UNIBLOC®
PUMPS

WHY GEAR PUMPS?

Glazings. Jams. Confections. Bolognese Sauce. Oils and Fats. Chocolate. Highly viscous fluids require a pump that is properly designed and equipped to move these materials in a productive and timely manner. In addition, a pump suitable for high viscous fluids must be durable and reliable, supplying customers with an equipment lifespan that helps keep long-term capital expenditures under control.

Gear pumps designed and fabricated by Unibloc® Hygienic Technologies (UHT) meet these specifications and more. Unibloc gear pumps incorporate proprietary features that facilitate easy cleaning and maintenance procedures and are backed by a customer service team that provides an unrivaled level of quality and support.

In this paper, we explain gear pumps and their inner workings. A more thorough understanding of a gear pump's design and intended use case scenarios can help determine if this style can best address the fluid handling requirements in your operation. In addition, we look at the design features incorporated into a gear pump from UHT that enable sanitary 3A classification.

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The advantages of gear pumps.

The main advantage of gear pumps is that they provide a constant and even flow rate regardless of pressure changes and thicker viscosity, making them suitable for applications requiring precise fluid delivery. In some cases, the gear pump design handles products with high viscosity—up to 100,000 centipoises (cP). Gear pumps work best with materials that have some degree of lubricity.

Processors that deal with CBD, ethanol, vegetable and canola oils rely on gear pumps. So do processors of flavorings, syrups, and ingredients with high viscosities such as icing and ice cream. Cosmetic products, suchas lotions and shampoos, rely on gear pumps, as do processors of motor oil, glycerin, and even waxes.

Gear pumps also have a relatively simple and compact construction with fewer moving parts than other pump types. This simplicity makes them easier to install and maintain. The compact design accommodates tight spaces and complex systems where space is limited.

The more compact the design and the shorter the shafts, the better the pump's ability to eliminate shaft deflection at high pressure, which aids pump efficiency, flow rate, and durability.

Materials of construction.

Gear pumps feature a housing commonly manufactured from anodized aluminum, stainless-steel, or bronze. The metal must be compatible with the product, which often means a housing made of stainless-steel alloy and Teflon rotors. Caustic or highly corrosive substances might call for the selection of special alloys or composites. UHT offers 316L stainless-steel as standard with other alloys available as options.

Pumps designed for hygienic applications often rely on Teflon gears for several reasons, including:

- **Cleanability:** Teflon is non-reactive and smooth. It is easier to clean than metal and less likely to harbor contaminants or bacteria, crucial for equipment that comes into direct contact with food or pharmaceutical products.
- **Non-contaminating:** Teflon will not leach or introduce contaminants into the pumped product. Again, this attribute is important in hygienic applications that must protect product purity.
- **Compatibility with soft or delicate materials:** Metal gears can be abrasive or damaging to shear-sensitive products. Teflon's softer and non-abrasive nature can help ensure gentle handling.

Industrial gear pumps are designed to handle a broad temperature range and can operate at higher temperatures than the pumps made for 3A sanitary applications. Teflon can swell at temperatures above 180° F, making it incompatible with CIP routines using a heated cleaning solution.

Standards for hygienic pumps.

Product safety is critical for processes involving food, pharmaceuticals, and personal care products. Bacteria, parasites, and similar hazardous microorganisms can cause expensive product recalls, fines, and injury lawsuits. Bacterial colonies can harbor in equipment crevices, pores, and points of product buildup. Given the pump's central role in product transfer, it can become the point of contamination for an entire batch.

To address this risk, processors use hygienic pumps to meet mandated hygienic standards, preserve product purity and integrity, and protect public safety.

The Food and Drug Administration (FDA) sets standards for the food industry within the Code of Federal Regulations (CFR). As part of the CFR, good manufacturing practices (GMPs) appear in Title 21, Part 110. They describe the minimum hygienic and processing requirements to produce safe food. They describe methods, equipment, facilities, and controls.

Pumps involved in food processing, for example, should be able to accommodate either clean-in-place (CIP) or clean-out-of-place (COP) procedures, including their sanitation schedules and the chemicals and cleaning practices associated with them.

Typically, gear pumps transport fluids in industrial applications. UHT's engineers created a gear pump with 3A sanitary standards in mind that expands its use into food processing and other industries with stringent hygienic processes. The Unibloc gear pump is one of the few hygienic gear pumps available and provides a cost-effective option for hygienic applications.

Impact of gear pump design on maintenance.

Many processors struggle to maintain fully staffed maintenance crews due to the scarcity of skilled labor in manufacturing. Therefore, managers streamline their maintenance procedures. During pump selection, managers should look at the impact of pump design on cleaning and maintenance.

Gear pumps use two gears, one of them driven by a shaft. On the other side, the gears are secured by bushings. Highly viscous products can cake and collect, particularly near the bushings. Manual cleaning is needed to remove these deposits.

Gear pumps are generally easy to maintain, but some designs are more difficult to disassemble and reassemble than others. The more parts and steps required to take apart a pump for cleaning or maintenance, the longer crews are unavailable for other tasks.

Having fewer parts minimizes the risk of misassembly and eliminates the possibility of parts inadvertently entering the process stream. By avoiding a foreign object in the product, a great number of maintenance tasks are eliminated.

Unibloc-GP with Compac® FMS

Choosing a gear pump over a lobe pump.

Like gear pumps, lobe pumps are also available for hygienic applications, but they feature lobes rather than gears. Lobe pumps have a bigger wetted cavity than gear pumps, and they might not be the best fit for an application that requires a higher level of precision.

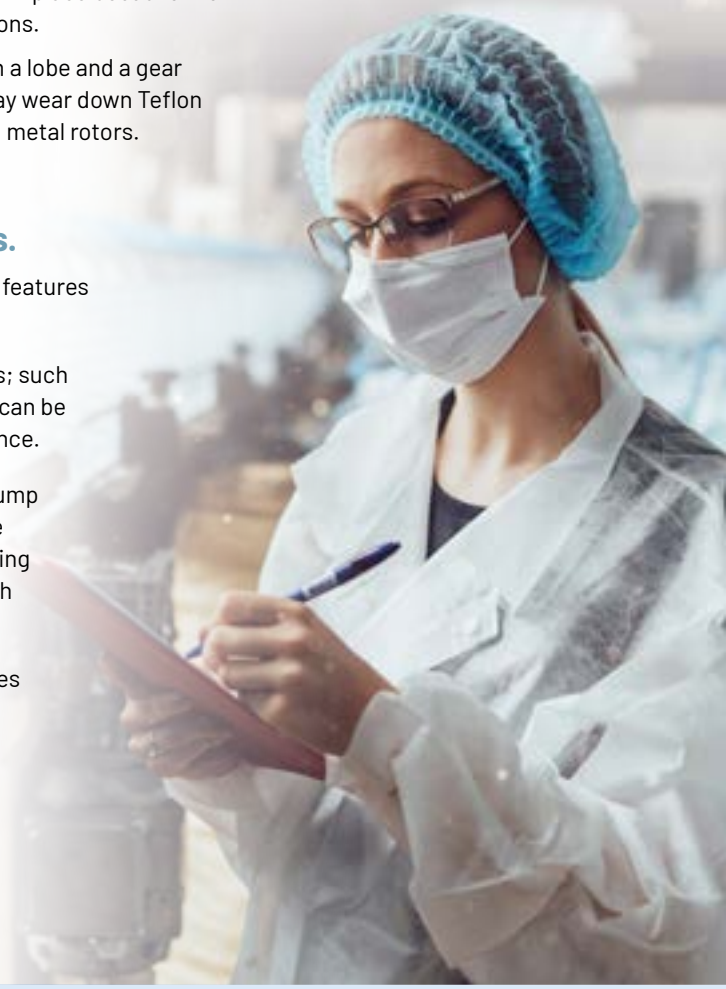
A gear pump operates well in a lot of filling applications for consumer-bottled goods such as shampoo or medicine bottles. Gear pumps are designed with different numbers of teeth, such as eight or even 25-teeth gears. The gear rotation allows accurate filling due to the displacement per tooth that delivers consistent flow.

Gear pumps are a more economical option compared to a similarly sized lobe pump as well. In filling operations, for example, a gear pump might cost approximately half that of a similarly sized lobe pump.

When not to select a gear pump.

Consider two scenarios when determining whether a hygienic gear or lobe pump better suits an application. Due to the design, hygienic gear pumps cannot be cleaned in place because their Teflon-based gears can swell in the temperatures used for CIP operations.

The second scenario for operators to consider when deciding between a lobe and a gear pump is if the product is abrasive. Over time, the constant abrasion may wear down Teflon gears, and in this instance, operators might consider a lobe pump with metal rotors.



Selection considerations of hygienic gear pumps.

Gear pumps are available in a variety of styles and sizes, with different features and options depending on the application and manufacturer.

Many industrial gear pumps have a dead leg where the product collects; such pumps are inappropriate for hygienic applications. These gear pumps can be difficult and time-consuming to disassemble for cleaning or maintenance.

Pressure and flow rate are two important metrics to determine gear pump selection. The flow rate defines the amount of fluid moved through the pump during a given interval, with the pressure responsible for propelling the flow through the pump. For example, Unibloc gear pumps can reach 50 gallons per minute (GPM) and 150 psi.

Heating a liquid before pumping will decrease its viscosity. When it does not interfere with the product's composition or stimulate an undesired chemical reaction, heating the process fluid can aid a gear pump's speed, capacity, and the assembly's energy requirements.

When comparing gear pumps, look for tight tolerances in the pump's gear clearance. Close tolerances indicate a highly efficient pump.

Design features that save labor and increase product safety.

Unlike pumps where housings and covers require bolts, a Unibloc gear pump's wet end and cover are supported by wingnuts. The wingnuts enable swift and easy access for COP routines.

The ultra-hygienic design of a gear pump from UHT minimizes product collecting in the pump. Its design eliminates seams, gaps, and pinches where process material could accumulate.

Unlike industrial gear pumps, Unibloc gear pumps are designed for hygienic applications.

The Unibloc gear pump offers a clean flow through the pump without a dead leg common to non-hygienic pump designs.

The gear design features back support that eliminates front support. The back support enables a flat, flush front cover that increases sanitation and ease of maintenance.

In addition, gears are manufactured from food-grade Teflon materials, eliminating the contamination potential from metal shavings due to gear-on-gear friction.

As part of the clean design, most pump bodies begin as a single piece of Stainless-Steel. Fully polished TIG welding eliminates visible welds on the pump.

Gear pump quick takeaways.

- Well suited for high viscosity fluids.
- Handles liquids from water or water/ethanol mixtures to 100,000 cP.
- QuickStrip technology for easy assembly/disassembly.
- Clean-out-of-Place (COP) compliant.
- Precise metering for filling operations.
- Port sizes from ½-inch to 2 inches (1.27 to 5.08 cm).
- Capacity up to 50 GPM.
- FDA food-grade approved materials (i.e., Teflon).
- 316L Stainless-Steel construction.
- Helical cut gears for smooth and quiet operations.
- Compact design for a smaller plant footprint.

Mounting options and profile.

The Unibloc gear pump provides operators with flexibility due to the range of possible mounting options, whether vertical or horizontal, mounted on skids, or on a filling machine. This mounting flexibility makes the pump suitable for a wide range of situations.

In addition, its compact design yields a pump that occupies a smaller footprint for the power that the pump supplies. This compact design boosts production and helps optimize floor space.

Summary.

Before selecting a pump, find a company that offers the expertise and the breadth of product line to help select the right pump that can optimize performance. Still need help narrowing your possibilities? Check out this simple graphic. Design engineers at Unibloc Hygienic Technologies are ready and willing to work with you on your pump selection needs. Call us today.

About Unibloc® Hygienic Technologies.

An industry leader in flow control technology and performance, Unibloc® Hygienic Technologies offers precision-engineered positive displacement pumps, AODD pumps, drum pumps, and other highly engineered products for demanding hygienic flow control applications. UHT serves a variety of hygienic industries, including food, beverage, bakery/confection, meat and poultry, brewery, pharmaceutical, and transportation, under the Unibloc®, Flotronic®, Hygenitec, and Standard Pump subsidiary brands. UHT's highly efficient, easy-to-maintain products help customers fight downtime, achieve a lower cost of operation, and meet deadlines with confidence. Learn more at unibloctech.com.

Unibloc Hygienic Technologies provides a broad portfolio of powerful solutions for companies around the world.

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