

Diagram of Equipment (Typical)

Budget Proposal for
LCI Thin Film Evaporator
Skid System



Customer Name: Canopy Growth Corp.

Date: 5/25/2018

Equipment Supplied

Item Qty Description

1 1 LCI Thin Film Evaporator – LHSE-0100

Thermal Surface Area: Approximately 1 m²

The thermal jacket is built in accordance with the ASME Code, Section VIII, Division I for pressure parts and ‘U’ stamped per ASME code with Canadian Registration Number.

Process area: Full vacuum to 1 barg @ 204°C

Thermal jacket: Full vacuum to 6.9 barg @ 204°C

Materials of Construction

- Process wetted parts: 316/316L SS
- Supports and Non-contact parts: 304 SS
- The surface finishes are 32 µin (0.8 µm) Ra for the inner heating surface; 63 µin (1.6 µm) Ra for the rotor and vapor section
- PTFE gaskets and Viton® O-rings

Specifications

End Cover Assembly: Housings for two (2) double mechanical seals on each end suitable for vacuum service and heavy-duty grease lubricated roller bearing

Mechanical Seals: Two (2) John Crane, Type-8 double mechanical seals, Viton® O-rings

Note: Mechanical seals require process compatible liquid lubricant; solvent may not be used for this service.

Rotor: Fixed clearance, dynamically balanced

Shell: Cylindrical jacket with spiral baffling for steam or liquid heating

Equipment Supplied (continued)

<u>Item</u>	<u>Qty</u>	<u>Description</u>
2	1	<u>Motor Drive Assembly</u> Type: Direct-mounted drive motor with gear reducer Motor: 5 HP, 460V/60Hz/3 phase, 1800 RPM Electrical Classification: Class I Div I Group C&D
3	1	<u>Condenser w/ Integral Distillate Tank</u> Type: Shell and Tube; condensing tube side, vertical orientation MOC: 316 SS tubes, 304SS Surface Area: ~13 m ² Rating: Process - FV & 1 barg @ 185 °C, Utility - FV & 6.9 barg @ 185°C
4	1	<u>Concentrate Tank</u> Capacity: ~10 L MOC: 316L SS process wetted parts and 304 SS non-contact Rating: FV & 2.75 barg, -28.9°C/185
5	1	<u>Concentrate Pump</u> Type: Centrifugal, Magnetic Drive Service: Ethanol/Resin MOC: 316 SS process wetted parts Motor: 0.75 HP, 460V/60Hz/3 phase, 3600 RPM
6	1	<u>Distillate Pump</u> Type: Centrifugal, Magnetic Drive Service: Ethanol MOC: 316 SS process wetted parts Motor: 0.75 HP, 460V/60Hz/3 phase, 3600 RPM
7	1	<u>Vacuum System</u> Type: Liquid ring vacuum pump w/ recirculating seal liquid MOC: 304 SS process wetted parts, Viton® O-rings. Auxiliary Components: Decanter, heat exchanger,
8	2	<u>Mechanical Seal Lubrication Assembly</u> Assembly: Seal pot thermosiphon with level and pressure gauge.

Equipment Supplied (continued)

<u>Item</u>	<u>Qty</u>	<u>Description</u>
9	1	<u>Feed Back Pressure Control Valve</u> Control valve with spring pressure
10	1	<u>Vacuum Control Valve</u> Control valve with electro-pneumatic positioner to control internal pressure (vacuum) Electrical/Signal: 24 VDC, 4-20 mA input
11	1	<u>Automatic On/Off</u> Control valves with pneumatic positioner to control concentrate flow Electrical/Signal: 24 VDC, 4-20 mA input
12	3	<u>Flow Meters</u> Coriolis mass flow meters Electrical/Signal: 24 VDC, 4-20 mA output, HART protocol
13	2	<u>Level Transmitters</u> For monitoring level of distillate and concentrate tanks Electrical/Signal: 24 VDC, 4-20 mA output, HART protocol Type: Differential pressure
14	1	<u>Absolute Pressure Transmitter</u> For monitoring internal pressure (vacuum) at vapor pipe Electrical/Signal: 24 VDC, 4-20 mA output, HART protocol
15	8	<u>Temperature Transmitters (RTDs)</u> For monitoring feed, concentrate, vapor, distillate temperatures, hot oil supply and return to evaporator jacket, and supply and return to condenser Electrical/Signal: 24 VDC, 4-20 mA output
16	3	<u>Pressure Relief Valves</u> Safety relief valves for the evaporator, evaporator jacket, and condenser shell MOC: 316 SS for process applications, Carbon Steel for utilities
17	2	<u>Pressure Gauges with diaphragm seals</u> Pressure at concentrate pump discharge and distillate pump discharge MOC: 316 SS bourdon tube, acrylic window, SS case

Equipment Supplied (continued)

Included in Skid Mounting of the LCI-supplied equipment in a framed unit for installation at plant site are the following:

- Structural support skid – 304SS (no additional paint or coatings applied)
- Access ladder
- Hand rails and floor grating
- Assembly and mounting of auxiliary components
- Piping between components supplied within the skid boundaries. Process piping will be 316L SS and utility piping will be 304 SS.
- Piping will be installed per ASME B31.3 for normal fluid service
- Coupling guards
- Carbon steel components painted in accordance with LCI paint specification
- Preparation for shipment to include additional bracing of equipment, disassembly of some items for protection during shipment, covering for all open ports, and loading onto buyer supplied transport
- The system will be thoroughly flushed and cleaned prior to packaging for shipment
- Hydrostatic test for process piping
- Control Panel and wiring of instruments and motors

Items not included in skid mounting:

- Feed tank and feed pump
- Foundation or buildings
- Reassembly of items removed for shipment
- Erection of skid at customer's plant site
- Details of piping design and layout
- Lubricants (gear box oil, mechanical seal lubricant, etc.)
- Retightening of all flanges and connections and final flushing of system after shipment
- Realignment of drives
- Insulation
- Motor Starters