

TRADITIONAL SIZING & SELECTION INFORMATION

IN GENERAL, THE MAJORITY OF PUMP PULSATION PROBLEMS CAN BE TRACED TO AND REMEDIED ON THE SUCTION SIDE OF A PUMP - EVEN THOUGH SOME SYMPTOMS MAY SHOW UP ON THE DISCHARGE SIDE. IN FEEDING THE PUMP, IT IS IMPERATIVE TO MAINTAIN A STEADY FLOW OF FLUID THROUGH THE SUCTION VALVES. ALSO, THE FLUID COLUMN MUST ATTACH THOROUGHLY TO THE FACE OF THE PLUNGER TO ACHIEVE COMPLETE CYLINDER FILL ON THE SUCTION STROKE. THEREFORE, IT IS RECOMMENDED THAT PULSATION STABILIZERS BE ATTACHED TO THE SUCTION SIDE FIRST, THEN THE DISCHARGE SIDE OF THE PUMP.

TO SIZE STABILIZERS, YOU WILL NEED:

1. MAXIMUM OPERATING PRESSURES (SUCTION & DISCHARGE)
2. PUMP CONNECTION SIZES AND TYPES
3. PUMP STROKE LENGTH AND PLUNGER SIZE
4. FLUID TYPE AND TEMPERATURE

MAXIMUM PUMP OPERATING PRESSURES: EXAMPLE: SFT-14403-F-300
DENOTES STABILIZER MAXIMUM WORKING PRESSURE

PUMP CONNECTION SIZES: EXAMPLE: SFT-14403-F-300

NOTE: THE STABILIZER OPENING SHOULD BE THE SAME SIZE AS THE PUMP OPENING OR LARGER. FLANGED AND THREADED SIZES ARE AVAILABLE FROM 1" TO 14" DEPENDING ON THE SERIES

ANSI RATING	ANSI 150	ANSI 300	ANSI 600	ANSI 900	ANSI 1500	ANSI 2500
WORKING PSI	150 PSI	450 PSI 700 PSI	1440 PSI	2100 PSI	3600 PSI	5000 PSI
SERIES #	1500	4500 7000	14400	21000	36000	50000

PUMP CAPACITY: EXAMPLE: SFT-14403-F-300

DETERMINE STABILIZER VOLUME NEEDED (CUBIC INCHES) USING STROKE LENGTH AND PLUNGER DIAMETER (SEE CHART BELOW) (THIS IS A GENERAL SIZING CHART - ALL FACTORS OF PUMPING STATION MUST BE CONSIDERED - IN SPECIAL INSTANCE PLEASES CALL FACTORY FOR PROPER SIZING.)

SUCTION

PUMP STROKE LENGTH	CUBIC INCH STABILIZER	CONNECTION SIZES
2-1/2 or SHORTER	100 CU.IN.	1" to 3"
2-3/4" to 4"	300 CU.IN.	2" to 8"
4-1/2" to 6"	600 CU.IN.	2" to 8"
6" to 8"	900 CU.IN.	3" to 8"
9" to 12"	1200 CU.IN.	3" to 8"
10" to 14"	2400 CU.IN.	4" to 14"
12" to 15"	4800 CU.IN.	4" to 14"

DISCHARGE

PUMP STROKE LENGTH	CUBIC INCH STABILIZER	CONNECTION SIZES
2-1/2 or SHORTER	100 CU.IN.	1" to 3"
3" to 4"	300 CU.IN.	2" to 8"
5" to 12"	600 CU.IN.	2" to 8"
10" to 12"	1200 CU.IN.	3" to 8"
NOTE: Below 2100 PSI	1200 CU.IN.	3" to 8"

★ **WHEN APPLICATION REQUIRES THE PLUNGER SIZE BEING MORE THAN HALF THE PUMP STROKE LENGTH; DEFER TO THE NEXT LARGER CU.IN. SIZE** ★

FLUID TYPE & TEMPERATURE:

FLUID THAT IS PUMPED MUST BE COMPATIBLE WITH THE INTERNAL CARTRIDGE (NITRILE IS STANDARD UNLESS OTHERWISE SPECIFIED - SEE PAGE 13 FOR ADDITIONAL INFORMATION ON ELASTOMER COMPATIBILITY)

CALCULATED PERFORMANCE BASED SIZING INFORMATION

Gas charged units are sized using the following equation:

$$\text{Size} = \frac{c * D^2 * S * (Ps \text{ or } Pd)}{\% * (Pcs \text{ or } Pcd)}$$

This approach for sizing suction stabilizers and discharge dampeners is a publicly available method that is well proven over many years. The equation and pump factors are found in John Miller's book, The Reciprocating Pump, Theory and Design, which Performance Pulsation Control utilizes in PPC's standard quotations and performance analysis.

"c" equals	0.100 for Triplex SA 0.030 for Quintuplex SA 0.684 for Simplex SA 0.558 for Simplex DA 0.558 for Duplex SA 0.196 for Duplex DA
"Size"	Equals gas volume retained in vessel
"D"	Equals diameter of plunger or piston
"S"	Equals stroke length of pump in inches
"Ps" or "Pd"	Equals pump operating Pressure in System (Ps = suction operating pressure / Pd = discharge operating pressure)
"Pc"	Equals pre-charge pressure (Pcs = Pre-charge press - suction / Pcd = Pre-charge press - discharge)
"%"	Equals Residual Pulsation as a percent of "P" expressed as a whole number. For instance 4% goes into the equation as "4"

(Note - % can be different for suction and discharge)

Example Operations: 2.25" X 3" single acting triplex pumping with a discharge pressure of 1360 psig and suction pressure of 2.7 psig, with a recommended 4% suction stabilizer performance and a recommended 4% discharge dampener performance level. PPC recommends that gas pre-charge pressure be maintained to insure performance levels noted within this calculation.

Notes: In this application, the following are the inputs.

- Ps** = 2.7 psig
- Pd** = 1360 psig
- Pcs** = 1.5 psig (PPC recommended pre-charge pressure for suction stabilizer is approximately 50% to 60% of suction operating pressure (Ps) – not to exceed maximum pre-charge pressure of the cartridge)
- Pcd** = 500 psig (PPC recommended pre-charge pressure for discharge dampener is approximately 60% to 80% of discharge operating pressure (Pd) – not to exceed maximum pre-charge pressure of the cartridge)
- C** = 0.100 for triplex single acting pump
- D** = 2.25
- S** = 3
- %** = 4 Performance selected

SUCTION STABILIZER SIZING:

$$\text{Size} = [0.100 \times 2.25^2 \times 3 \times 2.7] / [4 \times 1.5] = 0.69 \text{ gallons}$$

The size in the equation above equates to gas volume in gallons.

Size conversion – 0.69 gallons x 231 cubic inch / gallon = 159.4 cubic inch

Unit selected is a 300 cubic inch (1.3 gallons) unit with a pre-charged cartridge.

Performance criteria of 4% is satisfied.

Discharge Sizing:

$$\text{Size} = [0.100 \times 2.25^2 \times 3 \times 1360] / [4 \times 500] = 1.04 \text{ gallons}$$

The size in the equation above equates to gas volume in gallons.

Size conversion – 1.04 gallons x 231 cubic inch / gallon = 240.3 cubic inch

Unit being offered is a 300 cubic inch (1.3 gallons) unit with a pre-charged cartridge.

Performance criteria of 4% is satisfied.