# H-6172-CDLC

## Continuous Distillation/Rectification Pilot Plant

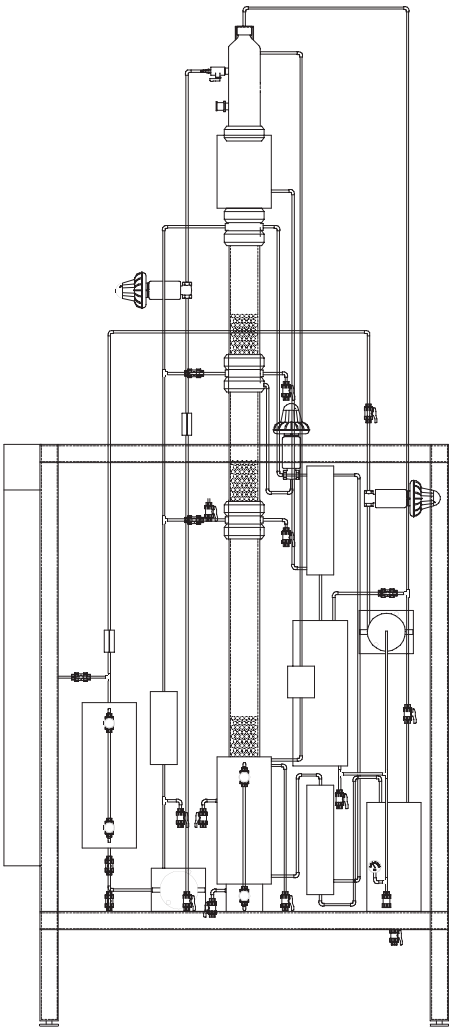
## Purpose

The Hampden **Model H-6172-CDLC** Continuous Distillation/Rectification Pilot Plant has been developed to permit student study of the fundamentals of a continuous distillation/rectification system encountered in modern industrial processes. Today's chemical engineers must recover expensive chemicals for reuse in the process or to prevent toxic chemicals from entering the environment. Distillation is one example of a liquid-liquid extraction process.

The process and data acquisition is controlled by an IBM compatible computer with color VGA monitor for control and data collection of the cooling water flow rate, feed flow rate, reflux ratio, feed heating, reboiler heating, and column vacuum. Also data collection for temperature, column differential pressure, and pressure.

## Description

The Hampden **Model H-6172-CDLC** Continuous Distillation/Rectification Pilot Plant is equipped with all components required to operate the system. The solution to be distilled is stored in the feed tank. The solution is pumped from the feed tank via the feed metering pump through an incline heater to either of these column feed pipes. The distillation column consists of a reboiler, three Pyrex glass column sections, stainless steel column packing, four packing support plate assemblies, reflux separator assembly, spiral condenser and cap assembly. The distillate feed consists of a reflux three way control valve, distillate spiral cooler, and distillate storage tank. The residue feed comes from the reboiler through the residue spiral cooler to the residue storage tank. Either the distillate of the residue may be pumped back into the feed tank for reprocess. Sampling ports are provided on all packing support plates, feed input, feed output, reflux, distillate tank, residue tank, and reboiler. Thermocouples are used to take all temperature readings.



All Hampden units are available for operation at any voltage or frequency

Hampden® ENGINEERING CORPORATION

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# Chemical Engineering Systems

Educational Training Equipment for the 21st Century

## Specifications

The superstructure is manufactured of 2" square mechanical tubing complete with levelers. The instrumentation terminal box is code gauge steel with locking cover. The instrument panel is 11 gauge steel. The superstructure is finished in instrument tan texture and the instrument panel in gloss white enamel.

The distillation column is constructed of 80mm Pyrex glass for student observation and consist of one 24" and two 12" sections. All other parts of the column is of stainless steel tubing with associated couplers and thermocouple compression fittings as required.

The condenser, feed and storage tanks are manufactured of stainless steel with liquid level gauges provided on all tanks.

The reboiler is a stainless steel tank with liquid level gauge, thermocouple, electric heater, heater controller, and differential pressure port.

The feed column heater includes the heater controller and thermocouple.

The feed metering pump is constructed of non-corroding materials. The flow rate can be varied from 4-368 mL/min. The flow rate is controlled externally from a 4-20mA signal.

All interface piping is 1/4" stainless steel with associated ball valves, needle valves, and hardware as required.

Cooling water is controlled with a pneumatic control valve with positioner and flow transmitter. The reflux three way control valve is pneumatically operated and controlled by a 4-20mA signal.

The pressure and differential pressure transmitters produces a 4-20mA output signal.

The computer is an IBM compatible with an Intel 1.6 GHz Pentium 4™ Micro-processor, 128MB DDR SDRAM, 1.44MB 3.5" diskette drive, 20Gb Ultra ATA 100 hard drive, Integrated Intel™ 3D graphics - 16MB, 17" Color Monitor–Flat Screen, PCI 10/100 Ethernet Adapter, 3 32-Bit PCI Slots, 1 parallel port/2 serial ports/2 USB, 104-key Millennium keyboard, Microsoft mouse - PS/2, Windows XP™, Fully FCC certified, and 48X CD Drive

The data acquisition and control section consist of analog and digital I/O boards, cables, and software support package.

## Experiments

**Experiments include:**

- Binary mixture separation of components with changes in the feed flow rate, feed temperature, reflux ratios, and reboiler temperatures.
- Comparing Raoult-Dalton Law using the method of McCabe-Thiele
- Column efficiency utilizing various types of packing i.e. Raschig rings, Berl Saddles or glass beads (not supplied).
- Pressure losses
- Taking samples and performing appropriate analytical procedures.

## Services Required

**Electrical:**
This unit operates on one of the following:

120/208V AC 3$\phi$ 60Hz @ 17A
220/380V AC 3$\phi$ 50Hz @ 10A
240/415V AC 3$\phi$ 50Hz @ 9A

**Instrument Air:**
100 PSI @ 4cu.ft./min.

**Water:**
Cooling, 2 gallons/min @ 30 PSI

Hot water for cleaning

**Drain:**
Waste Water

## Options:

**MODEL H-6172-P** Printer

**MODEL H-6172-CC** Computer Workstation

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