of Fermentation Derived Intermediates

Petrochemical

- Separation of Microcrystalline Wax from Crude Oil High Vacuum Residues
- Fractionation of Synthetic & Petrochemical Waxes to Soft & Hard Waxes
- Removal of Heavy Hydrocarbons from Asphalts, Tars, Residues

Polymers

- Devolatilization of Prepolymers, Biopolymers
- Removal of cyclic siloxanes from silicones
- Purification & Concentration of Monomers
- Purification & Concentration of Polymers, Plasticizers, UV Inhibitors
- Stripping Monomers from Polymers
- Purification of Epoxy Resins, Latexes, Isocyanates, Urethanes, Silicones, Acrylics and others
- Purification of Adhesives

Nutraceuticals, Foods, Flavors, Fragrances

- Elimination of Terpenes & Concentration of Oils
- Separation of Solvents from Flavors
- Concentration of Juices or Extracts
- Concentration of Tocopherols, Tocotrienols, Antioxidants
- Derivatives from Palm, Rice Bran, Soybean, Flax, Sunflower, Other Oils
- Distillation of Annatto Seed Oil Derivatives
- Concentration & Isolation of Lactic Acid
- Concentration of Capsicum
- Fractionation of Mint & Peppermint Oil
- Concentration of Nootkatone & Valencene from Citrus Oil
- Purification of Patchouli, Sandlewood, Vetiver, Cedarwood, Agarwood (Oud), Hempseed, and many other Oils
- Concentration of Lycopene
- Devolatilization of Botanical Extracts
- Isolation of Cholesterol, Sterols

Recycling

- Purification of Spent Lubricants, Brake fluids, Glycerol, Refrigerant
- Recovery of Thermal, Frying, Vacuum, & Transformer Oils
- Recycling of Dimethylsulfoxid (DMSO) Mother Liquors
- Recycling of Polyethylene Glycols
- Processing of Pharmaceutical Industry Mother Liquors
- Advanced Organic Intermediates
- Recycling of Monochloric Acids from Mother Liquors

POPE DISTILLATION AND EVAPORATION SYSTEMS

For Laboratories, Pilot Plants and Production Processing

Wiped-Film Molecular Stills and Evaporators

- ▲ Designed for separations of heat-sensitive, high molecular weight or viscous materials.
- ▲ Throughput range of 0.1 to 1000 kg/hr.

Fractional Column Distillation Systems and Components

- ▲ Designed for purification, fractionation and solvent recovery.
- ▲ Throughput of range of 0.1 to 500 kg/hr.

Toll Processing Services

- ▲ Minimizing client's process development costs, risk and time-to-market.
- ▲ Specialties in distillation and evaporation of heat-sensitive materials.
- ▲ 1 kg through truckload quantities – with quick turnaround.
- ▲ Fully equipped new facility.



APPLICATIONS

- ▲ Speciality Chemical Purification
- ▲ Pharmaceutical/Biomaterial Concentration
- ▲ Polymer Devolatilization
- ▲ Molecular Distillations of Esters, Fatty Acids, Mono, Di, Triglycerides
- ▲ Residue Removal/Decolorization
- ▲ Vitamin/Nutraceutical Isolation
- ▲ Wax Fractionation
- ▲ Oil Deodorization
- ▲ PCB, Insecticide Removal
- ▲ Water Removal - PPM Level
- ▲ Solvent Recovery, Many Others

Shown above: Multi-Stage Wiped-Film Processing Plant for flavors production with 12" Molecular Still, 12" Evaporator and 12" Fractional Column. Explosion proof

Stainless steel, high-purity, Fractional Distillation Batch System with 3" diameter column, 37-gallon boiling vessel



Multi-purpose, 20", high-vacuum, Molecular Distillation Production System



Turnkey, 12", stainless steel Wiped-Film Molecular Still Processing Plant with degassing stage, for edible oil deodorization



2", standard glass laboratory Molecular Still Unit for general R&D

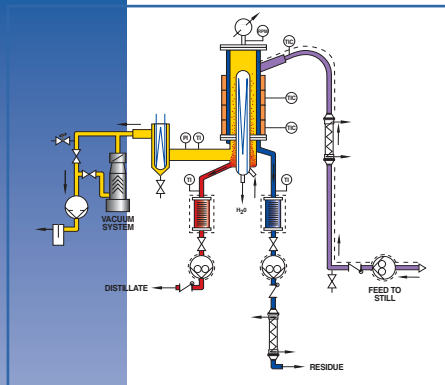


Turnkey, 12", stainless steel Wiped-Film Evaporator for polymer devolatilization



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WIPED-FILM EVAPORATORS, MOLECULAR STILLS AND HYBRID FRACTIONATORS

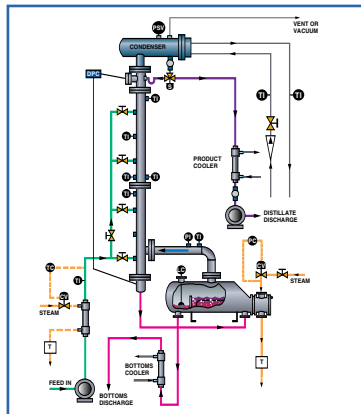


Process and instrumentation diagram of typical Wiped-Film Still System



Turnkey, 6', two-stage Molecular Still Pilot Plant for long chain ester purification

Typical Continuous Mode Fractional Distillation System schematic



- ▲ A complete range of equipment for separations of thermally sensitive materials.
- ▲ Evaporator/Concentrator, Molecular Short-Path, and Fractional Column versions available for application-optimized processing.
- ▲ Consistent method scale-up from lab bench-top units, to pilot plants, to turnkey production processing systems. All available from Pope.
- ▲ Standard lab and pilot units in 2", 4" and 6" diameters for 0.1 to 50kg/hr throughput feature reconfigurable modular design. Interchangeable components available in glass, stainless steel, Hastelloy, other materials.
- ▲ Production processing equipment in 12", 20" and larger diameters for 25 to >1000 kg/hr throughput, available in stainless steel, Hastelloy, other materials.
- ▲ All still sizes are available as basic stand-alone units, partial systems, or as complete, custom-engineered multistage turnkey plants.
- ▲ High vacuum, short residence time for highest quality.
- ▲ Experienced staff on hand to assist with applications testing and process development, through equipment design, fabrication and system startup.



4" glass Pilot Plant Still for Pharmaceutical product development



2" glass combination Molecular Still/Evaporator for polymers R&D

FRACTIONAL COLUMN DISTILLATION SYSTEMS AND COMPONENTS

- ▲ For purification, fractionation and solvent recovery.
- ▲ Sized for small to mid-sized processing, pilot plants and laboratory work. 1" to 12" diameters, 0.1 to 500kg/hr throughput.
- ▲ Batch or continuous configurations.
- ▲ Wide range of packings and internals, system designs and materials, including stainless steel, Hastelloy, glass, etc.
- ▲ Offered as: individual components, basic system or complete turnkey engineered systems.

3" stainless steel Fractional Column Still for general R&D. Batch configuration with optional continuous reboiler (not shown)



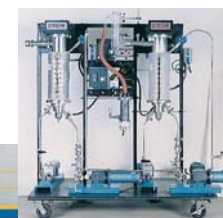
4-gallon, 2" diameter, high vacuum and high temperature Fractional Still for fine chemicals manufacturing

TOLL PROCESSING SERVICES

- ▲ Custom evaporation, molecular distillation and fractionation operations.
- ▲ Specializing in heat-sensitive and difficult separations, including pharmaceuticals and foods.
- ▲ Lot sizes from 1 liter to truck loads.
- ▲ Fast turn-around time,
- ▲ Fully equipped new facility, experienced staff.



20', 25 sq.ft. Molecular Distillation Toll Processing Station



2-stage, 6', 2.3 sq. ft. Wiped Film Still Tolling System configurable for molecular distillation, evaporation and column fractionation



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TOLL DISTILLATION PROCESSING SERVICES

Concept ▶ Lab ▶ Pilot Plant ▶ Commercialization

- ▶ **Laboratory Feasibility Testing**
- ▶ **Process Development/Pilot Trials**
- ▶ **Contract Processing
(Liters to Truckloads)**
- ▶ **cGMP & Kosher Certified**
- ▶ **Highest Levels of Expertise,
Performance and Confidentiality**

Hybrid

Wiped Film/Fractional Still Systems
Combine Technologies To Provide
Highest Purity, Yield & Value



3-stage stainless steel production scale hybrid distillation plant. Built with PLC system and used for the purification of nutritional supplements and intermediates.

Pope Scientific's world leadership in hybrid technology evolved from decades of experience in toll distillation, pilot process development and lab studies along with continuous innovation of equipment including wiped film and fractional stills.

Our breakthrough systems incorporate short duration, high vacuum wiped-film evaporation with efficient multiple plate column fractionation to:

- ▶ Allow the purification of heat-sensitive materials similar in volatility, which could not otherwise be separated; and
- ▶ Advance the quality of your product to levels not previously possible.

To your advantage, we're not just providing equipment; we're processing in-house as well. It's the synthesis of theoretical knowledge and hands-on expertise that truly separates us from the competition.



Tri-functional hybrid pilot plant is configurable for molecular distillation, evaporation and hybrid separation.

Successfully developed separation & purification applications include:

- Edible and Essential Oils
- Foods, Flavors & Fragrances
- Vitamins & Nutraceuticals
- Pharmaceutical Intermediates & Cosmetics
- Polymers, Waxes, Lubricants & Bio-based Materials
- Many other temperature sensitive separations [Fish, Citrus, Mint, Wood, Other Botanical Oils, Omega-3, FAME]

Concept ▶ Lab ▶ Pilot Plant ▶ Commercialization

For 50+ years Pope Scientific has provided a full range of process solutions.

Toll Processing Services:

- Laboratory Feasibility Testing • Process Development/Pilot Trials
- Applications Assistance Any Time/Any Stage
- Contract Processing • CGMP & Kosher Certified

Chemical Processing Equipment

(for Laboratory, Pilot & Large Scale Production):

- Wiped-Film Molecular (Short Path) Stills & Evaporators
- Batch and Continuous Fractional Distillation Systems
- Hybrid Wiped-Film/Fractional Distillation Systems
- Pressure Vessels, Reactors, and Process Vessel Systems



Benchtop 2" Wiped Film Still



Solution Driven.

www.popeinc.com

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OUTLOOK: DIVIDED CONGRESS BEGINS TOUGH SECOND SESSION

CHEMICAL

& Engineering News

JANUARY 28, 2002

REINVENTING PHARMA



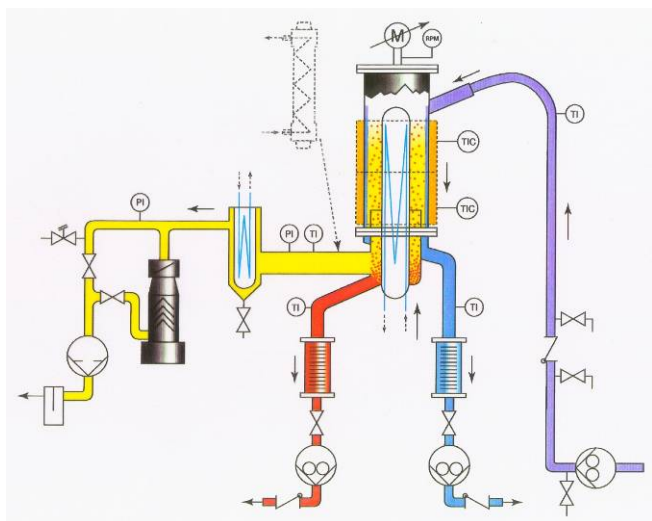
Configurations of Wiped Film Stills



OVERVIEW

Pope Wiped Film Stills (WFS) provide an efficient and powerful means of separating compounds from each other. The process is a thermal separation technique, (as opposed to extraction, centrifugation, etc.), meaning that the fundamental technique involves volatility differences between various compounds in a starting mix. Lighter components which are lower in boiling point, (BP) and molecular weight, (MW), will tend to evaporate more easily at a given temperature and pressure than the heavier components. The resulting vapor has a greater proportion of lighter components which when condensed, become distillate, while the unvaporized portion becomes residue. Adjustment of process parameters can provide the desired separation. This is a continuous process technique, with feed material being introduced into the WFS at a fixed feedrate, and the resulting distillate and residue streams being discharged from the WFS at continuous and fixed rates and compositions.

These stills are designed especially for heat-sensitive materials which if boiled and evaporated in more conventional equipment, would degrade, polymerize, or otherwise become less pure and even destroyed. The key features include vacuum condition to lower the required evaporation temperature and very short residence time (seconds) to minimize or eliminate whatever degradation might occur. In common with all Pope WFS units, a rotor containing diagonally slotted wiper blades in a heated vertical tube, (still body), wipes the incoming liquid around the inner circumference as well as downward, as a dynamic highly mixed thin film. The body temperature is adjusted to be hot enough to evaporate only the components desired to be distillate; the vacuum is adjusted to a level which minimizes the boiling point of the lighter components but not so great as to prevent condensation or to evaporate the heavier compounds as well. The results of operation with a well-tuned WFS system include optimized product purity and yield, with minimized degradation. Depending on the process, either the distillate or the residue may be the main product.



The figure above illustrates the Pope WFS process. Feed material, represented with purple color, is pumped into the still, or in the case of a lab size still shown, is admitted through a

metering valve from a feed vessel. The still body is heated from the outside, causing the volatile components, (red) to evaporate and condense as distillate, while the heavier components, (blue) remain as liquid, discharging as residue. Controlled heating is by means of either electric resistance elements or body jacketing for hot fluid or steam. The vacuum path (yellow) includes a cold trap to prevent stray light material from entering the vacuum pump, while any non-condensable material (gasses) do enter the vacuum pump and discharged via the exhaust outlet.



The above is a photo of a typical laboratory scale 2" WFS system; compare this to the previous illustration. Note that there are two condensers, and internal one and an external one; important distinguishing features of various WFS configurations will be covered next.

CONFIGURATIONS

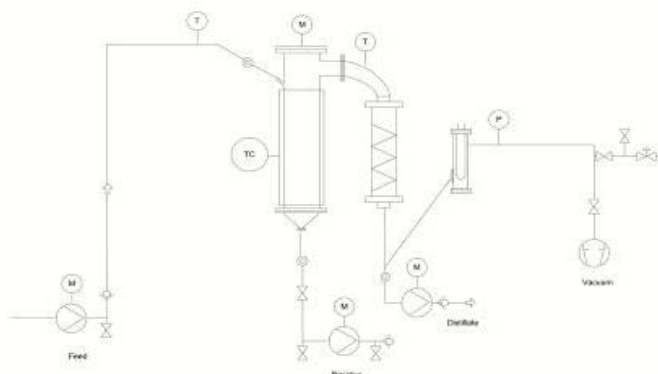
Pope stills can be configured in two main ways, (a third way is covered later). One is normally referred to as a Wiped Film Evaporator, (WFE), the other as a Wiped Film Molecular Still, (WFMS). A beneficial feature of many of Pope's stills is design allowing the user the capability to easily reconfigure between WFE and WFMS modes and in sizes up to 6", the capability to have both modes at the same time, is in the case of the above photo, and examples below.



The various configurations are considered singly below.

WFE: These are also sometimes referred to as Concentrators, Thin Film Evaporators, and other names. The distinguishing feature is an external condenser rather than internal. WFE's typically are used with feed materials containing a large percentage of light components such as light solvents or water, and where the goal is to concentrate the heavier product component. Typical examples include synthesized or fermented biomaterials previously separated in highly diluted in process chromatography, extractions from botanicals, and other operations. In other cases, the object is recovery of solvent, separated from heavier residue waste components and/or solids. External condensers can provide a very large surface area necessary for condensation of the high quantity of solvent, and in larger production size systems is also far less expensive than internal condenser designs. Usually, vacuum ranges are weak to medium level, from a few hundred torr down to 1 or occasionally as low as 0.1 torr. Vapor flows freely from the heated body to the condenser, though at stronger vacuum levels, the increased pressure drop limits the vapor flow and thus the throughput of the still. A diagram is shown below.

Wiped Film Evaporator



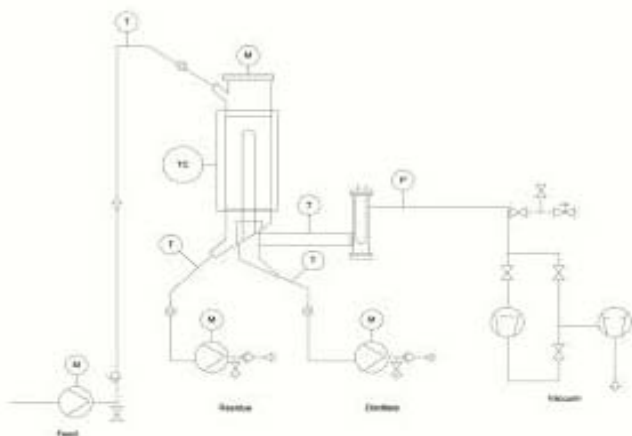
Examples of WFE's are shown in the photos below. Note the wide range of equipment sizes available, though in each case, the principal is the same, thus scaling up or down is possible.



WFMS: These stills are also known as Short-Path Units, as the internal condenser is positioned inside the body, a short distance away from the evaporation surface. This configuration is called

for when the distillate material has very high BP or MW, requiring high vacuum conditions, ranging from 0.1 down to 0.001 torr. At such vacuum levels, the pressure drop up to, over and down to an external condenser becomes limiting, even to the extent where no vaporized material at all will be collected and condensed – the molecules simply won't travel that far. An internal condenser solves the problem; vapor molecules that at least leave the heated surface can more easily find their way to the internal condenser than to one placed a longer distance away. Examples include removal of long chain free fatty acids from triglyceride oil, or of high MW monomers and dimers from pre-polymers, and any number of applications involving heavy materials to be distilled away from even heavier materials. Extreme cases may require evaporation temperatures beyond 300°C. Other complicating circumstances can include high melting point (MP) of the distillate, high feed and residue viscosity, sublimation, corrosion, etc. calling for special processes design and operation. Below is a diagram.

Wiped Film Molecular Still



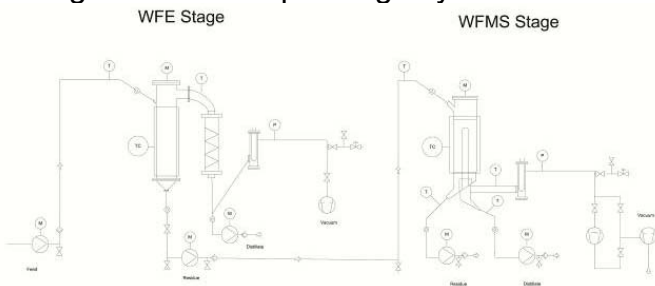
WFMS examples are shown in photos below.



MULTISTAGE SYSTEMS: There are several types of applications where a single pass through a WFE or a WFMS unit is not sufficient. One example is where the percentage of distillate is high and where the amount of remaining lights in the residue product is required to be very small. It is not possible to accomplish this in one pass because the vapor becomes so saturated with the light component that molecules simply won't leave the heated surface anymore. In such cases, a first pass removes the majority of lights, and a second pass with the residue removes the remainder.

Another type of application requiring multiple passes is where the feed material contains gasses and light solvents, and where a medium or high BP compound (middle cut) needs to be removed from even heavier residue material. The middle cut can require high temperature and vacuum level to distill, but if one imposes a high vacuum in an attempt to distill in a single pass, the gasses and lights will violently flash, carrying everything including heavy residue with it, decreasing the resulting purity levels. Furthermore, at these vacuum levels, the volatiles will not condense, bypassing the condensers and even the cold traps and go directly into the vacuum pump; something to be avoided. Finally, even if flashing is not a problem, the lights components, even at small percentages, can prevent obtaining a vacuum high enough to distill the midcut, no matter what kind of vacuum system is utilized. The best approach is to devolatilize the feed material in a first pass, resulting in an efficient, well-behaved second pass.

A diagram of a multiple stage system is shown below.



The photos below are of systems with a WFE followed by a WFMS, a very typical arrangement. WFE-WFE and WFMS-WFMS systems also exist.

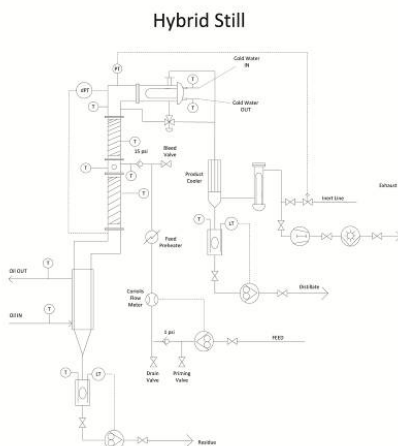


Some systems have vessel chambers as first stages, rather than WFE's. These are called flashers or passive degassers, in reference to that they have no moving parts. These degasser stages have sets of internal baffles that maximize surface area for vapor disengagement while limiting liquid entrainment. Heating is via heat exchangers in the feed line rather than the body, though vacuum and liquid pumps are still required as with WFE stages. Examples are shown below.



HYBRID STILLs: These are also known as wiped film fractional stills or wiped film hybrid stills, (WFHS). There are many situations where the gentle action of WFE's or WFMS's perform the task of separation with minimized degradation, but that the resulting purity level and/or yield of the product is unsatisfactory. This can happen when the feed contains components that are close in BP. A WFE or WFMS provides only one equilibrium stage or theoretical plate (TP), so is limited in resolving separation of such feed materials. The design of these systems incorporates addition of a fractional column section between a WFE body and the condenser. The columns normally utilize packing, often a structured cake type with low pressure drop characteristics. Depending on the application, different designs and heights of columns are utilized. Higher columns provide more TP's but also greater pressure drop which can become limiting; the trade-offs between purity, throughput and degradation must be taken into account. Also, if the application originally required a WFMS and a WFE did not work, than the application is not a candidate for the hybrid approach. In effect, hybrid systems are quite similar to conventional continuous fractional distillation systems, but with a WFE replacing a traditional kettle reboiler to provide a shorter residence time and thus less degradation. These are also more subject to scale down problems than WFE or WFMS units; it has been demonstrated that what may work quite well on a pilot or production scale hybrid unit may not work at all on a lab scale 2" hybrid unit. Operation of these systems is normally much more difficult than with WFE or WFMS units, requiring a lot of experience and patience, but with great potential rewards. Pope is the world leader in this technology, working closely with clients to bring complex processes to fruition and commercialization.

The below is a diagram of one type of hybrid still.



The photos below are examples of hybrids. These examples are also “Trifunctional” systems, i.e., designed and equipped for reconfiguration by the client between WFE, WFMS and WFHS modes, providing great versatility.



One might presume that multistage systems incorporating hybrids are possible, and this is in fact the case. It is quite typical that applications requiring hybrids also require multiple stages, and these may be additional hybrids, WFE's or WFMS's; often all three types are required, arranged in groupings derived by careful lab and pilot trials and strategic process design. The photos below show two-stage, three-stage, and 4-stage systems, respectively, and greater numbers of stages are possible as well. Every application is different, leading to a wide range of system designs and differing numbers of required stages.





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**APPLICATIONS QUESTIONNAIRE FOR
 MOLECULAR STILLs, EVAPORATORS, FRACTIONAL STILLs**

Date: _____ Phone: _____

Name: _____ Fax: _____

Title: _____ E-mail: _____

Company: _____

Address: _____

City: _____ State: _____ Zip: _____

Country: _____

The following data is useful for properly sizing equipment and establishing process parameters to accomplish a desired separation. **All data will be treated confidentially.**

I. FEED MATERIAL COMPOSITION & PROPERTIES

Please fill in as much of the information below as possible. It is essential that all components are listed and that the weight percentages total 100%, even if estimated. All provided boiling point and vapor pressure data, and at least some information on viscosity is extremely helpful.

Components (List All)	% by Wt. in Feed (Total 100%)	BP °F/°C (760 mm Hg)	MP °F/°C (760 mm Hg)	MW
1. _____	_____	_____	_____	_____
2. _____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____

(Cont.)



II. DESIRED PRODUCT PURITY

Which component(s) is the important end product? _____

Use the below to indicate desired goal (or ideal), and minimum acceptable final purities or compositions.

Components	Goal % Wt. in Distillate	Acceptable % Wt. in Distillate	Goal % Wt. in Residue	Acceptable % Wt. in Residue
1. _____	_____	_____	_____	_____
2. _____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____

Further notes regarding end product purity: _____

III. DESIRED PRODUCTION RATES (Indicate kg/hr. or gal/hr, etc.)

A. Feed Rate: _____ B. Distillate Rate: _____ C. Residue Rate: _____

If required production rates are not yet known, please provide estimate of batch sizes (from a reactor, or other operation), and frequency of batches. [Examples: 5000 kg/wk, 6 gal/day, 200 metric tons/month, etc.]

IV. ADDITIONAL INFORMATION (Add extra sheets, if necessary)

A. Additional Vapor Pressure/Temperature Data (mm Hg. @ °C): _____

B. Viscosity/Temperature Data (cP or mPa·s @°C): _____

C. Misc. Physical Information (Degradation Limits, Sublimation, Foaming, Solids, etc.): _____

D. Materials of Compatibility Information: _____

E. Safety Information (Flammability, Flash Point, Toxicity, etc.): _____

F. Any other information would be helpful, (also, attach GC's etc, if available): _____

Pope 2" Wiped-Film Still System



Pope Scientific has been supplying Wiped-Film Distillation systems and technology to many industries world-wide for over 45 years. This 2" molecular still package is designed and carefully built with high quality components to provide customers with a complete high performance wiped-film still system, at an affordable cost. Equipped with internal and external condensers, the system is ready for molecular (short-path) distillation, evaporation and concentration operations. The 2" Still package includes all the equipment necessary for efficient and precisely controlled operation of the still. Additional component options are also available for special processing requirements and customers' preferences. This equipment is designed, made and tested in WI, USA and is backed by Pope's unparalleled customer service! Knowledgeable specialists are accessible to users for everything from spare parts orders to in-depth technical phone and video consultation.



Key Features:

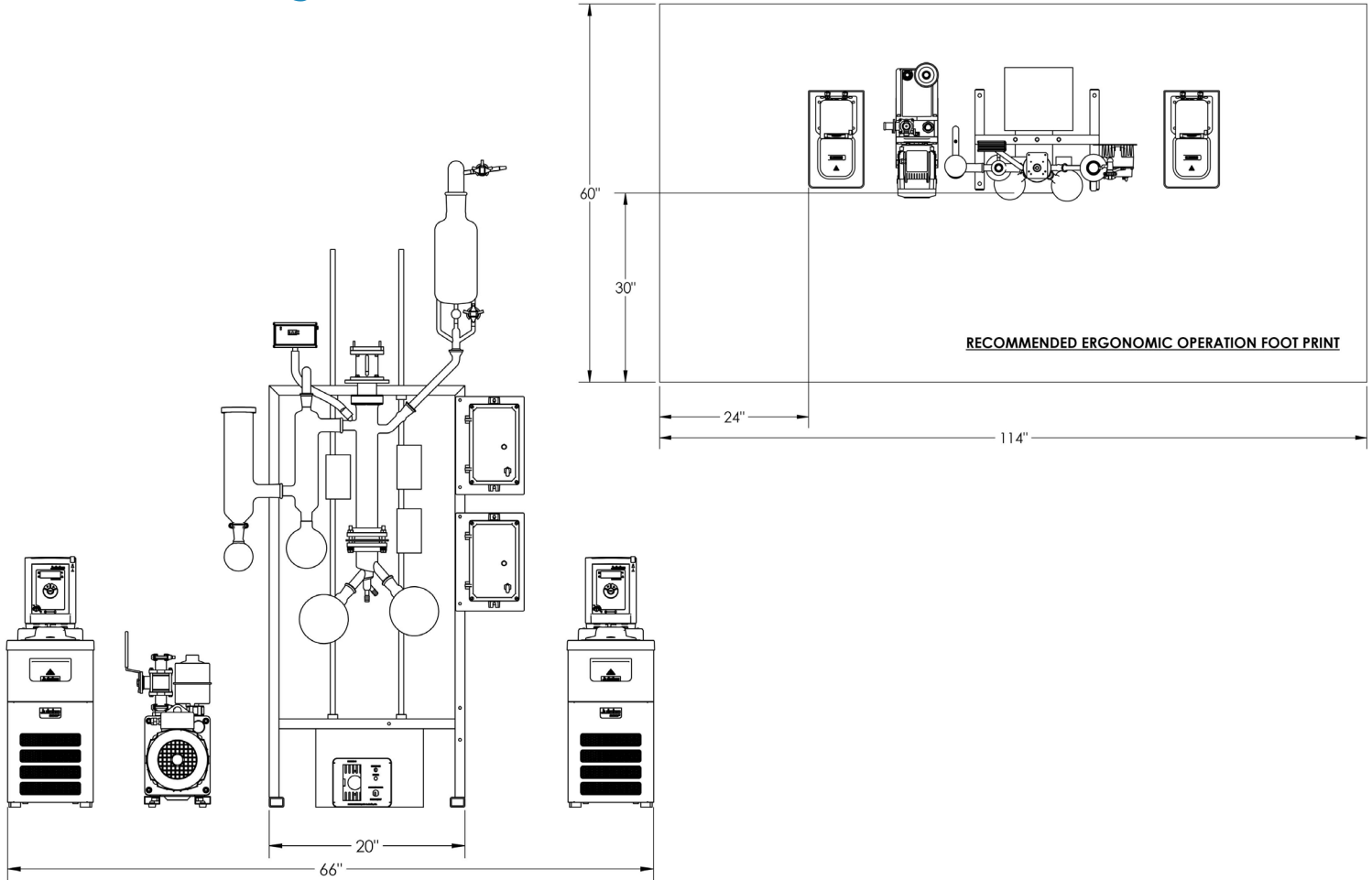
- All components included are of the highest quality and in stock
- Wetted parts are certified borosilicate glass, 316L SS drive and virgin Teflon wipers
- High integrity components and fittings assure high vacuum, leak-free operation
- Each order fully tested as a complete system; comprehensive documentation and manuals provided
- Feed rates from 200 - 1200 ml/hr, application dependent
- Compact, robust design
- Built, tested, and shipped within 3-5 weeks after order
- 12 month warranty
- The original, USA-made, classic WFS units since 1976

Optional Packages:

- Feed and discharge liquid pumps
- Stainless steel body/condenser substitution kit
- Vacuum booster diffusion pump
- Hot oil jacketing and heating substitution package
- Advanced automation control, recording and data handling packages
- Addition of Hybrid Distillation componentry providing fractional column and reflux sections for greater separation efficiency of fractions

Pope 2" Wiped-Film Still

Dimensional Diagram:



General Specifications:

Footprint	66"W x 22"D x 66"H (167.6 cm x 155.9 cm x 167.6 cm)
Electrical	60Hz Installations: 60 Amps @ 120V/1ph 50Hz Installations: 43 Amps @ 240V/1ph
Warranty	Limited 1 year warranty
Feed Rate	200 - 1200 ml/hr with glass body and condenser
Evaporator surface area	0.033m ² (0.36 ft ²)
Evaporator diameter	2"
Ultimate vacuum (clean and dry)	0.008 to 0.02 Torr. (0.001 Torr with optional diffusion pump)
Condenser circulator range	-20°C to +150°C
Immersion chiller operating temperature	-60 to -40°C (Colder if LN or dry ice & solvent is used instead)
Heating temperature	325°C

Rev. 0 5/2022

Pope 4" Wiped-Film Still System



Pope Scientific has been supplying Wiped-Film Distillation systems and technology to many industries world-wide for over 45 years. This 4" molecular still package is designed and carefully built with high quality components to provide customers with a complete high performance wiped-film still system, at an affordable cost. Equipped with internal and external condensers, the system is ready for molecular (short-path) distillation, evaporation and concentration operations. The 4" Still package includes all the equipment necessary for efficient and precisely controlled operation of the still. Additional component options are also available for special processing requirements and customers' preferences. This equipment is designed, made and tested in WI, USA and is backed by Pope's unparalleled customer service! Knowledgeable specialists are accessible to users for everything from spare parts orders to in-depth technical phone and video consultation.



Key Features:

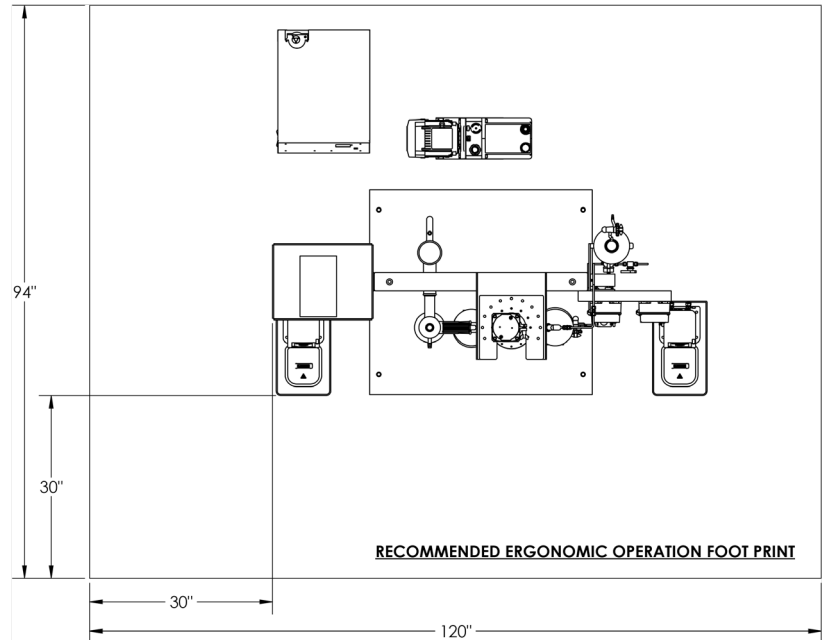
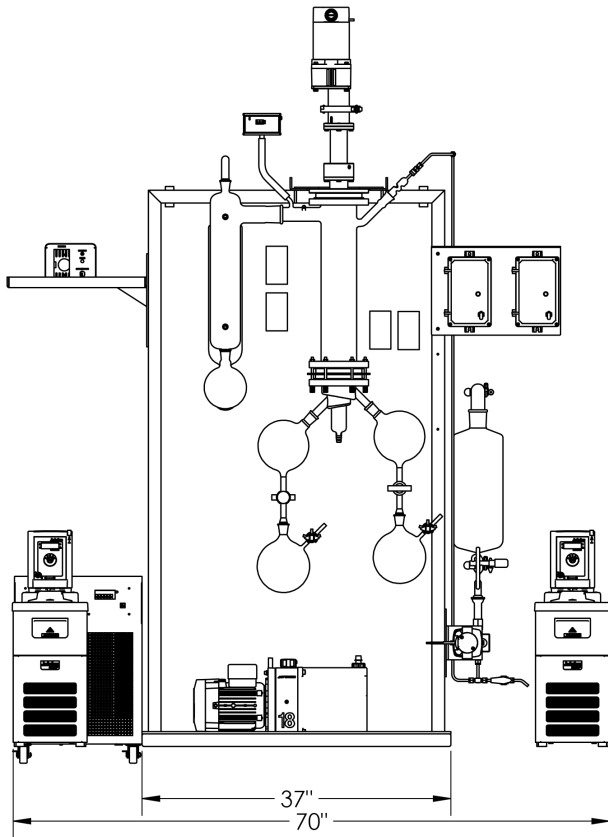
- All components included are of the highest quality and in stock
- Wetted parts are certified borosilicate glass, 316L SS drive and virgin Teflon wipers
- High integrity components and fittings assure high vacuum, leak-free operation
- Each order fully tested as a complete system; comprehensive documentation and manuals provided
- Feed rates from 500 to 4000 ml/hr in glass material
- Compact, robust design
- Built, tested, and shipped within 3-5 weeks after order
- 12 month warranty
- The original, USA-made, classic WFS units since 1976

Optional Packages:

- Feed and discharge liquid pumps
- Stainless steel body/condenser substitution kit
- Vacuum booster diffusion pump
- Hot oil jacketing and heating substitution package
- Advanced automation control, recording and data handling packages
- Addition of Hybrid Distillation componentry providing fractional column and reflux sections for greater separation efficiency of fractions

Pope 4" Wiped-Film Still

Dimensional Diagram:



General Specifications:

Footprint	70"W x 60"D x 87"H (177.8 cm x 152.4 cm x 221.0 cm)
Electrical	60Hz Installations: 52 Amps @ 120V/1ph, 14 Amps @ 240V/1ph 50Hz Installations: 61 Amps @ 240V/1ph
Warranty	Limited 1 year warranty
Feed Rate	500 to 4000 ml/hr with glass body and condenser
Evaporator surface area	0.11m ² (1.15 ft ²)
Evaporator diameter	4"
Ultimate vacuum (clean and dry)	0.008 to 0.02 Torr (0.001 Torr with optional diffusion pump)
Condenser circulator range	-20°C to +150°C
Immersion chiller operating temperature	-80 to -60°C (Colder if LN or dry ice & solvent is used instead)
Heating temperature	325°C

Rev. 0 5/2022

Pope 6" Wiped-Film Still System



Pope Scientific has been supplying Wiped-Film Distillation systems and technology to many industries world-wide for over 45 years. This 6" molecular still package is designed and carefully built with high quality components to provide customers with a complete high performance wiped-film still system, at an affordable cost. Equipped with internal and external condensers, the system is ready for molecular (short-path) distillation, evaporation and concentration operations. The 6" Still package includes all the equipment necessary for efficient and precisely controlled operation of the still. Additional component options are also available for special processing requirements and customers' preferences. This equipment is designed, made and tested in WI, USA and is backed by Pope's unparalleled customer service! Knowledgeable specialists are accessible to users for everything from spare parts orders to in-depth technical phone and video consultation.



Key Features:

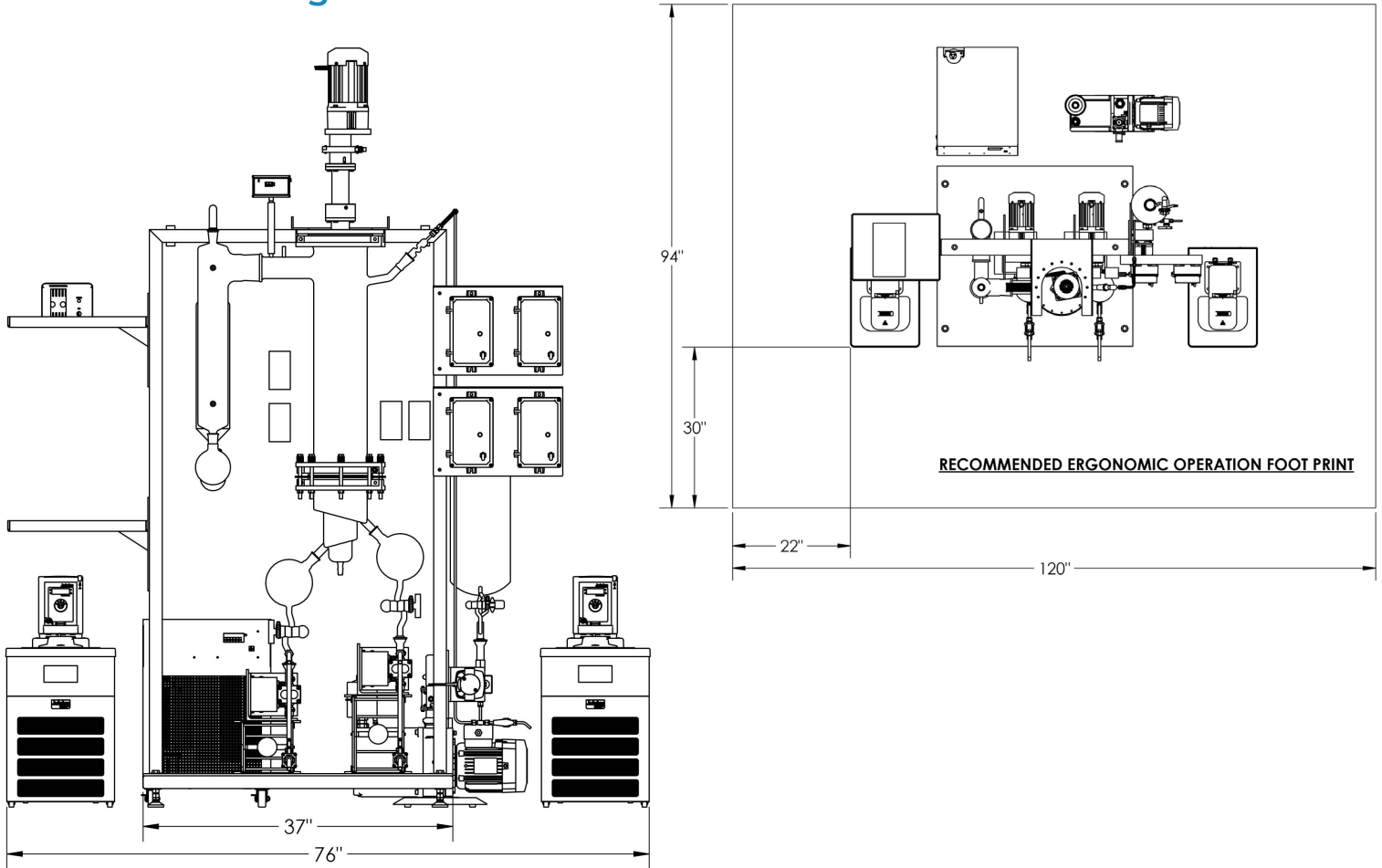
- All components included are of the highest quality and in stock
- Wetted parts are certified borosilicate glass, 316L SS drive and virgin Teflon wipers
- High integrity components and fittings assure high vacuum, leak-free operation
- Each order fully tested as a complete system; comprehensive documentation and manuals provided
- Feed rates from 1-8 liters/hr in glass material, greater in optional stainless steel
- Compact, robust design
- Built, tested, and shipped within 3-5 weeks after order
- 12 month warranty
- The original, USA-made, classic WFS units since 1976

Optional Packages:

- Feed and discharge liquid pumps
- Stainless steel body/condenser substitution kit
- Vacuum booster diffusion pump
- Hot oil jacketing and heating substitution package
- Advanced automation control, recording and data handling packages
- Addition of Hybrid Distillation componentry providing fractional column and reflux sections for greater separation efficiency of fractions

Pope 6" Wiped-Film Still

Dimensional Diagram:



General Specifications:

Footprint	76"W x 60"D x 90"H (193.1 cm x 152.4 cm x 228.6 cm)
Electrical	60Hz Installations: 70 Amps @ 120V/1ph, 35 Amps @ 240V/1ph 50Hz Installations: 83 Amps @ 240V/1ph
Warranty	Limited 1 year warranty
Feed Rate	1-8 liters/hr with glass body and condenser
Evaporator surface area	0.22m ² (2.37 ft ²)
Evaporator diameter	6"
Ultimate vacuum (clean and dry)	0.008 to 0.02 Torr (0.001 Torr with optional diffusion pump)
Condenser circulator range	-35°C to +150°C
Immersion chiller operating temperature	-80 to -60°C (colder if LN or dry ice & solvent is used instead)
Heating temperature	325°C

Rev. 0 5/2022

INTRODUCING THE ALL NEW

Pope ProPass 600 Wiped-Film Still

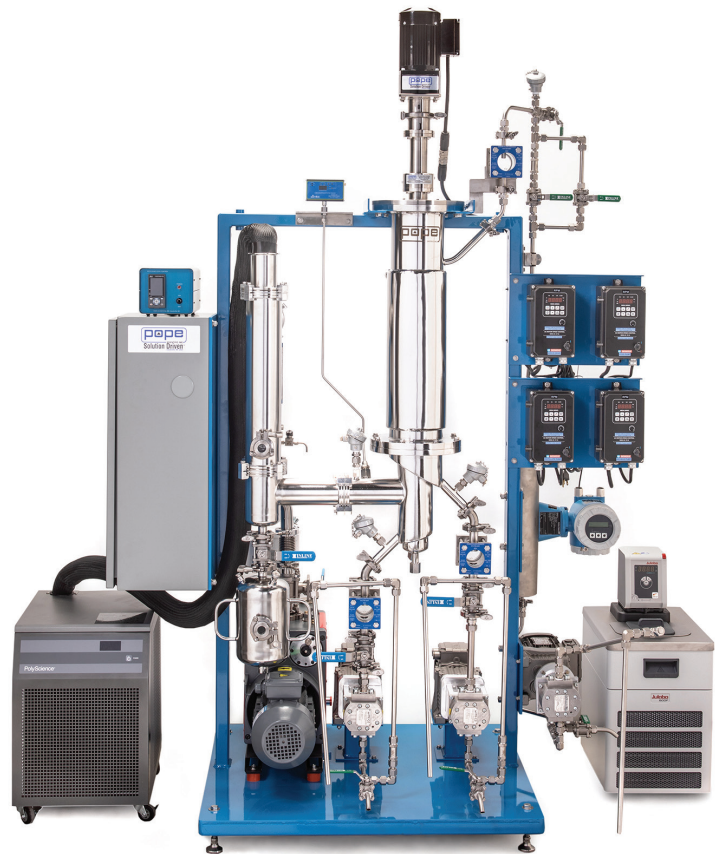


HIGHEST PERFORMANCE - GREATEST THROUGHPUT / PRICE RATIO

Description:

Recognized for decades for molecular distillation excellence, Pope Scientific proudly presents the ProPass 600 System. This single-stage wiped-film short-path distillation system contains the core essentials for reliable, round the clock operation. This includes processing materials of high heat sensitivity, BP, MW, and viscosity. All 316L stainless steel construction with no glass except for armored sight glasses, provides durability and high heat transfer rates for maximum efficiency and throughput.

The ProPass 600 has been developed from Pope's 45 years of experience in wiped-film distillation technology, equipment manufacturing and toll processing services. This design includes new high performance gear pumps, oversized vacuum pump, a compact, heavy-duty frame and more. The result is an industrial machine ready to take on a wide quality range of extracts and provide high purity and yield distillate product. And as always, backed by Pope's unmatched customer service and technical guidance after the sale.



Versatility:

A wide variety of applications in many industries may be handled with the ProPass with a wide range of parameters. Where more than a single distillation pass is required, ProPass modules may be linked together in series. For concentration and high percentage solvent applications, Wiped-Film Evaporator (WFE) versions with external condensers are available. The ProPass is also very useful for pilot plant studies and scaleup work.

Key Features:

- Up to 22 kg/hr feed rate
- Single point power distribution panel
- New high performance liquid and vacuum pumps
- All wiring to NEC industrial standards
- 316L SS used on all wetted metal parts
- Also available in 4", 9", 12" and 20" ProPass sizes
- USA designed and manufactured
- Industrial duty and performance

POPE SCIENTIFIC INC.

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INTRODUCING THE ALL NEW

Pope ProPass 600 Still System



The Pope ProPass At A Glance:

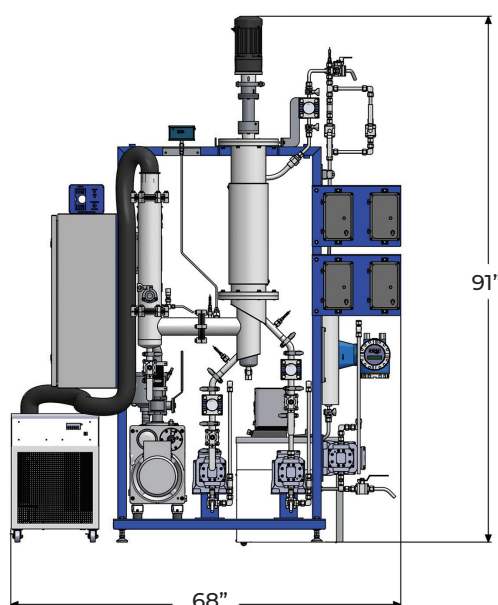
- Developed to provide the greatest reliable throughput per dollar possible!
- Choice of electric band or hot oil jacket heating
- An industrial duty no-frills, robust and efficient 6" wiped-film still for production processing or pilot plant work
- Designed as an all 316L stainless steel process wetted construction system, not a modification of a glass standard still system.
- Features a single-stage system capable of performing one-pass applications or multiple successive passes of differing operating parameters.
- Modularly designed for expansion of production needs, and easy linking of extra stages in a series if required - no need to purchase "all at once."
- Includes the basics for what is necessary to start continuous processing right out of the crate, with the option to upgrade components based on a customer's preferences and budget.

Optional Packages:

To suit the unique preferences and budget of the operator, a variety of options are available including:

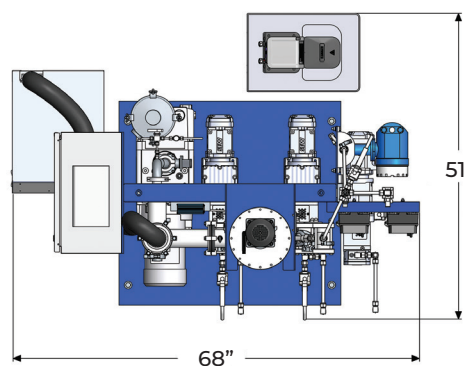
- Hot Oil Heating Substitution Package
- Feed Rate Display & Control Package
- Real-time Distillate Percentage Display Package, (eliminating bucket & stopwatch verifications)
- Vacuum Booster Package (Diffusion or other types)
- Automatic Vacuum Control Package
- Data Recording & Management Package
- Feed & Receiver Vessel Package Choices
- Contact Pope for more details regarding pricing and packages available

Dimensional Diagram:



General Specifications:

Footprint	68"W x 51"D x 91"H
Electrical	208V, 3-phase (WYE), 75 FLA (Others avail.)
Warranty	Limited 2 year warranty
Feed Rate	Up to 22 kg/h
Evaporator diameter	6"
Evaporator surface area	0.22 m ²
Internal condenser surface area	0.35 m ²
Vacuum capacity	29.7 CFM
Ultimate vacuum (clean and dry)	0.02 Torr or better (0.001 with booster)
Internal condenser chiller range	-35°C to 150°C
Immersion chiller operating temperature	-80 to -60°C



Heating Band version shown. Consult with Pope for Hot Oil version.

V1.0 2022

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