

# NASH Vacuum Pumps for Manufacture of Flavors & Fragrances

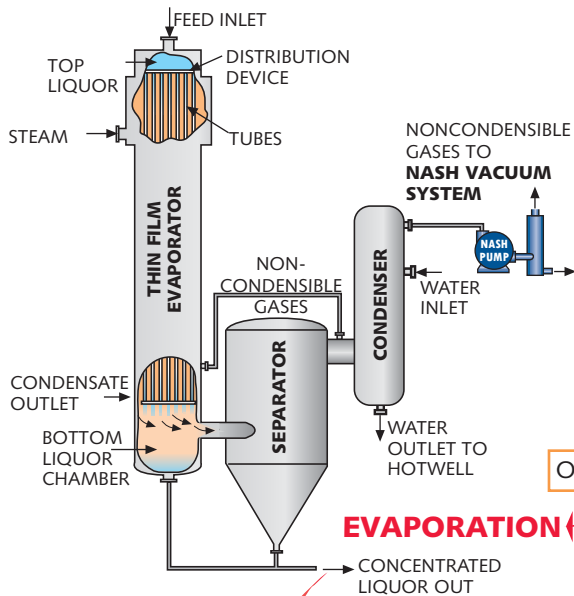


**Nash liquid ring pumps provide unparalleled reliability and low operating costs when used on evaporators and distillation equipment.**

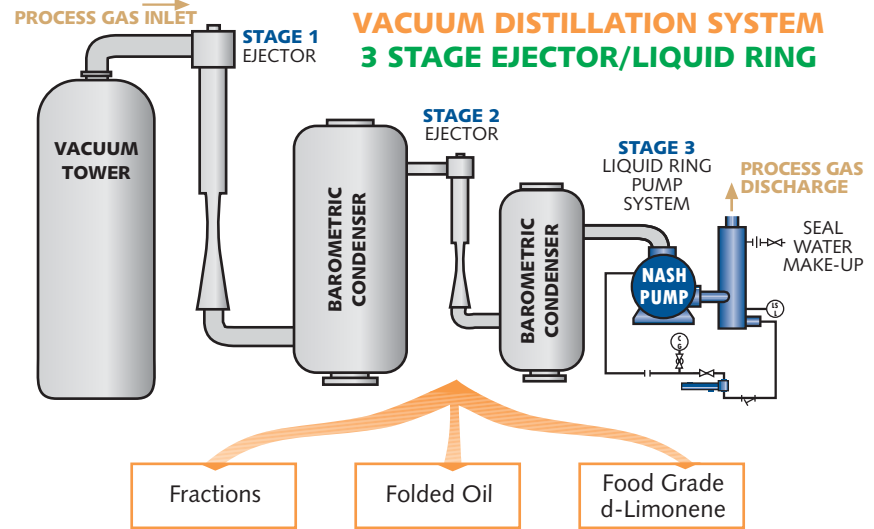
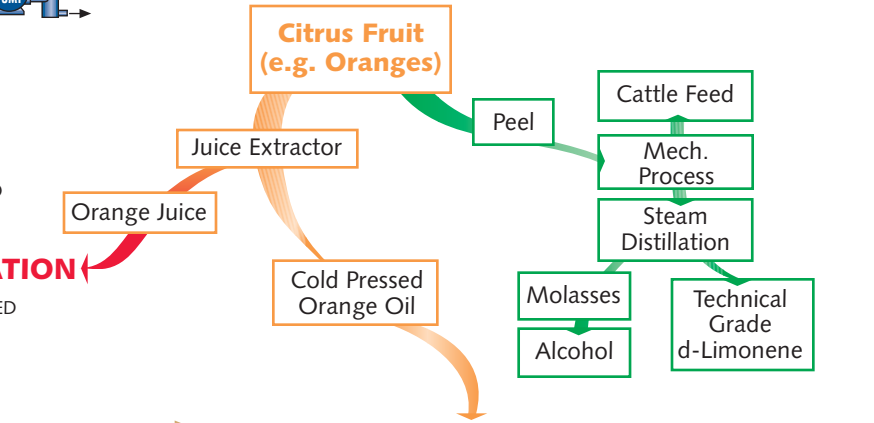
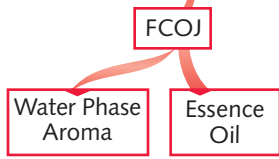
While the taste of food is limited to sweet, sour, bitter, salty, and savory (umami) - the basic tastes - the smells of a food are potentially limitless. A food's flavor, therefore, can be easily altered by changing its smell while keeping its taste similar.

Flavorants are engineered and composed in ways similar to those for industrial fragrances and fine perfumes. To produce natural flavors, the flavorant must first be extracted from the source substance. The methods of extraction can involve solvent extraction, distillation, or using force to squeeze it out. The extracts are then usually further purified and subsequently added to food products to flavor them. Nash pumps can accommodate varying process loads, while maintaining constant vacuum levels and temperatures, thus ensuring the quality of products being produced. A few of the common processes are explained below.

**Citrus** Cold pressed citrus oils have a high content of terpene hydrocarbons, which do not contribute much to the flavor and are detrimental to the oil's stability and solubility. Terpene hydrocarbons are usually removed by vacuum distillation, thin film evaporation or solvent extraction (a process that uses distillation to remove the solvent before use). The higher the vacuum of a still, the lower the boiling point of the oil. This principle, when extended to a short path still, results in a falling film evaporator. Nash pumps are tolerant of process upsets and can maintain constant vacuum levels under varying conditions, making sure that the desired product composition is achieved and downtime is not an issue.



Orange Juice and Cold Pressed Orange Oil are processed through a Juice Extractor. The peel is used for Cattle Feed, Mech. Process, and Steam Distillation. Steam Distillation produces Molasses, Alcohol, and Technical Grade d-Limonene.

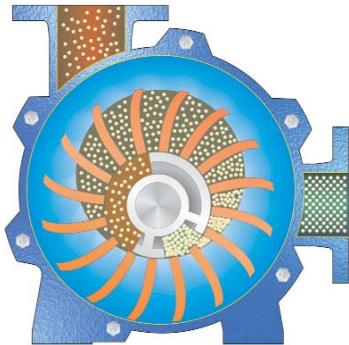


A few of the flavor/fragrance oils obtained through evaporation and/or vacuum distillation:

- Bergamot
- Lavender
- Lime
- Pine
- Orange
- Eucalyptus
- Lemon
- Nutmeg
- Rosemary
- Vanilla

## The Liquid Ring Advantage

Liquid ring vacuum pumps and compressors that use a fluid compressant in lieu of pistons, vanes or rotating lobes are the best choice in most applications. They provide benefits that are not possible with other alternatives.



Gardner Denver Nash easily complies with ATEX requirements because of the isothermal compression that is characteristic of liquid ring pumps. Simply put, NASH pumps run much cooler than other technologies.

Features	Benefits
Ability to handle vapor and carryover	Minimal process problems; Intended for severe mill and chemical duty use
Long design life	Highest reliability
No internal lubrication required	No routine maintenance required; less downtime
No metal-to-metal contact	Constant wear-free performance
Cool Running, Minimal temperature rise between inlet and discharge	Ideal for explosive gases and vapor recovery applications
Only one moving part	Simple and reliable operation

**Vanilla** is used in a broad range of flavors and fragrances. Vanilla extract contains more than 250 chemical components, and is generally extracted through percolation method or the oleoresin method. It is the second most expensive spice in the world market, and one of the most widely used flavors/fragrances.

Percolation method: an ethanol/water solution in the range of 25-50:65-50 (v/v) is used as a solvent and circulated over and through the beans under vacuum. This process creates a four-fold strength vanilla.

Oleoresin method: whole beans are pulverized and then ethanol is circulated over the beans, under vacuum, at 45°C. The excess alcohol is removed by evaporation and the process yields a ten-fold strength vanilla.

**Cocoa and other beans** These flavors/fragrances are also extracted through the use of solvents. In addition to evaporation, the process can also involve a vacuum filter, which also employs Nash vacuum pumps. In every filtration application, a Nash liquid ring vacuum pump or compressor can reduce operating costs and minimize downtime.

## Industry Workhorses

Nash liquid ring vacuum pumps and compressors have been used in many industrial applications for more than 100 years. They are known as tireless workhorses, designed to stand up to the rigorous, nonstop demands of the harshest industrial environments. Built better than industry standards, NASH pumps are known for their reliability.

Nash pumps are manufactured to ISO 9001:2000 standards and are Category 2 ATEX compliant. Nash's commitment to excellence and customer service extends from manufacturing and installation to technical assistance and beyond. Service and distribution centers are located throughout the world, offering quality service and support for Nash products.

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