



Where Innovation Flows

# Botanical Extraction of Cannabinoids

## APPLICATION DOCUMENT

Liquefied petroleum gases (LPGs), such as butane and propane, have been used as extraction solvents in pharmaceutical and perfume manufacturing, along with food-and-beverage production, for many years.

In recent years, LPG, especially in its butane form, has been found to offer operational benefits when used in a new application: the extraction of botanical plant oils, particularly cannabinoids that are then used in the manufacture of medical and recreational consumables.

The extraction of botanical oils is completed through a rather straightforward operational process that requires use of an LPG solvent. Once the botanical extraction process is complete, the LPG solvent needs to be recovered and sent back to a solvent tank so that it can be used again in additional extraction activities.

In a typical oil-extraction system, two to four extraction processes are completed per hour, with a day's operations taking place over an eight-hour period.

The main challenge in relying on hydrocarbons for botanical oil extraction is that they are classified as Class 1 Division 1 Explosives, according to the National Fire Protection Association (NFPA). This means that the movement and use of LPG in any manufacturing process is tightly regulated. Therefore, any botanical oil extraction operation, the majority of which take place in an indoor facility, that uses LPG as a solvent must meet all state, local and federal fire and safe-handling codes.

The second challenge is finding a compressor technology that can consistently deliver the reliability,

efficiency and safety that is paramount in creating an optimized botanical oil-extraction process. In this case, Blackmer® recommends its LB Series

Reciprocating Gas Compressors, specifically the [LB082EC](#) model. The LB082EC is the smallest model of LB Series compressor and is capable of achieving a vapor-recovery flow rate of 8.45 cubic feet

per minute (cfm), or 14.35 m<sup>3</sup>/hr, all while easily producing the pressures necessary to facilitate the butane-recovery process. The LB082EC compressor is UL-certified and features a pressurized oil-pump circuit on the heavy-duty crankcase – which is coated with a special epoxy – that forces oil onto the unit's bearings, wrist pins and connecting rods. Other features of the Blackmer LB082EC compressor, which are standard on all LB Series models, include heavy-duty pistons; high-efficiency valves; high-pressure head and cylinder O-rings; self-adjusting piston-rod seals; pressure-assisted piston rings; and wear-resistant crosshead assemblies. All of these features combine to make the LB082EC compressor an ideal solution for continuous-duty botanical oil-extraction applications.





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## COMPETITION

### • Other Reciprocating Gas Compressors

Some competitive Reciprocating Gas Compressor manufacturers have begun touting a triple-seal model that promises better leakage control. Why pay more for something superfluous? The Blackmer dual-seal LB082EC meets the rigorous requirements of UL and is certified for use in the extraction industry. In addition, it features a pressurized oil pump that targets the components that need to be kept lubricated. Conversely, competitive triple-seal models may use a "splash-loop circuit" that uses an oil pump to haphazardly sling oil onto the compressor's internal components, which may leave some parts unlubricated.

### Considering The Alternatives

As mentioned, while LPG is the most common, and some consider the "purest," solvent to use in botanical-oil extraction, there are two other processes that some end users choose to deploy:

- **Carbon Dioxide (CO<sub>2</sub>):** While effective, the cost of using CO<sub>2</sub> can be prohibitive because pressures as high as 4,000 psi (276 bar) need to be produced in order to facilitate the extraction process



LB082EC

- **Ethanol:** Some manufacturers favor ethanol because it is not a hazardous fluid, which removes the risk of explosion from the equation. However, ethanol must be used at extremely cold temperatures as low as -80°F (-62°C), which can be problematic.

Using ethanol in the extraction process does not require a compressor. Instead, air-operated double-diaphragm (AODD) pumps are commonly used to introduce the solvent into the material columns and then pump away any remaining solvent after extraction is complete. In this case, AODD pump technology from [Wilden®](#) and [All-Flo™](#), sister product brands of Blackmer within PSG®, can be and have been utilized successfully. In fact, All-Flo AODD pumps are specified for use by a private-label OEM that produces proprietary extraction systems that feature Blackmer LB082EC compressors.

For more information on these additional solutions, visit us at [psgdover.com/blackmer](https://psgdover.com/blackmer).

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