

Zenith® Pumps

PEP-II Series Gear Pumps



Precise,
Pulseless,
Repeatable
Performance

In Polymer
Applications.

Zenith®
Pumps

Zenith® Pumps

In 1926, Zenith Pumps developed the first precision metering gear pump for the extrusion of acetate rayon. This basic design became the foundation for the entire synthetic fiber industry.

During the '40s and '50s, Zenith Pumps developed the original PEP (Polymer Extrusion Pump) design for the extrusion of film, sheet and profile, which consisted primarily of polyester and nylon polymers.

Since then, Zenith has provided pumps for virtually every polymer utilized in the plastics industry. This diverse experience has resulted in the development of many design features and modifications for the PEP-II pumps.

The PEP-II's unique positive displacement design provides consistent, accurate polymer delivery under varying extruder output conditions of pressure, temperature and viscosity. With the PEP-II providing the pressure between the extruder and the die, extruder parameters can be configured to provide a homogeneous melt at increased throughputs and tighter gauge tolerances.

Today, the Zenith PEP-II pump has become the pump of choice for a wide range of polymer applications in the plastics industry. Zenith can be found wherever *precise, pulseless, repeatable metering* of fluids is required.

Benefits

For years, polymer processors have utilized gear-pump-assisted extrusion to solve critical issues in the diverse plastics industry.

The Zenith gear pump optimizes the extrusion process by allowing the screw to melt and homogenize the polymer. As the pump generates the needed pressure, it relieves the extruder of work; therefore, reducing heat from the shear, lowering the torque required, and eliminating surging. All this optimizes the performance of the extruder and offers the following benefits:

- **Improved Dimensional Stability**—Effectively isolates the die from upstream fluctuations.
- **Controlled Melt Quality**—Regulates the extruder back pressure while it reduces residence time, stabilizes the plasticating action, and lowers melt temperature.
- **Increased Production**—Provides very high efficiency regardless of its pressure building requirement.

- **Reduced Raw Material Usage**—Provides a narrower finished product gauge variation.
- **Eliminates Surging and Screw Beat**—Effectively handles problems caused by melt density or extruder parameters.
- **Increased Extruder Flexibility**—Allows varying process conditions such as higher regrind levels, temperatures, pressures, etc.
- **Crowned Root Gear Design**—Reduces shear internal to the pump, lowering the temperature and increasing the production rate per power required.
- **Streamlined Operation and Startup**—Closed-loop controls provide easy operator interface.
- **Extended Extruder Life**—Reduces work required by the extruder such as pressure and torque.
- **Lower Operational Costs**—Provides a more efficient method of conveying, eliminating material giveaway, and increasing production per pound of extrudate, etc.

Applications

PEP-II Series pumps are ideal for such processes as:

Film	Coextrusion	Tubing	Nonwoven Fibers
Sheet	Wire and Cable	Coating	Pelletizing
Profile	Nonwoven	Fiber Boosting	

Examples of materials processed include:

Acrylic	Fluoropolymers	PB	PVC	PIB
Cellulosics	LLDPE	PUR	PVA	ABS
Polysulfone	HDPE	PP	SAN	SMA
Polyester	PC	PA	HIPS	TPEs
Hot Melt	PE	PET	PMMA	Many others
Adhesive	PS	PEEK	PVB	

Pump Capacity

Capacity CC/REV	Flow Rate LBS/HR	Extruder Size, IN	Typical Drive HP	Capacity CC/REV	Flow Rate LBS/HR	Extruder Size, IN	Typical Drive HP
0.16	0.2-1.25	.25	0.5	10	13-80	1.0, 1.25, 1.5	2
0.3	.04-2.5	.25, .5	0.5	20	26-160	1.25, 1.5, 2.0	3
0.6	.8-5	.5	0.5	40	53-450	1.5, 2.0, 2.5	5
1.2	1.5-9.0	.5	0.5	100	250-1200	2.5, 3.5	10
1.8	2.4-14	.5	0.5	175	450-2100	3.5, 4.5	15
3	4-24	.75, 1.0	0.5	300	300-3600	4.5, 6.0	20
5	6-40	1.0	1	750	2000-7000	8.0	30

NOTE: These are typical sizes only; others are available. Actual pump and drive size will vary with viscosity, pressure and other factors. Contact Zenith for further assistance.

Specifications

- Capacities:** From less than 1 to more than 7,000 lbs/hr standard.
- Operating Speed:** See below: Depending upon process parameters.
- Pressures:** Body to 10,000 psi (690 BAR); differentials from 4,000 psi (276 BAR).
- Temperature:** To 950°F (510°C).

Technical Data

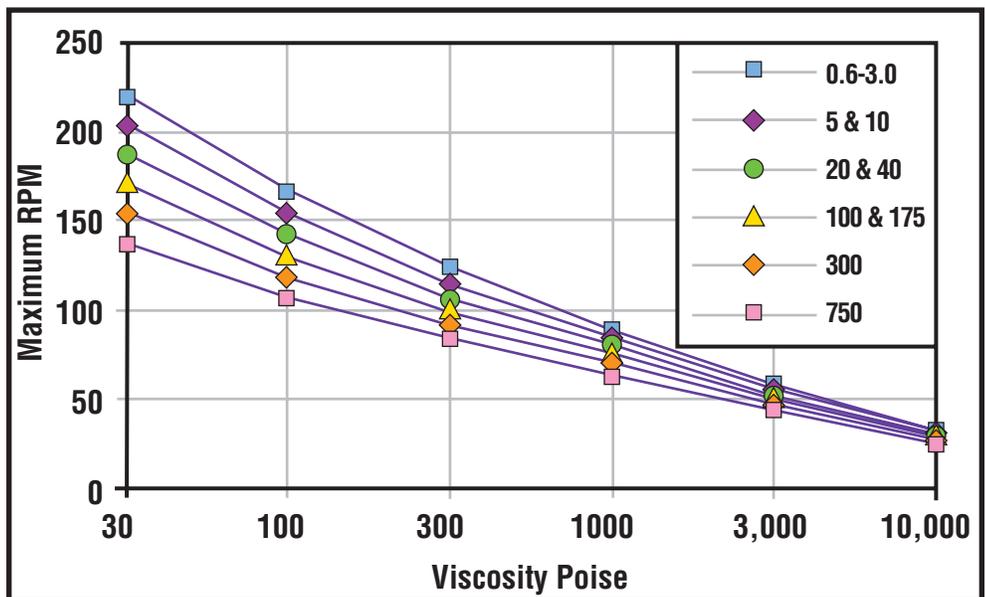
Required Torque: (IN-LB)

$$\text{Torque} = K_1 \Delta P + (K_2 N \mu)$$

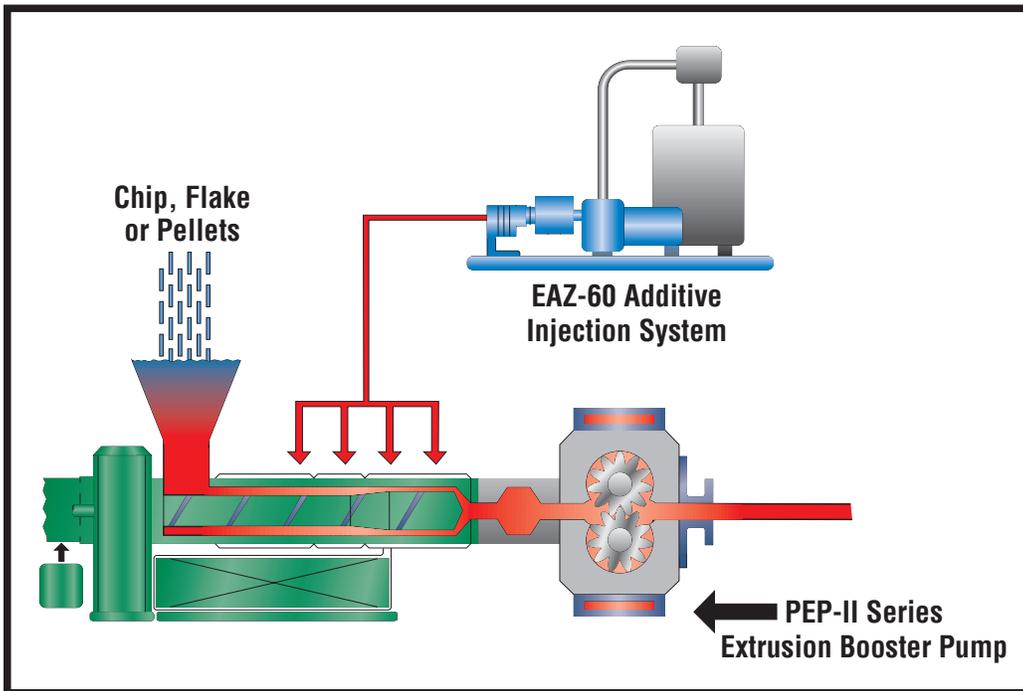
- K_1 = Constant from chart
- N = Rev. per minute
- ΔP = Differential pressure in bar
- K_2 = Constant from chart
- μ = Viscosity in Poise at application's maximum shear rate (refer to Technical Bulletin PEPTB)

Capacity cc/rev	K1	K2	Max. Torque IN-LB
0.16	0.0016	0.00332	80
0.3	0.0029	0.00332	80
0.6	0.0058	0.00355	195
1.2	0.0117	0.00459	410
1.8	0.0175	0.00507	410
3.0	0.0291	0.00597	600
5.0	0.0484	0.00342	1,225
10.0	0.0971	0.00706	2,085
20.0	0.1942	0.01172	3,250
40.0	0.3883	0.01919	6,750
100.0	0.9708	0.04328	12,100
175.0	1.6990	0.08113	22,400
300.0	2.9126	0.15357	50,600
750.0	7.2816	0.37911	116,600

Maximum Pump Speed



Zenith Pumps And The Extrusion Process



Zenith Pumps can handle all your extrusion pumping applications including additive injection for on-line compounding of tackifiers, colorants, stabilizers, etc.

Complete Systems Capability

Zenith Pumps offers typical drive and control packages, as well as custom systems designed to meet your particular process specifications. Our extensive experience and full engineering capabilities ensure you the best possible solution to your precision extrusion application.

Zenith's typical extrusion control package provides the basic controls for a PEP-II pump system. The drive consists of a motor and reducer mounted on a common base plate, with speed controlled by a Zenith ZeTROL digital speed controller. A pressure

control system regulates the extruder speed and maintains a constant pressure to the pump inlet. A temperature controller regulates the pump's electric heaters. Other features available include:

- Discharge pressure indicator
- Pump inlet/discharge changes
- Pump, fluid or steam heat plates
- Bronze heat plates for extreme service
- System mounting carts
- Start-up assistance



WARNING

FAILURE, IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Zenith Pumps, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that you analyze all aspects of your application and review the information concerning the product

or system in the current product catalog. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Zenith Pumps and its subsidiaries at any time without notice.



A CIRCOR Business Unit

ISO 9001: 2000 Registered

Zenith®Pumps

1710 Airport Road
Monroe, NC 28110

Phone: 704-289-6511 • Fax: 704-289-9273
zenithpumps@circor.com • www.zenithpumps.com