

New E Series High Efficiency Close Coupled Circulators from Armstrong Pumps

Armstrong announces the introduction of a new family of close-coupled, dry motor circulators for commercial and large residential high head applications. The ARMflo E Series circulators respond to the market need for high-performance, competitively priced units for heating or cooling applications such as hot water, geothermal, radiant panel, and snow melting in large residential or light commercial installations. They are designed to bridge the application space that exists between the smaller Astro Series wet rotors and the larger S and H Series 3-piece circulators.

Advanced motor technology and hydraulic design were combined to generate higher performance ratings than competitive models at comparable prices. For example, tests show that Armstrong's E11 and E9 circulators are as much as 64% and 74% more efficient, respectively, than competitive wet rotor pumps of similar power. Refer to the Appendix for efficiency comparison of all E Series models and competitive pumps of similar flow and head characteristics.

The E Series family of pumps is designed for extended durability and very quiet operation with high efficiency motors that are 30% smaller than other dry motor circulator motors. All models use permanently lubricated stainless steel bearings and silicon carbide mechanical seals. E Series pumps are designed to rival the durability of Armstrong's traditional 3-piece circulators, yet are most often priced at or below the level of competitive wet rotor and dry motor circulators of similar power.

Available in cast iron and bronze construction, E Series circulators are very compact units, measuring either 6.4" or 8½" between mounting flanges, less than 7" overall length (pump and motor), and just over 4" maximum width. All components of the E Series circulators, including the motor parts, were designed by Armstrong's product development team. The units are assembled and tested at Armstrong's manufacturing facility in North Tonawanda, NY.

The ARMflo E Series pumps are designed to provide years of trouble free operation and, when necessary, can be economically repaired in the field. Rather than discarding the entire pump - as is normally done with wet rotor pumps, all that's required to get an E Series pump back up and operating is to replace the coin-sized *EnviroSeal* silicon carbide mechanical seal.

Figure 1. Efficiency Curves for Circulators Tested

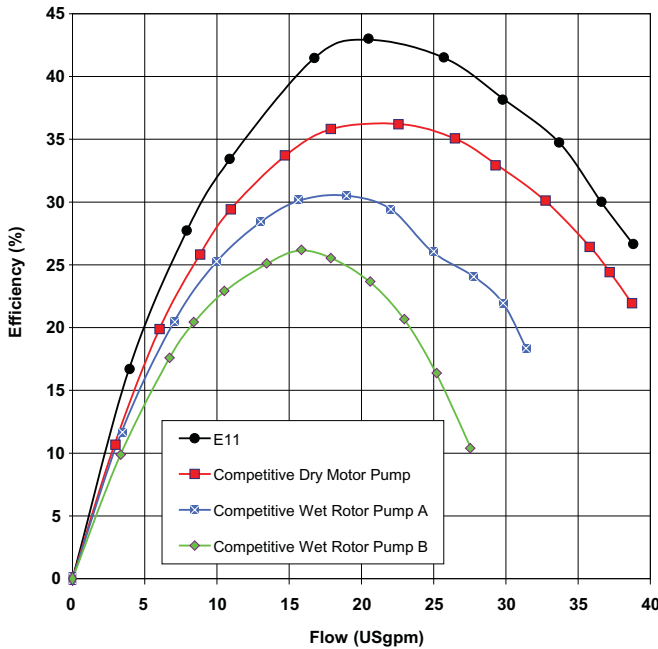
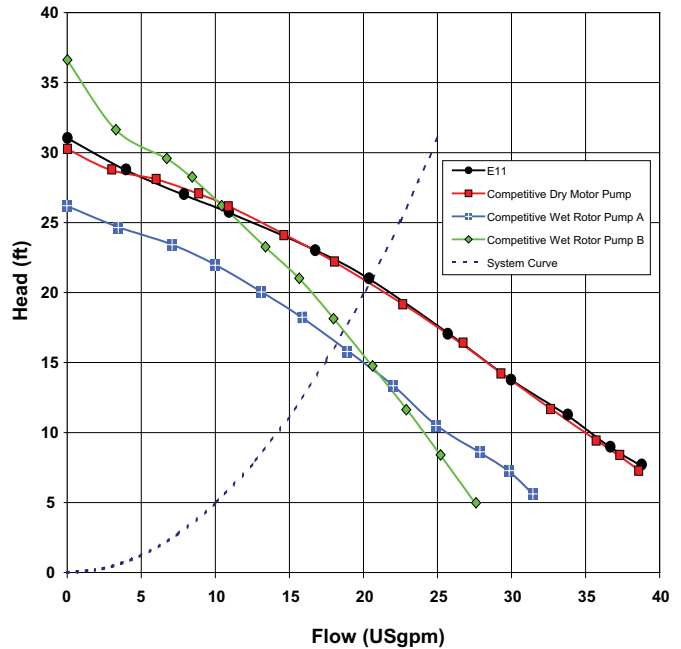


Figure 2. Pump Curves for Circulators Tested



Radiant Heat and Geothermal Applications

According to industry statistics, radiant heat installations have been growing at an annual rate of 15% to 30%, while the installation and use of geothermal heat pumps has grown by nearly 10% annually over the past ten years.

The technical requirements of these applications include a pump that can recirculate the heat transfer fluid through extensive piping systems. Longer lengths of tubing cause higher friction losses as the fluid circulates through the tubing. This higher friction loss shifts the system head curve to the left, thus requiring a pump capable of producing higher head to produce the flow rates required for proper system heat transfer.

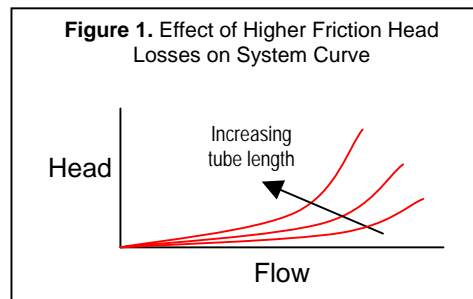


Figure 2: Typical tubing layout on a residential radiant heating installation.
[ref: Photograph by John Blais for TOH Magazine]



Figure 3: Horizontal piping layout for Ground Source Heat Pump installation.
[ref: Jackson Electrical Membership Corporation]

One of the attractive aspects of radiant and geothermal heating is the efficient use of energy in these space-heating applications. As shown in Table 1, the ARMflo E Series is the most energy efficient pump available on the market today for radiant and geothermal applications for large residential or small to medium commercial installations.

Some people may feel that efficiency differences in fractional horsepower pumps are insignificant, but as demonstrated in Table 1, the energy savings over the useful life of a pump can be well over \$100 compared to today's commercially available wet rotor circulators. These energy costs will vary by region of the country, depending on pricing from local energy suppliers, but \$0.10/kWh was chosen as an average for purposes of illustrating energy savings.

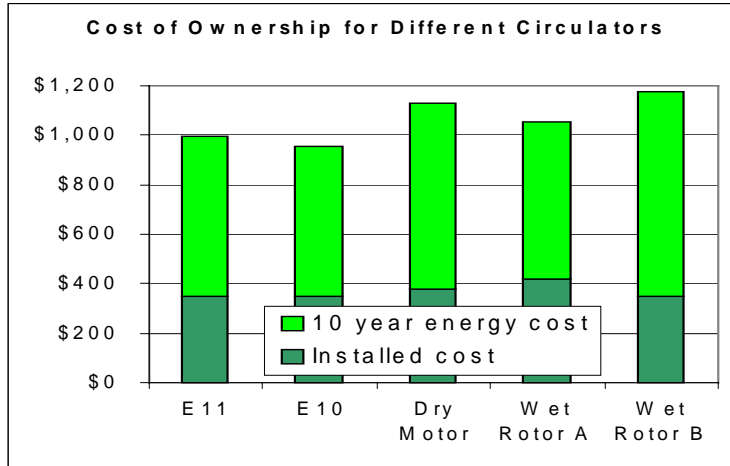


TABLE 1
Operating Costs for a radiant system requiring a pump producing 20 ft. of head at 20 USgpm

		E11	Dry Motor	Wet Rotor A	Wet Rotor B
Flow	USgpm	20.5	20.5	18.0	18.5
Efficiency	%	43.0	34.0	29.0	25.5
Power input	kW	0.188	0.218	0.184	0.241
Power output	kW	0.805	0.08	0.056	0.061
Operating days	Days / yr	170	170	170	170
Operating hours	Hours / day	18	18	18	18
Annual operating*	Hours / yr	3000	3000	3000	3000
Energy cost*	per kWh	\$ 0.100	\$ 0.100	\$ 0.100	\$ 0.100
Annual cost	per year	\$ 56.40	\$ 65.40	\$ 55.20	\$ 72.30
Add'l energy vs E11	first year	\$ 0	\$ 9.00	\$ (1.20)	\$ 15.90
Inflation rate	per year	3%	3%	3%	3%
Years of service		10	10	10	10
Inflation factor*		11.46	11.46	11.46	11.46
Extra energy costs	over period	\$ 0	\$ 103.17	\$ (13.76)	\$ 182.28
Total energy cost	over period	\$ 647	\$ 750	\$ 633	\$ 829

Capital Cost (Cast Iron models)

Estimated MSRP (\$US)		\$ 275	\$ 305	\$ 346	\$ 275
Estimated Installation cost		\$ 75	\$ 75	\$ 75	\$ 75
Installed cost		\$ 350	\$ 380	\$ 421	\$ 350

Cost of Ownership

10 year energy cost		\$ 647	\$ 750	\$ 633	\$ 829
Total		\$ 997	\$ 1,130	\$ 1,054	\$ 1,179
Difference		\$ 0	\$ 133	\$ 57	\$ 182

* Typical values for a northern US residential installation [ref: John Siegenthaler, PM Magazine, October 2002]

As shown in the table on page 3, energy savings from the increased efficiency of the E11 circulator over 10 years of operation is almost the price of a new circulator. (But with the E Series mechanical seal technology, the only repair part necessary is the mechanical seal - which typically costs only 20% of the price of a new circulator.) Calculations in the example shown assume certain energy costs, and use estimated Manufacturer's Suggested Retail Price for the five pumps being compared. Although energy costs differ across the country, the E Series circulators will compare favorably with competitive circulators, regardless of energy costs.

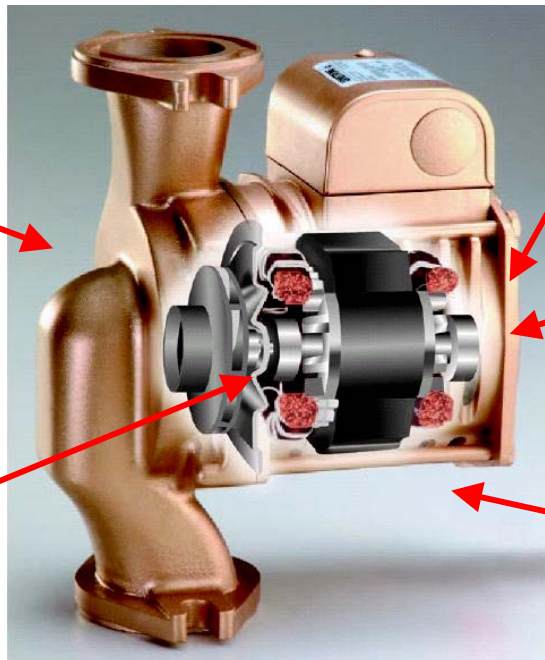
It should be noted that while the energy costs are slightly lower for the Competitive Wet Rotor A model, this pump is designed to deliver somewhat less performance (both flow and head) than the E11. For the example system installation described, if the design flow required is greater than 18 gallons per minute, this pump will not be satisfactory. As always, the choice of pump used in an installation should be based on the flow rate required to deliver the design heat transfer of the system.

In conclusion, the E Series circulators are an exciting step forward in energy efficiency and represent the lowest cost of ownership of the current competitive circulators on the market today.

Armstrong is a leading global supplier of HVAC and Fluid Flow equipment for residential, commercial, and industrial applications. Established in 1934, the company maintains three manufacturing facilities on two continents.

Greater Efficiency
Advanced motor and hydraulic design of the ARMflo E11 combine to yield a wire-to-water efficiency that's 41% higher than competitive wet rotor pumps of similar power.

Easy to Service
The field-repairable EnviroSeal mechanical seal is easily and inexpensively replaced. There is no need to discard the entire pump.



Long Bearing Life
E Series circulators feature permanently lubricated stainless steel ball bearings with L₁₀ bearing life of 52 years at B.E.P.

Quiet Operation
Precision dynamic balancing of each E Series circulator ensures quiet operation, and provides years of trouble-free operation.

Compact Size
The E Series highly efficient motor design is 30% smaller than conventional dry motor circulators, allowing more applications in places where space is at a premium.

Appendix A

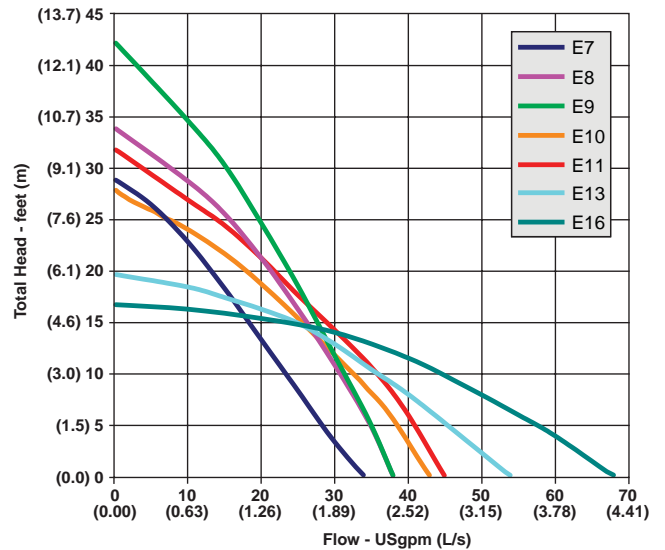
Materials of Construction

Pump Body: Cast Iron or Bronze
 Impeller: 30% Glass-filled Noryl
 Face Plate & Shaft: Stainless Steel
 Gasket: EPDM
 Seal: Silicon Carbide *EnviroSeal*
 Bearings: Permanently lubricated Stainless Steel

Technical Data

Model	E7	E8	E9	E10	E11	E13	E16
Max. Flow	34.0 (2.1)	38.0 (2.4)	38.0 (2.4)	43.0 (2.7)	45.0 (2.8)	54.0 (3.4)	68.0 (4.3)
Max. Head	29.0 (8.8)	34.0 (10.4)	42.4 (12.9)	28.0 (8.5)	31.9 (9.7)	19.7 (6.0)	16.8 (5.1)
Max. Fluid Temperature: 230°F (110°C)							
Max. Working Pressure: 150 psi (1034 kPa)							

Note: Flow in USgpm (L/s) and Head in feet (m).



Motor Data†

Model	E7	E8	E9	E10	E11	E13	E16
Nominal Power	1/12 hp	1/6 hp					
Voltage	120 V	120 V or 240 V					
Full Load Amp Draw at 120 V	1.5 A	2.0 A					
Full Load Amp Draw at 240 V	--	1.0 A					
Speed (rpm)	3000	3250	3250	3300	3300	3400	3400

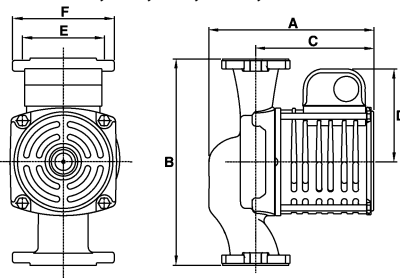
† All motors are 2 pole, single phase.

Dimensions and Weights

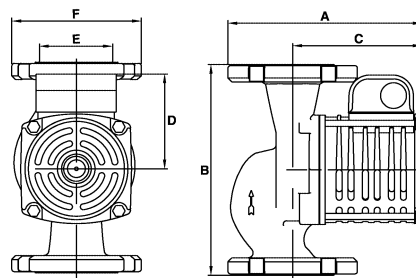
	A	B	C	D	E	F	Connection	Shipping Weight	
								Cast Iron	Bronze
ARMflo E7/E7B	6.4 (164)	6.4 (164)	4.8 (122)	3.8 (97)	3.2 (81)	4.2 (107)	1.25" Diameter 2-bolt flanges	11.5 (5.2)	12.8 (5.8)
ARMflo E8/E8B	6.4 (164)	6.4 (164)	4.8 (122)	3.8 (97)	3.2 (81)	4.2 (107)	1.25" Diameter 2-bolt flanges	11.5 (5.2)	12.8 (5.8)
ARMflo E9/E9B	6.4 (164)	6.4 (164)	4.8 (122)	3.8 (97)	3.2 (81)	4.2 (107)	1.25" Diameter 2-bolt flanges	11.5 (5.2)	12.8 (5.8)
ARMflo E10/E10B	6.8 (174)	8.5 (215)	4.9 (125)	3.8 (97)	3.4 (86)	4.2 (107)	1.5" Diameter 2-bolt flanges	13.0 (5.9)	14.8 (6.7)
ARMflo E11/E11B	6.8 (174)	8.5 (215)	4.9 (125)	3.8 (97)	3.4 (86)	4.2 (107)	1.5" Diameter 2-bolt flanges	13.0 (5.9)	14.8 (6.7)
ARMflo E13/E13B	6.8 (174)	8.5 (215)	4.9 (125)	3.8 (97)	3.4 (86)	4.2 (107)	1.5" Diameter 2-bolt flanges	13.0 (5.9)	14.8 (6.7)
ARMflo E16/E16B	7.7 (195)	8.5 (215)	5.1 (130)	3.8 (97)	5.7 (145)	5.1 (130)	2" Diameter 4-bolt flanges	18.6 (8.4)	20.7 (9.4)

NOTE: Dimensions are in inches (mm) and Weights lbs (kg).

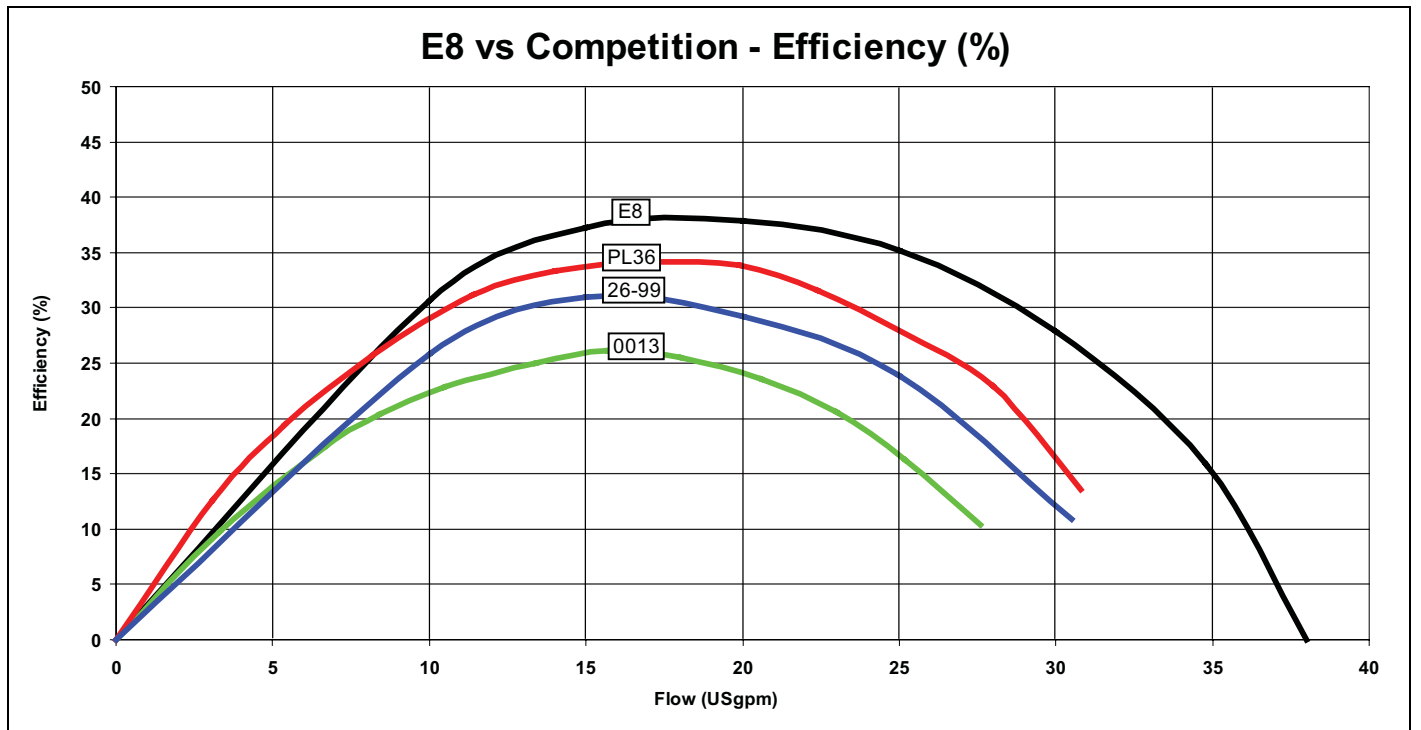
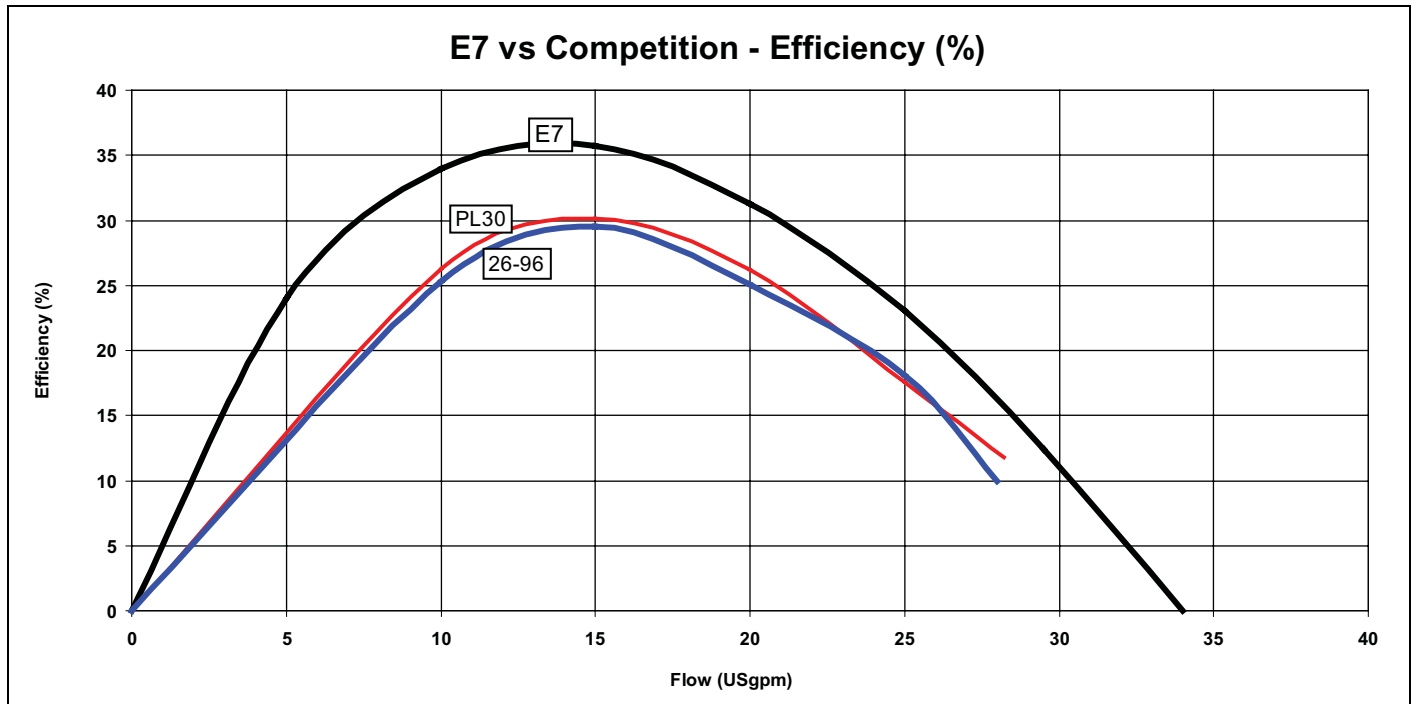
Models E7, E8, E9, E10, E11 and E13



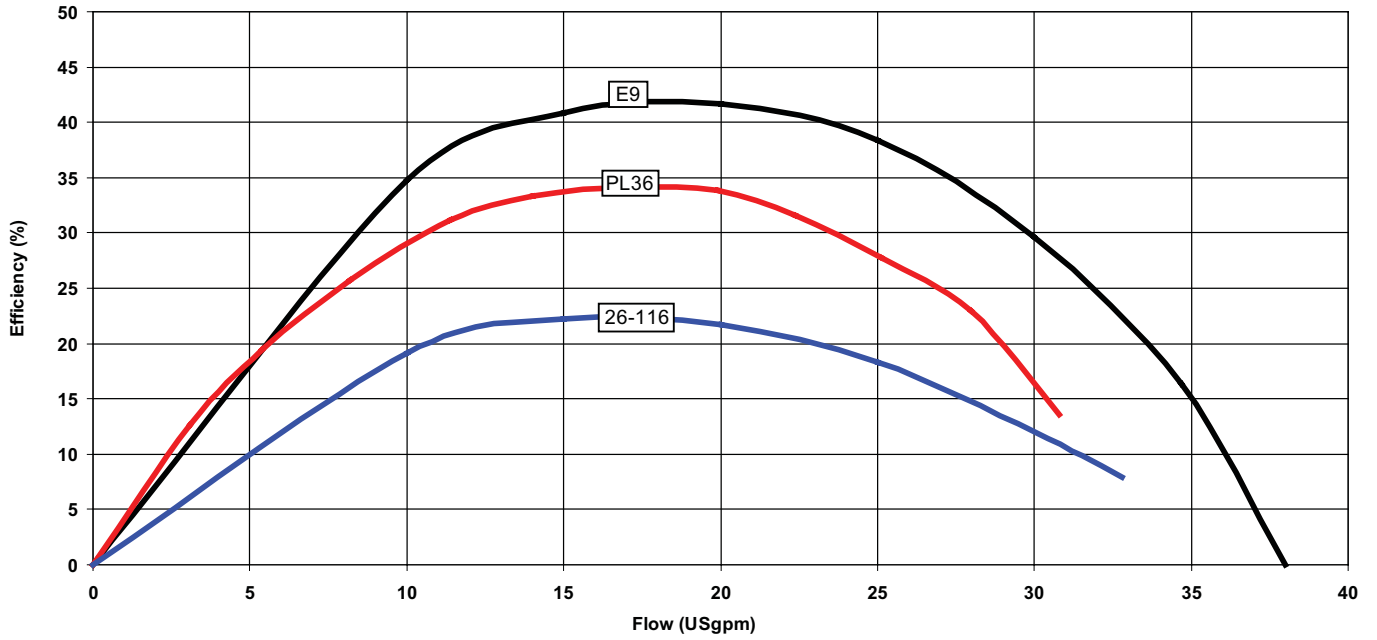
Model E16



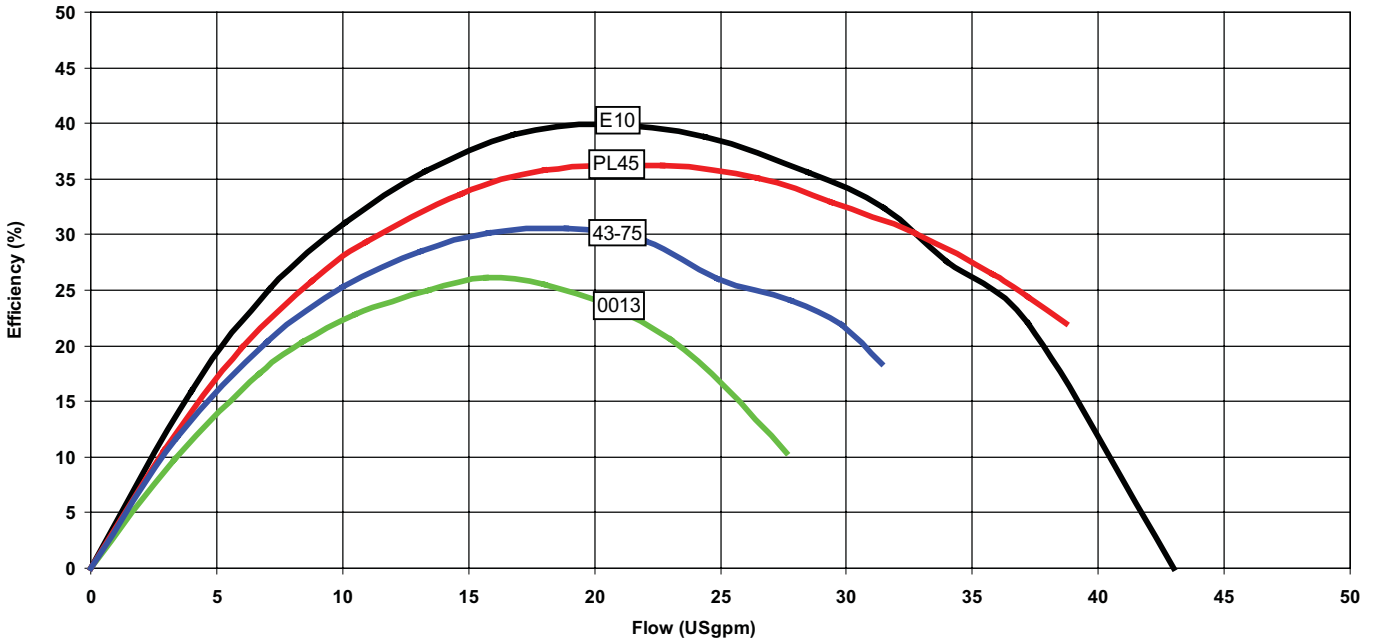
Appendix B



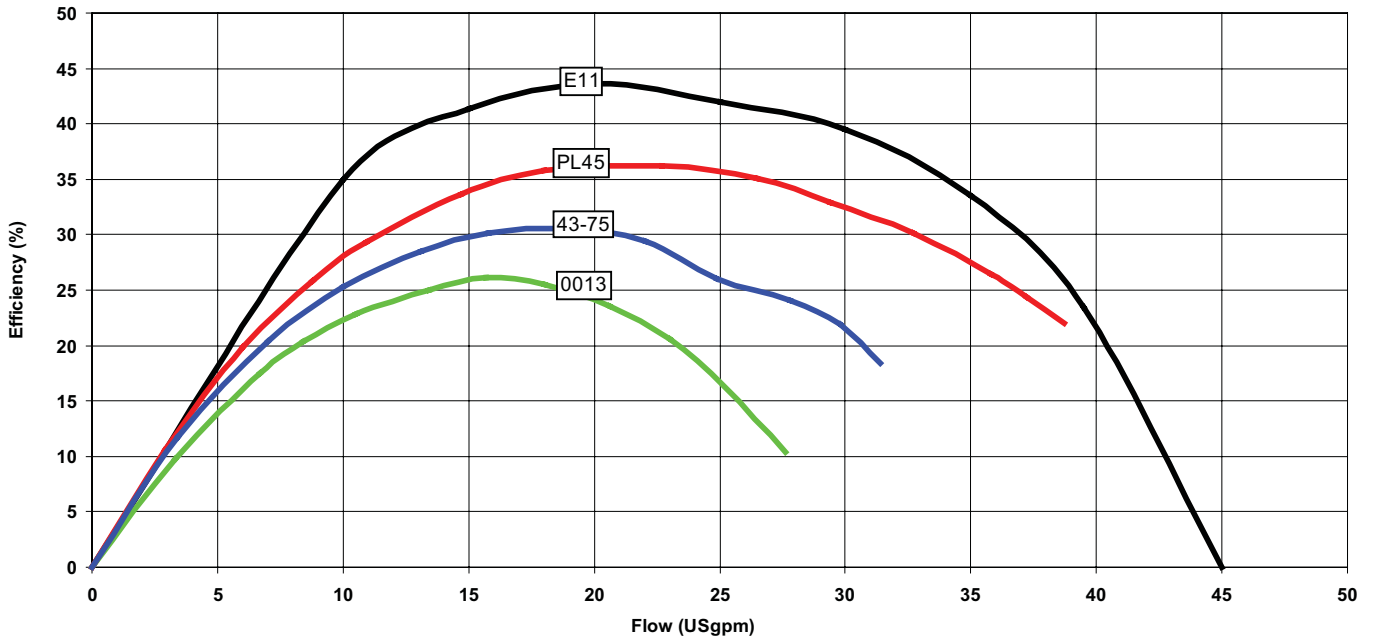
E9 vs Competition - Efficiency (%)



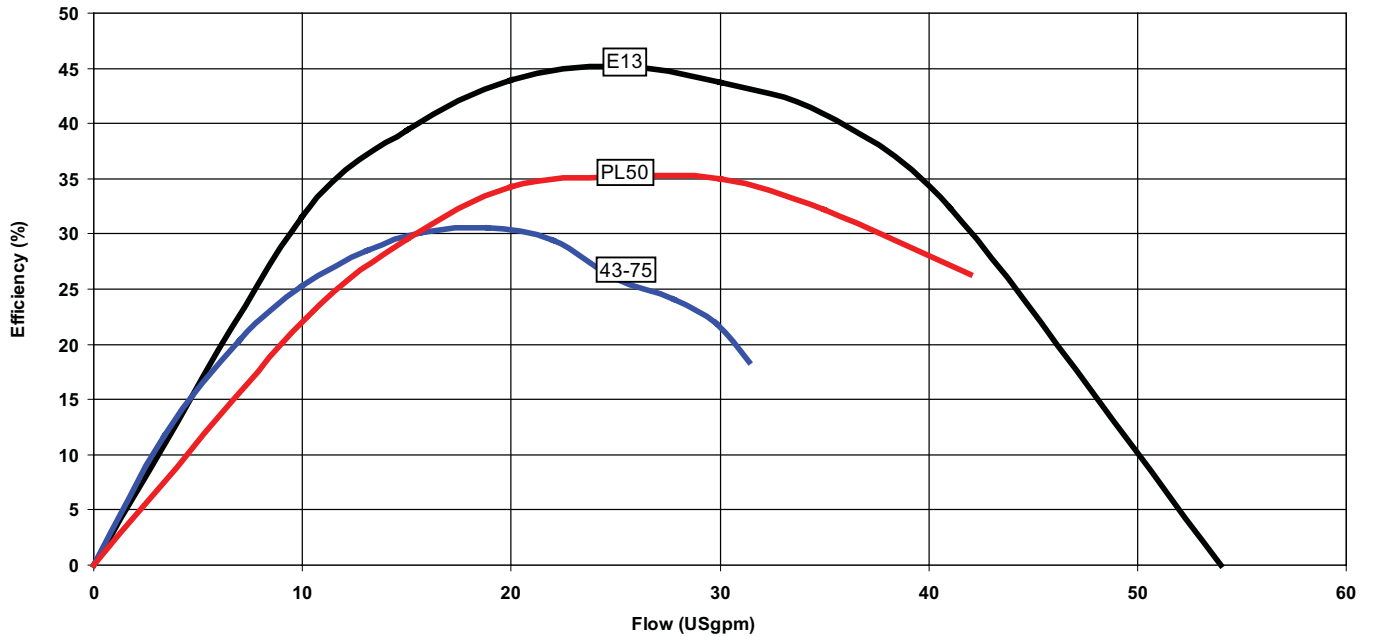
E10 vs Competition - Efficiency (%)

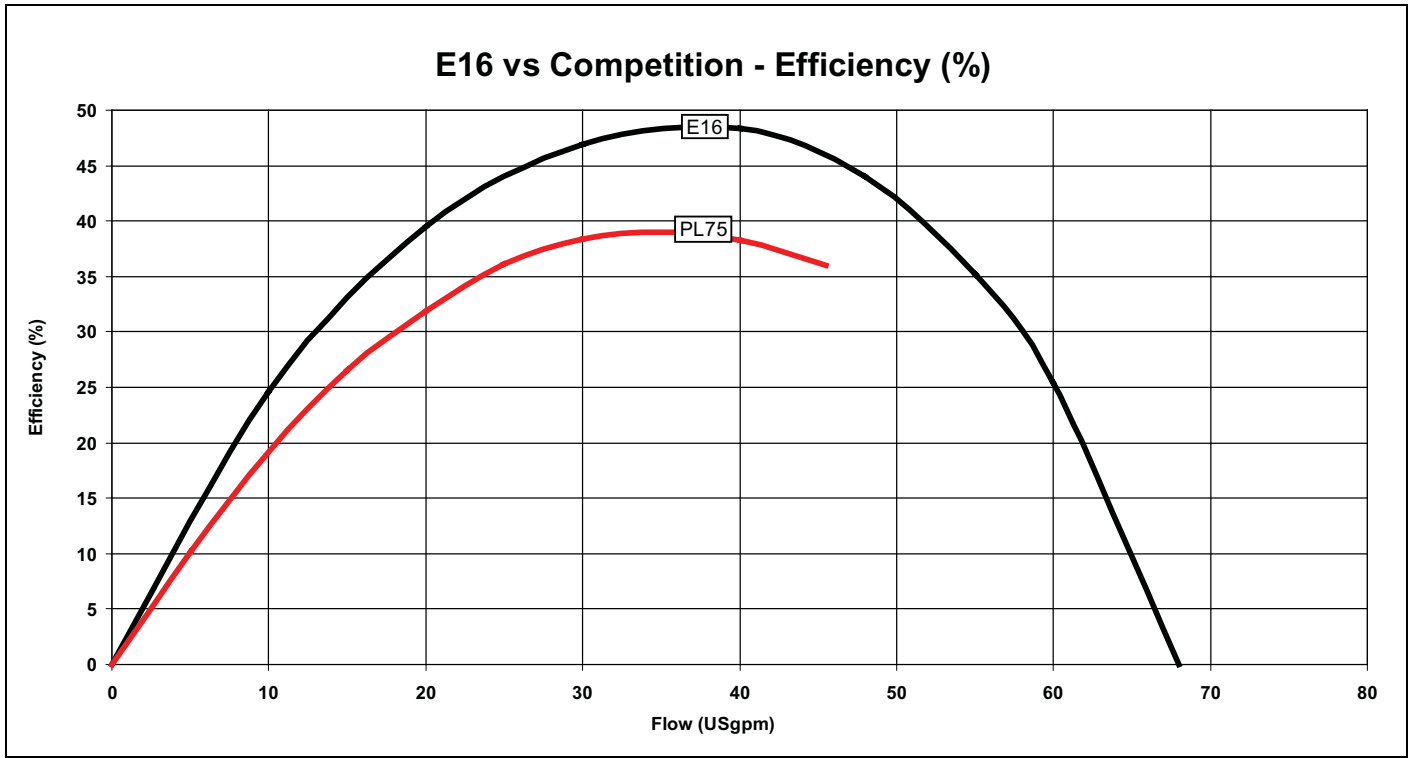


E11 vs Competition - Efficiency (%)



E13 vs Competition - Efficiency (%)





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