READYGo™ d-LIMONENE

Separating essential citrus oil from a water and oil emulsion

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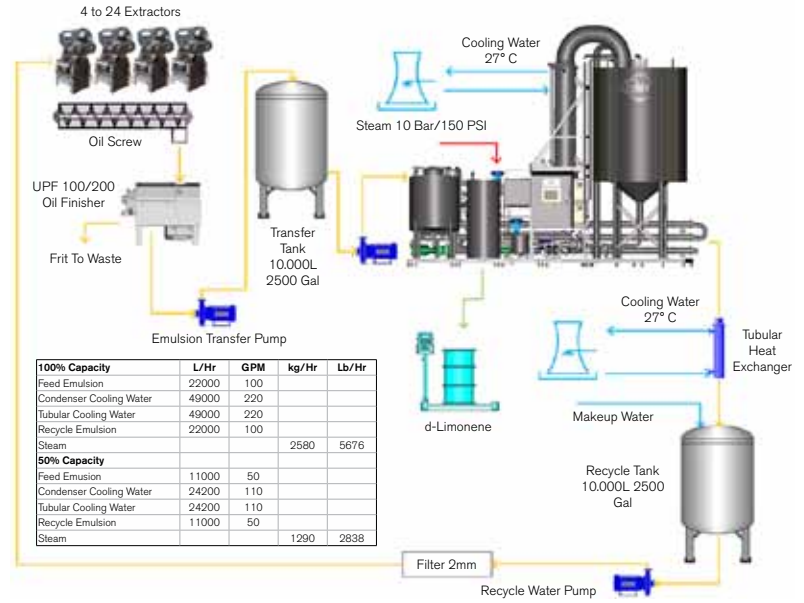
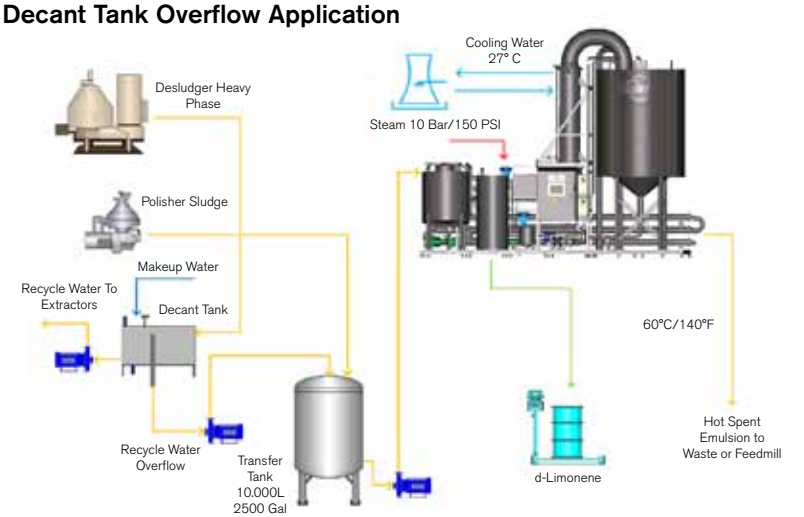
Primary Emulsion Application

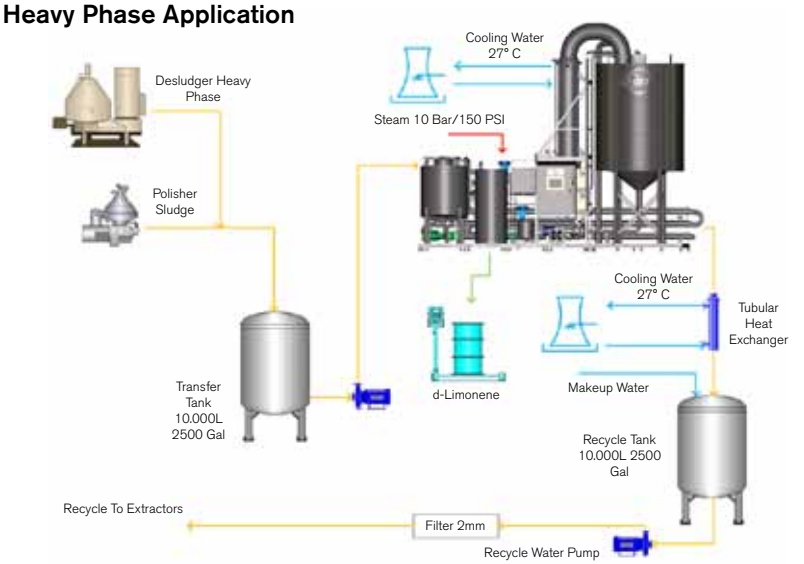


100% Capacity	L/Hr	GPM	kg/Hr	Lb/Hr
Feed Emulsion	22000	100		
Condenser Cooling Water	49000	220		
Tubular Cooling Water	49000	220		
Recycle Emulsion	22000	100		
Steam			2580	5676
50% Capacity				
Feed Emusion	11000	50		
Condenser Cooling Water	24200	110		
Tubular Cooling Water	24200	110		
Recycle Emulsion	11000	50		
Steam			1290	2838

Decant Tank Overflow Application



Heavy Phase Application



d-Limonene, a name derived from the word “lemon,” is an active terpene compound which generally makes up approximately 95% of the chemical composition of essential citrus oils. Citrus peel can be cold-pressed to recover essential oil used for flavors and fragrances and/or to recover d-Limonene.

d-Limonene has a number of commercial applications in industrial cleaning and degreasing, removal of adhesives, circuit board cleaning, cosmetics, flavorings as well as many others. Because of the multiple applications for d-Limonene, demand for the product has steadily increased over time.

Citrus processors, constantly challenged to find alternative sources of revenue given the maturity of the citrus juice market, have found selling d-Limonene to be an increasingly important part of their overall business.

Processors generally weigh the operating expenses of the oil recovery system against the potential gross revenue when determining which oil recovery technique to implement. Historically, only larger citrus processors who could justify the investment in waste heat evaporation technology took advantage of the d-Limonene market opportunity.

With the development of the JBT READYGo™ d-LIMONENE recovery system, now even smaller processors can recover this valuable product stream.

The complete, skid-mounted system for the recovery of d-Limonene from various oil-rich streams can help processing needs in a number of ways:

- As a cost-effective method to recover d-Limonene for processors who are not prepared to make the significant investment required for a cold-pressed oil recovery system
- As a supplement for existing cold-pressed systems, eliminating the need to invest in a costly expansion
- To remove residual d-Limonene remaining in the discharge of cold-pressed oil systems and other waste streams, thus providing assistance to waste treatment or disposal systems

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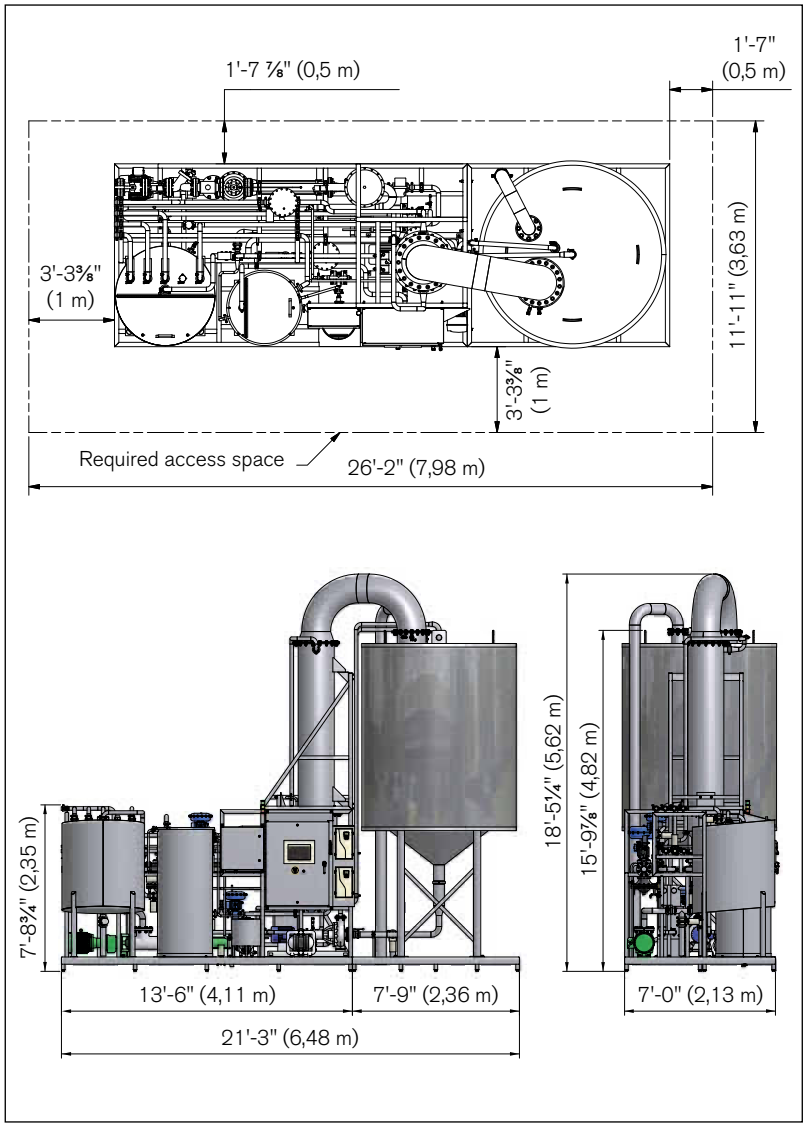
Technical Specifications

Electrical Supply	50Hz-3P-380V 50A; 60Hz 440V is available	
Motor Power	14kW	18 hp
Air Flow	3.5Nm³/hr	6 scfm
Air Pressure	6 bar	85 psi
Steam Flow (min-max)	950 kg/hr - 2400 kg/hr	2100 - 5300 lb/hr
Steam Pressure (min-max)	8 - 12.5 bar	120 - 180 psi
Feed Flow Rate (min-max)	9 - 22 m³/hr	40 - 100 gpm
Feed d-Limonene Concentration	0.1% - 5%	
Cooling Water Flow Rate (on-skid)	20 - 50 m³/hr	90 - 220 gpm
Maximum Cooling Water Temperature	27°C	80°F
CIP Solution Required	750 l/cycle	200 gal/cycle
Dry Weight	5,705 kg	12,576 lbs

Approximate Specifications



READYGo d-LIMONENE can easily be integrated into a fully automated plant, saving processors the investment needed to implement a fully engineered system. Multiple skids can be added where more capacity is needed.

Due to its design, READYGo d-LIMONENE has the ability to recover more terpenes than traditional cold-pressed systems potentially increasing overall revenue.

The READYGo d-LIMONENE system is designed to process up to 100 gpm (23 m³/hr) of oil-bearing emulsion.

The oil-bearing emulsion is created during extraction using the same method as for cold-pressed oil processing except that less water is used in order to create a more concentrated emulsion. The emulsion is diverted to the d-Limonene skid via the finisher emulsion transfer pump coming from the emulsion feed tank.

The emulsion from the Primary Emulsion Application sketch is pumped from the feed tank and mixed with live steam. Back pressure is maintained on the emulsion stream mixture and the liquid is flashed off into a vapor tank. A liquid level is maintained in the vapor tank using a centrifugal pump and a flow control valve. Vapor rises upwards and is condensed in a water-cooled condenser. The condensed liquid is pumped to a decant tank where the water and the d-Limonene are separated by gravity. The spent emulsion from the vapor tank is then pumped and cooled through a tubular heat exchanger and can be recycled back to the decant tank for use at the extractor or pumped off-skid. The finished d-Limonene is then pumped to storage.

The READYGo d-LIMONENE Recovery System is:

- A fully automatic operation, including CIP
- Capable of recovery efficiencies of 85% or higher from the feed stream
- Capable of 63% to 70% total plant recovery from the fruit

In other words, with a READYGo d-LIMONENE recovery system, citrus processors no longer have to watch potential earnings go down the drain.

The READYGo d-LIMONENE recovery system is the newest addition to the JBT READYGo family. Built on skids, READYGo products are shipping container-ready for easy transport around the globe.
Complete with electrical motor starters and instrumentation, READYGo products require minimal field engineering and installation - simply hook up the utilities and the system is ready to go!

Corporate Social Responsibility at JBT

We are your single source for profitable processing solutions

JBT is a leading provider of integrated food processing solutions.

From single machines to complete processing lines, we enhance value and capture quality, nutrition and taste in food products.

With a local presence on six continents, JBT can quickly provide our customers and partners in the food processing industry with the know-how, service, and support needed to succeed in today's competitive marketplace.

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