

MODEL SRFX-400 ETHANOL DISTILLATION COLUMN

INCLUSIONS & EXCLUSIONS:

INCLUDED:

- All engineering requirements including pad requirements and fastening
- The system is skid mounted on a painted steel frame with anchor attachments, with single point connections for E-Z field installation.
- Allen Bradley PLC control system comes included, standard on all ■■■ systems; providing our customers with nearly “turn-key” operating systems. Please advise us if you wish to provide your own control system or if you have other plant standard control systems that you require.
- The design of the system assumes an external feed supply tank to provide a continuous flow for automatic operation.
- A schedule of materials will be provided by ■■■ to help minimize customer cost.

EXCLUDED:

- The feed tanks are not included in this quotation as they are application specific. May not be required.
- All external pipes and tank Insulation & Tracing materials will be provided by customer if necessary.
- All Utilities provided by customer

DESCRIPTIONS:

A. MICROPROCESSOR CONTROL:

All sequences are controlled and displayed by the microprocessor. The processor does a self diagnostic check upon start up and during its operation to ensure optimum safety and control. The main CPU makes all the distillation decisions on a fixed program, ensuring positive control of all functions and a systematic fail-safe shutdown procedure. Temperature set-points and other operation parameters are made at the control panel. This results in current process values and minimizes any operator contact with the heated vessel. Tamper proof over temperature settings are controlled by the program for optimum safety of operation in any condition. Level controls include: radar sensor in the lower section and one in the overhead receiver.

- Displays and complete adjustment of all metering pumps
- Maintenance Screen for troubleshooting
- Manual or Automatic control
- Temperature adjustment and display of RTD'S in the system.
- All faults displayed on monitored devices including critical shutdown and alarming.

B. ELECTRICAL SUPPLY:

All electrical equipment will be installed per NEC standards and will be rated for use in ATEX areas. All instruments will be wired through S.S. & Galvanized steel conduit or (XP rated cable assemblies with approved glands) All motor controls, starters, & power wiring will be pre-installed by ■■■ for

single point connections. Equipment grounding will be by bolt connections provided on equipment supports.

C. INSTRUMENTATION:

■ will provide all instruments in the supplied control panel necessary for a turn-key operation. This includes PLC, transmitters for measurement of flow, vessel differential pressure and level modulating control valves and actuators, I/P transducers and positioners, relief devices and all local gauges for measurement of level, temperatures and pressure.

D. SKID or BASE STRUCTURE:

Built of "Epoxy coated Steel" the skid frame structure is designed and constructed to meet or exceed AISC and AWS welding specification standards.

E. PIPING:

Process & Utility piping will be of 304L S.S. except for hot oil piped areas. Provided piping will meet ANSI B31.3 specifications.

F. SYSTEM ASSEMBLY:

All equipment will be mounted within the structural frame of the SRXH system including preinstalled piping, terminated tie-ins, flanged connections, and main control panel with all electrical wiring. All instruments will be calibrated and installed. Upon shipping of the system some sensitive items may be removed and individually packed to ensure proper handling. ■ systems usually ship as a single piece excluding the control system when customer requests remote location mounting at customer site. It is the responsibility of the customer to provide all unloading & installation of the provided equipment upon arrival at customer site. ■ will provide detailed instructions with recommended procedures.

DOCUMENTATION PROVIDED:

Process Design:

- (PFD) Process Flow Diagram with heat and material balances
- Piping & Instrumentation Diagram (P&ID)
- Vessel Drawings and Specification Sheets
- Heat Exchanger TEMA sheets
- Pump Specification Sheets

Equipment General Arrangements:

- Plan Drawings of Equipment skid
- Elevation view of equipment

Structural Drawings:

- Plan views showing equipment supports
- Elevation views showing bracing, hand railing, and access points.
- Sections details including ladders, base plates, and lifting points.

Piping Drawings:

- Piping Isometrics
- 3-D Modeling of entire system
- Piping plan drawings

Electrical:

- Conduit Plans and wiring diagrams
- Terminal Box Layouts
- Loop Diagrams

Instrumentation:

- Instrument Index and instrument specification sheets (per ISA)
- Instrument Installation Details

Operating Instructions:

- Start-up and shut-down instructions
- Gant Chart for mile stoning
- Troubleshooting
- General process description and design basis (weights & envelope dimensions)
- Preventative maintenance & (1) Year Recommended Parts List
- Installation Instructions
- Bill of materials of all materials, including fabricated parts

NOTE: All drawings on diskette per AutoCAD 2010-2016 and printed versions upon completion.

PROPRIETARY INFORMATION:

All information contained or conveyed through oral or written correspondences between ■■■ International and its representatives is the sole property of ■■■ International and is not to be disclosed in any way to third parties without the prior written consent of ■■■ International.

STANDARD SRFX COLUMN DESIGN SPECIFICATIONS:

- Distillation Rate Approx. customer requirement 400 GPH, ethanol/water component
- Remove ethanol to Azeotrope percentage with flash vessel.
- Approx. Skid Dimensions 8' x 12' x 18' H approx. TBD. Height fully assembled
- Demister section
- Includes condensers and pumps.
- Heat exchangers and reboiler.
- Vacuum pump with liquid ring decanter and sensors
- dimensions supplied on design
- Designed to stand alone
- System is configured to set in place and fit shipping container/truck
- Heating/cooling source by client. ■■■ to provide specifications
- All wetted parts are 304 stainless steel with polished 304 stainless steel outer shell
- Vessel (insulated with S.S jacket) built to 150 ASME Standards with 5 PSI pressure relief valve
- Pressure sensor on column and compressed air supply.
- All auto valves are spring return (fail safe) closed in case of power failure
- 304 Stainless Steel plate heat Exchangers / Condensers
- Pressure and temperature gauges
- Column bottoms transfer pump
- Variable speed feed pump and flow meter
- Clean Ethanol transfer pump
- Approximately (6-8) 100-ohm platinum RTD'S with burnout logic range to 800°F

- Pre-Installed demister in removable section for access.
- Pre-wired with single point utility connection points
- Pre-piped with single point process connections
- Some on site assembly required
- Ethernet card for ■■■ monitoring or trouble shooting
- Pre-programmed Allen Bradley PLC Control System for program monitoring, adjustments, and added troubleshooting capabilities. The control system is mounted in an air purged NEMA 4 enclosure if mounted on the system. The panel is purged to meet Class, Division 1 explosive environments. UL Stamped by ■■■.
- Remote terminal or on column HMI as preferred.
- One (1) year limited warranty
- Onsite training available on request
- Shipping and packaging by customer with ■■■ assistance at our end as needed.

SRFX COLUMN SPECIFICATIONS:

****TO BE DETERMINED AT TIME OF ORDER***

PROCESS:

- | | |
|--------------------------|---------------------------------------|
| • Incoming Feed Rate | 7 GPM |
| • Feed Temperature | TBD |
| • Feed Composition (TBD) | 40% Ethanol,60% water, 7% Phosphorous |
| • Overhead Specification | Ethanol azeotrope |
| • Bottoms Specification | Less than 1% ethanol |
| • Turndown Ratio | 50% |

UTILITIES:

- | | |
|-------------------------------|---------------------------|
| • Steam Rate | TBD |
| • Cooling water temperature | 50F |
| • Cooling water flow | TBD |
| • Cooling water pressure drop | Less than 5PSI |
| • Electrical Power | 460 VAC 3 phase |
| • FLA | EST 600, TBD |
| • Electrical Classification | CL1, DIV2. |
| • Instrument Air | 100 PSI, Filtered dry air |

COLUMN DESIGN SPECIFICATIONS:

- | | |
|----------------------------|------------------|
| • Column height | 16-18 ft. TBD |
| • Column design pressure | 14.9 |
| • Demister/partial Packing | TBD |
| • Number of Transfer Units | Provided with PO |
| • Type of Condenser | 316 SS Plate |
| • Condenser duty | 1.6MMBTU/HR |
| • Condenser area | Provided with PO |
| • Type of Reboiler | Provided with PO |
| • Reboiler duty | 1.2 |

COLUMN PRICING:

1) STANDARD SRFX-400 FLASH VESSEL	
2) Chiller 50-60F. ~200 GPM	
3) Electric steam boiler	
4) Guaranteed maximum price (GMP)	
5) Shipping-handling costs extra	
6) Assembly and Startup assistance \$1500 per day plus travel and lodging. APPROX-7 DAYS	
EXCLUDES ANY TAXES IN TEXAS. (GMP) Guaranteed maximum price with shipping, delivered	

ADDITIONAL PREMIUM OPTIONS:

A. Electric 1.9 MMBTU/HR steam @150 PSI recommended.	
B. Compressed air	
C. Cooling tower	
D. All stainless frame adds. No painted areas.	

PAYMENT TERMS:

- 1) 70% with purchase order
- 2) 20% when in final stages (8 weeks ARO)
- 3) 10% on system startup.

****Note: Prices are subject to revision after 30 days.**

****Note: All prices are FOB, [REDACTED] and does not include shipping or crating costs if required. See added costs**

DELIVERY TERMS

DELIVERY	12-14 WEEKS
FOB	[REDACTED]